

Methodology of Credit Analysis Development

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ABSTRACT

The subject of research presented in this paper refers to the definition of methodology for the development of credit analysis in companies and its application in lending operations in the Republic of Serbia. With the developing credit market, there is a growing need for a well-developed risk and loss prevention system. In the introduction the process of bank analysis of the loan applicant is presented in order to minimize and manage the credit risk. By examining the subject matter, the process of processing the credit application is described, the procedure of analyzing the financial statements in order to get an insight into the borrower's creditworthiness. In the second part of the paper, the theoretical and methodological framework is presented applied in the concrete company. In the third part, models are presented which banks should use to protect against exposure to risks, i.e. their goal is to reduce losses on loan operations in our country, as well as to adjust to market conditions in an optimal way.

Key words: *loan, credit analysis, credit risk, credit process, assessment of creditworthiness*

JEL Classification: J21, E0

INTRODUCTION

Credit policy is the one that directs credit placements into priority economic branches and sectors, ensuring the stability of an individual bank as a lender. A good credit policy implies a well-designed credit analysis and a selection of credit placements. (Hanić A., Žunić E., Dželinčondžić, 2017). Adequately defined credit policy means respecting strict principles and standards for formulating loan applications, financial analysis, credit analysis, credit classification and structure, implementation of internal control of approved loans, and determination of methods and ways of credit obligations (Domazet, Marjanović, 2017). Approving loans to clients is the core business of banks. Loans are the basic component of assets of most banks. They are the main source of income, but also the main source of risk exposure. Banks must constantly monitor their overall loan coefficient in relation to total assets, being aware that the increase in the loan-to-asset ratio is promising higher revenues, but also a higher risk (Ćirović, 2002).

The coefficient method is most common in banks. Its basic function is to closely monitor the ability of the borrower to repay the credit obligations, the degree of efficiency of the business and the use of resources as well as the levels of potential risk (Vuković, Domazet, 2014). One of these criteria is the company's liquidity, its profitability, its indebtedness, equity, interest rate coverage, operational efficiency of assets and its business integrity (Ranković, 2005).

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Loan granting is also a risky activity, as apart from the internal factors, there are external factors which also influence the quality of the loans, such as changes in the economy, natural disasters, as well as the regulations adopted by the state. The estimation of the probability of the debtor's default is the main component of any rating category (Anderson, 2007). Among the existing approaches to measuring credit risk, the key input for each of them is the existence and use of the borrower's credit rating (Carey & Hrycay, 2001).

Despite innovations in the field of financial services, credit risk is still the most significant single cause of bank bankruptcy (Vuković, Domazet, 2015). In its broader sense, credit risk also signifies the risk from a decrease in the credit rating of the debtor or the issuer of securities, thereby increasing the probability of default and/or loss of money invested (Domazet, Stošić, 2013). The exposure to credit risk in modern banking business is measured by estimating the expected loss on a certain investment based on quantitative analysis, whereby the expected loss for this type of risk depends on three components (BCBS, 2004).

Credit and interest rate risk are the two most important risks which commercial banks may encounter. This article provides a comprehensive framework for measuring the integrated impact of both types of risk. Taking into account the changes in the prices of characteristics of assets, liabilities and off-balance sheet items, the integrated impact of loans and interest rates on banks' economic value and capital adequacy is estimated. The stress test, which is applied on banks, is fundamental to measuring credit and interest rates (Drehmann M., Sorensen S, and Stringa M., 2010). Altman's Z-score model was a logical upgrade of the current development of credit analysis. The financial indicators that measure profitability, liquidity and solvency of the company were considered irreplaceable and priceless performance indicators of the company. It is only recently that, with the development of new credit risk models, the potential of using financial indicators in assessing the creditworthiness in anticipating bankruptcy of the company is put to question (Altman, Edward I., G. Haldeman, and P. Nurajanan, 2001).

