A QUANTITATIVE APPROACH TO PROFITABILITY RATIOS

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***Abstract**: The main objective of this paper was represented by the analysis of the performances reflected by the rates of profitability in the case of three companies in the milling and bakery sector. We carried out econometric processing for which we used the linear and the second-order regression functions. The intensity and type of the correlations between the variables were highlighted, by analysing the rates of economic, financial and commercial profitability in correlation with the factors of influence in the case of three companies in the milling and bakery sector. At the same time, through the results we obtained, we were able to make comparisons between the three analyzed companies. Statistical tests were used to verify the econometric models: Durbin Watson, Student (t), Fisher–Snedecor, χ^2.*

Keywords: Performance, Profitability, Correlation, Statistical tests.

JEL Classification Codes: C52, L25.

1. INTRODUCTION

When we aim at evaluating the performance of a company, we look, in fact, for ways of measuring the economic and financial consequences of the decisions of the company management. By its nature, the notion of performance is a diverse topic, approached by researchers as an activity in many fields.

In order to carry out the present study we used as research methods: the collection and processing of information, interpretation of research data, and as research techniques: bibliography analysis, analysis of available information, highlighting correlations between data using econometric regression models.

We built a database based on the information provided by the financial statements over a period of 10 years (2008-2017) for three companies operating in the milling and bakery sector: *Sam Mills S.R.L. Botiz, Granovit S.R.L. Brăila, Monicom Impex S.R.L. Dej.* The selection of these companies was made on the basis of the top companies in the sector (www.listafirme.ro), each of the three occupying the first place in the top business in Romania for NACE code 1061: Label: *Manufacture of grain mill products* in each county (Satu Mare, Brăila, respectively Cluj). The data were processed using the Eviews software.

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2. COMPANY PERFORMANCE

It can be said that a company has high performance when its actions reconcile the expectations of all its partners. For example, it successfully creates value for its shareholders, satisfaction for its customers through price and product quality, it protects the natural environment, which implies responsibility towards the company, and its employees are satisfied with their workplace. If an aspect is not respected, the company risks losing its performance attributes (Bondoc, 2014, pp. 9-10).

The accounting information system is considered to be the main source for the analysis of the economic and financial performance of the entities, and the accounting provides a peculiar type of information, the financial information, useful to the different users in the decision-making process (Oancea-Negescu, 2009, p. 25). The profit and loss account is part of the annual financial statements and it is a summary accounting document that presents the income and expense items for a certain period, signifying the result of the activity of the company and thus allows to measure its performance (Pantea, 2017 pages 75-76).

In the specialized literature, the concept of performance in the economic and financial field has different meanings such as: growth, profitability, productivity, efficiency, success. We agree with the opinion that performance is recorded when a company is efficient and effective at the same time. By efficiency we mean maximizing the effect obtained on a unit of effort consumed or minimizing the effect consumed on a unit of resulted effect. By effectiveness, we mean achieving and exceeding the objectives (Robu, Anghel, Șerban, 2014, p. 300).

In this paper, we approach the performance of the company based on the profitability ratios.

3. PROFITABILITY OF THE COMPANY

The analysis based on the profitability ratios highlights the performance of the company as a ratio between the effects (benefits) obtained and the efforts involved in obtaining them. Profitability can be defined as "the ability of an enterprise to make a profit by using the factors of production and capital, regardless of their origin" (Robu, Georgescu, 2000, p. 190).

In strictly economic terms, profitability means the ability of a company to generate profit. Profit is the effect of conducting a profitable economic activity, attesting the proper functioning of the economic enterprise system. Profitability is the essential condition for ensuring the business success of an economic entity and is measured by obtaining positive results after comparing the financial effects with the financial efforts involved (Achim, 2010, p. 345).

An enterprise can be profitable, but only comparing its level of profitability with that of its main competitors, with their average rate of return, shows how competitive it is in the market. Any decision made at the level of a company must be motivated in terms of its impact on profitability. Expressing profitability in its relative form takes the form of profitability ratios (Crecană, 2012, pp. 59-60).

