12. MODELLING THE FINANCIAL PERFORMANCE OF THE BUILDING SECTOR ENTERPRISES – THE CASE OF ROMANIA[1]

Nicoleta BĂRBUȚĂ-MIŞU*

Abstract

In this paper I have designed an aggregate index of financial performance for the building sector enterprises from Galați - Romania. The creation and calculation of an index of financial performance is a personal contribution to the financial sector analysis of enterprises in our country. The development at national level of the financial performance assessment model presented in this paper may lead not only to establishing a system of classification for enterprises active in the building sector in accordance with their financial performance, but also to extending this system to other sectors of economy.

Key words: financial performance, financial modelling, capital structure, return on equity, retained profit ratio

JEL Classification: G32, G. 33, C39

Introduction

Modelling the financial performance offers the possibility of ***ranking at national level*** (or county level, in our case) of enterprises acting the building sector in accordance with their financial performance, based on the financial-accountancy data in previous years, but also ***financial performance forecasting for an enterprise*** in the case when we can make a prediction as real as possible of the financial rates that constitute the model variables.

The model can offer some ***other benefits***: listing enterprises in certain performance areas according to the value of the financial performance aggregated index; at a

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* Lecturer, Ph.D. Student, "Dunărea de Jos" University of Galați, Str. Domnească 47, Post Code 800008, Phone +40 236 413603, Fax. +40 236 461353, Nicoleta.Barbuta@ugal.ro;

certain moment, the management of the enterprise can take decisions related to the activity, investments, financing etc., according to the values of the financial performance index; starting from a sought level of financing rates that constitute the model variables, the enterprise management can timely acknowledge the performance level their enterprise will take, and can take corresponding decisions.

In order to model the financial performance we used the **score method**, which has wide practical applications in bankruptcy prediction, and which entails finding a linear combination of financial rates (the Z function) thus allowing for the separation of bankrupting enterprises from those that face no financial problems. The general form of this function is $Z = \sum_{i=1}^{n} a_i \times X_i$, where: a_i = weighting coefficient for financial ratio X_i; X_i = financial ratio i and i = number of financial ratios used, $i = 1 \div n$.

According to the Z scoring resulted for an enterprise, it is registered within a certain area of risk. Thus, we may say that the **score** is a method of external diagnosis that consists in measuring and interpreting the risk to which the investor, the creditor of the enterprise, is exposed at, and is also faced by the enterprise as a system in its future activity. It is based on a value judgment which combines a linear group of financial rates or significant variables.

The problem that needs a solution within this context is the one concerning the significance of parameters, in accordance with the specific interest of the information user. The scoring function pertains to the preventive intervention, having the character of a predictive tool (Anghel, 2002). Thus, the score constitutes itself a barometer of the economic-financial status of the enterprise, a tool which is at the disposal of shareholders and of the enterprise management alike.

The model presented in this paper is in fact a pilot model designed for a small group of enterprises, which will be subsequently developed and extended to the national level in a research grant.

For elaborating the financial performance model for building sector enterprises from Galati followed the next stages:

a. *Compiling the database necessary for the case study*, which in its turn entails: scientific documentation on the score method; establishing the conditions to be met by enterprises so as to be included in the initial sample; selection of the sample enterprises in accordance with the established conditions; collecting data for compiling the database (*Section 1*);

b. *Hierarchy of the building sector enterprises in accordance with their financial performance*, on the basis of 8 rates, calculated with the assistance of the data collected from the initial sampled enterprises, so as to isolate the performant enterprises from the non-performant ones (*Section 2*);

c. *Designing the model for determining the financial performance by financing*, which supposes: discriminate analysis of the performant and non-performant enterprises, selection of the financial rates to be used for modelling the financial performances; calculation of rates for initial sample enterprises; setting up the linear combination of the selected rates (*Section 3*);

d. ***Testing the analysis model***, both individually on the initial sample enterprises, as well as on a subsequent sample, by analyzing the success rate, so as to establish the relevance degree (*Section 4*).

1. Setting up the study database

The bankruptcy prediction for enterprises and banks, or for the municipalities or the governments' inability in paying the contracted debts, is a topic of great interest, which for decades continues to be of great interest for researchers and practitioners. Setting up a model for bankruptcy prediction was, and continues to be today, the subject of many scientific papers presented at national and international levels. The models proposed until today have the disadvantage that they may be applied only to the economies of the countries within which the statistical study was carried out, or within the branch or sector under focus, therefore their use cannot be extended to a greater area. Furthermore, the periods marked by economic instability determine the alteration of the correlations examined by the developed score function, which limits in time the use of these models, thus requiring their updating at regular time intervals, or the development of other models valid for the new conditions (Siminică, 2005).