Loans are granted on the basis of a direct request by the client, who contacts the credit institution. When discussing with a client, the loan officer assesses his character and the real purpose of the necessity for additional monetary funds. A loan officer also contacts other creditors who have previously approved loans to this client to assess their experience in dealing with this client. Records of an earlier loan can be seen in the credit bureau. When all the necessary documentation is collected, the loan officer undertakes preparation of the financial analysis of the loan applicant in order to determine the client's creditworthiness. The Credit analysis department then makes a proposal and gives their recommendation, i.e. their opinion, which is further forwarded to the Credit Committee for approval. If the Credit Committee approves the request, contracts are drafted, signed by both parties.

The evaluation of the borrower's creditworthiness is defined as a financial analysis in which the information collected is systematically examined and interpreted in order to evaluate the past and present performance of the borrower, as well as its future prospects. The analytical techniques used in the financial analysis are numerous. The financial analysis is based on a critical examination of the balance sheet, the profit and loss account, the cash flow statement and the ratio of numbers. Balance sheets and profit and loss accounts provide a static picture of the borrower's creditworthiness, while the cash flow statement brings about the required dynamism into the analysis (Ranković, 2005).

The most complex method of determining the creditworthiness of a loan applicant is the degree of business efficiency and utilization of resources, the level of operating funds used, the efficient use of credit resources and the level of potential credit risk. The analysis becomes a very suitable approach to continuous monitoring and checking the borrower's creditworthiness, early detection of deformations in the rating of financial strength of companies and signaling the process of correcting the business strategy. The determination of creditworthiness through the coefficient method is applied widely. The method consists of the analytical transformation of raw balance data and company reports and the comparison of the obtained credit rates with

standard, theoretical, empirical and sectoral rates. By analyzing all indicators, the creditworthiness of the company is evaluated, which represents its ability to repay the debt.

The aim of the research is the analysis of the credit analysis methodology and application of the model to reduce the credit risk in banks in the Republic of Serbia. Risk management becomes very important under the conditions of constant changes in the banking environment today and in the organization of banking operations which bear a very high risk. The basic hypothesis is the application of more rational components for making the improvement in credit analysis. Banks can use empirical models that can help to determine the financial difficulties of the borrower. Our banks cannot remain immune to this trend of development, and the need to control the risks that this development brings about. It emphasizes the process of deregulation of the economy and the banking system, but also points out the instability of the conditions in which this process is implemented. In the banking sector this need is best illustrated by the data on the growing number of non-performing loans in many countries, which further motivated the National Bank to develop a set of procedures and to introduce regulations governing the control and protection against credit, interest, currency and other risks, and also encouraged many banks to seriously direct the actions forecasting and managing risk, and develop functions of risk management.

The oldest and most popular empirical model is called the Z-score model. The origin of all empirical models is the Z-score model, designed by Edvard Altman. The model was a logical upgrade in the evolution of the development of credit analysis. Financial indicators which are measured are the following: profitability, liquidity and solvency of companies were considered indispensable and invaluable indicators of company performance. Yet recently, with the development of new credit risk models, the potential use of financial indicators to assess the creditworthiness of companies and bankruptcy forecasts are put on question. The essence of the method is to bridge the gap between traditional credit analysis and exact parameters obtained based on statistical multivariate methods of analysis of the creditworthiness of the loan applicant. Zeta method is considered a second generation of Z indicators and consists in using current data, a larger number of variables (a total of seven) and the inclusion of a very wide range of companies from industry, trade, services etc. It is considered to be particularly reliable for long-term predictions. It is based on the methodology of discrimination analysis and formulation of synthetic indicators of financial and credit quality of the borrower. This method is very important in taking decisions on the (non) approval of the loan to a company. Based on the results of the bank will determine the level of interest rates, compensatory share of borrower, collateral structure and coverage of credit. Zeta method determines the solvency of the borrower and the level of potential risk in case of placing the loan. Companies that do not meet the established framework of the financial profiles cannot get a loan. Methods for early detection of financial difficulties of enterprises by banks have a wider application in relation to the allocation of bank resources.

