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Some Romanian Models of the Bankruptcy Risk Analysis in Firms' Management Market

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Abstract

The bankruptcy risk is characteristic to all firms that do not have to have financial resources to pay debts to suppliers, creditors, employees, the state consolidated budget. In order to discover the bankruptcy risk, there have been used different methods which analysed the figures of the firm's accounting concerning both the enterprise liquidity and solvency, and the creditworthiness towards bank units offering credits. This is how the following Romanian banking models have been created: Cămăşoiu - Negoiescu, Anghel, Robu-Mironiuc, Romanian Commercial Bank, Raiffeisen Bank, BRD – Groupe Societe Generale, etc

The authors of the respective models have demonstrated the possibility of specialists in the field of economic-financial analysis to prefigure the firms' state of bankruptcy, as well as the risk analysis with a view to grant credits by commercial banks. The implementation of the mentioned models offers managers the necessary information to draw up the credit documents. The characteristic of these models is the fact that they are elaborated according to the realities of Romanian firms.

By means of the respective models, the analysts have demonstrated the existence in Romania as well, of some score functions that, by their calculus, express the firm's state of solvency and liquidity, similar to the models presented in the specialized literature abroad.

Keywords
bankruptcy, risks, models, solvency, liquidity, score function

INTRODUCTION

Bankruptcy is the result of an inappropriate management of the firm, being related to the enterprise financial strategy and to the cost of used capitals. The inefficient use of capital leads to the capital risk, that is visible "by means of two components: operating risk and financial risk, both dependent on the fluctuation of the profitability ratio to the variations of the activity volume." [1]

The operating risk is generated by the "inefficient use of fixed assets, by the unsustained growth of fixed costs in comparison with the turnover"[2] and the non-correlation of other factors of influence at the enterprise level.

The financial risk is generated by the volume of expenses remunerating the borrowed capitals, their level overcoming the profit of the operating activity, and practically the enterprise cannot pay its debts.

ROMANIAN MODELS OF THE BANKRUPTCY RISK ANALYSIS

So as the firm management can evaluate the bankruptcy risk, the financial analysis can use two types of methods: accounting methods and banking methods.

The accounting methods are used to make a comparative analysis in time, in order to foresee the future evolution of the firm's activities, concerning its liquidity and solvency.

The banking methods used in the analysis of bankruptcy risk allow the forecast of the firm's financial situation for a future period of time, according to the economic-financial analysis and statistic techniques. The essence of banking methods consists in establishing a set of score functions whose values determine the enterprise vulnerability or stability. The calculus of the score function consists in setting a model of analysis according to a series of values by means of which there can be evaluated the firm's vulnerability or the long-term insolvency, such as: Cămăşoiu-Negoescu model, Anghel model, Robu – Mironiuc model, Romanian Commercial Bank model, Raiffeisen Bank model, BRD - Groupe Societe Generale model, etc.

Cămăşoiu – Negoescu Model is based on the economic analysis of the impact of more factors on the firm's relevant indicators, and is calculated according to a score function:

$$z = [(3R_1+6R_2+4R_3+3R_4+6R_5+3R_6+3R_7+5R_8+5R_9+5R_{10}) / 4300]$$

where

$R1 = 1/ Vi = [(n/\sum Vi) x100]$

Vi – the age of the management team members

n – the number of the management team members

R_2 = [(receivables – debts / turnover)] x 100;

R_3 = (net profit / total costs) x 100;

R_4 = (equity / total assets) x 100;

R_5 = (short term patrimonial assets / patrimonial liabilities) x 100;

R_6 = (wages fund / total costs) x 100;

R_7 = (interests / amortization) x 100;

R_8 = (training expenses / costs) x 100;

R_9 = (advertising expenses / costs) x 100;

R_{10} = (employees in agencies / total number of employees) x 100.

By calculating the standard function, the following values and conclusions are obtained:

- Z > 180%, the society obtains profit;
- Z has a value included in the interval [50%-180%], the company has problems and, if it applies for a loan, it has to be monitored;
- Z<50%, the company has serious problems and cannot get a loan.

Table no. 1 The calculus of the Z score function - Cămăşoiu-Negoescu for S.C. „ALFA" S.R.L.

