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DETERMINANT FACTORS FOR THE GROWING OF SHAREHOLDERS' EQUITY IN THE METALLURGICAL SECTOR IN ROMANIA

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The article provides a statistical monograph of the financial position and performance for the period 2008 – 2012 of the entities from the Romanian metallurgical sector whose financial statements in the period 2004 – 2012 have become the object of the financial audit. There are tested five types of regression models in order to separately determine the evolution of equity in accordance with the variation of turnover, total assets, average number of employees and net result. After determining the most appropriate simple regression model, one proceeds at establishing a multiple regression model which would simultaneously reflect the evolution of equity in accordance with the above mentioned variables. The study's importance is enhanced by certain statistically-based concrete measures which management should consider in order to increase the shareholders' equity.

Key words: metallurgical sector, shareholders' equity, financial statements, audited entities, regression analysis

INTRODUCTION

The Romanian metallurgical industry is one of the significant sectors of the Romanian economy, in spite of the decline felt for this sector in the ensemble of the Romanian economy, this decline being determined by the complex process of major restructuring and privatisation of the main metallurgical companies [1].

This special focus on metallurgical industry is also determined by the specific requirements for increasing the effectiveness of this sector within the integration process of Romania within the European Union, while the process of restructuring the Romanian steel industry was monitored by the European Commission (2006, 2008 and 2010), in the context of the authorisation of Romania by the European Union to provide restructuring aid for restructuring purposes of its steel industry [2].

After a difficult period determined by various attempts to make effective this sector such as the adapting of production capacities to market needs, closing overcapacities, technological modernisations and optimisation of number of employees according to technical needs [3], the metallurgical sector started to prove a positive trend for increasing performances. Subsequently, this positive trend was affected by the global crisis that has started to negatively influence the worldwide economies. Thus, if for the year 2008 the amount of net investments for the metallurgic industry was 324,3 mil. €, for the following years net investments in this sector were reduced with 41,6 % (at 189,4 mil. € for 2009) and with 41,2 % (at 190,7 mil. € for the year 2010) [4]. Even so, the metallurgical industry is still of special importance for the Romanian economy, considering the fact that this sector represented 6,8 % of the total industrial output in 2009, 8,9 % of the manufacturing output in 2009 and 11,9 % of the total exports of goods in 2010 [5].

Because of the consequences of global economic crisis, the total value of shareholders' equity for steel companies was decreased by 40 %, down from 3,3 billion USD to 2 billion USD, which correspond to a level registered during 2004 - 2005 period, while for the same sector it was registered a spectacular growing of the total equity of steel companies during period 2000 – 2008 [1]. Currently, many companies from the metallurgical sector are facing a dramatic situation where the value of shareholder' equity is less than 50 % of the share capital, which could lead these companies into difficult situations [1].

In this context, an analysis of the potential factors that might influence the evolution of shareholders' equity and therefore the financial performances in the metallurgical sector is relevant, especially if the effects of the global economic crisis which still affects world economies cannot be neglected.

RESEARCH DESIGN

The objective of the study is to establish a model of managerial decision-making concerning turnover, total assets, the average number of employees and net result, which would also have as aim to increase the shareholders' equity for the entities from the Romanian metallurgical sector.

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According to the statistical classification of the economic activities in Romania, the metallurgical sectors consists of five categories of activities which include 774 companies, according to information provided by the Romanian National Trade Register Office [6]. On the basis of stratified sampling, from the mentioned companies there were selected only those which in the period 2004 - 2012 have been subjected to financial audit and which have published their financial statements for each of the last five financial years in the period 2008 - 2012. Thus it was selected a sample of 41 entities, namely 5,3 % from the total population represented by the entities from the Romanian metallurgical sector.

According to the Romanian accounting legal framework, the provisions of Order of the Minister of Public Finances no. 3055/2009 for the approval of accounting regulations in accordance with the European Directives and the Law of accounting no.82/1991, the companies that should be audited are the entities that, at the end of the last two preceding years, surpass two of the following three criteria:

- Turnover over 7,3 mil. €.
- Total assets over 3,65 mil. €.
- Average employees number over 50 [7].

