THE INFLUENCE OF FINANCIAL POLICIES ON RETURN ON ASSETS RATIO. AN ECONOMETRIC STUDY FOR ROMANIAN MANUFACTURING FIRMS

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Abstract: In this article we have identified the determinants of the return on assets ratio for the Romanian manufacturing firms over the period 2006 to 2011 using a fixed effects model. More exactly, the independent variables we included are: liquidity ratio; debt ratio; tangibility ratio; return on equity ratio; labour productivity ratio; return on sales ratio; depreciation and amortization ratio; leverage ratio; turnover's growth rate. Therefore, we have identified the influence of the financial and investment policies on return on assets ratio.

JEL classification: C23, G32, L25

Key words: return on assets, debt level, efficiency, manufacturing firms, profitability, investment policies

1. INTRODUCTION

In this article, we will try to demonstrate the impact of certain indicators that reflect the nature of financial policies on the return on assets ratio (ROA). The study will be focused on companies from Romania, companies engaged in the manufacturing industry, based on the data collected in the years 2006-2011. The indicators that assess profitability are amongst the most important indicators used by a company in its internal administration. Regardless the wording (the return on assets, equity or sales), these indicators can be found in the set of indicators published by most of the companies.

We have chosen the return on assets rate, because we consider that it reflects better than the return on equity rate the capacity of the companies to be efficient. Moreover, the majority of the factors interested in the company's activity are preoccupied with the increase in efficiency of the assets´ usage, in the effort of enhancing performance. The increasing pressure from the shareholders and also the limited financial resources force companies to seek and identify ways of growth of the assets´ efficiency, in order to stay competitive. To reach this aim, the companies should assess correctly the profitability of the assets. The return on assets rate measures the profit of a company in regard to its available resources (own capital and the liabilities it has on short, medium and long terms). Therefore, the return on assets rate is also a test that reflects the deployment of the capital. If a company does not have debts, then the return on assets rate is equal to the return on equity rate. High values indicate a high efficiency. A low return on assets rate is an indicator of an inefficient use of the assets.

The importance of the return on assets rate as a measurement indicator of the companies´ performance is recognized in the academic literature. Hence, Lindo (2008)

considers that the return on assets rate is the financial rate to measure the relationship between the profit obtained and the investments in assets made to generate profit. The return on assets rate is a base that can be used to measure the contribution of the profit to new investments. Therefore, through this indicator we can set a reference point that needs to be reached by any new investment, to maintain the existing level of performance.

The profitability of a company is influenced by various factors. Having knowledge of these factors is important, especially for the management of the company, in order to adopt adequate measures of development, but also to make short term and long term forecasts. Also, knowing about the interdependent relationship between profitability and influential factors is important for investors, creditors and other types of stakeholders, who show various interests in a particular company. Moreover, the structure of the capital and its impact on the efficiency of companies has always been a serious issue of research for all the researchers worldwide. To test the impact of different variables on the return on assets rate, we will use a panel data regression method.

In the scientific economic literature, there have been numerous studies aiming at identifying the impact of the structure of capital on the return on assets. In the following part we will list some of the specialized studies that were focused on studying the return on assets rate

2. LITERATURE REVIEW

Bosch-Badia (2010) conducted a study that tried to determine, through regression, a relationship between the return on assets rate, as a dependent variable, and indicators of productivity – the TFP index and labour productivity - , as independent variables. The results showed that both indices of productivity are determinant factors of the value of the return on assets rate.

Another thorough study on the return on assets was done by Gallinger (2000). He developed a model in which he introduced, as variables, indicators such as sales return, financial leverage, interest expenses, and return on equity. All these allow the analysis of the management of the company's assets and the opportunity to reuse more efficiently the assets in the future.

Siminică et al. (2012) have analyzed the relationship between the return on assets rate, as dependent variable, and a set of 24 indicators, which form the independent variables. The study case is conducted on a group of 40 companies listed by the Bucharest Stock Exchange (BVB), belonging to all fields of activity, in the period 2007-2010. The results obtained have indicated the existence of some variables correlated significantly to the level of the return on assets rate, being created in this respect 4 models of correlation, one for each analyzed year. The set of retained variables was different every year, which can only indicate that the economic situation differs from a year to another and modifies the correlations between the analyzed variables.

Ahmed et al. (2011) examine the impact of some factors such as size, indebting, level of tangible assets, risk and liquidity on the performance of Pakistan Stock Exchange (KSE) listed insurance companies. The performance level is measured through the return on assets rate. The results show that the size of the companies, the risk and the debt level are factors which influence the level of performance.

