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AN INVESTIGATION OF RISK CREDIT EMPHASIZING INTEREST RATE AND BANKING FACILITIES IN SAMEN CREDIT INSTITUTE: A CASE STUDY OF IRANIAN BRACHES

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ABSTRACT

In the present study, factor influencing credit risk of different types of facilities has been investigated in Samen Credit Institute up to 2013. In fact, for the first time in the literature, interest variable and its impacts on risk credit of payment facilities have been considered. Methodology includes correlation analysis of collected data using an estimation of variable coefficients in Regression Analysis and evaluation of their significance. Also, coefficients of dependent variables and the significance of the whole estimation model have been considered. Population include all branches of Samen Credit Institute in Iran which were comprised of 414 cases of banking facilities, out of which 34 central branches in 34 bank locators of the country were chosen. Making use of Logit Model, variables of banking facilities interest rates and types of the facilities had significant relationships while there was a negative significant relationship between numbers of monthly payments (payment interval) and postponement of payments. However, no significant relationship was observed between total amount and monthly payment. At last, results were evaluated using Hosmer-Lemeshow test, which output was in line with previous findings.

Keywords: *Risk Credit; Facility Interest Rate; Logit Regression; Hosmer-Lemeshow; Samen Credit Institute*

INTRODUCTION

Nowadays, banks and credit and finance institute have faced the problem of recovering pending demands and to-be-paid facilities. Therefore, researching these roots of this issue to prevent growth of pending demands in facilities would potentially lead to increase in income and provide these financial institutes with plans of reasonable consumption of financial resources and earn more money (Hassanzadeh *et al.*, 2010). Thus, incorrect use of financial resources in banking systems can lead to pending demands, i.e. increase of credit risk. Credit risk can be defined as a possibility of pending, doubtful payment, or defaulting of parts of a financial institute resource (Kalhor, 2011). Nevertheless, according the previous explanations, it is obvious that growth of debts and pending payments is very common in Iranian banking system. Since, whole financial load of the country is on the part of its banking system, a reducing volume of such facilities can help banks increase their financial capacities to preserve existing resources. Further, increase of such facilities indicates a threat to bank resources and would undoubtedly cause a national concern (Zahedi *et al.*, 2013).

Regarding this problem in banking system of the country, this study attempts to take care of credit risk and, consequently, banking system debts through a different viewpoint. In this way, credit risk is the dependent variable. Moreover, independent variables are types of facilities, payment interval, and payment amount.

Research Theoretical Fundamentals

Evaluating each applicant's credit risk and making correct decisions before offering facilities is an undeniable necessity. This would be possible only when bank could recognize their customers (real and legal) based on their capabilities and willingness to repay the facility on time. Therefore, under such a system, facilities would be granted to those applicants with lower ranks and with greater willingness to repay it on time. In this sense, recovered money would be used as resources to for those applicants would foster greater deposits and economic development (Issazadeh *et al.*, 2010).

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Risk a dispensable part of human life and institutes; typically all decision making situations are involved with some form or a certain type of risk.

Table 1.2: Different types of risk in financial institutes (Alsi, 2011, 11)

Sub-category	Type of risk
Stock risk, good’s risk, currency risk, interest rate risk	Market risk
Interaction risk, portfolio focus risk	Credit risk
Resource liquidity risk, property liquidity risk	Liquidity risk
IT risk, strategic risk, risk of internal control deficiency, human resource risk	Operation risk

Literature on Credit Risk

Credit risk was first measured on bonds and then classified by John (1909). But, many other institutes took care of this; the oldest one of which was Modi’s established in 1909. At that time some researchers noticed great similarity between bonds and facilities and investigated credit classification, i.e. measurement of default risk and interest of facilities (Asli, 2011).