The analysis of the result indicators in absolute size can provide useful information for the analysis, but not sufficiently representative for managers or investors and especially for comparisons between economic entities. Relativizing the results (the gross operating profit, the operating profit, the gross profit, the net profit), by comparing them to other measures (for example, the turnover, the assets or the capitals) leads to the determination of the rates of return (profitability ratios). In general, the rates of return are determined as a percentage ratio between a result indicator and the effort made by the company to obtain it (Bondoc, 2014, p. 61).

Depending on the indicators taken into account for their determination, in the economic theory and practice, we identify several types of rates of return: rates of commercial profitability or margin ratios (return on sales), rates of economic return, also called yield ratios, rates of financial return, also known as indices of global profitability (Mironiuc, 2009, p. 116).

4. ANALYSIS OF THE DATABASE AND RESULTS OF THE RESEARCH ACTIVITY

The information provided by the financial statements constituted the database that allowed us to analyze the link between the return on sales, the gross profit and the turnover, the economic rate of return, the gross profit, and the total assets, the financial rate of return, the net profit, and equity.

Before estimating a regression equation, the stationary nature of the time series must be verified. The stationary nature of the series is verified using the Augmented Dickey-Fuller test. The time series are stationary if *t_Statistic* ≥ *t_Critical* and the probability p is lower than the significance threshold $\alpha = 0.05$ (Șerbănescu, Necșulescu, 2013). After analysing the data presented in Table no. 1, we can say that all the data series are stationary.

Table no. 1 – Results of the Augmented Dickey-Fuller test

	t-Statistic	Prob	Level of significance accepted so that the data series may be stationary
Sam Mills S.R.L.			
Return on sales	-2.093404	0.0418	5%
Gross profit	-3.092018	0.0069	1%
Turnover	-2.280204	0.0348	5%
Economic rate of return	-3.839625	0.0222	5%
Total assets	-3.224947	0.0621	10%
Financial rate of return	-2.061759	0.0436	1%
Net profit	-3.423078	0.0437	1%
Equity	-9.244210	0.0002	1%
Granovit S.R.L.			
Return on sales	-2.996294	0.0090	1%
Gross profit	-3.316341	0.0054	1%
Turnover	-3.218264	0.0063	1%
Economic rate of return	-3.529400	0.0033	1%
Total assets	-3.309579	0.0560	5%
Financial rate of return	-5.161226	0.0069	1%
Net profit	-3.218562	0.0063	1%
Equity	-2.462249	0.0214	5%
Monicom Impex S.R.L.			
Return on sales	-4.377517	0.0009	1%
Gross profit	-4.415098	0.0008	1%
Turnover	-3.877434	0.0029	1%
Economic rate of return	-4.386530	0.0008	1%
Total assets	-5.057839	0.0006	1%
Financial rate of return	-4.254562	0.0010	1%
Net profit	-4.425477	0.0008	1%
Equity	-2.305324	0.0286	5%

The unifactorial and multifactorial regression functions for the three companies, obtained from data processing using the Eviews software are presented in Table no. 2, Table no. 3 and Table no. 4.

Following the processing performed, it is found that, for the three companies, the estimators of the parameters of the regression functions are significantly different from zero, from a statistical point of view, due to the fact that the calculated values of the statistical test t are high in relation to the theoretical value. The error independence hypothesis is accepted for all the econometric models. The validity of the econometric regression models is established by means of the statistical F-test (the calculated values of the statistical F-test are higher than the theoretical one). In conclusion, we can say that the Turnover, the Gross profit are influential factors for the return on sales.

Table no. 2 - Analysis of the correlation between the turnover, the gross profit and the return on sales