No	Values	Financial year						
		n	n+1	n+2	n+3	n+4	n+5	n+6
1	$R1 = [ni \sum_{i=n}^{n} Vi] x 100$	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2	R2=[(Receivables - Debts/Turnover)]x100	-50.84	-4.20	-6.55	-12.19	-14.19	-7.31	-12.58
3	R_3=(Net profit/Total costs)xl00	1,06	2.81	2.05	1.72	2.28	6.33	8.34
4	R4=(Equity/Total liabilities)xl00	70.04	73.10	55.07	48.45	43.01	39.07	47.86
5	R5=(Short term assets/Total liabilities)xl00	35.74	31.17	20.56	31.74	14.11	28.08	32.17
6	R6=(Wages fund/Total costs)xl00	10.66	13.02	12.61	14.78	15.49	16.24	15.48
7	R7=(Payable interests/Depreciation)x100	85.40	21.62	0.26	2.87	22.98	4.52	-
8	R8=(Training expenses/Total costs)xl00	-	-	-	-	-	-	-
9	R9=(Advertising expenses/ Total costs)xl00	-	-	-	-	-	-	-
10	R10=(Employees from agencies/ total number of employees)xl00	-	-	-	-	-	-	-
	Function of z score (%)	**4.20**	**11.54**	**6.88**	**7.50**	**5.88**	**7.60**	**7.92**

In this case the company cannot receive a loan, as it has to increase the efficiency of circulating assets and the cash that must be used for operational activities.

Anghel Model is based on a standard function based on standard function composed of four values, using indicators such as: net profit, total income, debts, total assets, cash flow. The standard function is calculated according to the model:

$$Z = 5{,}676 + 6{,}3718R_1 + 5{,}3932R_2 - 5{,}1427R_3 - 0{,}0105R_4,$$

where

R_1 = net profit / total income

R_2 = debts / cash

R_3 = debts / total assets

R_4 = debts / total income

The evaluation of a company's sustainability is based on the following classification (Breakdown / Bankruptcy) 0.0> z> 2.05 (favourable situation)

Table no. 2 The calculus of z score function –Anghel model for S.C. Alfa S.R.L.

No.	Values	Financial year						
		n	n+1	n+2	n+3	n+4	n+5	n+6
1	R1= net profit /total income	1.05	0.02	-0.02	0.01	0.02	5.95	0.07
2	R_2= debts/cash	25.31	3.84	3.20	3.86	2.46	1.71	4.21
3	R3= debts/total assets	0.29	0.26	0.24	0.43	0.43	0.38	0.44
4	R4 = debts/total income	8.80	28.80	36.00	50.40	50.40	316.80	126.00
	Function of z score	**147.07**	**25.07**	**21.35**	**23.81**	**16.28**	**47.52**	**25.24**

The analysis result is that the society is not in danger of bankruptcy, the score function having values higher than 2.05, as a result the firm is efficient.

Robu – Mironiuc Model was elaborated on the study of a sample of 60 industrial enterprises, of different sectors that are quoted on the Stock Exchange Bucharest.

The score function that determines the bankruptcy risk is presented as follows:

$$Z = -0{,}002\,R_1 - 0{,}028R_2 - 0{,}0570R_3 + 1{,}034\,R_4 + 4{,}629R_5 + 0{,}096R_6 + 0{,}170\,R_7 - 0{,}106R_8 - 0{,}024R_9 + 0{,}524$$

The bankruptcy risk is determined by means of the following values:

- $1 \leq z < 4$ the bankruptcy risk is low ;
- $0 \leq z < 1$ the bankruptcy risk is average;
- $-4 < z < 0$ the bankruptcy risk is very high.

Table no.3

No	**Values**	**Financial year**					
		n+1	**n+2**	**n+3**	**n+4**	**n+5**	**n+6**
1	R1= Circulating assets /Current debts	1,46	0,06	0,82	0,55	0,82	0,81
2	R_2= Total assets/Current debts	3,83	2,22	1,94	1,75	1,64	1,91
3	*R3*= Total debts/Total liabilities	0,26	0,44	0,51	0,56	0,60	0,52
4	*R4*= Gross result/Equity	0,21	-0,09	0,10	0,20	0,92	0,64
5	*R5*= Net result/Total assets	0,09	-0,05	0,04	0,06	0,25	0,22
6	*R6*= Operating gross surplus/Turnover	-0,01	-0,16	-0,04	-0,03	-0,09	-0,05
7	*R7*= Total debts/Equity	0,35	0,81	1,06	1,32	1,55	1,08
8	*R8*= Financial expenses/Turnover	0,01	0,01	0,01	0,00	0,00	0,00

9	*R9*= Turnover/Stocks	19,54	20,49	13,00	15,18	23,74	13,35
	Function of z score	**0,077**	**0,026**	**0,720**	**0,497**	**2,179**	**1,662**

The values of the score function indicates that the society is, in the first five years, in an average bankruptcy risk, and, in the last two years, the bankruptcy risk is low.

