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## **A MODEL OF ACCOUNTS RECEIVABLE RISK MANAGEMENT FOR BOSNIA AND HERZEGOVINA'S BUSINESS ENVIRONMENT**

### ABSTRACT

*The paper deals with accounts receivable collection risks in Bosnia and Herzegovina. The conducted research and analysis of existing models of accounts receivable collection risks, created a new model of collection risk management suitable for the business environment found in Bosnia and Herzegovina. The model is also applicable in other similar transition economies lacking the modern market economy features. No risk management model can replace a fully functioning legal and economic system. Implementation of reforms in all areas is a fundamental condition for solving these problems. Nevertheless, a well designed accounts receivable risk management is an appropriate transition management tool that may create the preconditions for recovery. The proposed model is based on cash flow indicators, working capital and asset ratios, current and quick ratios, and debt-equity ratios. It is optimal in assuring against accounts receivable payment risks in Bosnia and Herzegovina, as it was based on Bosnian financial statements data, and collateral and insurance instruments in usage in the country.*

**Key words:** *accounts receivable risk management, liquidity risk, illiquidity, cash generation, accounts receivable collection, transition*

**JEL classification:** *M41, G30*

### **1. INTRODUCTION**

Cash collection is one of the most important functions of a company, second only to revenue generation. Accounts receivable risk management is an indispensable tool for every company. The need is more exacerbated in countries with liquidity problems. This is especially the case in Bosnia and Herzegovina. The scale of illiquidity in Bosnia and Herzegovina endangers the entire national payments system and threatens a national financial breakdown. The accounts receivable collection risk cannot be fully avoided, and cannot be reduced by the full amount. Nevertheless, it can be reduced to an

acceptable, tolerable and reasonable measure that does not jeopardise the business success and long-term business goals.

Accounts receivable risk management includes research, analysis and detection of possible risks of receivables collection failures prior to the execution of the sales contract and insurance measures against these risks. The results obtained by the conducted research and by analysis of existing models of accounts receivable collection risks, created a new model of collection risk management suitable for the business environment found in Bosnia and Herzegovina. Furthermore, this model may be applied in other similar economies in transition, lacking the features of a modern market economy such as: a fully functioning legal system based on the rule of law, the existence of all necessary institutions to enforce the contracts, a developed democratic and social system, and a functioning economic system. No risk management model can replace a fully functioning legal and economic system. Implementation of reforms in all areas is a fundamental condition for solving these problems. Nevertheless, a well designed risk management system of accounts receivable collection is a good and appropriate transition tool that may create the preconditions for recovery and development of a market economy.

## **2. THE BUILDING BLOCKS OF THE MODEL**

The proposed model of accounts receivable risk management is based on cash flow indicators, working capital and assets ratios, the coefficient of accelerated liquidity and the relationship between total liabilities and equity. The proposed model should be optimal in the assurance against accounts receivable payments risks in Bosnia and Herzegovina because it is based on domestic financial statements data and insurance instruments that do exist in the country.

### **2.1. The definition of the hypothesis**

The fundamental hypothesis is that the existing system of revenue collection risk management in Bosnia and Herzegovina is not appropriate for the transition period. A new one should be introduced, which will create the preconditions for the recovery of the economy and its development on the principles of market economy. With the goal of statistical testing, the working hypothesis was transformed into the corresponding statistical hypotheses.

The first statistical hypothesis relates to the selection of adequate economic indicators, and inquires whether there is such a set of economic indicators which could ensure maximum informational efficiency with respect to Bosnia and Herzegovina's payment system.

The second statistical inquiry relates to the design of optimal receivables collection risk management model, which along with the selected indicators takes into account other factors, such as the amount of debt and the strength of the instruments of insurance. This hypothesis presumes there is no such system of managing the risks of receivables collection in Bosnia and Herzegovina's system of payments, which is good and

appropriate for the transition period and can create assumptions for development of a market economy.

## 2.2. Sample definition

The base for a new model of collection risk management was provided by a sample of statistic indicators, which is a result of a selection of economic indicators chosen to best represent the data taken from financial statements of selected companies. The sample of companies was selected from a set of companies that have been recorded in the Registry Agency responsible for reception and recording of data from financial statements of all enterprises and from the Registry of companies that are quoted on the Sarajevo Stock Exchange (SASE). The observed period covers 5 years: between 2003, and 2007. During their selection, companies had to meet some further conditions:

- they shouldn't have belonged to finance or insurance sectors;
- they had to have at least 100,000 KM of equity;
- they had to have available compulsory financial statements (balance sheet, income statement, statement of cash flows) for the period between 2002 to 2007.

The reasons for that are to ensure the following:

- the relative homogeneity of the sample with respect to company type.
- the homogeneity of the sample with respect to company size.
- balanced data sets for research consistency.
- data sets of at least five year periods, in line with the approach of other relevant authors (eg, Beaver 1967 and Altman 1968).
- data for the calculation of all independent variables (indicators).

