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Research Article

Scoring Model – A Modern Method Of Creditworthiness Analysis And Its Assessment

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ABSTRACT

The main issue for all creditors in the Republic of Uzbekistan is how to effectively lend to companies with an adequate increase of the rate of return. Specifically, commercial banks use traditional credit analysis methods, which are very slow, expensive and straightforward, or use one of the world's most developed models for assessing a company's creditworthiness, which is still not adapted to the characteristics and performance of the company national business ventures. From a professional and practical standpoint, it is emphasized that the models for assessing a company's creditworthiness developed for the individual market give significantly better results than other "standardized models". It represents the basic assumption of this research.

The financial statements of national companies, together with their analytical indicators, in the best way, reflect their characteristics. As such, they are the basis for developing a model for assessing companies' creditworthiness, which is the main goal of the research. The hypothesis of the paper is "Respecting the characteristics of national companies and current procedures of creditworthiness assessment. It is possible to develop a creditworthiness analysis model for the Republic of Uzbekistan that will be more efficient than generally known models". The result of the research is a model that can be practically applied, which contributes to increased efficiency in decision making, which can meet the requirements of the digital economy.

Keywords: Creditworthiness, Financial Indicators, Evaluation Criteria, Scoring Model, Coefficient Estimates

INTRODUCTION

The ongoing reforms in the Republic of Uzbekistan are the basis for the development of the national economy. Especially in recent years, the implementation of broad reforms in various sectors of the economy is paving the way for further sustainable development. The adoption of laws, decisions and decrees on further improving the banking system, which is the "driver" of the national economy, ensures the harmonious development of this industry.

In particular, the Decree of the President of the Republic of Uzbekistan (Decree, 2018) states to develop own scoring model by commercial banks, which allow assessing the level of

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creditworthiness of a potential borrower and reducing the terms of loans (microloans) to individuals and small businesses.

International experience shows that various credit scoring models used by banks are one of the modern methods that allow to accurately and comprehensively assess the creditworthiness of the client. It helps to select the most suitable client and significantly reduce credit risk. It means that losses related to non-repayment of the loan are avoided. Accurate, complete and prompt assessment of creditworthiness is important to reduce credit risk for banks and reduce the risk of non-repayment of credit for enterprises. It should be noted that the use of the credit scoring model in the practice of banks provides the expected effect for both the bank and the enterprise. Therefore, the credit scoring model serves as an important tool in determining the most optimal customers in the banking practice of developed countries.

Dozens of researchers and scholar conducted investigations into creditworthiness analysis and assessment of business entities. For example, many works – On the analysis and assessment of enterprises creditworthiness (Endovitsky and Bocharova, 2005), Analysis of creditworthiness of companies and organizations (Endovitsky et al., 2016), Assessment of creditworthiness of borrowers (Naumchenkova, 2016), Financial Analysis of enterprises (Liferenko, 2005), Issues of creditworthiness in banking (Abdullaeva, 2017), Evaluating creditworthiness of clients by commercial banks (Azizov et al., 2016), analysis of the financial condition of economic entities and creditworthiness (Rakhimov, 2015) and others have been explored. However, the relevance of the creditworthiness analysis and assessment, theoretical aspects, foreign experience, the current procedures have been covered in detail in the works of scientists. There has not been a complex approach and methodology for evaluating the creditworthiness of business units and software that meets the requirements of the digital economy.

Almardonov (2017) recommended the method of coefficients for assessing the creditworthiness, i.e. 8 coefficients for improving the practice of determining the creditworthiness of small businesses.

The coefficient method mainly assesses the financial aspects of the enterprise. In this case, the coefficients assess the creditworthiness based on the indicators of the completed period, but the loan is allocated for the next period.

Almardonov does not focus on the following aspects in his researches:

- creditworthiness is assessed based on financial indicators, i.e. 8 coefficients do not allow a complete financial analysis of the enterprise;
- non-financial indicators are not taken into account in the assessment of creditworthiness;
- perspective analysis of creditworthiness assessment has not been carried out;
- an improved program has not been developed that allows the method of coefficients to be calculated at the standard level and quickly.