In the study of the intervals found for the Z score, some enterprises are classified as presenting a high bankruptcy risk, or a lower one, or without bankruptcy risk. From this it results that the enterprises showing a high bankruptcy risk have lower financial performance, and vice versa, the ones that fall outside the bankruptcy risk obtain a high financial performance, reason for which I preferred to name the proposed model as – ***financial performance model***.

Statistical model researchers use financial rates for designing bankruptcy predictive functions. All bankruptcy predictive studies for enterprises are based on the original contribution of Beaver (1966) and Altman (1968).

Beaver brought the most important contribution in ***univariate analysis of bankruptcy*** for an enterprise. The technique of the univariate analysis implies the use of a single financial rate in a bankruptcy prediction model. Beaver separately analysed few financial rates and selected the critical point for each rate, so as to maximize the prediction accuracy.

Altman made a ***multivariate analysis of bankruptcy*** (which we shall further use within our model), which means that he developed a multiple discriminate analysis. The main idea of the multivariate analysis consists in combining information related to few financial rates in a single function (pondered index).

Beaver and Altman had many successors that developed the performance of analysis models of the bankruptcy risk, initiating alternate analysis methods. Thus, for bankruptcy prediction two schools stand out (Anghel, 2002): ***the Anglo-Saxon school*** represented by the Beaver model, the models developed by Altman, the Edmister models (1972), the Diamond model (1976), the Deakin probabilistic model (1977), the Springate model (1978), the Koh and Killough model (1980), the Ohlson model (1982), the Zavgren study (1983), the Fulmer model (1984), the Koh model (1992), the Shirata model (1999) designed in Japan on the basis of Anglo-Saxon school studies; ***the continental school*** represented by the Yves Collongues model

(1976), the Conan and Holder model (1979), the model of Balance Exposure of France Bank, the model of the French Commercial Credit (CCF), Chartered Accountants model (CA Score – 1987), the AFDCC 2 Score Function (1999).

Unlike the Anglo-Saxon school and continental school, the ***Romanian school*** distinguished mainly in theoretical contributions. The economic and financial modeling made history in traditional domains: multi-criteria models for the financial and macroeconomic equilibrium and for the quantification of this equilibrium2. Starting in the 1960's, Nicolae Rancu presented the problem of mathematical programming for quantitative formalisation of the relationship that characterizes economic phenomena and processes and the formulation of some solutions starting from quantification. In the 1970's, *Moisă Altăr*, *Gheorghe Zaharia*, *Doina Boldeanu*, *Carol Singer* and *Radu Stroe* realised the *Economic Computation* course with the main themes: mathematical programming (linear and parametric), some notions about dynamic programming, inventories theory, functions of production theory, investment optimisation, the problems related to balance of branch relationships.

At the beginning of the 1990's, a discipline was introduced for modelling by the new standards required by the Romanian higher education improvement, specialised in 3 directions: financial decision modelling, monetary decision modelling and administration decision modelling. Iulian Văcărel developed the multi-criteria analysis of the fiscal and budgetary policies and the impact of factors on sustainable human development. Tatiana Moşteanu made researches in the field of budgetary equilibrium. Ion Stancu promoted the corporate finance study through models of financial administration of the enterprises and models of financial structure and placement on the capital market. Moisă Altăr developed researches for modelling the impact of the financial-monetary policies on economic growth.

The ***Romanian School*** is represented by the following empirical models: the Mânecuță and Nicolae model (1996) proposed for the metallurgical industry, the model B – Băileşteanu (1998), the model I – Ivonciu (1998) and *the bankruptcy risk analysis model at the level of Romanian companies* or the bankruptcy prediction model, proposed by Siminică.

Also, C.Mereuță identifies priorities of the system of companies by applying the *ABC Method* used in management, based on the "20/80" principle, saying that 20 percent of causes generate 80 percent of effects. After studying a nucleus of junction-companies, representing 80 percent of turnover, on profits, losses, financial expenditure, employees, etc., will find the definition of the performance of the entire system of companies in Romania. This is the mechanism of *junction analysis*, which targeted two things: to determine the degree of concentration of the system and to establish the degree of structural domination of the markets by leaders, concerning the distance of the markets from the perfect competition model.

Bankruptcy risk prediction models have a predominantly statistical character, being designed with a starting point that takes into account the past financial status of

[2] History of Romanian modelling conducted by Professor, PhD, Radu Stroe (project manager) in the project financed by PNII, Ideas – Exploratory Research Projects – "Modelling the Factors with Impact on e-Banking Adoption" – CNCSIS, promoter The Bucharest Academy of Economic Studies.

bankrupt companies (thus with very low financial performance) and of some enterprises that experienced no financial difficulties (thus, with high financial performance). As the obtained results will be generalized for all enterprises showing features similar to those under focus, mention must be made from the start that the features and the activity sector of the selected enterprises for the study must be presented.