Therefore, the stratified sampling ensured the selection conditions for the largest 5,3 % entities from the Romanian metallurgical sector. For these entities there were collected data extracted from the financial statements published for each financial year 2008 - 2012 regarding the name and value of equity, total assets, turnover, the average number of employees and net profit. The obtained values were converted in (thousands) euro according to the exchange rates published by the Nation Bank of Romania for the last day of the mentioned financial years. Subsequently a simple arithmetic mean was created for each indicator for the five financial years of the values registered by each audited entity from the Romanian metallurgical sector. The average values have been statistically processed using Statgraphics Plus in order to establish the extent to which the shareholders' property depends on the evolution of the turnover, the total assets, the average number of employees or the net result of each of the 5,3 % entities within the Romanian metallurgical sector included in the study.

In order to obtain results as relevant as possible one analyzed the relevance of various simple regression statistical models listed in Table 1:

Table 1 **Typology of regression analysis models taken into account for analyzing the evolution of equity within the Romanian metallurgical sector audited in the period 2004 - 2012**

Nr. crt	Regression analysis models	Formula
1	Linear	Y = a + b*X
2	Square root X	Y = a + b*sqrt(X)
3	Logarithmic-X	Y = a + b*ln(X)
4	Reciprocal-X	Y = a + b/X
5	Exponential	$Y = a*b^X$

Source: Statistical processing performed by the authors

Once a significant model of simple linear regression was selected for the evolution of equity in relation with each of the four variables one attempted to create a multiple regression model which would simultaneously take into account the influence of the four variables on equity. To justify the relevance of this multiple regression model we established the correlation coefficient, the influence of the four independent variables on the dependent variable – equity, the p-Value level from the *Analysis of variance* (ANOVA) table, the confidence level and we succeeded in eliminating the effect of collinearity of independent variables.

RESULTS AND DISCUSSION

To consider a particular regression model relevant in order to estimate the average equity value for the audited entities from the Romanian metallurgical sector (dependent variable) according to the four mentioned independent variables, it is required to test these models in terms of calculating the coefficient of regression correlation as highlighted in Table 2:

Table 2 **Testing statistical models to determine the evolution of equity**

Relationship	Comparison of alternative regression models		
	Model	Correl. coeff.	R-squared
Equity (E)-Turnover (T)	Linear	0,9729	94,65 %
	Square root- T	0,8440	71,23 %
	Logarithmic-T	0,4998	24,98 %
	Reciprocal-T	-0,1467	2,15 %
Equity (E)- Total Assets (TA)	Linear	0,9843	96,89 %
	Square root-TA	0,9261	85,77 %
	Logarithmic-TA	0,6225	38,75 %
	Reciprocal-TA	-0,1437	2,07 %
Equity (E)-Number of Employees (NE)	Linear	0,9487	90,01 %
	Square root-NE	0,8392	70,43 %
	Logarithmic-NE	0,5291	28,00 %
	Reciprocal-NE	-0,1456	2,12 %
Equity (E)-Net Result (NR)	Linear	-0,6359	40,44 %
	Exponential	No fit	
	Reciprocal-E		
	Reciprocal-NR		

Source: Statistical processing performed by the authors

The most fitted model to study the correlation between the four variables in respect to which we studied the evolution of equity (turnover, total assets, average number of employees and net result) is the linear regression model. As shown in Table 2, after testing all the mentioned models, the square rot, logarithmic, reciprocal and exponential models proved to be less relevant in this regard. For the linear model were recorded the highest values of the correlation coefficient. For the first three independent variables the values registered for the linear regression model were situated at the upper extremity of the interval [0,75 - 1,00] which denotes a direct relationship of strong intensity between the dependent variable – equity – on one hand, and the indepen-

dent variables – turnover, total assets and average number of employees – for the audited entities from the Romanian metallurgical sector which in the period 2004 - 2012 were subject to financial audit activities. Therefore an increase of the independent variables almost certainly leads to an increased level of the dependent variable - equity.

If we take into consideration each model of linear regression we can observe from the values registered by the R-squared indicator that: the turnover explains in proportion of 94,65 % the variation of equity within audited entities from the Romanian metallurgical sector, the total assets justify 96,89 % from the variation of equity, the average number of employees considered individual explains in proportion of 90,01 % the variation of equity and the net result of the financial year singularly influences the dependent variable in proportion of 40,44 %.

Regarding the influence of the latter independent variable, it should be mentioned that the intensity of the relationship between equity and net result is an indirect one of medium level and it records average negative values.

Therefore, as shown in Table 3, after testing the five regression models, the best fitted model to describe the relationship between equity and the four independent variables, based on the values extracted from the financial statements published in the period 2008 - 2012 is considered to be the linear regression model.

