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Role of Credit Database on Internal Credit Scoring: a Case Study of Iranian Private Banks

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Abstract: This research intends to study internal credit scoring of consumers of the banks. Besides estimating the customers' need, they could know their capabilities in reimbursing the facilities. Therefore, to prevent being biased, the credits of the customers are assessed by selecting parameters, using current information and history of the customer, and by relying on demographic characteristics and credit history characteristics. Moreover, the credit and capacity of the customer are presented by credit score, and decision made upon accepting or rejecting the customers' application for getting the facilities and credit reference database by case study done on Karafarin Bank, Sarmaye Bank and City Bank, also to suggest solutions for improving this system; thus, a questionnaire used for collecting and analysing ideas of the heads or deputies of branches of the those banks. Interval data were examined by proportion and Friedman test and showed that by testing the hypothesis for each bank, separately and cumulatively, in all three banks, a half or more than a half of the answerers selected "much" or "very much" options, therefore the hypothesis was confirmed.

Keywords: Credit Assessing; Credit Risk; Credit Scoring; Bank Strategies; Credit Risk Measurement, Parameters of Credit Risk Measurement Models, Credit Reference Database.

I. Introduction

One of the banks' challenges is default in reimbursing outstanding claims based on credit pledges mortgaged. The banks need to identify their good payer and bad payer customers' good and bad payers; also, they need to score the customers' credits for increasing profitability and decreasing the outstanding claims. Collecting data of bank customers has an effective role in rendering marketing services and credit scoring, processing applications, controlling portfolio, detecting fraud and collecting claims, and helps banks to make more expedient and better decisions for rendering services to the customers [1-19-32]. Applying routine methods of credit risk management, and using instruments like credit policy codification, assessment of economic, technical and financial dimensions of the projects, and receipt of valuable pledges, all put emphasis on importance of outstanding claims. Effects of the bank's outstanding claims include decreasing banks ability, damaging their main role in collecting surplus resources and distributing them to different economic sectors, also decreasing liquidity of the banks. Therefore, banks have to increase the interest rate of their awarded facilities or strengthen their place in the internal and/or foreign market. Hence, bank expenses increase and they face decrease on profitability [17]. Credit assessment (CA) is a collection of decision-making techniques and models for developing credit management process. Credit assessment means assessing and evaluating ability of the applicants to reimburse the credit facilities and the probability of default (PD). Systems like credit scoring and credit rating are developed for customers' CA [22-23]. Therefore, CA helps the banks in awarding facilities to the applicants by assessing the risk; moreover, it enables banks, and Finance and Credit Institutes to develop credit strategies for optimizing their benefits [7-24-31]. The banks as well as Finance and Credit Institutes need a complete and comprehensive recognition of the customers to foresee their future behavior as per their payment history and accounts. Correct and complete recognition of the customer helps to control and decrease the outstanding claims of the bank, making decisions on rejecting or accepting the requests for receiving facilities, and reviewing the process of awarding the facilities by mentioning the conditions to the customers. Credit assessment system (CAS) is an alarm for the lenders to be aware of collecting and saving necessary information and gradually start to manage the credit risk and optimize the credit awarding processes.

II. Literature Review

Credit Risk: Considering the rapid development and increasing rivalry in financial credit industry, assessing credit risk in banks, and Finance and Credit Institutes has become more important; in such a manner that there is a need for developing effective and smart package of measures to assess and control credit risks for awarding facilities to the more well-deserved applicants or to prevent facility awarding to undeserved. In the last two decades, credit scoring has been declared as one of the initial methods for developing credit risk assessment and has resulted in increase of the profit and decrease of the loss of banks, and Finance and Credit Institutes [67]. Estimating the credit risk and screening the applicants have special importance for loaners in credit industry.

Actually, in this part, profitability only takes place when one can assure that considerable sum of awarded credits will be reimbursed by less risk. Thus, lenders need to have information about obligors for estimating the risks aims [7-14]. Usually for assessing loanees and determining whether they are good or bad payers, and for managing and measuring the credit risks, the loaners interview with the applicants and directly ask them to submit required documents as well as personal particulars to confirm the authenticity of the presented information. Moreover, they search and collect information from their databases, which are derived from information collected during years of business activities and experimental exercises in credit market. However, these information resources are not complete because they just include current and previous record of the customers without having the previous and current relations between the customers and other financial organizations, and from loaners' viewpoint, they have no information about prospective customers and their previous and current relations with other loaners; Therefore, for having comprehensive information about potential new customers, third-party providers have been established and developed in the past few decades; therefore, by data sharing and by developing advanced information technologies, loaners are now able to collect information which were not available for them before [14]. By collecting the personal information, credit history and additional features which were integrated with the other data sources, each person was scored and then credit applicants were classified to different groups in a population based on different risks classes. Hence, huge amount of data [9-12-13-14-16-18-36] from demographic characteristics are applied in credit scoring and also for preparing credit reports. [6-14] proved that facility awarding methods are mostly relied on available different types of information about loaned. Actually, due to ambiguity of information about the loaned, loaners decide on awarding facilities to loan as per hard information (Information that are easily codified electronically) or soft information. Therefore, credit scoring and loaner's technology capabilities have effective role in specializing facility awarding [11]. In fact, "credit risk means that reimbursement of received facilities may happen by delay or even not happen at all, which will result in problems and issues for cash flow and liquidity management of the bank" [2].