	Econometric model of unifactorial regression		**Econometric model of multifactorial regression**
	Turnover and Return on sales	Gross profit and Return on sales	Turnover, Gross profit and Return on sales
Sam Mills S.R.L.	$y = 3.15 - 0.006x_1$ $R = - 0.7591$ $R^2 = 0.5673$ ($d_c = 2.71$; $F_c = 10.49$)	$y = 5.53 - 2.97x_2 + 0.47x_2^2$ $R = - 0.8934$ $R^2 = 0.7982$ ($d_c = 2.10$; $F_c = 13.84$)	$y = 4.76 - 0.004x_1 - 1.93x_2 + 0.33x_2^2$ $R = 0.9306$ $R^2 = 0.8663$ ($d_c = 2.22$; $F_c = 12.96$)
Granovit S.R.L.	$y = -5.399 + 26.11x_1$ $R = 0.394$ $R^2 = 0.155$ ($d_c = 1.89$; $F_c = 14.73$)	$y = 0.37 + 209.41x_2$ $R = 0.985$ $R^2 = 0.971$ ($d_c = 2.37$; $F_c = 299.14$)	$y = 4.49 - 10.68x_1 + 227.18x_2$ $R = 0.99935$ $R^2 = 0.9964$ ($d_c = 2.77$; $F_c = 494.66$)
Monicom Impex S.R.L.	$y = -0.81 + 0.25x_1$ $R = 0.2319$ $R^2 = 0.0538$ ($d_c = 2.35$; $F_c = 8.45$)	$y = 0.05 + 11.25x_2$ $R = 0.9964$ $R^2 = 0.9928$ ($d_c = 2.84$; $F_c = 1105.19$)	$y = y = 0.28 - 0.03x_1 + 11.33x_2$ $R = 0.9967$ $R^2 = 0.9935$ ($d_c = 2.91$; $F_c = 537.84$)

We note with x_1 - the Turnover (the independent variable of the econometric regression model)
x_2 – The gross profit (the independent variable of the econometric model)
y – The return on sales (the dependent variable of the econometric regression model)

For Sam Mills S.R.L., the correlation of the return on sales with the turnover as well as with the gross profit is inverse and of high intensity. Approximately 57% of the variation in the return on sales is justified by the variation of the turnover and 80% by the variation of the gross profit. 87% of the variation in the return on sales is justified by the cumulative variation of the turnover and of the gross profit. The increase in the turnover on average by one million lei/year determines the annual reduction of the return on sales on average by 0.006 percentage points. The increase in the gross profit on average by one million lei/year determines the annual reduction of the return on sales on average by 2.97 percentage points. The increase in the turnover on average by one million lei/year determines the annual decrease of the return on sales on average by 0.004 percentage points, and in the case of the gross profit it decreases by an average of 1.93 percentage points/year.

For the company Granovit S.R.L., the correlations between the turnover and the return on sales as well as between the gross profit and the return on sales are direct and of low intensity, respectively high. 16% of the variation in the return on sales is justified by the change in turnover and 97% by the variation in gross profit.

Approximately 99.6% of the variation in the return on sales is justified by the cumulative variation of the turnover and the gross profit. The increase in the turnover on average by one million lei/year determines the annual increase in the return on sales on average by 26.11 percentage points. The increase in the gross profit on average with one million lei/year determines the annual increase in the return on sales on average with 209.41 percentage points. The increase in the turnover on average by one million lei/year determines the annual reduction of the return on sales on average by 10.68 percentage points and in the case of the gross profit it increases by an average of 227.18 percentage points/year.

For the company Monicom Impex S.R.L., between the turnover and the return on sales there is a direct and low intensity correlation, while a high-intensity correlation exists with the gross profit. Approximately 5% of the variation in the return on sales is justified by the change in turnover, 99% is justified by the change in gross profit. 99.4% of the variation in the return on sales is justified by the cumulative variation of the turnover and the gross profit. The increase in the turnover on average by one million lei/year determines the annual increase in the return on sales on average by 0.25 percentage points. The increase in the gross profit on average by one million lei/year determines the annual increase in the return on sales on average by 11.25 percentage points. The increase in the turnover on average by one million lei/year determines the annual reduction of the return on sales on average by 0.03 percentage points and in the case of the gross profit it increases by an average of 11.33 percentage points/year.

