Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231– 6345 (Online)
An Open Access, Online International Journal Available at www.cibtech.org/sp.ed/jls/2015/03/jls.htm
2015 Vol. 5 (S3), pp. 212-218/Jamali and Okhovatnia
Research Article

CLASSIFICATION OF BANK SHAHR'S CUSTOMERS BASED ON CREDIT RISK, BY USING MULTI MEASURE PREDICTION DECISION MAKING MODELS

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ABSTRACT
In this study, classification of bank shahr's customers based on credit risk of assessed by using multi measure models of prediction decision. In this approach, create risk of natural customers was educated by seven Indies and for legal customers; it was evaluated by using financial proportions. Research type of this study is descriptive. Survey and in order to test assumption, multi measure decision making techniques have been used and? Method of research is descriptive, and then due to relationship among variables it is correlative. In this study, to evaluate question and addressed queries, techniques of AHP TOPSIS are used and to assess assumptions, single sample t-test Pearson's correlation coefficient were applied, results of study indicated that according to prediction models in natural customers section with probability of 96.8 and in legal customers section with probability of 97.8 good pay customers credit score is more than mean value and there are correlation amongst records, average account balance, type OD security, applicant's income, current ratio, quick ratio and ratio of quick to current and credit risks of customers, furthermore, a significant relationship is between indices of legal natural customers and credit risks.

Keywords: *Credit Risk, Multi Measure Decision Making, Multi Measure Prediction*

INTRODUCTION
Correct relationship between financial regime and reduction regime of any country is accounted as one of the most important factor OD economy development growth in that country, Bank as main part of financial system, play major role in main tainting facilities for production, commercial, consuming and even private sector. In Iran, due to economic structure of country and because of some reason such as undeveloped networks, maintaining real economical sectors of country is authorized by country's banking network.

Unfortunately, this sector also is not so successful in full filament of most its goals, currently, continuation? Of activities of most banks are depended on state supports. A major volume of granted facilities which are perished or postponed is indication and reflation of unavailability of paper and expertise models in providing banks facilities within banking systems of country.

Evaluation and measuring credit risks, thus has a substantial among all risks which banks have to deal within their extended functional circle.

Control reducing risk is considered as one of the effective factors in improving grant in credits and? in Banks functions and has major role in continuation of granting facilities, profitability and several of banks and financial institutes. During research in risk management domain, throughout this process, we are faced to several tools, methods techniques where to be able to utilize them, it is needed to recognize risk type and due to type of risk using proper tools for reducing risk and management area. One of the suitable techniques in this field is utilizing decision making patterns models. Using these techniques and planning for making them more applicable and more mechanized and systematic in its consequence, significantly assist banks in order to manage crises and risks such as credential risks, cash how, market, interests rates and profitability. Since it is impossible to suppress risk because of aspects of theories and practices, we must conduct fundamental procedures by making suitable strategies and some of these proceedings techniques to manage risk within banks and financial institutes are using multi measure decision making techniques and prediction models. The main application of these models is bank systems, customer's behavior predication and decision making about credit level of customers. By using these techniques, it is possible to analysis available customer's information and whatever information is provided to customers of bank Shahr branches throughout all branches that are under study. In this approach we can classify and define customers based on previous and new customers. To classify and clustering customers under definitions we may use credential score which is resulted of mentioned models.

Assessment of most countries performance shows that level of economy growth and total investments are related profoundly. Allocation investment resources to economic activities are accomplished through financial market where bank credits markets are a component of this market.

This is accomplished as the most prominent role of bank in financial market via granting credits facilities to customers. Therefore, assessment managing credit risk (probability of any deficit in granted credits paybacks from customers) is signification. Furthermore institution must be successful in paying back their? Completely to financial and credit risks must be low. Traditional methods in making decision to grant credits to facility applicants as such procedures in our country, as are based on personal judgments may not be responsive. Thus by considering importance of risks, what is important and always is one of the most important challenge of credit institutes is evaluation probability of any deficiency or shortcoming in paying back by facilities applicant. In order to select a group of customers who guarantee their payback and show confidence at deadline. Overall, banks and credit institutes must evaluate credential financial indices of credit applicants (customers) and in fact they assign credit scores to customers to identify their credit status (to be or not to be good pay). Credit evolution means assessment and estimation ability of credit applicants and financial aids along with probability of facilities pay backs from these applicants. After credit evaluation, banks customers are classified in two groups of risk and non – risk customers. In other hand, bank systems customers are also divided into legal and natural customers. Therefore, before granting bank loans, credential states of each customer must be identified due to their good pay or vise versa statue.

