

# Application of the Scoring Model for Assessing the Credit Rating of Principals

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**Abstract** – One of the most commonly used methods for assessing the credit rating of counterparties is a credit scoring model or credit scoring.

Economic pressures, resulting in increased demand for loans, along with increasing the competition in the market of enterprises and the development of computational techniques and technologies leads to the development of statistical credit scoring model, and in order to expedite the process for making decisions related to credit approval.

Credit scoring is used to increase the precision in the approval of loans to creditworthy customers, which can result in increased profits or rejection of those customers who are not creditworthy.

**Keywords** – Credit rating, credit scoring model, credit risk.

## 1. Principles for making credit scoring model

Banks use a variety of tools and systems that are used for making a decision on approval or rejection of the loan application separately. From the aspect of management with credit risks may be noted that the most important tool became the credit scoring statistically derived tool for decision making that include score-card and a set of statistical indicators. [5]. Predicting the creditworthiness of the loan applicant is of particular importance to each creditor. Indeed, granting loans to the loan applicant who is late in repayment or does not repay the loan, in fact, results in losses for the bank, and on the other hand, the refusal of the loan applicant that is potentially good, results in lower profits for the bank. Therefore, the creditor must bring two types decisions: first, should he give a credit to a new applicant, and secondly, how to deal with existing applicants, including the fact that points to the question – should he increase their credit limits? [7].

Credit scoring system awards points to the loan applicant which sum represents the numerical value that indicates how possibly is the borrower to be late in repayment of the loan. [2]

Credit scoring system assigns a quantitative measure, called point, of the potential client and that

point reflects the future behavior in the repayment of granted loan. Analysts who developed credit scoring system identified those characteristics of loan applicant that best predict the repayment of the loan. Statistical procedures allocate each feature a numeric value or point so that scoring system measures the relative importance of a given feature for predicting the repayment of the loan. Classical methods, in determining whether to grant credit to a particular borrower, use subjective evaluation of loan analysts, which is based on their previous experience of adoption decisions.

The management of the loan portfolio can be accomplished with a classic credit analysis.[1] Namely, if increases the delay in the repayment of loans, management will need to reduce the amount of granted loans, but there is no way to notify the loan officer how much and how to reduce the risk. However, the use of credit scoring system credit management can notify the level of credit score, to be proposed to rise from 200 to 210, which will reduce possible losses.

The main reasons for the use of credit scoring are the following: [5]

- Reduction of bad debts,
  - Improving operational efficiency. Namely, because the process of evaluating the creditworthiness when applying credit scoring is automated, it is removed the manual way of the risk assessment,
  - Providing greater control of the loan portfolio by monitoring the scoring process and the characteristics of the portfolio.
- Credit scoring allows the credit management:
- Better managing with credit risk, providing more precise and more consistent decisions.
  - Reduces operating costs, because saves time for the credit analysts,
  - Implementation of a consistent system for making credit decisions and managing credit policy in different locations for the population.

There are two types of credit scoring, from the aspect of the data used in their manufacture, and they are:

### 1.1. Generic credit scoring model.

Generic credit scoring model is built to predict future repayment of the loan, using only the information from the credit bureau, such as history of repayment of the loan, credit exposure and appetite for additional exposure. [4] Based on such a database by applying statistical methods and artificial intelligence methods it is created a credit scoring model that includes those features of the loan applicant that best predict future behavior in the repayment of the loan;

### 1.2. User-friendly credit scoring model.

This model is based on data for the clients of specific financial institution. In fact, it is designed specifically for each creditor. Procedures, supported by statistical and other methods are applied to data that has a creditor, so those features of loan applicant that are important for regular repayment of the loan are pointed out. The advantage of user customized credit scoring model is that it includes low cost, universal acceptance and high availability. The advantage of the adjusted credit scoring model, however, includes greater accuracy than generic credit scoring model, and base is the fact that they are fully understood by the user and they are not a "black box" [3].

It is common for banks that use credit scoring for the first time, to start with the generic, and then introduce the adjusted credit scoring. The final assessments, i.e. scores are obtained by summing the two ways. In addition, both (generic and adjusted) credit scoring systems have their place in the credit scoring of the loan applicant.

When calculating the credit scoring actually it is used the model that consists of a list of questions with a certain number of points for each answer. In the model are used only the information that predict future behavior in the repayment of the loan. The collection of all points obtained from the credit application and credit report, the bank receives a number of points that answer the question - how is likely a particular loan applicant to repay the loan according to the agreed conditions, without delay. This credit scoring is actually a list of risk.