The Romanian Commercial Bank Model is used to set the good situation of the firm according to a set of values and indicators of performance evaluated according to six criteria:
a. Patrimonial liquidity (Lp) = circulating assets / short-term liabilities;
b. Solvency (S) = equity / liabilities;
c. Financial profitability (Rf) = gross profit / equity;
d. Rotation of circulating assets (Nac) = turnover / circulating assets;
e. Dependence on supply (A) and internal and external sales (D) markets;
f. Securities (deposits in lei, foreign currency, guaranties, mortgages, goods purchased from loans, cession, receivables).
The evaluation criteria noted with points classify the enterprises as follows:

Table no. 4

No.	Evaluation criteria	Limit values	Points
1	Patrimonial/liquidity Lp=Short term assets/Liabilities	<80% (80-100)% (100-120)% (120-140)% 140-160)% > 160%	-2 -1 +1 +2 +3 +4
2	Solvency S- Equity/ Liabilities	<30% (30-40)% (40-50)% (50-60)% (60-70)% (70-80)% >80%	0 1 2 3 4 5 6
3	Financial profitability Rf = Gross profit/Equity	<0 (0-10)% (10-30)%	0 3 4
4	Rotation of circulating assets N_{ac} = Turnover/Circulating assets	(5-10)% >10%	2 4
5	Dependency of domestic supply (At), foreign supply (Ai); Sale:: internal (D_t), foreign (D_c)	A_t>50%, De>50% Ai>50%, De>50% At>50%, D_t>-50% Aj>50%, D_t>50%	4 3 2 1
6	Securities	pledged deposits mortgages, guarantees purchases from loans receivables cession	4 3 2 1

Taking into consideration the score the enterprise situation is assessed as follows:

Table no. 5

Category	Total points	Economic financial situation – degree of risk
A	>20	Very good – loans can be granted
B	16-20	Good – loans can be granted
C	11-15	Floating – there is immediate risk

D	6-10	Special risk – does not present guarantees to grant loans
E	0-5	Very precarious – with no guarantees to grant loans

According to the notation grid, enterprises in A and B category are considered to have a very good economic-financial situation and can receive loans from the banks. The enterprise in C category presents a high degree of risk, the granting of a loan meaning a high risk bonus. The enterprises in C and D category does not present guarantees and cannot take loans.

Table no. 6 The grid for the evaluation of creditworthiness – BCR Model for S.C. „ALFA" S.R.L.

Performance criteria	**Financial year**						
	n	**n+1**	**n+2**	**n+3**	**n+4**	**n+5**	**n+6**
1.Patrimonial liquidity (L_P)	120	141	63	82	55	82	81
2. Solvency (S)	70	73	55	48	43	39	47
3. Gross financial profitability (Rfb)	9.63	21.17	-9.17	10.10	20.57	92.22	64.14
4. Rotation of circulating assets (Nac)	9.67	7.91	8.39	6.19	8.38	6.7	5.7
5. Dependence on the market (%)	A_t>50% D_t>50%	A,>50% D_t>50%	A_t>50% D_t>50%	A_t>50% D_t>50%	At>50% D_t>50%	A,>5% D_t>50	A_t>50 %
6. Securities	Deposits as security	Deposits as security	Deposits as security	Deposits as security	Deposits as security	Deposits as security	Deposits as security
Points							
1. Patrimonial liquidity (Lp)	1	2	-2	-1	-2	-1	-1
2. Solvency (S)	6	6	4	6	3	6	6
3. Financial profitability (Rft)	3	4	0	4	4	4	4
4. Rotation of circulating assets (Nec)	2	2	2	2	2	2	2
5. Dependence on the market (%)	2	2	2	2	2	2	2
6. Securities	4	4	4	4	4	4	4
Points	**18**	**20**	**8**	**17**	**13**	**17**	**17**

The value of the outline resulting from the evaluation of creditworthiness have lead to the conclusion that the enterprise is placed in B category, excepting year (n+3), when it had an economic and financial situation that allowed the granting of a loan. The financial balance is maintained.