Fairfield and Yohn (2001) have done an analysis of the return on assets rate in their attempt to identify factors based on which you can forecast the level of the return on assets rate. The authors have obtained results indicating that by breaking down the return on assets rate in the assets rotation and the profit margin it doesn't offer information to forecast the future level of this rate. On the other hand, the splitting of the return on assets rate into the variation of the assets rotation and the profit margin variation is useful to forecast the variation of the rate.

Doğan (2013) analyzes the effect the size of companies has on profitability based on a sample test of 200 companies listed by the Istanbul Stock Exchange in the period 2008-2011. The return on assets rate is the index used to quantify profitability, whereas the total assets, total sales and the number of employees are indicators that describe the size of the companies. The outcomes obtained indicate a positive relationship between the indicators of size and the profitability of the companies. Other variables such as the debt level and the number of years since the establishment have a negative relation with the return on assets rate, while the liquidity ratio is in a positive relation.

Lalinsky (2012) makes use of financial data, gathered during the years 1993-2009, for 90 companies from Slovakia to identify the determinant factors of the ROA. The results indicate that the macro factors (energy costs, adhesion to the EU) have a significant importance for the evolution of the return on assets rate. Another important effect in the evolution of the return on assets rate is generated by factors that describe competitiveness – the efficiency of the company's management, the professionalism and quality of the management, the reduction of costs.

Judging by the previously presented information, we can see noticeable the interest taken by the academic literature in the analysis of the return on assets rate. Hereinafter, we will present some relevant aspects regarding the methodology chosen to identify the factors that influence the return on assets rate.

3. METHODOLOGY AND ANALZYED DATA

The financial observations regarding the companies in Romania are grouped in panel data. Panel data contain observations that possess not only identifiers for transversal sections, but also for their evolution in time. Considering the grouping of the observations in panel data, we will make use of a model specific to panel data. The basic class of the models that can be estimated through panel data tools can be expressed as follows:

$$Y_{it} = \alpha + X_{it}^{'}\beta + \delta_i + \gamma_i + \varepsilon_{it}$$

where Y_{it} is the dependent variable, X_{it} is a vector k dimensional of regressives, and ε_{it} are the innovations for M transversal units and observed for T periods. The terms δ_i and γ_i represent the specific effects (random or fixed) for units of the transversal section or for certain time periods. Consequently, for the panel data we can distinguish two main methods of estimation: models based on fixed effects and models based on random effects.

The presence of the specifically transversal or temporal effects can be captured and analyzed through techniques for fixed and random effects. We can specify the models that contain effects in one or both dimensions, for example, a fixed effect in the

dimension of the transversal section, a random effect in the dimension of the period or a fixed effect in the transversal section and a random effect in the period dimension. Necula[1] considers it should be emphasized that, actually, the one with random effects in both dimensions can be estimated only when the panel is in balance, when each transversal section has the same set of temporal observations. The specifications with fixed effects are tackled by using a simple approach consisting in the elimination of the average of the dependent variable at transversal or temporal levels and then through using a regression equation applied to the generated data. The specifications with random effects involve that the effects corresponding to $\boldsymbol{\delta_i}$ and $\boldsymbol{\gamma_i}$ are outcomes of some random independent variables with zero average and finite variation. Most importantly, the specification based on random effects implies that the specific effect is not correlated with the innovations of the equation.

Aparaschivei et al. (2011) states that in the models with fixed effects, the error component, $\boldsymbol{\delta_i}$ and $\boldsymbol{\gamma_i}$, can be correlated to the regressives, $\boldsymbol{X_{it}}$, but still it is sustained the hypothesis that there is no correlation between regressives and the random component of the error, $\boldsymbol{\varepsilon_{it}}$. In the models based on random effects, it is assumed that $\boldsymbol{\delta_i}$ and $\boldsymbol{\gamma_i}$ are completely random, a stronger hypothesis that implies its non correlation with the regressives (Baum, 2001).

In order to decide which model is more appropriate than the other, between a random effects model and a fixed effects model, we will conduct a Hausman test. The Hausman principle can be applied to all problems of testing hypotheses in which two estimators are involved. In this particular case of panel data, it is known that the estimator of fixed effects is consistent not only in the random effects model, but also in the fixed effects model as well. In the model based on fixed effects this is also efficient. On the other hand, the estimator based on random effects cannot be used in the model based on fixed effects, being by nature efficiently in the model based on random effects (Kunst, 2009).

The study of the determinant factors for the return on assets rate will be done based on 4.060 observations for companies in Romania, engaged in the manufacturing industry. The observations capture data from the years 2006-2011.