Therefore, as there are more points, the lower the risk is, or how many fewer points, the risk is greater. But it is necessary to determine the limit value that selects "good" loan applicants from "bad". "Bad" loan applicant is generally defined by using negative indicators, such as bankrupt, deception, crime, abatement and negative net present value.[8] Loan applicants who have more points than the limit normally are considered for good and for them the

bank grants credit, and those whose scores are below the specified limit, the bank doesn't grant loan.

Credit scoring model includes a set of features which are allocated according individual attributes. Each attribute or answer has a statistically derived score or "weight". Score card includes from 10 to 15 features that have from 2 to 10 attributes. An example of a score card used for evaluating business subjects is given in the table 14.

A score is calculated for each loan applicant using a score-card when is assigned a number of points depending on the selected attributes. The scores of all individual attributes are collected to obtain an overall score which is then compared with the limit values and, on the basis of this comparison, a decision is made on approval or rejection of the loan application. Limit is the highest level in which the financial institution is prepared to work.

## 2. Advantages and disadvantages of credit scoring model

Credit scoring model enables to the banks to offer loans to loan applicants who have substantial property and a good credit history.

Credit scoring model has the following advantages: [6]

- It is objective and consistent,
- If it is well organized, can eliminate discrimination against some applicants,
- Relatively cheap,
- Relatively simple and easy to interpret,
- The methodology that is used in the preparation of these models is a common and comprehensible,
- The bank is able to achieve better service to their loan applicants with the ability for quickly approving or rejection to the requests.

Today, there are reasons "for" and "against" credit scoring. Generally, on one side, scoring is efficient and makes the lending process faster, so there is no partiality that can occur with the loan officer, but on the other side may be some unique features that scoring will not consider, and that the loan officer would notice.[9] If we observe the advantage that credit scoring has in granting credit then generally could be indicated the following:

- With the use of credit scoring the crediting process is much faster and efficient,
- With the use of credit scoring system are reduced costs for salaries and that affects on reducing the cost of credit,

- Credit scoring provides probability whether the client would delay repayment or not, with high precision it is possible the interest on the the loan to adjust the risk. It influences towards increasing in profitability, which is certainly desirable goal for the loan applicant, and for the bank.

On the other side, the disadvantages of the credit scoring model are the following:

- If the variable does not satisfy certain required assumptions, then the statistical validity of the model is questionable. The model can not provide adequate results over time. In this case, however, the model will not be predictable. If, for example, the bank is determined to give credit cards to students, using credit scoring model that is designed on samples that do not contain the student population, then the model isn't able to distinguish good from bad clients. [6] Therefore, the model must occasionally be supplemented and updated to give reliable results;

- Credit scoring is a mechanical system for analysis of the loan applicant, so that there is a danger that some data can be incorrectly analyzed and interpreted. As illustration of this problem can be stated in the case of Lorents Lindsay, a member of the top leadership of the U.S. central bank, whose request for a credit card was denied in 1995, even though it was a person with a high salary, which previously had not bad credits. [10] The reason for this interpretation of the system resulted from the fact that in the previous period, banks requested from the credit bureaus report on his credit history, or data that is taken as indicative of high credit risk in credit scoring.

### **3. Case Study -credit scoring of clients from Stopanska banka-AD Skopje, Republic of Macedonia**

The use of credit scoring in the assessment of the client's loan application will be shown through an example. Namely, let us suppose that two people apply for consumer credit in the amount of 40,000 denars intended for buying household appliances. In the demand for consumer loan, person "A" stated that he has 32 years, he is married and he is father of a young child, while person "B" stated that he is 40, he is married and is father of two young children. Also, in the application, the person "A" has stated two years of working experience as a primary school teacher, with his monthly net salary of 18,000 denars, but they have no other income in the family. Moreover, as part of the supporting documentation in the loan application, he submitted a receipt for the length of service and salary. Person "B" stated that

has been working for 12 years as an inspector in administration with a net monthly salary of 28,000 denars, and they do not have other income in the family. To determine the level of indebtedness of loan applicants, bank requested information from the credit bureau, which indicated that the person "A" has already repaid a consumer loan with another bank, with the monthly installment of the loan amounting to one third of his net salary. Also, the information of the credit registry show that in the previous two years the person "A" used another consumer credit that repaid with occasionally delay. In the bank the loan applicant had only bank account through which he took a salary, and in addition he used deposit or other credit services. The information from the credit registry for the person "B" showed that he used a loan whose monthly installment was 15% of the net salary (4,200 denars) and he repaid the credit regularly. In the bank he had a bank account through which he took a salary and deposit. At the request of the loan the persons ("A" and "B") stated that they are tenants.

