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## THE COMPARISON OF EFFICIENCY AND PERFORMANCE OF PORTUGUESE AND UKRAINIAN ENTERPRISES

*This article intends to analyze the performance and the efficiency of companies and to identify the key factors that may explain it. It was selected a sample with 15 enterprises: 7 Portuguese and 8 Ukrainian ones, belonging to several industries. Financial and non-financial data was collected for 6 years, during the period of 2009 to 2014. Research questions that guided this work were: Are the enterprises efficient/profitable? What factors influence enterprises' efficiency/performance? Is there any difference between Ukrainian and Portuguese enterprises' efficiency/performance, which factors have more influence? Which industrial sector is represented by more efficient/profitable enterprises?*

*The main results showed that in average enterprises were efficient with low level of profitability. According to gained results several indicators were highlighted so that companies would pay more attention to them.*

*JEL: D21; D24; D29; D 51; F15; F22*

### Introduction

Nowadays every enterprise set stable development and efficiency as a target to achieve. In order to achieve that use of comprehensive economic and financial analysis considered to be a must. One of the main targets of the research is to compare enterprise efficiency of Portuguese and Ukrainian enterprises while conducting a study of the theoretical basis of enterprise performance and efficiency, factors which influence them, choosing how to conduct comprehensive economic and financial analysis.

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The need for such a comparison is a result of the increasing complexity of companies activity in conditions of high competition at the global level. The environment in which they function is constantly getting more complicated, risks are growing, and access to resources is reducing, which leads to deterioration of economic and financial activity results. Additional threats are created by the absence of needed attention to the issues of economic analysis of enterprises activity, which is used from time to time in the process of managing their activities.

The following tasks were solved during research:

- the essence of the categories “performance”, “efficiency” and “effectiveness”, was revealed, whose meaning is important for improving the efficiency of enterprise performance;
- existing determinants of the performance were studied;
- methodical approaches of comprehensive economic analysis of enterprise's economic activity were analyzed and on this basis modern and more substantiated method of its implementation was developed;
- the researched methodology was made (objectives, collecting data process, sample, applied methods were chosen);
- comprehensive economic analysis of enterprise was made in order to identify the level of efficiency and performance, identify factors impact and presentation of its results was given.

The practical object of the study was to conduct economic and financial analysis of enterprise efficiency and profitability via linear regression analysis of comprehensive indicators (Asset Turnover Ratio and Return on Assets), identify factors of influence and their impact on dependable variables; use the results to define average efficiency and profitability levels among the sample in general or separately by its country (Portugal or Ukraine) or industry (paper; building materials; building; steel or engineering (automotive)).

The research sample consists of 90 observations in total: 7 enterprises from Portugal and 8 enterprises from Ukraine, which operate in the industrial sector of the economy. The chosen enterprises belong to 5 sectors: paper; building materials; building; steel and engineering (automotive). Each enterprise had been studied during 6 years, for the period of 2009 to 2014.

### **The Literature Review**

Efficiency is one of the main categories of the economy, which is directly linked to the achievement of the final results of the company. The world is constantly changing and is always characterized by continuous progress; also the market economy does not remain constant. All of those require active steps from the enterprises for improving their activity

performance. It obligates development and provision of sustainable performance in order to achieve success.

That is why the pre-research has great importance for continued comparison of Portuguese and Ukrainian enterprises.

Review of determination of efficiency was carried, in particular, by Adzhavenko (2014), who had determined that efficiency can be defined from different angles, as a set of properties and constituent elements: productivity, operability, economy (a measure of the use of system resources), quality, profitability, quality of working life.

As written by Mlíkva (2013), performance is an economic category which is closely linked to the systemic view of its measurement and evaluation. The system whose performance is to be measured and evaluated corresponds to its internal structure. To measure the performance of the enterprise is, therefore, necessary to know which (and also how) subsystems of its internal structure contribute to the overall performance.

Efficiency as an economic category is the qualitative and quantitative characteristics of performance management (Krivovyazyuk, 2012). It is typical for the whole reproduction process and all its phases separately including (production, distribution, exchange and consumption); describes the activities of any business section and economic systems at all levels (companies or industrial enterprises, households, industries, region, state economy as a whole).

The definition of efficiency found place in a large number of studies, our vision of effectiveness, efficiency and performance according to aspects of economic practice is next:

- Effectiveness is a measure characteristic which shows if everything is going according to made plan and if company achieves set targets;
- Efficiency is a measure which shows the quality of some activity, the ability not only achieve target but do it with less costs spent;
- Performance – characteristic of success connected to a specific activity.

One of the central questions in the economy is why some firms succeed and others fail. Enterprise success is influenced by many factors and variables.

Determining the firm performance using a set of financial measures has been and still is an interesting and challenging problem.