Credit Risk Model's Parameters. Generally, its key parameters are:

- **Probability of Default (PD):** It is defined as the probability of defaulting on a loan and placing it within the unpaid class. This parameter has significance relation with factors like credit rate of the applicant of the loan, external economic environment, interest rate, exchange rate, and so on.
- **Exposure at Default (EAD):** The expected total value that a bank would be exposed to when an obligor defaults on a loan from that bank. In most of credit risk measurement models, this parameter is determined within a year by loans cash flow or Bonds.
- **Loss Given Default (LGD):** Loss due to decrease of value in percentage. Because of recovery, the bank does not lose total loans resulted from default in payment. In fact, this parameter measures the real loss in proportion to special recovery [27].

Credit Score: Increase in applications for consuming credit has resulted in Credit Industry competition. Therefore, credit managers have to develop and utilize machine-learning methods for analyzing credit data to save time and decrease errors. Hence, credit scoring is a method that helps the lenders in deciding on awarding facilities to the applicants as per their age, income, marital status, etc [10-19]. Credit scoring is an important issue among the world's modern financial topics, so it has special importance in calculating and decreasing credit risk [20-34]. Credit score is a method for assessing credit risk of the applicants of the facilities. Credit score is calculated by credit scoring models and is a number that shows the creditworthiness of the facility applicant based on analysis of the particulars of the applicant written in application form [38]. In other words, Credit scoring is a classification technique and a method for identifying different groups within a population as per special particulars achieved by combination of personal data including credit record and other non-personal information, parameters differences, classifications and statistical instruments for foreseeing the future. Technically, credit scoring models are mathematical algorithms or statistical programs which show the probability of the reimbursement of the awarded facilities by the consumers [14]. Distinct particulars of good and bad customers are identified from each other by credit scoring [5-20]. Therefore, the collection of data are divided into two separate groups of good customers and bad customers; in fact, the aim of credit scoring is to present solutions for classifying these customers rapidly and precisely to estimate probability of default of each customer for specifying credit in reality [20]. Methodology of credit risk analysis consist by credit scoring based on credit consumer behavior, delinquency ratio; financial stability of facility suppliers, these enable better use of the facilities [28]. The aim of credit scoring is to estimate the financial risk for assisting credit facilities loaners to make faster and more real decisions about facility awarding management [35].

Various Kinds of Credit Scoring: Various kinds of credit scoring are as follows [19-25]:

- **Application Scoring:** This includes estimating the reimbursement capability of the person or the company as per remaining commitments of the credit applicant. In fact, it is estimation for credit risk assessment according

to demographic, social, and financial conditions for deciding on whether to award the credit to the new applicant or not.

- **Behavioral Scoring:** This is similar to new application scoring but it also includes present customers; therefore, the loaner is provided with documents about credit behavior of the applicant of the loan in proportion to active management of portfolio process.
- **Collection Scoring:** Collection scoring classifies the customers in different groups according to the insolvency.
- **Fraud Detection:** This method classifies the customers on the basis of the probability of guiltiness.