This study also seeks a strategy to provide a solution to this problem so as to introduce a financial models ultimately which? be able to select credits applicant based on effective parameters and indices (both legal natural customers) and classify applicants properly tp prevent any deficiency or shortcoming in paying back granted facilities.

Theatrical Basics

Risk

Potential measurable loss of a kind of investment is called risk (Alireza, 2005).

Risk Management

Risk management is a systematic method to identify analysis, measure, supervise, control and report probable dangers threats in difference business domain limits, whereas after developing related policies strategies to deal with risk along with goal of minimizing probable dangers and threats there would be time to manage those factors (Gholamhossein, 2009).

Market risk: Are probable dangers arising from price fluctuations (Value) in monetary and capital market (Hossein, 2009).

Operational Risk: is any loss arising from four elements: human, system, internal job procedures external events and this definition is not extended to credit and reputation risk and also satirical risk (Jamshid, 2007).

Credit risk: Is probability of reduce in value or even unvalued feature of some assets of banks specially granted facilities (loans) (Mirfeiz, 2010).

Credit score (CS): In this study a number is assigned to each customer as credit score. By comparing this customer's numbers, they are classified in two groups of risky and safe customers (both legal and natural customers) regarding acceptance and paying back on time (Mir, 2010).

Research Assumption

First assumption: Credit score of every customer who's is applicant for receiving financial facilities in research branches is greater than mean value.

Third assumption: There is a significant relationship between related indices of legal natural customers of research's branches and risk level.
Review of studies and researches which are related to issue in different reference such as university's center for preparation research scientific literatures confirms that in Iran, only a few number of researches are conducted in this area, but some similar studies are conducted where in the following we address some of those:

Study History

Foreign researches

Vita *et al*., (2011) in a research under title of "measurement of customers credit risks in a set of banks by using neural networks adaptive variables concluded that provided model has a better function comparing to logistic regression that is representative of standard approach in banks".
Marchin (2011) in a study under title of "customers behavior modeling by variables analysis through neural system method" concluded that pre-processed information of customers can reduce Credit risk in prediction variables.
Juliue (2012) under title of "credit risk profitability of banks in Ghana 'concluded same result that there is a positive and significant?
By considering interest rate between credit risk profitability of banks.
Funda (2014) found the same result under title of "Macroeconomic modeling of credit risk for banks" where some variables such as rate of? unemployment rate and inflation rate that increase credit risk will have significant impact on macroeconomic issue in next future periods.
Dessat *et al*., (1998) tried of classify customers into two samples of good bad then concluded that classification into good bad customers has priority to other type of estimation classification method.
Candio (1999) concluded a research and found that in order to reduce risk of loan portfolio it is better, firstly banks determine conditions of loan applicants clearly and brightly and also evaluate these condition by considering credit risks, secondly all types of loans to be classified by banks in ? with similarities and probability of not paying bank: this classification may be base3d on type of industry, geographical location, type of product ….
Ranger (2009) in his paper under title of a probable model of decision making, provide a model of decision making include random decrease of risk, then he concluded that estimated variable may impact directly and reverse on same issues such as proper distribution of optimization decision making, uncertainty ? and normalization of standard deviation.

National Researches

Seyed (2009) in a research under title of "rating credit oriented measures of banks customers through Delphi,? Those differences are observed due to significance and importance of experts view between the 5 – measures.
Maryam and Mohamad (2010) in their study of assessment of banks financial organizations based on decision making models, concluded that following improvement in decision making for granting credits to banks customers. Credit risk management and iots reduction, there may arise dangers.
Saber (2012) in their research under "assessment of macroeconomic? and credit risk of bank, conceded that managers and supervisees of banking system must consider in of macroeconomic on credit risk in compiling credit laws and regulations and also credit policies applicable on banks and credit institutes, to reduce credit risks of banks.
Bahman (2014) after conducting their study of "relationship between credit risk and interest components risk (can and liabilities in banks) concluded that general, credit risk has positive impact on liability interest but credit risk has not any signification impact on cash interest risk.

MATERIALS AND METHODS

Research Method

This study is of correlation type due to relationship between variables, because aims to assess relationships among dependent and independent variable, correlation researches included all studies with objectives of discovering and identifying relationship between different variables by using correlation coefficient, aim of correlation research is understanding complicated behavioral patterns by evaluating correlation among these patterns and variables which are assumed to have relationship (Delawar, 2001) this is a sectional research, if aspect of data collection matters and period was 2012 to 2013 but if assessment of issue within on organization matters, it would be field study.