Raiffeisen Bank Model evaluates the creditworthiness of a firm according to the value of indicators number, as follows:

a. Patrimonial liquidity *(Lp)* = circulating assets / debts;
b. Solvency *(S)* = total assets / debts;
c. Profit operating margin = (current profit / operating income) x 100;
d. Interest coverage ratio = operating profit / interest expenses;
e. Equity ratio = Equity / total assets.

According to the client's main activity – trader, manufacturer or service supplier – the values of these indicators are interpreted differently.

The evaluation of clients is determined by the examination of two qualitative criteria and five quantitative criteria., according to table no.7.

Raiffeisen Bank evaluation system is presented as follows:

Table no. 7

No.	Evaluation Criteria	Percentage	Values	Degree
Quality criteria				
1.	Manager quality, business strategy and handed securities (others than those accepted when the debtor's exposition is diminished)	25%	See table no. 6	
2.	Structure of social capital	15%	See table no. 7	
Quantitative criteria				
1.	Patrimonial liquidity= Circulating assets/Short-term debts	14%	>1.5 >1.2 >1.0 >0.8 <0.8	1 2 3 4 5
2.	Solvency report = Total assets/ Debts	14%	>1.19 >1.U >1.05 >1,00 <1.00	1 2 3 4 5
3.	Profit operating margin = [(operating profit + Financial profit)/Operating income x 100	10%	>3% >1.5% >1.0% >0%	1 2 3 4
4.	Interest coverage ratio = operating profit / interest expenses	14%	>4 >3 >2 >1 <1	1 2 3 4 5
5.	Equity ratio = (Equity/Total assets) x 100	8%	>16% >10% >5% >0% <0%	1 2 3 4 5
	Client's calculated risk	100%		

The evaluation of non-financial criteria within Raiffeisen Bank model is realised with the score established for the „Management quality" criterion.

Table no. 8

Criteria	Evaluation
Experience in the firm's sector of activity , management team, clear business strategy, good reputation	1
Experience in the firm's sector of activity , management team, prepared business strategy, good reputation	2
Limited experience in the firm's sector of activity , management team, prepared business strategy, good reputation	3

Limited experience in the firm's sector of activity , new management team, prepared business strategy, good reputation	4
Depends on one person, lack of strategy, limited experience in the firm's sector of activity	5

The evaluation of non-financial criteria within Raiffeisen Bank model is realised with the score established for the "Social capital structure".

Table no. 9

Criteria	Evaluation
Majority held by a strong international company	1
Majority held by a medium international company	2
Majority held by a small international company	3
Majority held by a local international company	1
Majority held by a medium/small international company	3
Majority held by states from A category, including the Romanian State	1
Majority held by states from A category	4
Majority held by A category management	2
Majority held by population	3
Majority held by an investment fund	4
Evident problems concerning the social capital/disagreements with holders	5
Unknown structure of the social capital	5

The evaluation of the rating system of Raiffeisen Bank in the creditworthiness analysis of S.C. "Alfa" S.R.L.

Table no. 10

No.	Evaluation criteria / Score	Percentage	n	n+1	n+2	n+3	n+4	n+5	n+6
Quality criteria									
1	Manager quality outline	25%	Experience in the firm's sector of activity, business strategy, reputation						
			1	1	1	1	1	1	1
2	Capital structure		Majority held by population						
	Score	15%	3	3	3	3	3	3	3
Quantitative criteria									
1	Patrimonial liquidity		3,33	3,84	2,22	1,94	1,75	1,64	1,91
	Score	14%	1	1	1	1	1	1	1
2	Solvency		3,33	3,84	2,22	1,94	1,75	1,04	1,91
	Score	14%	1	1	1	1	1	1	1
3	Profit operating margin		1,88	4,89	-2,05	1,72	3,10	5,01	11,53
	Score	10%	2	1	4	2	1	1	1
4	Interest coverage ratio		4.55	31,00	729,88	53,03	7,57	95,3	-
	Score	14%	1	1	1	1	1	1	-
5	Equity ratio		70,04	73,10	55,07	48,45	43,01	39,07	47,86

	Score	8%	1	1	1	1	1	1	1
6	Client's calculated risk	100%	1,4	1,3	1,6	1,4	1,3	1,3	1,1
	Creditworthiness category		A	A	A	A	A	A	A

The analysis result indicates the fact that this company is not subject to bankruptcy risk, can apply for a loan and the creditworthiness category resulting form the calculus does nor threaten the relationship with the bank. The firm's financial balance is maintained.