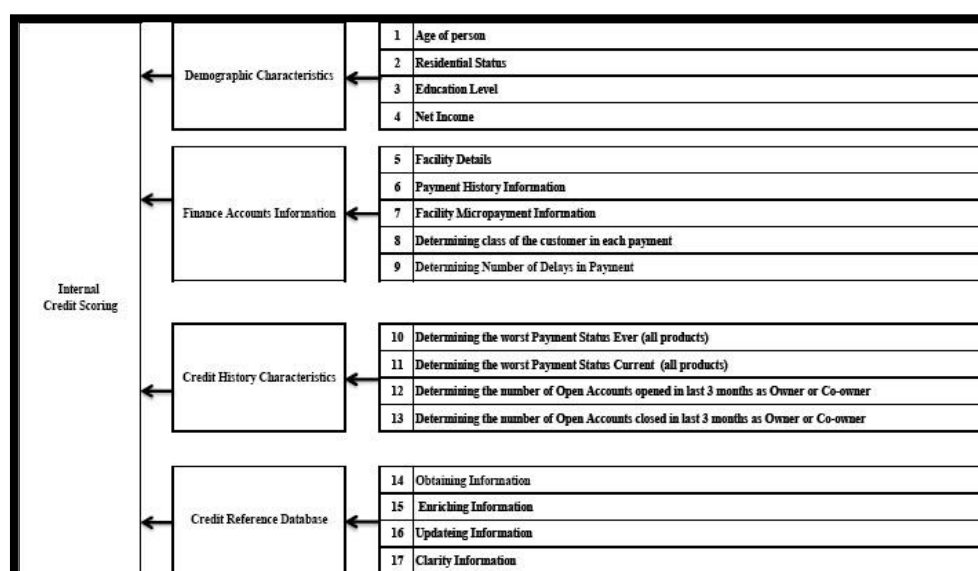
Advantages of Credit Scoring: Credit scoring has many advantages for both loaners and loanees. For example, credit scoring decreases discrimination because credit scoring models provide a real analysis of creditworthiness of the customer and enable the loaner to focus on information related to credit risk; moreover, it prevents bias [15-21]. Saving time in processing facility awarding [21-40], ability to make better and rapid credit decisions with higher quality [4-21], determining interest rate for customers and evaluating securities [3], decreasing credit analysis expenses, closer control on present accounts, prioritizing claims [21-33], all are other advantages of using credit scoring method [21-35]. Credit scoring provides credit and finance institutes with determining definite credit limit for each consumer [21-26-29] and enables them to manage their accounts more effectively and profitably [21-26-30].

Credit Reference Database: The pre-requisite of comprehensive CAS in banking system is to provide comprehensive and complete information about the bank customers within a comprehensive database of bank customers consisting of demographic and credit history characteristics, reimbursement of the awarded facilities, manner and penal records of consumer including default in paying tax, etc. Credit reports and credit score are prepared by inquiring about the customers as per the information like their demographic and credit history characteristics and facility (loan) accounts information of the customers.

III. Research Methodology

Research Model and Variables: As it is shown in figure 1, with respect to effective independent variables, credit reference database has a role in internal credit scoring of consumers in the mentioned banks.

Figure 1: Research conceptual model for explaining the credit reference database of the bank



Population and Sample Size: Two basic criteria are identified for the selection of subjects: a) Credits used for the expert employees or the head of the credit sector; Branches covering the superintendent, deputy, or the head of branches of Karafarin Bank, Sarmaye Bank and City Bank. Since, stochastic stratified sampling used by Cochran formula. As a result, n is 63 with 95% confidence level. Research Validity and Reliability: At the beginning, research literature is assessed thoroughly with the intention of assessing the validity of measurement. Afterwards, among experts a group of 15 individuals like the head or deputies of the branches was interviewed to change and finalize the collected factors and indices. At last, a well-designed questionnaire was distributed for assessment. Reliability indicates the extent to which analogous results are similar in equal conditions. It should be noted that to be able to examine reliability in this research, Cronbach's Alpha method is used. In addition, SPSS software indicates that obtained quantity of Cronbach's Alpha was 0.917, an appropriate quantity for the questionnaire.

Hypothesis Testing: Likert's scale used for veiwpolling and non-parametric tests plan the test hypothesis. In Meanwhile the proportion test was used if more than fifty percent of respondents agree with the questions. Friedman test applied to prioritize the reseach components.

IV. The Results of Hypothesis Testing

The inferential statistical analysis results of main and related sub hypothesis in terms of banks show on Table 1. The all null hypothesis confirmed by 95% confidence level. Thus, the selected effective indices are significance for assessing internal credit scoring of the consumers.

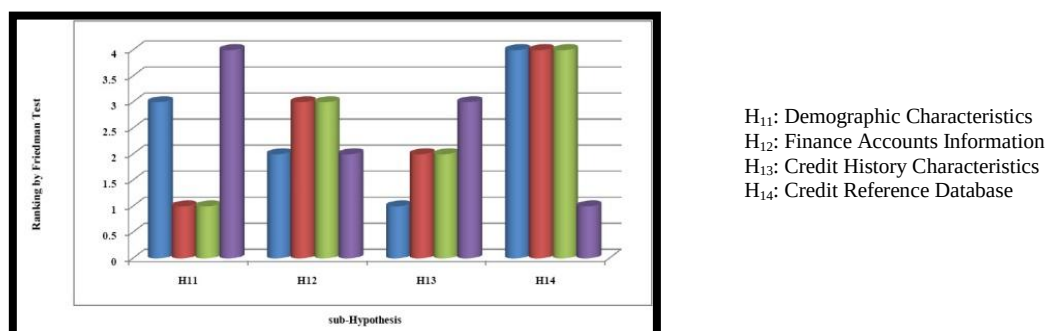
Table 1: Research hypothesis test results