Based on the data from financial reports, the sample was divided into two groups of 30 companies: the ones operating at profit and the others, operating at a loss during the analyzed period.

## 2.3. The “value added” indicator

The indicator “value added”, was used as a criterion to differentiate between profitable and non profitable enterprises. The indicator “value added” is according to the “Business Excellence model” based on the economic profit over and above the own cost of capital, i.e. opportunity cost of capital. Own cost of capital is a product between the enterprises equity and the cost of debt capital represented by the average bank savings rate (4%). The “value added” indicator is calculated by the following formula:

$$\text{Value added} = \frac{\text{Net profit}}{\text{Equity} \times 0,04}$$

Enterprises having this rate greater than 1 are profitable and the other having this rate lower than 1, are not.

## 2.4. The variables

Selected statistical tests and the application of regression analysis were necessary to define the dependent and independent variables. The dependent variable is a dummy variable shown in binary form, and defined by the value added indicator.

Independent variables are indicators chosen by the analysis of relevant scientific literature and suggested by the majority of its authors. Independent variables are numerical and classified into three groups: liquidity indicators, cash flow indicators, and solvency indicators as shown in the following table.

The independent variables are the most commonly used financial ratios.

Table: Indicators		Definition	Data source
<b>I. Liquidity indicators:</b>			
1	Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	Balance sheet
2	Working capital to total assets ratio	$\frac{\text{Current assets} - \text{current debt}}{\text{Total assets}}$	Balance sheet
3	Quick ratio	$\frac{\text{Current assets} - \text{inventories}}{\text{Current liabilities}}$	Balance sheet
<b>II. Cash flow indicators:</b>			
1	Cash flow ratio	$\frac{\text{Free cash flow}}{\text{Current liabilities}}$	Cash flow report Balance sheet
2	Free cash flow ratio I	$\frac{\text{Operating CF} + (-) \text{Investment CF}}{\text{Total liabilities}}$	Cash flow report Balance sheet
3	Free cash flow ratio II	$\frac{\text{Net CF of all activities}}{\text{Total liabilities}}$	Cash flow report Balance sheet
<b>III. Solvency indicators:</b>			
1	Gearing ratio	$\frac{\text{Non-current liabilities}}{\text{Non-current liabilities} + \text{Equity}}$	Balance sheet
2	Debt ratio	$\frac{\text{Total liabilities}}{\text{Total assets}}$	Balance sheet
3	Debt-to-equity ratio	$\frac{\text{Total liabilities}}{\text{Equity}}$	Balance sheet

The used **liquidity ratios** are: the current ratio, the working capital to total assets ratio, and the quick ratio.

**The current ratio** is the ratio of current assets to current liabilities. It shows the company's ability to pay back its short-term liabilities with its short-term assets (cash, inventory, receivables). The higher the ratio, the more capable the company is of paying its current obligations. The limit to the ratio is 1.

**Working capital to total assets ratio (WCTA)** shows the availability of working capital (difference between current assets and current debt) in relation to total assets. The limit value of this indicator is 25% of working capital in relation to the total assets, i.e. the values higher than 25% mean there is sufficient liquidity.

**Quick ratio** (QR, also known as Acid-test) is an alternative measure of liquidity, similar to the current ratio, but it does not include the inventories into current assets as they may be difficult to liquidate quickly. The limit value is 0,8.

The used cash flow ratios are: the cash flow ratio, free-cash-flow 1 to total liabilities ratio and free-cash-flow 2 to total liabilities ratio.

**Cash flow ratio** shows the firm's capability to pay off its current liabilities. The limit value was set on **0.4, i.e. 40%**, and assumes the company's ability to meet all its current obligations. When the ratio of cash flow is greater than 0.4 the company should have no problems with liquidity, and when the coefficient is lower than 0.4, the company indicates a financial instability and possible future illiquidity. The cash flow from operating activities in "healthy" companies and financial institutions is at least 40% of the current liabilities, or at least 20% of total liabilities.<sup>1</sup>

Recently, the most frequently used, but also the most controversial category of cash flow is free cash flow. However, the problem in literature is, that there is no single definition for the calculation of free cash flow. Usually, defined as the difference between cash flow from operating activities and capital expenditures necessary to maintain the same level of operations, the two sub-categories of free cash flow are free cash flow 1 (a money flow necessary to maintain the present business activities), and free cash flow 2 (a money flow readily available to improve the present business activities). To get these measures in form of a ratio, they are compared relative to total debt to receive:

**Free cash flow 1 to total debt** (FCF1TD), and **Free cash flow 2 to total debt** (FCF2TD).

The used solvency indicators are:

**Gearing ratio** (GR), shows the level of long term debt relative to total capital.

**Debt ratio** (DR) shows the company's ability to meet all its outstanding obligations.

**Debt to equity ratio** (D-E).

### **3. THE ANALYSIS**

The analysis has two parts. Within the first part, an analysis of financial reports was conducted and the needed ratios were calculated. During the second part, the data were statistically analysed. The software, **SPSS v.13.0** was used to compute the data, enabling the logistic regression and the non-parametric tests ( $\chi^2$  test and others).