Management of Credit Risk in Banking System

Among different risks, industry has gone through great steps toward credit risk management. Until first 1990s, credit risk analysis mostly meant an investigation of loan conditions. Today, credit risk management includes both an investigation of customers’ loans and an analysis of investments. In addition, improvement of modern technologies for buying and selling risk has enabled many banks to replaced traditional methods of customer’s maintenance in their own offices with more efficient methods. These new methods seek for better property combination based on conditions of credit grant, market, and business. Recently, factors in charge of risk management are interwoven with bank allocation of credit. Prestigious banks use risk ranking systems which categorize credits according to either ‘possibility of default’ and ‘disciplinary loss’.

These banks base their decision makings based on quantitative techniques and procedures; for instance, in the past, giving loans to applicants was based on personal judgments. However, nowadays, loan giving in small-sized amounts is more disciplined than the past and banks adopt statistical model to predict default risk (Vesali, 2010).

How to Measure Customers’ Credibility

When paying bank facilities, individuals must be correctly evaluated, disregarding their social personality. Correct measurement of credibility when paying for small-sized or big-sized facilities not only does keep the financial institute far from default dangers, but also saves the applicant from falling into a great challenge. So it is noteworthy that bank or financial institute administrators need to be realistic and take applicants’ credibility into account, without insulting their personality, and also share their decision with them clearly. However, when in financial institutes, these applicants have some enquiries and expect the institute to fulfill them. In this sense, customers’ enquiries can be divided into following categories:

- A – Just Enquiries: a set of enquiries which are realizable within the framework of rules and obligations.
- B – Unjust Enquiries: enquiries not realizable within the framework of rules and obligations of the institute; but the applicant expect staff to ignore rules and fulfill his/her want, though this can have harmful effects on other customers. Therefore, giving illogical promises to applicants not only does put the institute into trouble, but also harms the applicant itself in near future.

Banks make use of three methods to identify and approve the credibility of their customers:

A- Method 5C

1. *Character*: features and characteristics of the borrower. Predicting of how the applicant tries and how he is committed to repay the loan on time. This notion is directly related to culture and ethics.
2. *Capacity*: this means the rank and rate through which loan can be supported, which is in fact borrower’s ability to repay for the loan. This factor indicates borrower’s position and capability in having a loan.

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3. *Capital*: In fact, this factor shows the borrower’s position and capability which is set on the basis of institute’s structure and its executive records in accomplishing great projects.

4. *Conditions*: this means an investigation of institute and individual’s and internal and external conditions.

5. *Coverage*: this shows the amount of loan and investment security and reliability.

B –LAPP Method

1. *Liquidity*: liquidity is an important factor in credit institutes which, in some cases, is more important than interest. Here, the proportion of liquidity to commitments and current debts is considered.

2. *Activity*: here, amounts of profit and gross income are evaluated in comparison with sale and final prices.

3. *Profitability*: in this part, amount of profitability, gross income, and net income are considered in comparison with sale and final prices.

4. *Potential equipment*: status of management efficiency, human resource compounding, products, financial resources, market influence, and communications can be investigated.

C – Method 5P

1. *People*: people and their ideas about the institute are used.

2. *Product*: type of production and its market is evaluated.

3. *Protection*: This includes both financial supports (internal: bills) or property liquidity and support (external: banks, institutes, and individuals).

4. *Payments*: records of customer’s accomplishment of past commitments are taken into account.

5. *Future perspective*: sale profit besides market possibilities and price fluctuations (Middle-East Banking Institute, www.mibgroup.ir)