Thus, the main ***requirements*** that must be met by all enterprises from the initial sample are: to be included in the chosen activity sector; to grasp the evolution in time of the financial performance of the enterprises under study; to have a continuous activity throughout the analysed period; the selected sample must include not only enterprises showing high financial performance, but also low financial performance.

Taking all these into account, in order to compile the database necessary for the study we have chosen the main activity sector as the ***building*** sector***,*** in which Romania took the first place within the European Union in what concerns the production growth rate in March 2008, with an advance of 32.5% as compared to the similar period in 2007, in accordance with the data provided by the European Statistical Office, Eurostat.

From this it can be said that the Romanian building sector registers a fast growing rate by making products able to meet the exigencies of the contemporary market from the economic, social, and environmental points of view. The main factor that accelerated the development of the building sector was the expansion of the real estate market which is continuously changing. Later on, this role was taken over by the great infrastructure projects that benefit from support from financial international organisations.

In this sector there were funds received from the World Bank, the European Bank for Reconstruction and Development, and from the pre-structural funds from the European Union, allotted via programmes such as PHARE, ISPA, and SAPARD. In the following years the building sector registered continuous growth, especially in urban areas, as a result of the structural funds, of the support granted by the government, and also because of the sustained development of the mortgage credit.

The building sector also provides for many workplaces and may be considered an important provider of work force in Europe, as the greater part of Romanian immigrants works in the building sector.

The time period considered for data collection from the initially sampled enterprises is of 6 years, that is 2001–2006, which means that we managed to grasp the time evolution of financial performance for the enterprises under study.

One essential condition taken into account when establishing the sample was that the enterprises active in this sector show continuous activity during the chosen time interval. This condition greatly reduced the number of potentially sampled enterprises, as a great number of enterprises ceased their activity while others were only beginning it. The greatest problem we faced was to identify the building sector enterprises active in the Galați County, for which the site of the Ministry of Finance still has to give a solution. Thus, searching for these enterprises was mainly based on their notoriety. We identified 11 enterprises: 2 large, 7 medium and 2 small. We did not manage to include any micro enterprise in our sample because of their reduced popularity at the level of the Galați County.

The selected and analysed enterprises represented, in 2006, 0.93% of the total number of active enterprises in the building sector, with a turnover of 100.61 million euros, that is 35.85% of the turnover obtained in the Galați County building sector and, respectively, 5.78% of the total turnover of the Galați County.

Within the sampled enterprises in 2006 there were 3,639 employees, that is 29.55% of the workforce employed in the building sector of the county, and, respectively, 3.28% of the total employed in the Galați County.

The methodology for building the analysis model of the financial performance asks for the existence in the initial sample of both enterprises with high financial performance and enterprises with low financial performance to satisfy the representativeness condition. This was studied in *Section 2*, which shows that the initial sample meets all conditions for achieving the model, so it can be considered a representative sample.

After establishing the sample we passed to the collection of data required by the study. To assure the needed efficiency in gathering information, it has been organized in tables worked in Excel, which allow for the automatic calculation of various indicators and of the financial rates based on formulas introduced by the user.

As the website of the Ministry of Finance does not offer detailed financial information, we furthered our research with an additional research with the Register of Commerce by studying the balances filed by the 11 enterprises, and by collecting the necessary information for our database. The method we used for building the database consisted in directly extracting the data from the balance sheets - Profit and loss account, Debts and liabilities situation, Fixed assets situation, and Distribution of the profit - by collecting one page for each enterprise, for a six year period, in order to eliminate any conjunctive issues. Data aggregation for the building sector was performed in a new Excel sheet.

For each enterprise and for the whole sector, few parameters have been calculated: financial equilibrium indicators, balances interim management, profit ratio, liquidity, solvency, debts degree, etc. This analysis helped us to rank the sampled enterprises in accordance with their financial performance.

2. Ranking of enterprises in the building sector by their financial performance

Concerning the ranking of enterprises active in the Galați County building sector by their financial performance, we have chosen to grant grades from 1 to 11 in terms of the values of the main financial parameters considered as main performance criteria, during the period 2001–2006, as follows*: for maximizing parameters*, grade 1 will be granted to the enterprise that obtained the highest value, and grade 11 to the enterprise that obtained the lowest value; *for minimizing parameters*, grade 1 will be granted to the enterprise that obtained the lowest value, and grade 11 to the enterprise that obtained the highest value; *for parameters for which the favourable values lay within the established interval*, grade 1 will be grated to the enterprise for which the value of the parameter is the closest to the middle of the interval, and grade 11 to the enterprise for which the value of the parameter is the farthest to the middle of the interval.