The information from consumer credit request, as well as those obtained from other sources, credit officer enters into the computer and then calculates the total number of points which have acquired persons "A" and "B". Data from the processing of applications for consumer credit, along with individual and total points which have acquired loan applicants are presented in Table 1.

As can be seen from the table, the maximum number of points that can be reached from the loan applicant based on all criteria was 200. Moreover, in accordance with the level of acceptable risk, determined by credit policy of the bank, defined that it will accept requests for consumer loans if loan applicant reaches at least 120 points, while requests with less than 80 points automatically will be rejected. Individual points that won the person "A" on the basis of certain criteria, are given in the third column of the table and their sum reveals that he had a total of 105 points, while the points won by the person "B" are 160 and they are given in the fourth column.

Otherwise, can be noted that the person "A" reached the maximum number of points for the last criterion (age), while in other circumstances, he passed pretty bad. This particularly applies to monthly income, where the person "A" reached only 30 of the possible 50 points. Also, the loan applicant was poorly rated in terms of the level of indebtedness and was concluded that he has a bad credit history. Person "B" maximum number of points showed in the length of service and had excellent credit history

i.e. regularly repaid loans and owned account and saving deposit in the bank.

The points that got person "A" are located in the interval of uncertainty (100), so that a computer program can not decide acceptance or rejection of the loan application. Therefore, the loan officer will need more time to consider the loan application and may request additional information about the person "A", but in any case his word will be decisive. However, considering that with the new loan whose monthly installment amounts to 3.515 denars and the old annuity which is 5.940 denars (or 33 % of net salary) total will have to repay 9455 denars per month. So the total monthly repayment of debts of the person "A" will reach over 50 % (52.52 %) [11] of net salary, and probably the consumer credit request will be denied because his monthly income does not guarantee full repayment of the loan.

Person "B" reached 160 points that without a doubt means accepting the loan request. The credit exposure of this loan applicant does not exceed the allowable amount of one-third of net salary. By the time of grading, together with previous credit, he is in charge of 27.55% of his net salary or a total of 7.715 denars (4,200 denars from the previous installment and 3.515 denars from the new installment).

From the credit scoring can be concluded that the loan application of the person "A" has been rejected because of large credit exposure - over 50% (52.52%), while the loan application of person "B" is accepted for its credit exposure, which does not exceed more than one-third of his net salary.

Table 1: Evaluation of the loan application using a credit scoring

Characteristics	Points	Points of person "A"	Points of person "B"
<b>Monthly net income</b>			
less than 10 000 denars	10		
10 000-15 000 denars	20	<b>30</b>	<b>30</b>
15 000-30 000 denars	30		
30 000- 60 000 denars	40		
over 60 000 denars	50		
<b>Length of service</b>			
unemployed	0		
under 1 year	10		
from 1 to 3 years	20	<b>20</b>	<b>40</b>
from 3 to 5 years	30		
over 5 years	40		
<b>Credit history</b>			
Bad (delays or doesn't	0		

pay the debts)			
No credit history	5		
Average (occasionally delay in repayment)	10	<b>10</b>	<b>20</b>
Excellent (regular repayment of debts)	20		
<b>Relation with the bank</b>			
There is no bank account	0	<b>5</b>	<b>20</b>
Only transaction account	5		
Saving deposit	10		
Transaction account and saving deposit	20		
<b>Housing status</b>			
Unknown	0		
Tenant	10	<b>10</b>	<b>10</b>
With parents	15		
Own apartment	20		
<b>Age</b>			
20- 30 years	10		
30- 50 years	20	<b>20</b>	<b>20</b>
over 50 years	10		
<b>Total</b>		<b>105</b>	<b>160</b>

#### 4. Conclusion

Classic credit analysis has sequence disadvantages arising from subjective way of evaluating the creditworthiness of loan applicants.

It proved as insufficient for managing credit risk. Therefore there are new techniques or quantitative methods that exceed these disadvantages, i.e. its objectivity assists in making quality business decisions. The credit scoring system assigns the potential client with a quantitative measure (score), representing the future behavior of the loan repayment. This quantitative measure of credit managers allows: better risk management, enabling better decision-making, reducing operating costs and implementing a consistent system of making credit decisions and credit policy at different locations.

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