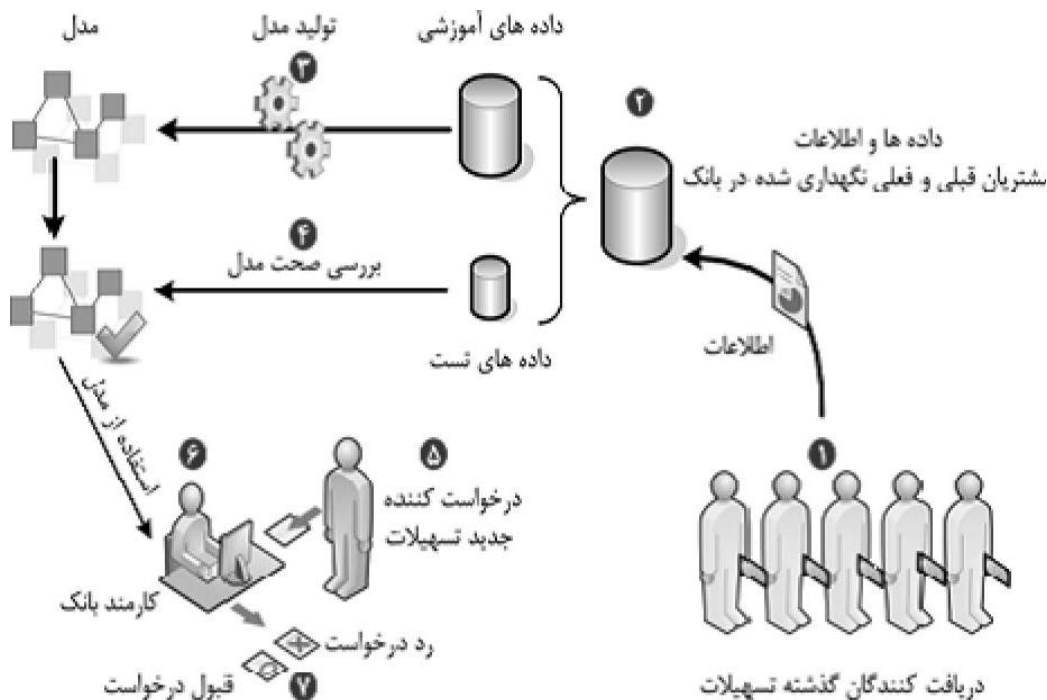


Figure 2.1: Steps of evaluating customers’ credibility in banks and financial institutes (Asli, 2011)
PERSIAN WORDS, NUMERIC VALUES NOT ALLOWED. PLEASE REPLACE THEM WITH ENGLISH WORDS AND NUMBERS.

Advantages and Disadvantages of Evaluating Customers’ Credibility

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1. Reduction of discrimination between people and development of equality in granting facilities, so that creditors define amount of facilities based on the information they obtain from the ranking system.
2. Increase of speed and accuracy in the process of granting facilities.
3. Reduction of expenses in evaluating facilities, so that institute administrators would decide more easily about interest rate and asking guarantees and assurances.
4. Limiting the applicant as defined by the system, resources would be managed more efficiently and loan postponement would be less possible.
5. Providing all institutes with this system, standard products would be available in all geographical places.
6. Problems emerging from personal interests and judgments in granting facilities would be as few as possible.
7. Improvement of loaning process and promotion of customers' satisfaction.
8. Provides the possibility of quick logical answering to the applicants in shorter periods of time.
9. According to information inside the system and records of customers' previous payments, it develops creditworthy among customers and receivers of facilities and services. Also, it distinguishes on time and delayed payments to the customers.
10. Reduces credit risk and pending demands.

Literature

Yingian *et al.*, (2010) investigated the effect of interest rate of banking facilities on increase or decrease of demands in East Asian banks considering different indexes such as interest, etc. Findings showed direct influence of interest rate on increase and decrease of banking demands.

In a study, Altunbas *et al.*, (2009) took a consideration of the relationship between facility rates and risk in banks of European Union and US using a seasonally balance sheet and found out that unusual rates in a certain period of time increase banking risks.

Eveline (2010) also attempted to evaluate the function of credit risk management in Switzerland banks and considering quality of facility payments. Findings of this study showed the necessity of appropriate and adequate information from applicants would lead to decrease of credit risk and serenity of payment for bank facilities.

Amini *et al.*, (2009) in one study investigated pending demands of Qazvin banking system (challenges and strategies) and introduced them as occurring as a result of economic conditions, high inflation, and paralyzed banking function. Further, they suggested that pending demands not only do increase inflation, they also cause increase of dealing and underground economy.