Then, for each enterprise and financial performance criteria we have determined a grade calculated as weighted arithmetic mean, the weighting of each year being considered as follows: 8% for the year 2001, 10% for the year 2002, 15% for the year 2003, 20% for the year 2004, 22% for the year 2005, and 25% for the year 2006, so as to grant more weight to the values corresponding to last years. These grades are written in *Annex 1*[3], in which the final grade of the financial performance for each enterprise is calculated as a simple arithmetic average of the grades obtained by the enterprise for the 8 performance criteria we employed.

The enterprise with the highest financial performance will be the one that obtained the lowest grade. The general idea is that the most performant enterprise is the one that obtained the best values to the greatest number of parameters.

The ranking of the enterprises by their financial performance during 2001–2006 is presented in Table 1.

Table 1

Ranking of building sector enterprises by the financial performance achieved in the 2001–2006 period

No.	Enterprise name	Score
1	ARCADA COMPANY SA	3.09
2	VEGA 93 SRL	3.87
3	CONSTRUCȚII FEROVIARE SA	4.60
4	CONFORT SA	5.12
5	ARCADA SRL	5.63
6	MOLDOVULCAN SA	5.82
7	CONSTRUCȚII AVRAM IANCU SRL	5.88
8	CONSTRUCȚII ŞI REPARAȚII SA	7.04
9	ICMRS SA	7.09
10	CONSAL SRL	7.10
11	SOREX SA	8.12

Source: Calculus made by author.

This order is useful in grouping the sampled enterprises in performant and non-performant. This ranking is also used in establishing the groups of enterprises considered for the model to determine the financial performance of enterprises within the building sector of the Galați County.

3. Creating the model of financial performance by financing

Setting up the score function was based on the use of financial ratios, which allow for the comparison of the results of parameters obtained for different enterprises active in the building sector.

[3] Annexes 1 to 8 may be visualised in the electronic version of this work.

From the detailed analysis of the individual financial performances and from the ranking performed in Section 2, we have grouped the enterprises into performant and non-performant, as follows:

- 7 enterprises with high financial performance (Arcada Company, Vega 93, Construcții feroviare, Arcada, Construcția Avram Iancu, Confort and Moldovulcan), registering at the end of 2006 total assets of 70.562.084 euros and a turnover of 84.325.652 euros;
- 4 enterprises with low financial performance (Consal, Construcții şi reparații, ICMRS, Sorex), with a cumulated value of their assets at 31 December 2006 of 17.442.955 euros and turnover of 16.282.985 euros, respectively.

The detailed analysis of the sample allowed for establishing some clear differences between the two groups of enterprises, as we can see in Table 2. For our analysis we used both medium and median values of the financial ratios, which are more relevant as they cancel inconclusive values.

Table 2

The medium and median values of the financial ratios for the two groups of enterprises: performant/non-performant

No.	Indicator	Performant enterprises		Non-performant enterprises	
		Medium	Median	Medium	Median
1	Return on total assets	0.211	0.193	-0.313	-0.212
2	Return on economic assets	0.384	0.343	-0.067	-0.056
3	Return on equity	0.392	0.320	-0.289	-0.168
4	General liquidity	1.511	1.487	1.149	0.989
5	Medium and long term solvency	1.942	1.871	1.088	1.056
6	General leverage	1.162	1.232	-0.076	-0.191
7	Weight of financial debts in total debts	0.122	0.131	0.065	0.025
8	Reinvested profit ratio	0.942	0.983	0.017	0.052

Source: Calculus made by the author.

Consequently, from the discriminate analysis it results that there are significant differences between the two groups of enterprises (performant and non-performant), for each of the 8 ratios employed. Thus, we appreciate that the sample we used is representative for the model of determining the financial performance.

From the financial diagnosis of the enterprise in Romanian and foreign literature and also in the financial practice, a plethora of ratios can be derived and used as variables for various models. From all the financial ratios presented in the literature, we selected only 8 for the discriminate analysis (Table 2), which we considered to be the most significant. Out of these we shall have to select just 5 for the model variables.

A sensitive issue is represented by the method of variables inclusion within the model. Two methods can be used for the selection of the variables for the model:

a) inclusion of all ratios that are likely to allow for classifying into two groups and further selection on the basis of statistical criteria;

b) selective inclusion of potential ratios, in terms of an *a priori* basis (for example the notoriety in the literature).

In our model we used both methods, on one hand, taking into account those financial ratios that best separate the performant and the non-performant enterprises (that is the difference between medium and median values of the computed ratios take the greatest value), and, on the other hand, both the notoriety of using the ratios in the literature and in banking, as well as the specific interest of such information for users.

Thus, in order to study the enterprise financial performance, there are of interest for us ratios that separate performant enterprises from the non-performant ones, but also those that separate the enterprises in accordance with the structure of used assets, own assets and borrowed assets, on short, medium, and long term.