The binary logistic regression is the following:

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<sup>1</sup> Gulin, D.: "Sastavljanje i korištenje izvještaja o novčanom toku", Računovodstvo i financije 03/2006. Zagreb.

$$E [y_i] = \frac{e^{\beta_0 + \beta_1 X}}{1 + e^{\beta_0 + \beta_1 X}}$$

The **Wald significance test** is used to test each and every variable. The model as a whole is tested on **Nagelkerks R<sup>2</sup>**, and **Hosmer & Lemesh  $\chi^2$  test**.

### 3.1. Statistical computation

The model's function is the following:

$$\text{Company type} = f(\text{CR}, \text{WCTA}, \text{QR}, \text{CFR}, \text{FCF1TD}, \text{FCF2TD}, \text{GR}, \text{D-E})$$

where:

**Company type:** binary variable with values: 0 (bad) and 1 (good).

**CR:** current ratio

**WCTA:** working capital to total assets ratio

**QR:** quick ratio

**CFR:** cash flow ratio

**FCF1TD:** free cash flow 1 to total liabilities ratio

**FCF2TD:** free cash flow 2 to total liabilities ratio

**GR:** gearing ratio

**DR:** debt ratio

**D-E:** debt-to-equity ratio

Such an expression of a logistic regression function with the use of the ENTER method and a Wald significance test enables us to discover the relative importance of particular ponders of selected indicators.

The computed logistic regression function is as follows:

$\text{Log (Tip)} = - 1,333 + 1,877x\text{CR} + 4,174x\text{WCTA} + 1,257x\text{OR} + 0,718x\text{CFR} - 0,566x\text{D-E}$
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The following table shows the coefficients for each indicator, its significance and the results of the Wald test:

Indicators	Coefficient	Wald	Sig.
<b>CR*</b>	<b>1,877</b>	<b>15,562</b>	<b>,000</b>
<b>WCTA*</b>	<b>4,174</b>	<b>9,143</b>	<b>,002</b>
<b>QR*</b>	<b>1,257</b>	<b>18,373</b>	<b>,000</b>
<b>CFR*</b>	<b>0,718</b>	<b>10,643</b>	<b>,001</b>
FCF1TD	0,008	0,067	,796
FCF2TD	-0,117	0,043	,835
GR	1,116	0,642	,423
DR	0,198	0,026	,873
<b>D-E**</b>	<b>-0,566</b>	<b>6,806</b>	<b>,009</b>
Constant	-1,333	9,719	,002
* indicator is statistically significant at 95% level			
** indicator is statistically significant at 90% level			
Source: own computation in SPSS v 13.0			

### 3.2. The interpretation of the results

The displayed results of the multivariate analysis show that the affiliation of a particular group of companies with regard to whether a company creates value-added is associated with the performance of the current ratio, working capital and liquid assets ratio, quick ratio and cash flow ratio at the level of confidence of 95%.

When the confidence level is decreased to 90%, (which is still acceptable) the debt and equity ratio proves to be a statistically significant indicator too.

Within the parameters of the analysed model, other variables were unable to show statistically significant difference in the companies belonging to the group of good or bad.

According to the presented results, it may be concluded that the statistically significant variables include indicators of liquidity, while the variables representing the indicators of solvency are not statistically significant when estimating the risk of collection of receivables. This was expected because of the liquidity nature of the claim itself.

The most significant indicators at the 95% significance level is the **WCTA** with the value of **4,174**. Other indicators ranked according to their importance are: **CR** = 1,877, **QR** = 1,257, **CFR** = 0,718.

At the 90% significance level, the **D\_E** = -0,566 may also be included.

The accuracy of the model is shown in the next table:

Model accuracy					
Step	-2 Log likelihood	Nagelkerke R Square	Chi square	df	Sig
1	2004,484 (a)	0,552	11,732	8	,010
Source: Own computations in SPSS v 13.0					

It is visible from the table and based on the **Nagelkerke R<sup>2</sup>**, that the regression function relatively fairly explains the risk of default on the liabilities. However, when the logistic regression model is used, the **pseudo R<sup>2</sup>** results are insufficient, so a more precise significance test based on the maximum likelihood **Hosmer & Lemeshov  $\chi^2$**  test. It is visible from the table that the  $\chi^2$  test is statistically significant at the 0,10 level, which confirms the conclusion based on the Nagelkerke R<sup>2</sup>, that the model fairly explains the data from which it was derived and has high accuracy which can also be tested by comparing the hit rate of classified enterprises.