Shamsi (2005) carried out a research on designing and defining a model of credit risk in Iranian banking system. Findings are indicative of the fact that prediction of customers' credit risk at the time of granting credit facilities is possible through a prediction of customers' characteristics as predictive variables and using them in statistical models. Finally, a Logistic model is so efficient in predicting customers' credit risk.

Research Assumptions

A – There is positive significant relationship between the rate facilities and credit risk in Samen Credit Institute.

B - There is positive significant relationship between the type of facility and credit risk in Samen Credit Institute.

C- There is negative significant relationship between number of payments and credit risk in Samen Credit Institute

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D – There is positive significant relationship between payment intervals and credit risk in Samen Credit Institute.

E - There is positive significant relationship between the facility total amount and credit risk in Samen Credit Institute.

F – There is positive significant relationship between each payment’s amount and credit risk in Samen Credit Institute.

MATERIALS AND METHODS

Methodology

In the present study, use was made of correlation analysis and collected data were analyzed in Eviews software. Firstly, Logit Regression was used to investigate assumptions. Secondly, prediction of model was supported using Hosmer-Lemeshow Test.

Population includes 34 Samen Credit Institute branches all around the country, chosen among 600 total existing branches, a central branch from each province. Sampled materials were 414 cases of unpaid banking facilities, chosen from among four more common rates, namely, 14, 25, 27, and 28 percentages to be analyzed for having being paid or unpaid. Following classification tables were made as the first step of analysis:

A –

Explanation	Number
Delayed applicants	181
No delay in payments	233

B -

Type of contract	Title	Number of samples cases	Delayed	No delay
Interactional	Particular payments-global formula	221	60	161
	General payments-simple formula	15	1	14
Cooperative	Civil business cooperation	89	53	36
	Partnership in private sector	89	68	21

Data collection was documentary and so data were retrieved from Samen Comprehensive system and required statistics and records were analyzed up to 2013. In this way, instruments in the present study were reliable and valid.

Logistic Regression

Logistic regression is a kind of regression model in which predictive (independent) variables can exist both in a quantitative scale and a categorical scale, while dependent variable is a two-leveled category. These two categories indicate belonging or not belonging to a group. In logistic regression, the concept of ‘chance’ is used to indicate the value of dependent variable. In statistics, chance is the proportion of an occurrence probability P_1 to its non-occurrence probability $(1-P_1)$.

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This probability ranges between 0 and 1 while *chance* can have a value more than 1. In logistic regression analysis, the key term is ‘Logit’ which is ‘natural logarithm of chance’. By being planar, we mean two probable occurrence or non-occurrence of phenomenon: buying or not buying, register or not register, successful or not successful. These variables can have only two positions, sum of their probability would be unit.

Logit Model

Logit Model is representative of model whose dependent variable is two-dimensional. This model is very common in investigating credit risk. Its superiority over other models, such as Probability Linear Model, Discriminant Analysis Model, Tree Classification Method, and Artificial Neural Network Model, is that this Logistic Regression can be used only in cases in which dependent variable can adopt only two positions (0 and 1).

Furthermore, in this model there is no limit for normalization of dependent variables and equality of variance between the two groups.

We only need to know whether the phenomenon has occurred or not. Therefore, according to the above, we need to define a model based on Logit statistical model (dependent variables are X1 to X6 and Y is the dependent variable):

$$Y = f(X1, X2, X3, X4, X5, X6)$$

Interest rate		X1
Type of facility	X2	
Number of payment		X3
Payment interval		X4
Total amount of facility	X5	
Each payment		X6
Paid or unpaid		Y

RESULTS AND DISCUSSION

Research Findings

Variable statistics for all population members can be seen in table (5.1). Influential factors on damage risk or no-damage risk include facility rates (see the following table), and damage risk or no-damage risk is as a two-dimensional variable which can fluctuate between 0 and 1. This means that cases that lead to pay for the damage have been labeled by 1 while those with no damage have been labeled by 0. Among 414 cases, 181 have had damages while 233 had no damage or lateness.