Given these conditions, we have established the following variables for the model: return on equity, general leverage, retained profit ratio, general liquidity and the weight of financial debts within the total debts.

The return on equity measures the profitability of owners' capital that is the financial investment made by shareholders when buying the company shares (Stancu, 2002) and is influenced by the way of asset securing and, thus, by the financial structure of the enterprise (La Bruslerie, 2002). The return on equity (R_f) is calculated in accordance with the formula: $R_f = \frac{\text{Net result}}{\text{Owners' capital}}$ and quantifies the remuneration of capital invested by shareholders, including the net profit at the disposal of the enterprise for self-financing (Lumby, Jones, 2003).

The reasons for which we have chosen the return on equity as first variable took into account the fact that, as our intention was to design a parameter of financial performance, we appreciate it as being the most relevant parameter of this variable, ensuring the best predictions, a fact demonstrated also by Zmijewski (1983) in a study performed on 75 enterprises filing for bankruptcy, and 3,573 non-bankrupt enterprises. We also consider that, for the owner, this is the most expressive parameter for measuring the result as it is superior (as compared to owner's concern) to economic profitability, to expenses or turnover. On the other hand, it is a parameter widely used by the Romanian banks when performing the analysis of enterprise worthiness, for example Raiffeisen Bank and the Commercial Bank.

General leverage (G_{ig}) calculated as follows: $G_{ig} = \frac{Total\ debts}{Own\ assets}$ reflects the degree to which own assets ensure the financing of the enterprise activity. This parameter can be also interpreted as a ratio of financial autonomy of the enterprise, as it indicates the degree to which its long and short-term commitments are guaranteed by own assets.

Most of the Romanian banks use as trust indicator the general leverage, but many times this is calculated as a ratio of total debts to total liabilities (Raiffeisen Bank, Commercial Bank, Romanian Bank for Development). As my intention was to set up a model of financial performance by financing, I think that the general leverage

mentioned in the above formula is the most relevant parameter of the decision for financing.

The reinvested profit ratio (R_{pr}) is a ratio less used in the Romanian literature and in banking, but we have chosen to use it within our model as our enterprises used extensively the profits for reinvesting, as we can see in the analysis of the sample. The reasons for doing this refers to enhancing the enterprise position on the competitive market, increasing the degree of capitalization, redimensioning the social asset, and even taxation.

The retained profits are an alternative and cheaper method of increasing owners' capital in comparison with new shares issued and, also, is the most important source of capital used for financing intangibles.

More frequently, the literature deals with the ratio of dividends distribution (R_{Dv}) by the shareholders (Krainer, 2003), computed as: ($1 - R_{pr}$). This is because the investors, especially the ones who speculate, are mainly interested in the level of earnings on short term and in the time of recovering their investment by cashed dividends.

The general liquidity (R_{lg}) computed as: $R_{lg} = \frac{Circulating\ assets}{Short\ term\ debts}$ measures the capacity of cash flow of the enterprise that is short-term solvency and reflects the degree to which the turning into cash flow of circulating assets can fulfil the eligible payment obligations.

We have chosen the ratio of general liquidity as it reflects the short-term financial balance of the enterprise, although this has proven to be a bad bankruptcy predictor, in accordance with Zmijewski's study. Yet, it is a parameter widely used by banks, for example Raiffeisen Bank. With the Commercial Bank and the Romanian Bank for Development, in the above mentioned formula, the circulating assets are corrected (diminished) by the value of non-valorised stock and of uncertain clients.

The weight of financial debts in total debts ($D_{f(\%)}$) is computed as: $D_{f(\%)} = \frac{Financial\ debts}{Total\ debts}$ and reflects the ratio of financial debts with a view to pointing out the nature of enterprise financing. This parameter shows the dependency of enterprise on banks and other business partners. This is not a ratio that is used by banks, yet I have considered it useful as a relevant indicator in what concerns the temporal stability of financing sources used by the enterprise.

All these ratios were calculated in the database for each of the 11 enterprises selected in our sample, for the 2001–2006 period. Also, for each enterprise we have established a medium level of these ratios for the 2001–2006 period, by using the ratios in Section 2.

Starting from individual levels of these ratios (for each of the 11 enterprises in the sample) we have calculated the medium weighted ratios of all performant and non-

performant enterprises. The medium financial ratios for all performant and non-performant enterprises were calculated on the basis of the centralized balance for the two groups of enterprises. The values thus obtained were used to point out the relevance of the selected ratios for differentiating the two groups of parameters (Table 3).

Table 3

Financial ratios for the two groups of enterprises

No.	Financial ratios	Non-performant enterprises (NPF)	Performant enterprises (PF)	Dispersion
1	Return on equity	-0.178	0.391	0.087
2	General leverage	0.521	1.181	0.9171
3	Reinvested profit ratio	0.008	0.966	0.9158
4	General liquidity	1.390	1.583	0.0001
5	Weight of financial debts in total debts	0.088	0.110	0.0007

Source: Calculus made by author.