Table no. 3 - Analysis of the correlation between the gross profit, Total assets and the Economic rate of return

	Econometric model of unifactorial regression		**Econometric multifactorial regression model**
	The gross profit and the economic rate of return	Total assets and economic rate of return	Gross profit, Total assets and Economic rate of return
Sam Mills S.R.L.	$y = 0.05 + 0.000000312x_1$ $R = 0.8553$ $R^2 = 0.7315$ ($d_c = 1.64$; $F_c = 21.79$)	$y = 1.42 – 0.00000125x_2$ $R = -0.4743$ $R^2 = 0.2250$ ($d_c = 2.40$; $F_c = 17.42$)	$y = 1.19 + 0.00000038x_1 – 0.00000044x_2$ $R = 0.9857$ $R^2 = 0.9716$ ($d_c = 3.28$; $F_c = 119.74$)
Granovit S.R.L.	$y = 1.96 + 0.00026x_1$ $R = 0.7909$ $R^2 = 0.6255$ ($d_c = 2.21$; $F_c = 13.36$)	$y = 16.69 - 0.000024x_2$ $R = -0.4147$ $R^2 = 0.1720$ ($d_c = 2.66$; $F_c = 16.61$)	$y = 11.22 + 0.00028x_1 - 0.000029x_2$ $R = 0.9404$ $R^2 = 0.8843$ ($d_c = 2.21$; $F_c = 26.76$)
Monicom Impex S.R.L.	$y = 0.06 + 0.00002x_1$ $R = 0.9857$ $R^2 = 0.9716$ ($d_c = 2.70$; $F_c = 273.73$)	$y = 2.79 - 0.00000014x_2$ $R = -0.1145$ $R^2 = 0.0131$ ($d_c = 2.41$; $F_c = 10.47$)	$y = 1.66 + 0.00002x_1 - 0.00000033x_2$ $R = 0.9893$ $R^2 = 0.9787$ ($d_c = 2.66$; $F_c = 160.76$)

We note with x_1 - The gross profit (the independent variable of the econometric regression model)

x_2 - Total assets (the independent variable of the econometric model)

y – the economic rate of return (the dependent variable of the econometric regression model

In the case of the three analysed companies, the estimators of the parameters of the regression functions are significantly different from zero because the calculated values of the statistical test t are high in relation to the theoretical value. The error independence hypothesis is accepted for all the econometric models. The validity of the econometric regression models is established by means of the statistical F-test (the calculated values of the statistical F-test are higher than the theoretical one).

For the company Sam Mills S.R.L., between the gross profit and the economic rate of return there is a direct and high intensity correlation, while, between total assets and the economic rate of return, this is a reverse and medium-intensity correlation. Approximately 73% of the variation in the economic rate of return is justified by the variation of the gross profit and 23% of the total assets variation. 97% of the variation of the economic rate of return is justified by the cumulative variation of the gross profit and of the total assets the rest of 3% by the variation of the random factors. The increase in the gross profit on average by one million lei/year determines the annual increase in the economic rate of return on average by 0.000000312 percentage points. The increase in the total assets on average by one million lei/year determines the annual reduction of the economic rate of return on average by 0.00000125 percentage points. The increase in the gross profit on average by one million lei/year determines the annual increase in the economic rate of return on average by 0.00000038 percentage points and in the case of total assets it decreases by an average of 0.00000044 percentage points/year.

For the company Granovit S.R.L., the correlations between the gross profit and the economic rate of return as well as between total assets and the economic rate of return are direct and inverse, respectively of average intensity. Approximately 63% of the variation in the economic rate of return is justified by the variation of the gross profit and 17% of the total assets variation. 88% of the variation of the economic rate of return is justified by the cumulative variation of the gross profit and of the total assets and 12% by the variation of the random factors. The increase in the gross profit on average by one million lei/year determines the annual increase in the economic rate of return on average by 0.00026 percentage points. The increase in the total assets on average by one million lei/year determines the annual reduction of the economic rate of return on average by 0.000024 percentage points. The increase in the gross profit on average by one million lei/year determines the annual increase in the economic rate of return on average by 0.00028 percentage points and in the case of total assets it decreases by an average of 0.000029 percentage points/year.