MATERIALS AND METHODS

The main objective of the research is to alleviate credit risk through the development of the scoring model of creditworthiness analysis and assessment based on analytical indicators that reflect the specifics of the national economy. A model created in this way is based on the current values and performance of the companies. As such, the model should be tested concerning existing models in order to prove that the results obtained by it are more adequate and better. It is necessary to note that the research aims to draw the maximum from the financial statements and analytical indicators. Therefore, the paper aims to investigate:

- the existing application of financial statements and analytical indicators used in the assessment of the creditworthiness of enterprises, the possibility of developing and applying a new model for assessing the creditworthiness of companies from the local market;
- the level of reliability and accuracy of the new model for the company's creditworthiness in classifying them.

In the course of the research, comparisons of practical materials, analysis with the help of statistics and tables were carried out. Based on the results, clear conclusions and recommendations were made.

RESULTS

Since the emergence of the market economy, credit relations have been continuously improving. This process is expected to continue on a larger scale in the future because credit relations are an important financial factor for many businesses to start, operate and expand.

What are the criteria and procedures for attracting bank loans and credits? In this regard, the main issue in establishing credit relations between enterprises and commercial banks is the analysis of their creditworthiness and the improvement of its valuation practice. Each commercial bank pursues an independent policy on credit relations with its customers. However, attention should be paid to one important aspect, namely, a clear assessment of the creditworthiness of the enterprise.

Various methods are used to analyze and assess the creditworthiness of enterprises in commercial banks of Uzbekistan. In the practice of banks, there are used three types of coefficients: coverage, liquidity, and autonomy. Based on these coefficients, the creditworthiness of enterprises is assessed based on three classes. The following table describes the analytical indicators and their classification by classes.

Table 1 ***Criteria for assessing creditworthiness used by domestic banks***

Indicators	**I class**	**II class**	**III class**
1. Coverage ratio(Cr)	Cr > 2	2> Cr >1	1> Cr
2. Liquidity ratio (Lr)	Lr > 1,5	1,5> Lr >1	1> Lr
3. Autonomy ratio (Ar)	Ar > 60%	60%> Ar >30%	30%> Ar

Source: Authors

The criteria for assessing the creditworthiness of this procedure have the following shortcomings and general aspects that need to be improved:

- shortcomings in the method of calculating coefficients;

- impossibility to fully assess the financial condition of the enterprise based on these coefficients;

- international experience is not taken into account.

These shortcomings are as follows.

1. In banking practice, the coverage ratio is calculated by dividing current assets (line 390) by current liabilities (line 600). In this case, several current assets can not be used to repay the loan. Including the part of "finished goods (goods)" in the structure of finished products (goods), expenses for the next period (line 190), overdue expenses (line 200), overdue receivables (line 211) in account receivables, prepayments to employees (250 lines),

prepayments to the budget on taxes and other obligatory payments (270 lines), prepayments to target state funds and insurance (280 lines), debts of shareholders on shares in the authorized capital (290 lines) are not funds for loan repayment current assets. These and similar serious shortcomings are present in all of the above coefficients.

2. It is impossible to fully assess the financial condition of the enterprise with three coefficients. It requires the use of many indicators that reveal the financial condition of the enterprise.

It is essential to eliminate the shortcomings mentioned above to improve the assessment of the creditworthiness of the enterprise in the banking sector of the country based on the requirements of the period. The purpose is to conduct a complete, accurate and rapid assessment of the creditworthiness of borrowers. It will allow selecting the most suitable enterprises that are eligible for credit. As a result, credit risk is significantly reduced.

In order to effectively implement the work in this area, the "Scoring model of creditworthiness analysis" was developed by authors and certified by the Intellectual Property Agency of the Republic of Uzbekistan (№DGU 05087. 05.03.2018).

The software of "Scoring model of creditworthiness analysis" assesses the creditworthiness of enterprises divided into 5 classes based on two important aspects:

1. Evaluation based on financial indicators (liquidity indicators, balance sheet liquidity, turnover indicators, profitability indicators, stability indicators and Altman model);

We know that one of the most reliable models for assessing an enterprise's bankruptcy through its financial statements is the Altman model. Altman's Z-Score model is a numerical measurement used to predict the chances of a business going bankrupt in the next two years. American finance professor Edward Altman developed the model in 1968 to measure the financial stability of companies. Altman's Z-score model is considered an effective method of predicting the state of financial distress of any organization by using multiple balance sheet values and corporate income.