Table: Model accuracy					
Classification			Expected		
			Type		Accuracy in %
Step	Type	Given	0	1	
		1	0	103	17
1	26		94	78,3	
<b>Overall</b>				<b>82,1</b>	
Source: own computations in SPSS v 13.0					

The model's prognostic accuracy has reached a satisfactory 82,10%. And it is better in detecting bad enterprises (85,8%), as opposed to the good ones (78,3%).

### 3.3. Model limitations

Already at the beginning of the work, some limitations became obvious:

- a) The data set is based on a relatively small number of observations: possible violation of normal distribution assumptions.
- b) The data set is based on financial reports of Bosnian enterprises:
  - that may be deliberately inaccurate, due to accounting manipulations;
  - that may not be “fully commensurate” as they do not fully comply with the International Financial Reporting Standards;
  - without any form of computational or logical financial reporting control;
  - methodologically incommensurate due to a change in financial reporting rules in 2006, which resulted in the creation of two databases: for a period between 2002 and 2005, and for the period between 2006 and 2007; so in the process of data unification, some losses or errors were possible.
- c) Some companies were reluctant to fully disclose complete sets of all financial data as well as correctly and accurately fill the verification forms.
- d) The indicators have limits that may not be optimal across all observed industries.



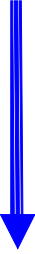


#### 4. MODELLING THE RECEIVABLES COLLECTION

Based on the results of the regression analysis, following indicators were identified as having the largest impact on defining the instruments that could be used as collateral or some other form of insurance of receivables collection:

1. Working capital and assets ratio (coefficient **4,174**)
2. The current ratio (coefficient **1,877**) and the quick ratio (coefficient **1,257**)
3. Cash flow ratio (coefficient **0,718**)
4. Debt to equity ratio (coefficient **0,566**)

In the accounts receivable risk management model, these values need to be observed according to their relative impact. When selecting the insurance instrument, the value of debt should be taken relative to its total size and ratio to total income. Accordingly, the value of the indicator should be observed inversely to the debt amount and insurance instrument.

Table: A Model of Accounts Receivable Risk Management					
INDICATORS in relation to control measures	Good	DEBT in % of total revenue	Small %	INSURANCE INSTRUMENTS	WEAK
All indicators good		up to 2%		no insurance	
All indicators good		between 2,01 and 5%		minimal insurance, promissory note	
1 & 2 good; 3 & 4 bad		between 5,01 and 10%		promissory note, warranties	
uz 1, dobar bar još jedan		between 10,01 and 20%		collateral, mortgage	
1 good, other bad		beteen 20,01 and 25%		collateral, letter of credit, promissory note	
	Bad		Large		Strong

The worse the indicators, the stronger the collaterals needed.

When signing a contract with a business partner, the company shall not ask for any collateral if the analysed indicators' values are better than the control values, and if the claims size from the contract is not greater than 5% of overall claims.

If the receivables' value, on the other hand, amounts to 25% or more of all claims, very strong collaterals shall be asked for (bank guarantees and secured bonds)

It has been shown that it is possible to construct a corporate system of receivables collection risk management in Bosnia and Herzegovina's system of payments that could safeguard the lenders from debtor's default.

The created model is optimal for Bosnia and Herzegovina because it was based on datasets from financial reports of Bosnian companies and collaterals really used in Bosnia and Herzegovina.

## **5. CONCLUSION**

The problem of receivables collection is complex, large and not easily solvable in the existing situation. It is partly inherited from earlier economic system without clear market rules and defined ownership rights. As the illiquidity infection spreads, the collection of receivables problem is threatening the national economic collapse. When successful and profitable enterprises enter into liquidity problems, it is only a matter of time when they'll stop paying to their creditors. Because of lacking legislative, executive and judicial authorities, mortgages and other instruments of insurance of receivables, are insufficient means of guarantee. Bankruptcy proceedings are not implemented in a way commensurate to developed market economies. The problems with unpaid receivables in Bosnia and Herzegovina will be solved neither quickly nor easily. Implementation of reforms in all areas of institutional development is critical for solving collectables problems, particularly reforms in payments and transactions system.

When signing a contract with a business partner, the company shall not ask for any collateral if the analysed indicators' values are better than the control values, and if the claims size from the contract is not greater than 5% of overall claims. If the receivables' value, on the other hand, amounts to 25% or more of all claims, very strong collaterals shall be asked for (bank guarantees and secured bonds).

It is possible to construct a corporate system of receivables collection risk management in Bosnia and Herzegovina's system of payments that could safeguard the lenders from debtor's default. The created model is optimal for Bosnia and Herzegovina because it was based on datasets from financial reports of Bosnian companies and collaterals really used in Bosnia and Herzegovina.

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