In our model, the ROA rate will be a dependent variable, and amongst the independent variables we included various indicators specific to different policies adopted by the companies. More exactly, amongst the independent variables we included: liquidity ratio; debt ratio; tangibility ratio; return on equity ratio; labour productivity ratio; return on sales ratio; depreciation and amortization ratio; leverage ratio; turnover's growth rate.

The return on equity ratio, labour productivity ratio and the return on sales are indicators that reflect the performance and efficiency of the companies. Their influence on the return on assets rate should be positive.

The debt ratio and the leverage ratio are indicators that reflect the financing policy of the company.

The depreciation and amortization in total fixed assets ratio is an indicator that reflects the policy of investment of the company. A high value of this indicator reflects management's intention to replace a part of the production capacity.

[1] http://www.cnp.ro/user/repository/econometrie.nivel1.v3.2.pdf

The liquidity ratio is an indicator that reflects and measures the capacity of the companies to meet their liabilities. The higher the rate of this indicator, the bigger is the safety margin taken by the companies to cover their debts.

Tangibility ratio reflects the weight these assets have on total assets. We have included the revenue growth rate in our model to capture the impact the growth of the company has on the return on assets rate.

Just as we mentioned before, in the estimation, we can use either a model based on fixed effects or one based on random effects. To be able to choose between the two, we realized the Hausman test. The Hausman test verifies the null hypothesis according to which the estimated coefficients generated by the model based on random effects are the same with those estimated by the fixed effects model. If the coefficients are similar (P-value insignificant, Prob $>\boldsymbol{\chi^2}>\mathbf{0.05}$) then we can use the model based on fixed effects. If we obtain a significant P-value, we will use the model based on fixed effects. As we can see in table 4.5, the most favourable model of estimation is the fixed effects model, P-value being significant (Prob$>\boldsymbol{\chi^2 = 0.0000}$).

Moreover, another argument supporting the utilization of the models based on fixed effects is that, if there are any omitted variables, not included in the model which are the same for all entities of the model, but which vary in time (for instance, the laws and rules that a company must comply to), this class of model is more appropriate.

Table no. 1 Hausman test

	Coefficients			
	Fixed effects	Random effects	Difference	S.E.
Liquidity ratio	0.3129	0.4708	-0.1578	0.0184
Debt ratio	-0.0981	-0.0701	-0.0279	0.0095
Depreciation and amortization ratio	-0.0064	-0.0071	0.0007	0.0002
Return on sales	0.0651	0.0602	0.0048	0.0020
Return on equity	0.0324	0.0391	-0.0067	0.0018
Tangibility ratio	-0.1089	-0.0947	-0.0141	0.0102
Productivity ratio	0.0001	0.0001	0.0000	0.0000
Leverage ratio	0.0113	0.0087	0.0026	0.0065
Turnover's growth rate	-0.0001	-0.0001	-0.0000	0.0000
$\boldsymbol{\chi^2(9) = 138.20}$				
Prob$>\boldsymbol{\chi^2 = 0.0000}$				

4. RESULTS

The results obtained by using the fixed effects model for panel data are provided in table 2.

The results obtained reveal important aspects. Surprisingly, the debt ratio has a negative influence on the return on assets ratio. Therefore, a growth of the ratio of debts in total assets will generate a decrease of the return on assets rate. As we see it, this could be one of the reasons for which companies in Romania are less efficient and generate a lower added value. The negative influence of the debt ratio on the return on assets can be explained also by the lack of a mature financial market, by the high costs associated to the contracted loans and by the inexistence of a capital market which can

act as an alternative to the banking market, companies not being able to capitalize their assets sufficiently enough to increase efficiency. Moreover, the influence of tangibility ratio supports this statement. The coefficient associated to the financial leverage is insignificant statistically.

Table no. 2 The estimation's results

Dependent variable Return on assets	Coefficients	Standard error	P-value
Independent variables			
Liquidity ratio	0.3129	0.0421	0.0000
Debt ratio	-0.0981	0.0155	0.0000
Depreciation and amortization ratio	-0.0064	0.0007	0.0000
Return on sales	0.0651	0.0043	0.0000
Return on equity	0.0324	0.0026	0.0000
Tangibility ratio	-0.1089	0.0173	0.0000
Productivity ratio	0.0001	0.0065	0.0010
Leverage ratio	0.0113	0.0077	0.1430
Turnover's growth rate	-0.0001	0.0001	0.0570
Constant	9.2489	1.4101	0.0000
Sigma_u	16.8979		
Sigma_e	11.0471		
Rho	0.7005		
F test that all u_i=0: F(944, 3106) = 4.91			Prob > F = 0.0000
R-sq			0.3226

The proportion of the depreciation and amortization in fixed assets, an indicator which reflect the investment policy, has a negative influence in the return on assets rate. The result is normal, if we take into consideration the fact that a growth of the investments implies also a growth in expenses. Moreover, the source of these investments can be represented by the profit of the companies, which leads to a decrease in the return on assets rate. In the future, depending on the nature of the investments (on short term; medium and long terms), these could lead to a growth of the return on assets rate.