For the company Monicom Impex S.R.L., between the gross profit and the economic rate of return there is a direct and high-intensity correlation, while, between the total assets and the economic rate of return this correlation is inverse and low- intensity. Approximately 97% of the variation in the economic rate of return is justified by the variation of the gross profit and 1.31% of the total assets variation. 98% of the variation of the economic rate of return is justified by the cumulative variation of the gross profit and of the total assets and 2% by the variation of the random factors. The increase in the gross profit on average by one million lei/year determines the annual increase in the economic rate of return on average by 0.00002 percentage points. The increase in the total assets on average by one million lei/year determines the annual reduction of the economic rate of return on average by 0.00000014 percentage points. The increase in the gross profit on average by one million lei/year determines the annual increase in the economic rate of return on average by 0.00002 percentage points and in the case of total assets it decreases by an average of 0.00000033 percentage points/year.

In the case of the three companies, the estimators of the parameters of the regression functions are significantly different from zero because the calculated values of the statistical test t are high in relation to the theoretical value. The error independence hypothesis is accepted for all the econometric models. The validity of the econometric regression models is established by means of the statistical F-test (the calculated values of the statistical F-test are higher than the theoretical one). In conclusion, we can say that the net profit and the Equity are influential factors for the financial rate of return.

Table no. 4 - Analysis of the correlation between Net profit, Equity and Financial rate of return

	Econometric model of unifactorial regression		**Econometric model of multifactorial regression**
	Net profit and financial rate of return	Equity and the financial rate of return	Net profit, equity and financial rate of return
Sam Mills S.R.L.	$y = 4.6 + 0.00000133x_1$ $R = 0.4993$ $R^2 = 0.2493$ ($d_c = 2.27$; $F_c = 20.45$)	$y = 11.61 – 0.0000059x_2$ $R = -0.4226$ $R^2 = 0.1786$ ($d_c = 2.17$; $F_c = 17.39$)	$y = 11.99 – 0.00000014x_1 – 0.00000006x_2$ $R = 0.8055$ $R^2 = 0.6488$ ($d_c = 3.88$; $F_c = 76.21$)
Granovit S.R.L.	$y = 537.24 – 0.00065x_1$ $R = -0.5724$ $R^2 = 0.3276$ ($d_c = 1.92$; $F_c = 38.98$)	$y = 484.26 - 0.0012x_2$ $R = -0.9708$ $R^2 = 0.9425$ ($d_c = 2.11$; $F_c = 257.88$)	$y = 395.88 + 0.00032x_1 - 0.0015x_2$ $R = 0.9894$ $R^2 = 0.9789$ ($d_c = 2.26$; $F_c = 162.66$)
Monicom Impex S.R.L.	$y = 0.98 + 0.000087x_1$ $R = 0.9708$ $R^2 = 0.9425$ ($d_c = 1.93$; $F_c = 131.01$)	$y = -9.76 + 0.000021x_2$ $R = 0.3991$ $R^2 = 0.1593$ ($d_c = 2.35$; $F_c = 15.16$)	$y = 6.27 + 0.000093x_1 - 0.0000066x_2$ $R = 0.9769$ $R^2 = 0.9544$ ($d_c = 2.40$; $F_c = 73.33$)

We note with x_1 - the net profit (the independent variable of the econometric regression model)
x_2 - Equity (the independent variable of the econometric model)
y - the financial rate of return (the dependent variable of the econometric regression model)

For the company Sam Mills S.R.L., between the net profit and the financial rate of return, there is a direct and medium-intensity correlation, while, between the equity and the financial rate of return, this correlation is reverse and of medium intensity. Approximately 65% of the variation in the financial rate of return is justified by the cumulative variation of net profit and equity and 35% by the variation of random factors. The increase in the gross profit on average by one million lei/year determines the annual decrease both of the financial rate of return on average by 0.00000014 percentage points and of the equity by 0.00000006 percentage points/year.

For the company Granovit S.R.L., between the net profit and the financial rate of return as well as between the equity and the financial rate of return, this correlation is inverse. Approximately 98% of the variation in the financial rate of return is justified by the cumulative variation of the net profit and the equity. The increase in the net profit on average by one million lei/year determines the annual increase in the financial rate of return on average by 0.00032 percentage points and in the case of equity it decreases on average by 0.0015 percentage points/year.