Table 5.1: Data descriptive statistics

risk	Interest rate	Type of facility	of Number of payment	Payment interval	Total amount of facility	Each payment	
0.562802	22.98068	2.608696	2.591787	96.58213	1.55E+08	82000034	Average
1	25	2	2	30	1.00E+08	6752500	Median
1	28	4	4	365	2.00E+09	2.00E+09	Maximum
0	14	1	1	30	10000000	521000	Minimum
0.49664	5.461697	0.861623	1.311166	80.00437	2.26E+08	1.91E+08	Standard deviation
414	414	414	414	414	414	414	total

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Logit Model Test

As it can be observed in table 5.2, dependent variable is probability of dishonor (risk) which alter in case other variables change: unpaid = 1; paid = 0. To reach the ultimate model, model was fitted on different variables.

Table 5.2: Results of Logit Regression Model

Probability	Testing assumption	Significance of coefficient	Statistic (Z)	Standard deviation	Coefficient of influence (B)	Independent variables
0.0000	confirmed	Positively significant	6.419599	0.038090	0.244525	Interest rate of facility X1
0.0352	confirmed	Positively significant	2.105901	0.306635	0.645744	Type of facility X2
0.0422	confirmed	Negatively significant	-2.031257	0.327533	-0.665303	Number of payments X3
0.0015	Not confirmed	Negatively significant	-3.165781	0.005523	-0.017485	Payment interval X4
0.4049	Not confirmed	Negatively significant	0.832926	1.95E-09	1.62E-09	Total amount of facility X5
0.3228	Not confirmed	Negatively insignificant	-0.988771	2.13E-09	-2.10E-09	Each payment X6
0.0000			-4.288872	0.814067	-3.491429	Stable coefficient C
Number of obs					414	
McFadden R-squared					0.252601	
LR statistic					143.3203	
Prob(LR statistic)					0.000000	

As it can be seen in table 5.2:

An existing criterion for the investigation of the significance of model (all coefficients not zero) is the probability of statistic LR (this statistic is used for the investigation of Logit Regression Model) with value equal to 143.32 and probability of statistic LR with value of 0.00. Thus, result of statistic LR shows that, at 99% of confidence interval, assumption of all coefficients being zero is annulled and so estimated regression is significant.

In Logit models, there is no R^2 and instead we have MC Fadyeen. McFadyeen's value changes between 0 and 1 and measures model fitting very well. Value obtained for MC Fadyeen's statistic is 0.25 which shows that we have been able to identify only 25% of the factors influencing credit risk. Other factors can have other reasons.

Therefore, variables of interest rate, type of facility, type of facility, number of payments, and payment interval were significant while total amount of the facility, and each payment were not significant at 95% confidence interval, though they were not excluded in the model due to their importance in explaining customers' behavior. Coefficients obtained from fitting show the type of relationship of each variable with probability of paying the payments. According to table 5.3, variables of interest rate and type of facility have significant relationships with payments being paid.

To evaluate the credibility and correctness of the mode, use has been made of Hosmer-Lemeshow Test in EViews software. This test compares expected fitted values with real values in each group (number of

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groups have been considered 6). According to values in table 5.4, as it can be seen, Hosmer-Lemeshow statistic is 14.69 and its probable value is 0.14 (Q^2 with 8 degrees of freedom). Since, this value is more than 0.05, zero assumption is accepted. In this way, it can be concluded that obtained variables are capable of explaining for the amount of risk in unpaid demands. So, this test supports the acceptability of fitting pattern.