In Table 3 we have calculated the dispersion of financial ratios for the two groups of enterprises, so as to demonstrate the relevance of the sample and for the weighted values of the ratios. It results that the two groups are homogenous in terms of general liquidity and of the ratio of financial debts within total debts. The heterogeneity of the two groups of enterprises was found in the return on equity criterion (leading to grouping the enterprises into performant and non-performant) and was visible to a greater extent in the general leverage and in the reinvested profit ratio (leading to grouping enterprises in terms of the structure of used capital).

In accordance with the individual score of each enterprise, presented in Table 1, the group of performant enterprises was further grouped into 3 subgroups, while the non-performant enterprises were grouped into 2 subgroups (each group including the enterprises with the closest score), thus: *group 1* composed of 2 enterprises with the highest financial performance (Arcada, Vega 93); *group 2* composed of 2 enterprises with medium financial performance (Construcții feroviare, Confort); *group 3* composed of 3 enterprises with satisfactory financial performance (Arcada, Moldovulcan, Construcția Avram Iancu); *group 4* composed of 3 enterprises with lower financial performance (ICMRS, Construcții si reparatii, Consal); *group 5* composed of 1 enterprise with the lowest financial performance (Sorex).

For each group we have established the centralized balance, on the basis of which a medium level of the 5 ratios was calculated, and then a score was granted to each group. The greatest score was given to the group of enterprises with the highest financial performance, and the lowest score went to the group of enterprises with the lowest financial performance, so that the sum of all scores be 10: 5 points for group 1; 3.5 points for group 2; 2 points for group 3; 0.5 points for group 4 and -1 point for group 5, showing the lowest performance. The mean values of the 5 ratios for the 5 groups of enterprises are presented in Table 4.

Table 4

Financial ratios for the five groups of enterprises

	Return on equity	General leverage	Reinvested profit ratio	General liquidity	Weight of financial debts in total debts	Points
Group 1	0.4629	1.1813	0.9700	1.7712	0.0931	5
Group 2	0.1186	1.3966	1.0000	1.1160	0.2250	3.5
Group 3	0.2811	1.8343	0.0069	1.4326	0.0184	2
Group 4	-0.1784	0.4975	0.0083	1.4319	0.0899	0.5
Group 5	0.0159	-6.2075	0.0000	2.0733	0.0000	-1

Source: Calculus made by author.

The relationship for including an enterprise in a given performance area is: $\mathrm{P_{f_i}} = \mathrm{a_1} \times \mathrm{R_{f_i}} + \mathrm{a_2} \times \mathrm{G_{ig_i}} + \mathrm{a_3} \times \mathrm{R_{pr_i}} + \mathrm{a_4} \times \mathrm{R_{lg_i}} + \mathrm{a_5} \times \mathrm{D_{f(\%)_i}}$, where:

$\mathrm{P_{f_i}}$ = aggregate financial performance index four group i, $\mathrm{i} = 1 \div 5$;

$\mathrm{R_{f_i}}$ = return on equity for group i;

$\mathrm{G_{ig_i}}$ = general leverage for group i;

$\mathrm{R_{pr_i}}$ = reinvested profit ratio for group i;

$\mathrm{R_{lg_i}}$ = general liquidity for group i;

$\mathrm{D_{f(\%)_i}}$ = weight of financial debts in total debt of group i.

For estimation of a_i coefficients we used the following equation system:

$$\begin{cases} 0.4629 \times a_1 + 1.1813 \times a_2 + 0.970 \times a_3 + 1.7712 \times a_4 + 0.0931 \times a_5 = 5 \\ 0.1186 \times a_1 + 1.3966 \times a_2 + 1 \times a_3 + 1.1160 \times a_4 + 0.2250 \times a_5 = 3.5 \\ 0.2811 \times a_1 + 1.8343 \times a_2 + 0.0069 \times a_3 + 1.4326 \times a_4 + 0.0184 \times a_5 = 2 \\ -0.1784 \times a_1 + 0.4975 \times a_2 + 0.0083 \times a_3 + 1.4319 \times a_4 + 0.0899 \times a_5 = 0.5 \\ 0.0159 \times a_1 - 6.2075 \times a_2 + 0 \times a_3 + 2.0733 \times a_4 + 0 \times a_5 = -1 \end{cases}$$

and the solutions are:

$$a_1 = 0.32;\ a_2 = 0.4554;\ a_3 = 4.0207;\ a_4 = 0.8787;\ a_5 = -10.7815.$$

The model for financial performance assessment thus obtained is:

$$P_f = 0.32 \times R_f + 0.4554 \times G_{ig} + 4.0207 \times R_i + 0.8787 \times R_{\mathrm{lg}} - 10.7815 \times D_{f(\%)}$$