CREDIT ANALYSIS IN THE COMPANY Z-GROUP BASED ON THE PARAMETERS USED IN BANKS IN THE REPUBLIC OF SERBIA

Credit analysis of the company Z-Group is presented in the paper.

Table 1. Balance sheet Z-Group (in 000 EUR)

ASSETS	31/12/2016	31/12/2015	31/12/2014
Cash and cash equivalents	3,258	2,499	1,435
Receivables from sales	8,929	7,035	5,994
Other receivables	4,994	4,167	2,455
Inventories	35,950	32,111	19,203
Current assets	53,080	45,811	29,078
Land and premises	31,044	21,385	18,856
Plant and equipment	14,144	13,268	9,789
Current payments and construction	1,838	118	9
Tangible fixed assets	47,025	34,771	28,655
Shares, related parties	0	0	0
Receivables from sales (mid-term/long-term)	0	0	0
Other assets (mid-term/long-term)	590	566	100
Various assets (mid-term/long-term)	590	566	100
Accrued taxes	1,470	347	185
Other receivables	626	3,161	65
Goodwill	3,131	0	0
Total goodwill, Z-Group receivables	5,228	3,508	250
Total assets	105,923	84,658	58,083
LIABILITIES AND CAPITAL	31/12/2011	31/12/2010	31/12/2009
Liabilities to banks	34,762	15,461	13,758
Liabilities from sales (short-term)	25,759	23,323	16,369
Other liabilities, deferred income (short-term)	3,757	3,192	2,477
Current mid-term/long-term liabilities	7,360	7,330	4,145
Provisions – without pensions (short-term)	122	266	750
Total short-term liabilities	71,760	49,572	37,499
Liabilities to banks	13,451	7,216	7,880
Liabilities from sales (mid-term/long-term)	472	0	0
Liabilities for pensions	0	0	0
Other mid-term/long-term provisions	0	0	0
Other liabilities, deferred income (mid-term/long-term)	1,395	151	127
Liabilities (mid-term/long-term)	15,318	7,367	8,007
Minority interest and fixed assets	6,653	6,653	5,892
Extra assets, capital surplus	16,461	16,187	287
Retained earnings/ accrued loss	-11,142	3,033	3,638
Own shares	-734	-387	-736
Other changes on equity	7,607	2,233	3,496
Equity	18,845	27,719	12,577
Total liabilities and equity	105,923	84,658	58,083

Source: Serbian Business Registers Agency

Table 2. Profit and loss account of Z-Group (in 000 EUR)

Revenues, expenses and result	31/12/2016	31/12/2015	31/12/2014
Net sales	135,285	110,761	90,671
Costs for goods sold	-74,417	-59,548	-47,161
Gross profit (loss) from business operation	60,868	51,214	43,510
Sales, general and administrative costs	-29,492	-21,739	-17,116
Other business expenses	-39,076	-27,829	-17,116
Writing-off/appreciation of receivables	-241	-41	-7
Currency difference	-14	358	463
Earnings before interest and tax (EBIT)	-7,305	4,061	7,189
Interest and other expenses	-6,024	2,190	5,419
Interest receivable and other financial revenues	90	205	42
Earnings before tax/Group/extraordinary	-13,239	2,190	5,419
Revenues from participation of related parties	0	0	0
Earnings before tax and extraordinary revenue	-13,239	2,190	5,419
Other/Writing-off/Appreciations/Provisions	0	0	0
Extraordinary writing-off of tangible and intangible fixed assets	0	0	0
Extraordinary expenses	0	0	0
Profit/loss from sales of assets	0	0	0
Addition/Ascribing/with provisions before tax	0	0	0
Extraordinary revenues	0	0	0
Other ascribing and revalorization	0	0	0
Profit (loss) before tax on income	-13,239	2,190	5,419
Deferred tax income/loss	1,122	-113	-18
Income tax	-144	-1,149	-1,311
Net income	-12,261	927	4,089

Source: Serbian Business Registers Agency

Negative and available cash flows in 2015 and in the first half of 2016 are the result of negative flows from business and investment activities. The Group has an increase in inventories, a reduction in liabilities to related companies, and a significant investment in equipment.