Table 5.3: Results of Hosmer-Lemeshow Test for supporting prediction of the model

Test of fitting acceptability	
Number of observations	414
Number of groups	6
Value of Andrews statistic	14.69
Level of probability	0.14

Discussion and Conclusion

In this study, attempts have been made to seek for underlying reasons of increase in unpaid demands then suggest logical strategies to reduce them and increase efficiency of banks and credit institutes. Findings of 6 variables, analyzed through Logit Regression, have been presented in the following table:

Table 6.1: Findings of all assumptions

Test of assumption for all samples by Logit Method	Variable symbol	Variable	Explanation
Confirmed	X1	Interest rate	First assumption
Confirmed	X2	Type of facility	Second assumption
Confirmed	X3	Number of payments	Third assumption
Not confirmed	X4	Payment interval	Fourth assumption
Not confirmed	X5	Total amount of facility	Fifth assumption
Not confirmed	X6	Each payment	Sixth assumption

According to statistics in the above table with materials including paid and unpaid cases, variables of interest rate, type of facility, number of payments, and payment interval were all significant. However, only the first three variables were confirmed in assumptions. So it can be said that:

1. The more the interest rate, the more the credit risk.
2. The more we move toward cooperative facilities, the more the risk and so the more the demands.
3. The more the number of payments, the less the risk.

Discussion and Comparison

In many previous studies, demands and credit risk in banks and credit institutes have been investigated which are introduced and compared with those of the present study. Latifi (2013), adopting Logit Method, considered the relationship between credit risk indexes and customers’ on-time payment in Mellat Bank. It was concluded that there is significant relationship between the two variables. In this sense, there is agreement between finding of the present study and those Latifi (2013) in that both conclude that special attention is needed to be paid to decisive indexes such as interest rate, type of facilities, credit risk, and management of all. This can facilitate decision making in granting facility and receiving deposit from the customers so as to reach optimal management of risk for the bank.

Further, Mousavi (2011) employed Logit Method to investigate influential factors on customers’ creditability ranking in Saderat Bank of Khorasan Province, Iran. Findings were in agreement with the

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assumption that there was significant relationship between customers' individual indexes and their credit risks. Therefore, after comparing them with those of the present study, it was concluded that evaluating customers' credibility must be carried out with great attention. This was due to the notion that research findings indicated that customers' different individual indexes can lead to o-time payment and decrease credit risk.

Moreover, in Arabmazar and Royeentan's (2006) study under the title of 'factors influencing credit risk of bank customers; a case study of Keshavarzi Bank in Tehran, Iran' using Logit Method', a random sample of 200 institutes were collected from 1999 to 2004. They came to the following conclusions: There is significant relationship between type of activity, interest rate, and total time period of payment with customers' credit risk and can have great influences on that. Therefore, obtained result and comparison of them with other researches show that Logit Model can have appropriate capabilities in predicting influential factors of credit risk.

Suggestions based on Findings

Suggestion can be drawn from the findings of the present study. In the present study, variables of interest rate, type of facilities, number of payments, and payment interval have been shown to be significant and therefore following suggestions can be proposed here:

1. Accurate evaluation of customers' credibility and paying attention to whether they are legal or natural and paying no attention to their previous balances.
2. More attention needs to be paid to offering facilities with high rate of interest o applicants. They should evaluate whether the applicant has the capability of paying back the money or not.
3. Regarding customers' application, it must be noted that the type of applicant's utilization of the loan be in line with the type of facilities he/she receives. Findings show that facility risk is very high in cooperative contracts.
4. During total period of payment, certified documents of applicant's income can be regularly requested.
5. It must be noted that it is better to turn all facilities toward facilities with more payments and, in this way, the possibility of changing facilities into demands would decrease.

Suggestion for Further Research

Other factors having impacts on bank customers' credit risk can be taken into account in future studies, such as:

1. Investigation of the effects of geographical position of branches on the amount of demands in a sample bank.
2. Investigation of factors influencing unpaid loan facilities in a sample bank
3. Investigation of the relationship between facilities for long-term deposits and demands in a sample bank.
4. Investigation of the effect(s) of credit policies on the process of filling resources in a sample bank.

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