Research Variables

In this study, customer's credits risk is accounted as dependent variable and inderdent variables are classified in two groups related to legal natural person's indices.

Dependent Variable

Credit Risks of Baks Shahr's Branches Customers

Credit risk is probability of postponed, doubtful or not paying back of a part of granted facilities by customers.

Independent Variables

Independent variables of this research are related indices to natural customers and those related to legal customers, these indices show state of customers' credit that affects level of customers risk credit (Variable of research).

A. Natural persons indices are:

1- Applicants income, 2- Education, 3- job record, 4- security type 5- security value, 6- average of customers account balance.

B. Legal pensions indices are:

1-cash flow ratio
2- Efficiency ratios
3- Repayment and return capacity rates of loans
4- Profitability ratio

In this research aim of data analysis is to make clear whether commercial unit or establishment is able to pay back its debts to bank or not?

To achieve this objective, we use two following methods and compare their result:

a- Multi – indices decision making modes.
b- Logistic regression method

First Model Multi–indices Decision Making Model

In this model first weights must be allocated to each related index of customers so as to have univalent weights, must be allocated to each related index of customers so as to have univalen weights, then by considering these indices, decision must be made regarding ideal options and choices (customers with lower credit risk 0, actually the good pay customers are selected.

In order to allocate weights to indices in this study method of simple additive weighting (SAW) and to select ideal option, TOPSIS model are used.

Topsis Model's Steps

First step – converting decision matrix to an unscaled matrix by below mentioned?

Second step – creating weighted unscaled matrix by assuming vector W as input of TOPIS ?

So: Weighted unscaed matrix =

Where ? is a matrix in which, indices scores were become unscaled and comparable inside that and ? is a diagonal matrix only elements of its main diameter will be non – zero.

Third step – determining ideal solution ideal negative path:

For ideal option A and negative ideal option A we provide following definitions: ideal option =

Ideal negative option =

Where

Where

Fourth step – calculation of separation level (distance)

Fifth step – calculation of relative peroxidation to ideal solution Aj, this relative approximation is defined as following

It can be seen that if than and we will have and if then therefore option all gets nearer to ideal solution, the more cli+ value gets nearer to unit.
Sixth step – rating of options: According to descending order of cli +, existing options of problem can be rated.
Second models logistic regression model: this models is used when dependent variable is solution variables and has in to modes. Logistic regression modes follows logistic curve.
In this modes, chance concept is used for value of dependent variable, in statistical terminology, chance means probability of event occur ances?
Relative to lack of its occurrence?, this probability changes within ranges of zero one, however chance maybe greater than one.
In order to analysis dependent variable under logistic regression models we use general modes as below:
Y can only have to values of zero one 9y=0 ? pay customers and y+0 for not good pay ones)
Maximum likelihood method is used to determine coefficients:
Where is row vector of coefficient and x is column vector of independent variables
Chance of non – paying case =
E is naperies figure.
L (chance ratio logarithm) to linear parameters and its value derived from maximum likelihood method after determining coefficients. Hence, by determining confident of that show value of l variable (change of non – paying logarithm) by 1 unit increment in value of independent variable after calculation of probability for non – paying case. Banks customers can be classified in risky non – risky categories.

RESULTS AND DISCUSSION

Findings

Fist assumption is traduced as following:
First assumption: credit score OD each customer who received facilities from under study branches is greater than mean value.
To assess first assumption of this research we use single simple t-test. Result of above mentioned test for natural and legal customers are respective provide in Table (1) and (2).
Table (1): Results of t-test for natural customers
Table(2): Result of t-test for legal customers
According to results of table (1), level of signification is lower than O.Os thus is zero assumption is refused and adverse assumption is confirmed. There for mean value of natural customers has significant difference with mean value of test. Since statistic T is positive then credit score value of natural customers is greater than mea value of statistic population and situation is evaluated to be suitable.
According to result of table (2), level of significance is less than 0.05 and zero assumption is refused and reverse assumption us confirmed. Therefore mean value of legal customer’s significant difference with mean value of test. Since static T is positive, then credit score value of legal customers is greater than mean value o statistic population and its situation is evaluated to be suitable.
Table (3):customers credit risk
Table (4): T – test for customers credit risk
Table (5): Result of Pearson test for natural customers
Table (6): result of Pearson test for legal customers

Second Assumption

Second assumption is introduced as following:
Credit score of each customer of study branches is less than mean value.
To respond to above mentioned assumption, in first step us encode credit score of customers as below mention method, then assumption is assessed by using single sample t - test
Mean value and significance coefficient in table (4) show that both natural and legal customers have significant level as less than 0.05 thus zero assumption is refused and rehire situation have significant difference with test’s mean value.