Investors use Altman's Z-score to decide whether to buy or sell a company's stock, depending on the assessed financial strength. If a company shows a Z-score closer to 3, investors may consider purchasing the company's stock since there is minimal risk of the business going bankrupt in the next two years.

However, suppose a company shows a Z-score closer to 1.8. In that case, the investors may consider selling the company's stock to avoid losing their investments since the score implies a high probability of going bankrupt.

Based on the above, the use of the Altman model in assessing creditworthiness is important in ensuring the reliability of the methodology being developed. For this reason, we also paid special attention to the Altman model in the process of developing the "Scoring Model of Creditworthiness Analysis and Evaluation".

2. Evaluation based on non-financial indicators (total credit history, credit security, project realism, the level of competitiveness of the product, business reputation).

One hundred points assess the creditworthiness of the enterprise based on financial indicators and 100 points based on non-financial indicators with a total of 200 points. Assessment of creditworthiness based on financial and non-financial indicators have been described in the following tables.

In most of the literature devoted to analyzing creditworthiness, financial indicators are recognized as quantitative indicators and non-financial indicators as qualitative indicators.

However, since financial indicators are mainly composed of financial ratios, and non-financial indicators also consider the internal and external factors of the enterprise, we decided to express them into financial and non-financial groups.

Table 2

Indicators	**Point distribution**	**Classes on creditworthiness**									
		Standard	**Point**	**Standard**	**Point**	**Standard**	**Point**	**Standard**	**Point**	**Standard**	**Point**
		1-class		**2- class**		**3- class**		**4- class**		**5- class**	
1. Corporate liquidity indicators:	15		15		12		9		6		0
Current liquidity ratio	5	2<	5	2>Clr>1,5	4	1,5> Clr>1	3	1> Clr>0,5	2	Clr<0,5	0
Quick liquidity ratio	5	1,25<	5	1,25>Qlr >1	4	1> Qlr>0,75	3	0,75> Qlr>0,5	2	Qlr<0,5	0
Cash flow liqudity ratio	5	0,75<	5	0,75>Cflr>0,5	4	0,5>Cflr >0,25	3	0,25>Cflr>0,1	2	Cflr<0,1	0
2. Balance sheet liquidity ratios	15	A1>P1 A2>P2 A3>P3 A4>P4 A5<P5	15	A1>P1 A2>P2 A3>P3 A4>P4 A5<P5 if one condition is not met	12	A1>P1 A2>P2 A3>P3 A4>P4 A5<P5 if 2 conditions are not met	10	A1>P1 A2>P2 A3>P3 A4>P4 A5<P5 if 3 conditions are not met	5	A1>P1 A2>P2 A3>P3 A4>P4 A5<P5 if the conditions are not met at all	0
3. Analysis of assets' turnover:	20		20		16		12		8		0
Current assets turnover	5	Cat>12	5	12>Cat>6	4	6>Cat>4	3	4>Cat>3	2	3>Cat>0	0
Receivables turnover	5	Rt>12	5	12>Rt>6	4	6>Rt>4	3	4>Rt>3	2	3>Rt>0	0
Payables turnover	5	Kak>12	5	12>Kak >6	4	6>Kak>4	3	4>Kak>3	2	3>Kak>0	0
Inventory turnover	5	It>12	5	12> It >6	4	6> It >4	3	4> It >3	2	3> It >0	0
4. Profitability indicators analysis:	15		15		12		9		6		0

Return on current assets	5	ROA>40%	5	40%>ROA>30 %	4	30%>ROA>20 %	3	20%> ROA>IR (inflation rate)	2	ROA<IR (inflation rate)	0
Return on equity	5	ROE> 40%	5	40%> ROE >30%	4	30%> ROE >20%	3	20%> ROE >ID	2	ROE <IR	0
Gross margin	5	GM >40%	5	40%> GM >30%	4	30%> GM >20%	3	20%>GM>10%	2	GM<IR	0
5. Analysis of financial stability indicators:	15		15		12		9		6		0
Financial independence ratio	5	FIR>0,6	5	0,6>FIR >0,5	4	0,5>FIR >0,4	3	0,4>FIR >0,3	2	FIR<0,3	0
Debt to equity ratio	5	0,2>DER>0	5	0,4>DER>0,2	4	0,5>DER>0,4	3	1>DER> 0,5	2	DER>1	0
Equity mobility ratio	5	EMR> 0,5	5	0,5>EMR>0,4	4	0,4>EMR>0,3	3	0,3>EMR>0,2	2	EMR<0,2	0
6. Assessment of creditworthiness according to the Altman model	20	Alm> 2,99	20	2,99>Alm> 2,8	15	2,8>Alm >2,7	10	2,7>Alm >1,8	5	Alm<1,8	0
Total points	**100**		**100**		**79**		**59**		**36**		**0**