Cash flow statement of Z-Group is shown in Table 3.

Table 3. Cash flow statement of Z-Group (in 000 EUR)

Position	31/12/2011	31/12/2010	31/12/2009
Earnings before tax (Profit/loss before income tax)	-13,239	2,190	5,419
Depreciation of intangible fixed assets	6,253	4,192	3,047
Writing-off/appreciation of receivables	241	41	7
Loss/profit from sales of fixed assets	0	0	0
Other extraordinary expenses/revenues	0	0	0
Loss/profit from capital investments/related parties	0	0	0
Interest and financial expenses/revenues	5,934	1,871	1,770
Earnings before interest, taxes, depreciation and amortization/EBITDA	-811	8,294	10,243
Income tax	-144	-1,149	-1,311
Changes in tax/provisions	-1,055	-581	0
Earnings before interest, depreciation and amortization/EBIDA	-2,010	6,563	0
Interest and financial expenses/revenues	-5,934	-1,871	0
Current long-term liabilities from the previous year	-7,330	-4,145	0

Position	31/12/2011	31/12/2010	31/12/2009
Increase/decrease of provisions for pensions	0	0	0
Increase/decrease of other non-cash items	0	0	0
Cash flow for capital expenses, working capital	-15,273	547	0
Working capital	-2,597	-7,907	0
Cash flow for capital expenses	-17,871	-7,357	0
Inflow of tangible fixed assets	-14,668	-12,680	0
Revenues from sales of fixed assets	640	2,229	0
Capital investments/related parties/ financial assets	-6	0	0
Goodwill (non-tangible fixed assets)	-3,131	0	0
Other assets/liabilities	455	-465	0
Adjusting conversion/revaluation/other writing-off	501	-1,357	0
Cash flow of the Group	-34,080	-19,633	0
Assets/liabilities of the group	2,535	-3,097	
Cash flow before dividend	-31,545	-22,730	0
Dividends	-1,310	-745	0
Own shares	-347	0	0
Stake in loss/profit in minority interest	0	0	0
Financial needs/surplus	-33,203	-23,484	0
Cash, cash equivalents, marketable securities	-758	-1,064	0
Liabilities to banks (short-term)	19,300	1,704	0
New liabilities to banks (mid-term/long-term)	13,595	6,666	0
Adjusting non-realized changes (realized general revenues)	1,066	-476	0
Cash after debt financing	0	-16,655	0
Absorption of increase/decrease of share capital	0	0	0
Cash after financing	0	0	0

Source: Authors calculation based on Serbian Business Registers Agency data

After analyzing the balance sheet, the profit and loss account and the cash flow statement all financial indicators which are applied in the development of credit analysis by domestic banks with foreign capital are shown in the Appendix part (Table A).

Based on the data used in the proposed model, the financial analysis of Z-Group was made and the following conclusions were drawn:

1. Return on equity (ROA) is negative in 2016, telling investors that the Group does not earn any money, despite making investments.
2. Return on assets (ROE) in 2016 is negative. The fall in this indicator shows the competitive weaknesses of the company.
3. The net margin is the ratio of profit after taxation and net sales. It shows how much net profit the Group has generated from the total realized business at the market. In the presented examples it is negative.
4. Return on investment was negative in 2016 and amounted to -12.5%, while in the previous year it amounted to
5. 2,6%. The company's revenues began to decline, according to which the loan officer concludes that the Group will hardly repay the existing loan.
6. The return on the engaged capital represents the ratio of the net profit with total assets. It amounted to -11.1% in 2016.
7. The Group's equity ratio in 2016 was 17.79%. The share of borrowed sources of financing is significant and is above their own capital: also, business assets are predominantly (82.3%) financed with borrowed capital.