Banks	Hypothesis	Frequency	$\hat{P}$ (%)	Z value	Results
Karafarin	Main	13	0.93	3.21	H ₀ Accepted
	Sub-1	11	0.79	2.14	H ₀ Accepted
	Sub-2	11	0.79	2.14	H ₀ Accepted
	Sub-3	7	0.50	0.00	H ₀ Accepted
	Sub-4	13	0.93	3.21	H ₀ Accepted
Sarmayeh	Main	24	0.96	4.60	H ₀ Accepted
	Sub-1	20	0.80	3.00	H ₀ Accepted
	Sub-2	22	0.88	3.80	H ₀ Accepted
	Sub-3	21	0.84	3.40	H ₀ Accepted
	Sub-4	24	0.96	4.60	H ₀ Accepted
City	Main	14	0.58	0.82	H ₀ Accepted
	Sub-1	11	0.46	-0.41	H ₀ Accepted
	Sub-2	18	0.75	2.45	H ₀ Accepted
	Sub-3	15	0.63	1.22	H ₀ Accepted
	Sub-4	22	0.92	4.08	H ₀ Accepted
Accumulation	Main	51	0.81	4.91	H ₀ Accepted
	Sub-1	42	0.67	2.65	H ₀ Accepted
	Sub-2	51	0.81	4.91	H ₀ Accepted
	Sub-3	43	0.68	2.90	H ₀ Accepted
	Sub-4	59	0.94	6.93	H ₀ Accepted

In Karafarin bank, the main hypothesis confirmed and indicates: 79.70 percent of respondents had the age range of 28 to 36; 66.40 percent were male; 66.40 percent were married; 59.80 percent held bachelor's degree; 86.40 percent had less than 8 year experience and the entire respondents were employees of credit department. In Sarmaye Bank, the main hypothesis was confirmed and indicates: 42.24 percent of respondents were between 44 and 52; 84.48 percent were male; 76.80 percent were married; 76.80 percent held equally high school diploma and bachelor's degree; 49.92 percent had job experience of 24 and 32 years; 34.56 percent were the head of the branch or credit department. In City Bank, the main hypothesis was confirmed and indicates: 31.44 percent of respondents were between 28 to 36; 41.06 percent were male; 48.31 percent were married; 45.94 percent held bachelor's degree; 45.94 percent had less than 8 year experience and 45.94 percent worked as employees in credit department. In sample banks, the main hypothesis was confirmed by adding data and indicates: 38.56 percent of respondents were between 28 to 36; 63.02 percent were male; 64.31 percent were married; 48.84 percent held bachelor's degree; 46.33 percent had job experience of 24 and 32 years and 50.22 percent worked as employees in credit department. With regards to confidence level which is less than 0.05, Friedman non-parametric tests were indicative of the rejection of the null hypotheses. It suggests that there is a priority of importance in indices. Considering the mentioned banks, the importance of defined indices ranks in main hypothesis is indicated cumulatively and separately in Figure 2.

V. Conclusion and Recommendation

The research results appear one of the challenges of the banks is default in reimbursement of the outstanding claims based on credit pledges mortgaged by the bank. Karafarin Bank, Sarmaye Bank and City bank need to identify their good payer and bad payer consumers and to score their credits for increasing profitability and decreasing outstanding claims. Assessing and measuring reimbursement capabilities of the credit consumers and calculating the PD by help of current and previous information of the applicants, shows the CAS for presenting credit score to the consumers of the abovementioned banks. Hence, those banks will be able to classify their consumers impartially and as per statistics and quantitative and qualitative information by becoming member of Credit Bureau System and by benefiting the data shared by other members, also by receiving services of this system in the form of credit report, generic credit score, etc. They would to use their internal strategies along with current generic credit score as a base for decision making about facilities awarding; therefore, they will be manage the bank risk.

Figure 2: Bank's ranking in terms of research hypothesis indices by Friedman Test

Establishing various credit assessment companies, receiving various services from them and comparing the results gained from each company, enables the credit awarders including Karafarin Bank, Sarmaye Bank and City bank to make more reliable decisions, and results in encouraging the banks to become member of Credit Bureau System. Calculating and presenting credit scores to the consumers, enable the banks to consider a level of flexibility for the consumers as per credit score, therefore they will be able to observe their consumers, achieve their satisfaction, and finally increase the profitability of their bank, by 1) presenting various kinds facilities, 2) considering the maximum floating amount of facilities, 3) percentage of received interest from consumers, 4) floating duration of reimbursement for the consumers and also, or 5) presenting value added services to the consumers. Applying CAS is an advantage for Karafarin Bank, Sarmaye Bank and City bank against other banks and provides an opportunity for developing and presenting value added services to their consumers.

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