This model allows for framing an enterprise with the characteristics of those enterprises selected for the sample, in a certain performance area. For this we first calculate the five financial ratios involved in the analysis, on the basis of which the

score P_f is determined. In accordance with its value, the enterprise will fall into one of the following five performance areas:

- if $P_f \geq 4.25$ the enterprise has a very high financial performance;
- if $2,75 \leq P_f < 4.25$ the enterprise has a medium financial performance;
- if $1,25 \leq P_f < 2.75$ the enterprise has a satisfactory financial performance;
- if $-0,25 \leq P_f < 1.25$ the enterprise has a low financial performance;
- if $P_f < -0.25$ the enterprise has a very low financial performance.

The limits agreed for establishing the intervals represent the simple arithmetic mean of scores granted to two consecutive groups of enterprises.

The higher the value of score P_f determined for an enterprise, higher than the value of 1.25, (the limit that mathematically separates the enterprises with high financial performance from the low financial performance ones), the greater the possibility of obtaining a higher performance. To have always a higher financial performance, the recurrent calculation of the score P_f is needed, as its reduction in value implies a reduction in the financial performance and, in these conditions, the managers should take measures for recovery.

4. Testing the model for determining the financial performance

The presented model was later tested both for enterprises from the initial sample under study, and also for other enterprises in the *posterior sample*, obtaining an average success ratio. Thus, the following results were obtained after model testing for the eleven enterprises in the initial sample:

For performant enterprises (PF), out of the seven ones included in the sample, in accordance with the known data, only six were correctly included by applying the model of establishing the financial performance on the financial-accounting data in the year 2006, as the success ratio (comparing the predictive classification with the known data on the initial sample enterprises) was 85.71% (Table 5), and on the basis of medium financial ratios (calculated for the latest six years) 71.43% of enterprises were correctly included (Table 6).

For enterprises with low performances (NPF), out of four included in the sample, only two of them were correctly included by applying the model of establishing the financial performance on the financial-accounting data in the year 2006, at a success ratio of 50% (Table 5), and on the basis of medium financial ratios, 100% of enterprises were included correctly (Table 6).

Table 5

Prediction of the initial sample enterprise status based on data from 2006 indicators and their ranking, under P_f

No.	Enterprise name	Actual status	P_f	Ranking according with P_f	Points (correct = 1)
1	ARCADA COMPANY SA	PF	5.85	PF	1
2	SOREX SA	NPF	5.73	PF	0
3	CONSAL SRL	NPF	2.62	PF	0
4	VEGA 93 SRL	PF	2.41	PF	1
5	ARCADA SRL	PF	2.03	PF	1
6	MOLDOVULCAN SA	PF	1.85	PF	1
7	CONFORT SA	PF	1.74	PF	1
8	CONSTRUCȚII AVRAM IANCU SRL	PF	1.34	PF	1
9	ICMRS SA	NPF	0.50	NPF	1
10	CONSTRUCȚII ŞI REPARAȚII SA	NPF	-0.35	NPF	1
11	CONSTRUCȚII FEROVIARE SA	PF	-0.34	NPF	0
Rate of success					72.73%

Source: Calculus made by author.

Table 6

Prediction of the initial sample enterprise status based on average values of their indicators and ranking, according P_f

No.	Enterprise name	Status	P_f	Ranking according with P_f	Points (correct = 1)
1	ARCADA COMPANY SA	PF	5.67	PF	1
2	ARCADA SRL	PF	4.80	PF	1
3	CONSTRUCȚII FEROVIARE SA	PF	4.23	PF	1
4	CONFORT SA	PF	3.28	PF	1
5	VEGA 93 SRL	PF	1.93	PF	1
6	CONSTRUCȚII AVRAM IANCU SRL	PF	1.16	NPF	0
7	CONSAL SRL	NPF	0.85	NPF	1
8	ICMRS SA	NPF	0.82	NPF	1
9	MOLDOVULCAN SA	PF	0.39	NPF	0
10	SOREX SA	NPF	-1.00	NPF	1
11	CONSTRUCȚII ŞI REPARAȚII SA	NPF	-2.57	NPF	1
Rate of success					81.82%

Source: Calculus made by author.

For all tested enterprises included in the initial sample, the success ratio of establishing the financial performance (calculated on the basis of medium values of the financial ratios involved in our analysis) was 81.82% and for the year 2006 it was 72.73%.

The analysis of the capacity of *a priori* prediction of the P_f model (Table 7) highlighted that the 1st type of error (non-performant enterprises classified as performant) is 0% for the medium values of ratios, and 28.57% for the ratios calculated on the basis of the data of the year 2006, and the 2nd type of error (performant enterprises classified as non-performant) shows degree of 18.18% for the medium values of parameters, and of 27.27% for the ratios calculated on the basis of data in the year 2006.