Assessment of creditworthiness based on financial indicators

Source: Authors

Table 2 ***Assessment of creditworthiness based on non-financial indicators***

Indicators		**Points**
Credit history of business:	**Classes**	**20**
A company has been repaying credits from banks, including customer bank, for more than 3 years on time and in full.	1 class	20
A company has been repaying credits from banks, including customer bank, up to 3 years on time and in full.	2 class	15
Banks, including the customer bank, have repaid the credit amount (principal and interest) late or partially in the last three years. However, the loan and its interest have been repaid in full (within a month).	3 class	12
Banks, including the customer bank, have repaid the credit amount (principal and interest) late or partially in the last three years. However, the loan and its interest have been repaid in full (for more than a month).	4 class	9
A company has not repaid credits (principal and interests) from banks, including	5 class	0

customer bank in full.		
Credit security:		**20**
The collateral is modern, highly liquid, sufficient, and the ownership belongs to the enterprise. The financial condition of the guarantor is absolutely stable. The insurance policy fully covers the loan and is taken for the entire term.	1 class	20
The collateral is new, liquid, sufficient, and the ownership belongs to the enterprise. The financial condition of the guarantor is stable. The insurance policy covered 50% of the loan and received 50% of the period.	2 class	15
The collateral is more than 50% obsolete, liquid, insufficient, and ownership belongs to the enterprise. The financial condition of the guarantor is stable. The insurance policy covered the loan from 25% to 50% and was taken from 25% to 50% of the period.	3 class	12
The collateral is old, illiquid, insufficient, and the ownership belongs to another enterprise. The financial condition of the guarantor is unstable. The insurance policy covered less than 25% of the loan, and less than 25% of the period was taken.	4 class	9
The collateral is invalid, illiquid, insufficient, the right of ownership belongs to another enterprise. The financial condition of the guarantor is bankrupt. The insurance policy covered less than 25% of the loan, and less than 25% of the period was taken.	5 class	0
Project realism:		**20**
It meets the requirements of the bank's credit policy and has sound sources of information. There is an opportunity to implement the project: a positive financial result of the enterprise. The amount of cash flow is enough to repay the loan amount (principal and interest). The business plan of the project is economically and practically sound. The company has enough competent staff. There are favorable natural conditions, adequate infrastructure and utilities.	1 class	20
It meets the requirements of the bank's credit policy and has sound sources of information. There is an opportunity to implement the project: a positive financial result of the enterprise. The amount of cash flow is enough to repay the loan amount (principal and interest). The business plan of the project is economically and practically sound. The company does not have enough competent employees.	2 class	15
It meets the requirements of the bank's credit policy and has sufficient sources of information. There is a severe risk of the implementation of the project. The positive financial result of the enterprise and the amount of cash flow are sufficient to repay the loan amount (principal and interest). The company does not have enough competent employees. There are favorable natural conditions and adequate infrastructure. There is a delay in the provision of utilities.	3 class	12
It does not fully meet the bank's credit policy requirements and does not have sufficient sources of information. There is a severe risk of the implementation of the project. The positive financial result of the enterprise and the fact that the amount of cash flow is sufficient to repay the loan amount (principal and interest) depends on the risk. The company does not have enough competent employees. There are favorable natural conditions and adequate infrastructure.	4 class	9