8. The ratio of distribution of dividends was negative in 2016 and indicates a weak development perspective of the company.
9. EBIT/interest expense in 2016 was negative and indicates the possibility of bankruptcy. It also shows the company's inability to fulfill its obligations to creditors.
10. Debt / EBITDA is negative and poses a problem for the Group to settle its debts to banks because there is no cash available.
11. Tangible fixed assets/sales - fixed assets in 2016 were provided by sale in the amount of 64.7%.
12. The total liabilities ratio shows that the level of indebtedness increases from year to year.
13. The gross profit margin amounted to 45% in 2016 and shows how much the Group has on its disposal to cover current expenses on financial and other expenditures. Gross profit margin is a measure of market demand for Group's products or services and market competitiveness.
14. The Z-Group sales ratio in 2016 was decreasing and indicates that the company does not have the capacity to grow in the local economy and does not use its capacity sufficiently.
15. The debt-to-sales ratio increased from year to year, as equity and net assets declined faster than the company's liabilities. Most of the financial liabilities represent short-term liabilities. It is necessary to make the conversion of short-term liabilities to long-term in agreement with the bank.
16. Business loss in 2016 and negative net result are caused by the large costs of moving the warehouse and administrative buildings of the company into a new distribution center, as well as due to the increase in the price of energy products, which resulted in increased production and distribution costs.

CREDIT RISK MITIGATION

At international level actions are taken and methods of risk assessment are standardized. The leading financial institutions were involved in the development of internal models for measuring market and credit risk. The agreement on international capital, now known as Basel II, has been adopted. The foundations of the Second Basel Accord are the following (Sinha, 2012):

1. The minimum capital requirements of each bank are based on their own assessments of risk exposure.
2. Supervisory review for determining the risk assessment procedure of each bank and adequate level of capital.
3. Increased public informing on the actual financial position of the bank so that market discipline can become a decisive factor that would force too risky banks to reduce risk exposure.

One of the key novelties proposed in the Second Basel Accord is the requirement that banks hold capital to the level they can endure business risk in addition to already existing credit and market risks. For the assessment of credit risk, two main approaches have been proposed as follows:

1. Standardized approach
2. Approach based on internal ratings -IRB

A standardized approach includes credit risk weights which are multiplied by credit exposure in order to obtain weighted risk assets. Ratings assigned to creditors by rating agencies are used as risk weights. Rating agencies are independent institutions that perform an external credit assessment of the client. The advantage of this approach is the improvement of refined approaches in determining risk weights. The standardized approach does not recognize the time dimension of credit risk, i.e. the different placement maturities when determining risk ponders.

It also does not recognize the maturity structure of interest rates that reflects the rise in credit risk with the flow of time.

The IRB refers to the fact that ratings internally assigned to borrowers play a major role in the determination of risk weightings. The practice has shown that most banks base their credit risk assessment methodology on one component of credit risk - bankruptcy probability. An important feature of the IRB approach is that it measures both unexpected and expected losses. The expected losses should be covered by reserves for losses on credit placements, which is why they are separated from the second level of regulatory capital. The level of expected losses is obtained as a multiplication of the probability of bankruptcy and bankruptcy loss. The conditional expected loss, which is the multiplication of the two previous explanations of the parameter, indicates the total capital that the bank must possess to cover the expected and unexpected loss.

The risk weight function promoted in Basel II has the following form (<http://www.addiko.com>): Figure 1.

$$K = \left[LGD \times N \left[(1 - R)^{0.5} \times G(PD) + \left(\frac{R}{(1 - R)^{0.5}} \times G(0.999) \right) \right] - PD \times LGD \right] \times (1 - 1.5 \times b(PD))^{-1} \times (1 + (M - 2.5) \times b(PD))$$

N – standard normal probability

G – inverse standard normal distribution

R – correlation coefficient

B (PD) - adjustment for maturity date which depends on the bankruptcy probability

Conditional probability of bankruptcy in the function of risk weight is presented by the following:

$$N \left[(1 - R)^{-0.5} \times G(PD) + \left(\frac{R}{(1 - R)^{0.5}} \times G(0.999) \right) \right] \quad (1)$$