Table 3 **Best fitted model for equity approach of audited entities from metallurgical sector in Romania**

Relationship	Regression Analysis			
	Best fitted model	General formula	p-Value	Confidence level
E-T	Linear	Y = a + b*X	0,0001	99 %
E-TA				
E-NE				
E-NR				

Source: Processing performed by the authors

Since the p-Value calculated in ANOVA table registers in all situations values of the coefficient below 0,01 we can state that statistically the linear model presents a confidence level of 99 % in terms of equity evolution correlated with each of the four variables.

After establishing and justifying the relevance and representativeness of the general model equity evolution in relation with turnover, total assets, the average number of employees and net result, there were also calculated the afferent parameters of the four models of simple linear regression, as shown in Table 4:

Table 4 **Simple linear regression – equity correlation**

The equations of the fitted models
Equity = -13 787,9 + 0,747348 x Turnover
Equity = -3 487,25 + 0,453356 x Total Assets
Equity = -18 473,6 + 88,5365 x No. Employees
Equity = 27 063,2 – 5,82822 x Net Result

Source: Statistical processing performed by the authors

Therefore, by starting from the financial statements published in the period 2008 - 2012 by the entities from the Romanian metallurgical sector audited in the period 2004 - 2012 we can observe at medium level that an increase of turnover with 100 m.u. leads to an increase of equity with 74 m.u., an increase of total assets with 100 m.u. leads to an increase of equity with 45 m.u., each new employee leads to an equity increase with 88 m.u.

These statistical results based on simple linear regression models are grounded, but they don't simultaneously present the influence of independent variables on equity. Given that the linear regression model proved to be the most fitted, it was established that this deficit can be covered by creating a multiple linear regression model. Since for three of the independent variables taken into consideration (turnover, total assets and average number of employees) there were registered, at the level of simple linear regression models, very high values of the correlation coefficients (between 0,9487 and 0,9843), at the level of multiple linear regression model, there is the risk of collinearity (some independent variables which have a certain relation to each other would generate at the level of the dependent variable – equity – unreal amplified effects). After eliminating this risk, one could establish the following multiple linear regression model between equity and the four above mentioned independent variables:

Equity =
1 683,3 –
0,222602 x Turnover –
2,25955 x Net Result =
0,669433 x Total Assets

Avoiding collinearity and providing a relevant model is the reason for which the average number of employees was removed from the formula of the multiple linear regression model. Based on the financial statements published in the period 2008 - 2012 by the audited entities from the Romanian metallurgical sector, this model presents a confidence level of 99 % given the fact that the p-Value calculated in the *Analysis of variance* (ANOVA) table registers a value of 0,0041 (well below the maximum accepted value of 0,01).

The adjusted R-squared statistically calculated for this model denotes that the independent variables included in the multiple linear regression model (turnover, net result and total assets) simultaneously explain the variation of the dependent variable (equity) in proportion of 99,14 %.

CONCLUSION

Therefore, from an economic point of view, for the entities from the Romanian metallurgical sector an increase of turnover is not a viable policy since an increase of 100 m.u. would lead to a equity decrease of 22 m.u. Thus the sales increase is not able to boost the value of equity (shareholders' equity). Taking into account the multiple regression model in order to increase eq-

uity, one should rather approach policies to increase net result and total assets. An increase of net result with 100 m.u. would lead to an increase of equity with 225,9 m.u. Also, an increase of total assets with 100 m.u. would lead to an equity increase with 66,9 m.u. Net result and then total assets have the strongest direct proportional impact on equity. This does not necessarily mean that the best managerial decision is to increase net result by diminishing expenses. In order to estimate this one must further take into consideration the manner in which turnover changes in relation with total assets. The established regression model presents a very high correlation coefficient between the two variables (0,99) which shows that an increase of total assets with 100 m.u. leads to an increase of turnover with 59 m.u. Therefore, the assets of the entities from the Romanian metallurgical sector are not efficient (the ideal situation would be that a certain increase of assets to lead to a certain increase of turnover). The optimal decisions of management from this sector to increase the shareholders' equity should target launching investments in order to hold efficient input means in the first place, even if the impact on equity would not be so great at the beginning. Subsequently, the reduction of production cost by diminishing consumption would indirectly impact the increase of net result, while maintaining constant the production volume, without necessarily taking into consideration the increase of turnover.

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Note: The responsible translator for English language is the lector from Babeş-Bolyai University, Cluj-Napoca, Romania