The indicators that reflect the level of efficiency and performance of the companies (the return on sales ratio, the return on equity and the productivity ratio) are positively correlated with the return on assets rate. Thus, a growth of these indicators will lead to an increase of the ROA. Out of these three indicators, the most significant impact on the ROA is brought by the return on sales, while the productivity has a lower influence. The results are in line with expectations, in general, a growth of the productivity or a growth of the return on sales will lead also to an increase in the return on assets rate.

The tangibility ratio has a negative influence on the return on assets. A very high rate of these fixed and intangible assets in total assets will not generate a growth in the results of the companies.

Companies with a high liquidity ratio have also a higher return on assets rate. Basically, a high liquidity ratio implies the possibility of the companies to meet their

liabilities out of the available resources. In this case, they are not forced to resort to external sources that generate additional expenses that might affect the financial result.

Surprisingly, the growth of the turnover does not lead to a growth in the return on assets rate. This result can be backed up by two explanations; either this growth was done based on the investments made, or the positive impact on the return on assets rate was absorbed by the performance rates.

5. CONCLUSIONS

In this article we have identified the determinants of the return on assets ratio for the Romanian manufacturing firms over the period 2006 to 2011 using a fixed effects model. More exactly, amongst the independent variables we included: liquidity ratio; debt ratio; tangibility ratio; return on equity ratio; labour productivity ratio; return on sales ratio; depreciation and amortization ratio; leverage ratio; turnover's growth rate. The results reveal that the debt ratio has a negative influence on return on assets ratio. The proportion of the depreciation and amortization in fixed assets, an indicator which reflect the investment policy, has a negative influence in the return on assets rate. In line with expectations, the indicators that reflect the level of efficiency and performance of the companies are positively correlated with the return on assets rate. The tangibility ratio has a negative influence on the return on assets, while firms with higher liquidity ratio have also a higher return on assets rate.

REFERENCES

1. Ahmed, N., Ahmed, Z., & Usman, A. (2011) Determinants of performance: a case of life insurance sector of Pakistan. *International Research Journal of Finance and Economics*, *61*, 123-128.
2. Aparaschivei, L., Vasilescu, M.D.. Cătăniciu, N. (2011) Impactul investiţiilor şi al valorii adăugate brute asupra câştigului salarial. Economie teoretică şi aplicată, Volumul XVIII (2011), 2(555), 214-226.
3. Baum, C. F. (2001) Residual diagnostics for cross-section time series regression models, The Stata Journal, 1(1), 101-104.
4. Bosch-Badia, M. T. (2010) Connecting productivity to return on assets through financial statements: Extending the Dupont method. International Journal of Accounting and Information Management, 18(2), 92-104.
5. Doğan, M. (2013) Does Firm Size Affect The Firm Profitability? Evidence from Turkey Research. Journal of Finance and Accounting, 4(4), 53-59.
6. Fairfield, P. M., & Yohn, T. L. (2001) Using asset turnover and profit margin to forecast changes in profitability. *Review of Accounting Studies*, *6*(4), 371-385.
7. Gallinger GW. (2000) A framework for financial statement analysis part 1: Return-on-asset performance. Business Credit, 102(2):40-43.
8. Kunst, R.M. (2009) Econometric Methods for Panel Data – Part II. Available at http://homepage.univie.ac.at/robert.kunst/panels2e.pdf. (accessed 16 June 2013)
9. Lalinsky T. (2012) Firm Competitiveness Determinants: Results of a Panel Data Analysis. National Bank of Slovakia.

10. Lindo D.K. (2008) Asset Management is Your Job. SuperVision, 69(1), 14-18.
11. Necula, C. Suport de curs – Econometrie. Available at http://www.cnp.ro/user/repository/econometrie.nivel1.v3.2.pdf. (accessed 16 June 2013)
12. Siminică, M., Cîrciumaru, D., Simion, D. (2012) The Correlation between the Return on Assets and the Measures of Financial Balance for Romanian Companies. International Journal of Mathematical Models and Methods in Applied Sciences, 6(1), 249-256.