The Romanian Bank for Reconstruction and Developemnt - Groupe Societe Generale aims at applying to companies some of the five creditworthiness categories, according to the financial performance indicators.

a) Financial dependency ratio = (Debts / total assets) x 100;
b) Immediate liquidity = [(Circulating assets - Stocks)/Short-term debts] x 100;
c) Patrimonial solvency = (equity / total assets) x 100;
d) Profitability ratio according to turnover = (operating profit / net turnover),
e) Expense coverage ratio = (gross profit/total expenses) x100

According to the value of each indicator, the bank grants credits and the company is situated within certain intervals, or by the summing up the points obtained for all evaluated indicators, the final score is determined. In accordance with the company's score, the company is included in one of the five categories of financial performance.

When the score is close to the inferior or superior limit within the five categories of financial performance, the bank can raise or lower the rank after negotiations, taking into consideration the general evaluation of the company's activity.

The placement in one of the five categories of performance is made by the evaluation of criteria in Table no. 11.

The evaluation of ranking by BRD - Groupe Societe Generale

Table no. 11

No.	**Evaluation criteria**	**Crediting categories**				
		Cat. A	Cat. B	Cat. C	Cat. D	Cat. E
1	Financial dependence ratio	1-30.0	30.1-50.0	50.1-65.0	65.1-80.1	over 80.0
2	Immediate liquidity	over 110,0	85.1-110.0	65.1-85.0	50.1-65.0	under 50.0
3	Patrimonial solvency	over 50,0	40.1-50.0	30.1-40.0	20.1-30.0	under 20,0
4	Profitability ratio according to turnover	over 10,0	5.1-10.0	3.1-5.0	1.1-3.0	under 1,0
5	Expenses coverage ratio	over **1**20,0	100.1-120.1	90.1-100.0	70.1-90.0	under 70,0
	Indicator score	10	8	5	2	0
	General score	**41-50**	**26-40**	**11-25**	**1-10**	0

The evaluation of financial criteria within the BRD Groupe Societe Generale model in the analysis of creditworthiness of S.C. „Alfa" S.R.L.:

Table no.. 12

No.	**Indicator score**	**n**	**n+1**	**n+2**	**n+3**	**n+4**	**n+5**	**n+6**
1	Financial dependence ratio	29.95	26.06	44.92	47.09	56.98	61.45	52.10

No.	Indicator score	n	n+1	n+2	n+3	n+4	n+5	n+6
	Score	10	10	8	8	5	5	5
2	Immediate Liquidity	43.10	78.00	46.00 0	43.00	26.00	59.00	46.00
	Score	0	5	0	0	2	2	0
3	Patrimonial solvency	70.4	73.10	55.07	48.45	43.01	39.07	47.66
	Score	10	10	10	8	8	5	8
4	Profitability ratio according to turnover	2.36	5.01	-2.34	1.64	3.24	10.0	12.39
	Score	2	8	0	2	5	10	10
5	Expenses coverage ratio	98.94	97.26	102.09	98.30	97.76	94.04	92.29
	Score	5	5	8	5	5	5	5

The evaluation of the final score of SC. „Alfa" SRL, within the creditworthiness analysis realised by BRD Groupe Societe Generale.

Table no. 13

Indicator score	Period						
	n	n + 1	n+2	n+3	n+4	n+5	n+6
Score	27	38	26	23	25	27	28
Category of creditworthiness	B	B	B	C	C	B	B

CONCLUSIONS

The conclusion of this analysis shows that this company can get a loan, is not insolvent; however, as a result of evaluation, the bank requires the right to permanently monitor the company. As a result of these methods, the following conclusions can be drawn:

1. According to the Cămăşoiu – Negoescu model, the company has financial difficulties as it needs a growth of the efficiency of circulating assets and of the used capital only for operational activities. However, the resulting information is not relevant as the values of some indicators are not characteristic to the company and the financial results are positive.
2. By the implementation of Anghel model, we underline that the score function has values indicating the fact that this company is not threatened by bankruptcy.
3. The values resulted by the application of the Robu- Mironiuc model, the company can be accepted for receiving a loan and is not exposed to the bankruptcy risk.
4. This analysis made according to the crediting rules of The Romanian Commercial Bank, Raiffeisen Bank and BRD - Groupe Societe Generale.

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