There is a delay in the provision of utilities.		
It does not meet the bank's credit policy requirements and does not have sufficient sources of information. There is a high risk in the implementation of the project. The negative financial result of the enterprise and the amount of cash flow are not enough to repay the loan amount (principal and interest). The company does not have enough competent employees. Favorable natural conditions and infrastructure are not available. Utilities are bad.	5 class	0
Goods competitiveness level		**20**
Diversity of goods, high quality, high added value and optimal price, optimal cost, good sales service, high demand.	1 class	20
There are various goods, high quality, good sales service, optimal pricing, differentiated cost, demand.	2 class	15
Lack of type of goods, average quality, average price, average cost, sales service.	3 class	12
Lack of type of goods, low quality, average price, high cost, and sales service are not at the demand level.	4 class	9
Lack of type of goods, low quality, average price, high cost, no sales service, very low demand.	5 class	0
Business reputation		**20**
The company has a high position in the industry and the branch, a high reputation in the market, a well-known brand	1 class	20
The company's position in the industry and the branch is average, has a reputation in the market, the brand is familiar to customers	2 class	15
The role of the enterprise in the industry and the branch is not noticeable significant, and the brand is not familiar to customers.	3 class	12
The role of the enterprise in the industry and the branch is not significant, and the brand is not familiar to customers.	4 class	9
The role of the enterprise in the industry and the branch does not matter. It does not have its reputation in the market and does not have a brand.	5 class	0
Total score		**100**

Source: Authors

According to the creditworthiness analysis and its scoring model, the total score is studied in 5 classes ranging from 0 to 200. Table 4 provides full details by grades.

Table 4

The order of credit allocation by classes

Class	**Brief explanation**	**Total (score)**
1-class	This category of enterprises is high creditability. Credits to these enterprises can be provided on a preferential basis in the general order.	156-200

2- class	This category of enterprises can repay the loan. These enterprises can be allocated loans in the prescribed manner.	120-155
3- class	Businesses in this category cannot repay the loan. In some cases, it is possible to provide loans to these enterprises at high-interest rates.	82-119
4- class	The financial condition of the enterprise is not stable. Credit risk is very high in this category of enterprises.	till 81
5- class	Credit is not provided to this category of enterprises.	0

Source: Authors

The above methodology reveals the essence of the creditworthiness analysis and scoring model of its assessment, taking into account the characteristics of the national economy. International models, national experience, practical problems and approaches to their solutions were used in the development of this model.

DISCUSSION

The proposed methodology and model of creditworthiness analysis and assessment has the following advantages:

1. This model can accurately, fully, comprehensively assess the creditworthiness of the enterprise.

2. In contrast to the current assessment, the creditworthiness status is based on 5 classes. It will increase the ability of banks to select enterprises based on creditworthiness. The following table provides a comparative analysis of the current and proposed scoring model of creditworthiness analysis and valuation.

Table 5

A comparative analysis of the current and proposed scoring model of creditworthiness analysis and valuation

In the current order		**In the scoring model**	
Class	Credit allocation condition	Синф	Credit allocation condition
1-class	Credit is allocated	1-class	It is possible to allocate a loan on a preferential basis
2-class	Credit can be allocated in individual cases	2-class	Credit is allocated in general order
3-class	Credit is not allocated	3-class	Credit can be allocated at high-interest rates in individual cases
		4-class	Too high credit risk
		5-class	Credit is not allocated

Source: Authors

3. The methods of calculating the criteria for assessing creditworthiness have been improved, i.e. the level of accuracy has been increased.

4. Being developed taking into account international experience

CONCLUSION

In the practice of the banks of the Republic of Uzbekistan, the coefficient method is used to assess the enterprises' creditworthiness. Therefore, the main focus is on financial performance. However, in the coefficient method, it is not possible to fully disclose financial performance with these three ratios. In addition, the shortcomings of the method of calculating these coefficients further indicate that the uncertainty of this method is high. Another disadvantage of this coefficient method is that the loan is allocated to the next period, based on the data of the completed period. Therefore, predicting future activities is one of the important tasks.

Another aspect that is not paid attention to by banks, but is important to pay attention to, is non-financial indicators. It is because non-financial indicators are an important factor for the sustainable development of future activities of enterprises.

Considering the above existing shortcomings and combining foreign experience, the methodology "Scoring model of creditworthiness analysis" was developed.

This methodology allows to sharply reduce credit risk through a comprehensive assessment of the creditworthiness of the enterprise based on financial and non-financial indicators.

CONFLICT OF INTERESTS AND CONTRIBUTION OF AUTHORS

The authors declare the absence of apparent and potential conflicts of interest related to this article's publication and report on each author's contribution.

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