Since static T is positive value of these variables are greater than statistical population. Therefore credit risks of customers are at level of mean and above of that, so second assumption is refused.

Third Assumption

Third assumption is introduced as following:

Third assumption: there is a significant relationship between credit risk and related indices to natural legal customers of study branches.

To assess above mentioned assumption, Pearson test is used to demonstrate relationship between related indices of natural legal customers and credit risk.

According to result of table (5) there is negative relationship between indices of job record. Balance average, type of natural customers. It means that by increase of each one of these factors. Credit risk will reduce.

Results of Assumption

Results of First Assumption

According to research fist assumption, credit score of customers was assess through mean value (for natural customers 0.227 and legal customers 0.174), findings show in both group of customers credit score was at mean value level and above that.

Results of Second Assumption

According to research second assumption, credit risk of both natural legal customers were compared to mean value (3) and result show that credit risk for both group of customers is at mean value level and above this level, thus assumption is refused.

According to result of first assumption, credit score is at desired level but mean while credit risk is not suitable. One of the reasons of discrepancy between first and second assumption id method of classification where for credit score of customers each customer’s credit score is compared with mean value.

Then high score of some customers makes total credit score at mean value level and above, bur for credit risk. Customers are classified within special ranges and this lead to keep credit risks of customers to be at mean value above which is not suitable case for bank.

For example in credit risk, credit score of 0.51 and 0.999 for customers are at fist level with 1, whereas rating of this customer in credit score has its real figure. Thus result of first assumption is more reliable.

Third Assumption Results

Results of third assumption demonstrated that, for legal customers, there is relationship between indices such as job record. Balance average, type of security, customer’s income and credit risk.

More over for legal customers there is relationship between credit risk of customers and three Indies of current ratio, quick ratio and current to quick ratio: one of the reasons of lack of relationship between many Indies and credit risk may be low volume of legal customers sample, therefore mention assumption is confirmed

Suggestions

In this section of study report, by considering results tiring, firstly we provide to under study organization (bank Shahr) then some recommendations that may be helpful for research’s are provided.

Applied Suggestions based on Study Finding

Assessment of granting credit process in country bank system state arbitration basis in credit system. Most of country’s bank ignore risk context in general credit risk in specified case neither proceed any action to control total risk of assets and depts of bank. Consequences of this arbitration system in granting credit are high volumes OD doubtful credits for being paid back and then reduction in capability of bank. Therefore in order to increase efficiency power of banks we suggest following:

1. By considering this situation that credit score in both natural legal customers is at mean value level and above that, we suggest information of customers are assess by immediate and top level managers by developing information systems in organizations whereas these systems to be integrated and managers assessment to be periodic in order to ensure obtained collected data are consistence with natural legal customers real states,

2. By considering that credit risks of both legal natural groups of customers is at mean value level and above that, it is recommended that financial establishment can achieve suitable effective decisions by considering its strategic credits scheme macropolicie in credit and by designing and applying credit affairs management system and also focusing on priories granting loans.
3. By considering, relationships between natural customs credit risk and indices such as job records. Balance average type of security and applicant income also relationships between legal customers credit risk and indices such as current ratio, quick ratio, current to quick ratio, we suggest more focus on these indies at the time filing and granting facilities.

Recommendation for Future Researches

A) We recommend research's apply the same models of assessment in other banks and compare abstained results with tinging's of this study to test reliability of model in several ways.
B) We recommend that by using other approaches such as neural networks as prediction models and data of same study. Conduct comparisons on result

Obstacles Limitation of Study

This study is also similar to many field researches was faced to some obstacles limitations such as those are mentioned below:
A) Sensivities of bank's authorities about customers information (natural legal ones) lead to length of study time.
B) By considering that bank Shahr is a new founded bank and minority of number of titles containing complete data of financial status of facility applicants, we able to form a data bank with capacity of 250 cases for natural customers and 135 cases for legal customers, thus it is necessary that mentioned data bases to be expanded to upgrade accuracy of reductions by model.
C) Lack of knowledge from many experts of credit department about method of this research made researchers to explain more than required level and this also is a reason for longer duration of research

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