For the company Monicom Impex S.R.L., there is a high intensity correlation between the three indicators. Approximately 96% of the variation in the financial rate of return is justified by the cumulative variation of the net profit and equity. The increase in the net profit on average by one million lei/year determines the annual increase in the financial rate of return on average by 0.000093 percentage points and in the case of equity it decreases on average by 0.0000066 percentage points/year.

5. CONCLUSIONS

The regression analysis is used to determine the correlation between indicators and allows the study and the measurement of the relationships between the dependent variables and one or more independent variables. In this paper, the analysis of the connections between the indicators is performed with the help of linear and parabolic econometric models. The intensity of the relationship between indicators is measured by correlation coefficient (Multiple R) and accuracy with dependent variable care is explained by independent variable variation for the coefficient of determination (R-squared). The validity of the econometric model is accepted if the hypothesis of independence of the random variables is verified (the Durbin - Watson test), the parameters are significantly different from zero (the t test) and the model is suitable for the data (the F test).

Following the study we have carried out, we found that the gross profit has a positive influence on both the return on sales and on the economic rate of return, except for Sam Mills S.R.L, where this indicator has a negative influence on the return on sales. In the case of Granovit S.R.L., compared to the other companies, the correlation between the variables is the most intense. For the companies Monicom Impex S.R.L. and Granovit S.R.L., the turnover has a positive influence on the return on sales, whereas the total assets negatively affect the economic rate of return. The equity has a negative influence on the financial rate of return for the companies Sam Mills S.R.L and Granovit S.R.L. and positive for Monicom Impex S.R.L.

According to the econometric analysis, in the case of Sam Mills S.R.L., about 80% of the variation of the rate of commercial profitability is justified by the gross profit, so we recommend a higher profit mainly to increase the return on sales, the influence of this variable on the other profitability rates being lower. In the case of Granovit S.R.L., 97% of the variation of the return on sales and 73% of the variation of the rate of economic profitability are justified by the gross profit, thus determining the need to increase this variable. We noticed that 90% of the changes in all the analyzed profitability rates is justified by the gross or net profit in the case of the company Monicom Impex S.R.L., therefore we suggest to increase the profit.

One of the acknowledged limitations of this research is the fact that each ratio is just one number divided by another, so we could have combine profitability ratios analysis with knowledge of companies' economic circumstances and environment.

Further research might investigate other profitability determinants. The research may also be extended to other economic sectors in order to perform a comparative analysis of profitability.

REFERENCES

1. M.V. Achim, *Analiză economică-financiară*, *(Economic and Financial Analysis)* Risoprint Publishing House, Cluj-Napoca, 2010
2. M.D. Bondoc, *Analiza performanțelor entității economice (The analysis of the economic entity performances)*, Ed. Sitech Publishing House, Craiova, 2014
3. C.D. Crecană, *Rentabilitatea entităților economice (Profitability of Economic Entities)*, Ed. Economică Publishing House, Bucharest, 2012

4. M. Mironiuc, *Analiză economico-financiară. Performanță. Poziție financiară. Risc* (*Economic and Financial Analysis. Performance. Financial Position. Risk)*, the Publishing House of Alexandru Ioan Cuza University, Iași, 2009
5. M. D. Oancea-Negrescu, *Analiza și evaluarea informațiilor financiare (Analysis and Assessment of Finanical Information)*, Ed. Economică Publishing House, Bucharest, 2009
6. M.I. Pantea, *Analiza economico-financiară, instrument al managementului întreprinderii*, *(The Economic and Financial Analysis, a Tool of the Company Management)* the Publishing House of the West University of Timisoara, Timişoara, 2017
7. V. Robu, I. Anghel, E.C. Șerban, *Analiza economico-financiară a firmei (Economic and Financial Analysis of the Company)* Ed.Economică Publishing House, Bucharest, 2014
8. V. Robu, N. Georgescu, *Analiză economico-financiară (Economic and Financial Analysis),* Omnia Uni Publishing House, Brașov, 2000
9. L. Şerbănescu, C. Necşulescu, *Analyzing and forecasting key profitability indicators of banking system in Romania*, Lucrări Ştiinţifice. Management Agricol, Agroprint Publishing House, Timişoara, 2013
10. www.bvb.ro
11. www.listafirme.ro