Table 7

Analysis of a prior error rate of the model P_f

Specification	Actual		Prediction	
	Medium ratio values	Ratio values at 2006	Medium ratio values	Ratio values at 2006
PF	7	7	5	8
NPF	4	4	6	3
Total	11	11	11	11
Error	Error no.		% error	
	Medium ratio values	Ratio values at 2006	Medium ratio values	Ratio values at 2006
Type I	0	2	0%	28.57%
Type II	2	1	50%	25%
Total	2	3	18.18%	27.27%

Source: Calculus made by author.

Furthermore, the model was also tested for enterprises in the same sector, which were not included in the initial sample. Information from the financial-accounting reports of enterprises were collected for the 2001- 2006 period for another sample (*a posterior*) made up of ten enterprises, out of which five with high performance and five enterprises with low performance. In ranking the enterprises in terms of their financial performance, we have used the same reasoning presented in Section 2, with the mention that the scores of these enterprises were granted from 1 to 10 in accordance with the values obtained for main financial parameters taken into account as performance parameters (Annex 2). In these conditions, the enterprise hierarchy after the financial performances in 2001-2006 period is presented in Annex 3.

The variables from testing sample (performant and non-performant enterprise) for year 2006 are calculated in Annex *4*, and the average variables of the testing sample are calculated in Annex *5*.

By computing the score P_f for the 10 enterprises within a posterior sample and ranking them decreasingly in accordance with the obtained score, we came to the situation presented in Annex 6 for year 2006 and in Annex 7 for average variables in 2001-2006 period.

In the given conditions, we notice a prediction success degree lower than the *a priori* one, where only 60% of the performant enterprises, and, only 60% of enterprises with low financial performance, respectively, were correctly grouped for the year 2006 and 80% of the performant enterprises and 60% of non-performant enterprises were correctly grouped for the 2001-2006 period.

The analysis of the capacity of a posterior prediction of the P_f model highlighted that the 1st type of error (non-performant enterprises classified as performant) is of 40% for the medium values of ratios, and of 20% for the ratios calculated on the basis of the data of the year 2006, and the 2nd type of error (performant enterprises classified as non-performant) show a lack of success degree of 40% for the medium values of parameters, and for the ratios calculated on the basis of data in the year 2006.

In accordance with the five areas of performance determined by using the model of establishing the financial performance level, for period 2001-2006, the group of 10 enterprises is the following:

- Katy shows a very high financial performance;
- Viva Construct and Comtiem show a medium financial performance;
- Baza, Brico and Civica show a satisfactory financial performance;
- Vîlceana, Triplex and Unicom show a low financial performance;
- Drumuri şi poduri shows a very low financial performance.

Conclusions

On the whole, the success ratio of the model on the 21 sampled enterprises (the enterprises in the initial sample and the ones in the subsequent sample) was 76.19% for medium ratio values and 66.6% for the ratio value of 2006. The model relevance can be improved by including the greatest possible number of enterprises in the initial sample group. However, from model testing it results that it has the greatest relevance when the rata of the model of determining the financial performance by financing are calculated as average values of the latest years, the success rate being in this case 81.82% for initial sample and 70% for the posterior sample. This demonstrates that this sector is undergoing profound changes and that the model will have to be adjusted periodically, in accordance with the evolutions registered in the building sector.

These percentages show that the financing is an extremely important factor in valuating the level of the financial performance of an enterprise. The highest the success rate of the model, the stronger the financing influence on the financial performance.

Thus, the model of establishing the financial performance by financing is widely used as, on the one hand, it allows for ranking enterprises active in the building sector in terms of their financial performance, and, on the other hand, it demonstrates that the financial performance of these enterprises is greatly determined by the way of financing the activity. The truthfulness of this latest idea is given by the fact that the initial ranking of enterprises was performed on the basis of some criteria that do not

necessarily take into account the financing, and by applying the model the same results, with small exceptions (Consal and Sorex), were obtained.

The relevance of the model is higher if the enterprises reinvest more of the profit obtained, and they use less financial debts to finance their activity. Enterprises that had the highest financial performance were those which reinvested an important part of their net profit, and also those that used less the financial debts (Arcada Company, Arcada, Constructii feroviare, Confort).

Thus, the variables that had the greatest influence in establishing the financial performance of enterprises are: the reinvested profit ratio and the weight of financial debts in total debts. The conclusion that can be drawn from this model is the following one: the higher the weight of financial debts within the total debts, the lower the financial performance indicator, and the higher the reinvested profit rate, the higher the financial performance of the enterprise. In circumstances of insufficient data necessary for the calculation of the two ratios, the highest financial performance is obtained by enterprises with the highest return on equity.

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