In this expression, G (0.999) is interpreted as the inverse standard deviation from which the conservative value of the system factor for the confidence level of 99.9% is derived. Another important element of the expression is G (PD), which denotes the inverse standard normal distribution from which the bankruptcy threshold is derived under normal business conditions, based on a certain probability of bankruptcy. Similar to the conditional probability of bankruptcy is the average probability of bankruptcy PD. It is weighted by the loss caused by bankruptcy in conditions of an unfavorable environment in order to obtain the unexpected loss measure. It is the economic interpretation of the term (<http://www.addiko.com>):

$$LGD \times N \left[(1 - R)^{-0.5} \times G(PD) + \left(\frac{R}{(1 - R)^{0.5}} \times G(0.999) \right) \right] - PD \times LGD \quad (2)$$

An important parameter in the above expression is the correlation coefficient R. The correlation coefficient R is characteristic for each class of credit exposure. Changes in the value displayed by various classes of credit exposure are dependent to a various degree on the state of

the general economic environment. The new agreement recognizes the basic and higher IRB approach. (Alexander, C. and E. Sheedz, 2004).

If the bank applies a higher IRB approach, it independently determines the probability of bankruptcy, but it also has the ability to independently determine the value of some other risk factors, and potentially of all of them together. When estimating the probability of bankruptcy, banks have a lower limit of its value to 0.03%. Also, it should be determined on the basis of the long-term average rate of bankruptcy of borrowers from a given class or subclass for the time period of one year. The quality of the IRB approach derives from the following (Alexander, C. And E. Sheedz, 2004):

- It is obligatory to evaluate the credit rating of each loan applicant.
- Obligatory risk assessment of any business transaction that should be subject to loan making.
- A diversified scale of risk weight
- The ability of banks to use their own internal risk models, as more sophisticated and more precise models in determining a risky portfolio of a particular bank.

The Basel Committee decided to introduce the latest standards - Basel III. The new set of rules implies an increase in operating capital in case of market instability. Banks are required to keep ratio of capital and their total assets to 7%. For these reasons, banks will have to retain their profits, which they will not give to the shareholders or spend on bonuses. The reform package that Basel III brings about envisages that the minimum ratio of regular capital is increased from 2% to 4.5%. Banks will be obliged to have stabilization reserve that will be used to protect capital in times of crisis. The stabilization reserve is allocated on the basis of a set of rules that limit the payment of dividends and rewards when the limit of stabilization reserve is exceeded. (BCBS, 2010).

Although banks in the region have mainly introduced a risk management framework which is in accordance with regulations, the issue of optimizing business processes remains unsolved.

CONCLUSION

In this paper, the development of credit analysis is presented as well as the implementation of all ratio indicators. In the development of credit analysis, return on equity (ROE) is a very important indicator, as its decline points to competitive weaknesses of the company. Return on assets (ROA) represents the ability of the company management to maximize profit in relation to invested capital. Based on a net margin, a credit analyst concludes to what extent the management is able to maintain revenue growth by investing in relation to the increase in costs due to interest payments on the company's loans.

In the analysis of debt ratios, banks apply another three coefficients as follows: EBIT / interest expenses, EBITDA / interest expenses and interest debt / EBITDA. The indicator between interest debt and EBITDA represents the ability of the company to settle its loan obligation which is required to be less than five where a credit officer can conclude that a company can settle its obligations in five years from its own funds. Based on the value of net working capital, the credit analyst concludes that the company is funded by external sources of financing or by its own sources. If the company has a negative cash flow, the company relies more on external sources of financing, being a high-risk enterprise with low profitability.

The European Union has adopted a key directive introducing a mandatory requirement for all banks in the EU. As Basel II focuses on the conscious management of risks by the bank management, banks will have to archive data, primarily by shifting ratings and failing to fulfill obligations as well as by determining the distribution of these phenomena by rating classes.

In this paper, models for the assessment and management of credit risk are defined. Some of their basic characteristics have been examined. The conclusion can be drawn that all models can be applied in banks in Serbia in order to reduce uncollectibles.

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