A lot of factors were researched by scientists in the context of a variety of performances' types. Among factors of influence, the literature has established that slack financial resources can play an important role in improving CSP. In particular, Aguilera-Caracuel et al. (2015) analysed whether excess financial resources can lead to better benefits of the multinational enterprises (MNEs) gained from their international cultural diversification and as a result can lead to conducting advanced corporate social responsibility activities, which improve their CSP level (Aguilera-Caracuel et al., 2015).

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Vätavu (2014) in order to highlight determinants of profitability made an analysis based on cross-sectional regressions, where performance indicators were based on the rest of variables and performance was considered as a function of financial and non-financial indicators.

Return on Assets (ROA) was set as a performance proxy, the variables (factors) which had influence were debt, asset tangibility, size, liquidity, taxation, risk, inflation and crisis. Regression results indicated that Romanian companies had had higher performance when they have been using limited borrowings. Negative impact on dependent variable had tangibility, business risk and the level of taxation. Though earnings are provided by significant sales turnover, performance is affected by high levels of liquidity. Unstable economic times displayed by high inflation rates and the current financial crisis, which also had a strong negative influence on total corporate performance (Vätavu, 2014).

In order to identify indicators that impact corporate financial performance, Ching and Gerab (2012) used principal component and multiple regression analyses of 16 Brazilian listed companies for the period 2005-2009 (Ching & Gerab, 2012). As the result of first analysis five factors that impact financial performance were extracted from 20 variables and ratios, which ones had been used later in multiple regression analysis. The last analysis was used to confirm indicators influence on corporate profitability and define the influence level. The financial performance of companies was influenced by factors such as firm size (the most predominant accounted for 26.9 % of total variance), working capital management, solvency (liquidity), margin, financial debt (the least important, accounted for 9.1 %).

The influence of several variables on the financial performance in the context of capital structure was made by Banerjee and De (2014). In their work independent variables such as “business risk”, “size of the firm (in sales)”, “growth rate”, “debt service capacity (interest)”, “dividend payout”, “financial leverage”, “degree of operating leverage”, “firm’s age” and “size of the firm (in assets)” were researched to find out which might have some impact on the profitability of the Indian iron and steel industry. The study showed that “financial leverage”, “debt service capacity (interest)” and “size of the firm (in assets)” are significant factors influencing the profitability of the firms (Banerjee & De, 2014).

Another study employed next methodology: the underlying dimensions of the financial ratios were identified by using exploratory factor analysis, which was followed with the discovery of any possible potential relationships between the firm performance and financial ratios using predictive modelling methods (Delen, Kuzey & Uyar, 2013). Results defined next factors: liquidity (the most significant, was explaining 11.48% of the total variance); asset structure (explaining 9.59% of the total variance); asset and equity turnover ratio (9.1%) and showed how efficiently a company used its assets and equity to generate sales revenues; gross profit margin (6.95%); financial debt ratio (6.58%); current assets (5.29%); leverage (4.83%); net profit margin (4.81%); net working capital (NWC) turnover ratio (3.99%); sales & profit growth ratio (3.92%); asset growth ratio (3.89%). In this study decision tree algorithms (like C5.0, Classification and Regression Trees, Chi-squared Automatic Interaction Detector and The Quick, Unbiased, Efficient Statistical Tree) were used to evaluate the financial performance of Turkish companies listed on the Istanbul

Stock Exchange. According to findings of conducted prediction models, two profitability ratios (i.e., EBIT ratio and net profit margin) have the biggest impact on company performance. These ratios indicate the potential ability of a company to control their costs and expenses. The leverage and debt ratios had an impact on the company performance as well and the sales growth and Asset Turnover Ratio (ATR) had indicated the ability of a company to generate sales. For improving its overall performance firm must have high sales performance. Finally, findings corroborated the Dupont analysis, which decomposed Return on Equity (ROE) into the three multiplicative ratios of Profit margin, Asset Turnover, and Leverage.

Kijewska (2016) identified the determinants of ROE using an original and five-factor version of the DuPont formula was analysed on the example of two Polish companies from mining and metallurgy sector. The last method was used in order to analyse in more detail ROE dependence and possible ways to improve return of the firm.

Kotane and Kuzmina-Merlino (2012) for more effective analysis suggested using the system of financial indicators that should have taken into account industry and companies conditions. According to them, the basis for the mentioned system should have included: Current ratio; NWC to Sales ratio; Debt to Equity; Financial cycle; Sales margin; ROE; Maturing. Those financial indicators were optimal and correlated and corresponded to each other. Besides indicators, the financial analysis made by the owner (manager), interpretation of information has great importance. That is why circumstances must be always taken into consideration while calculating financial indicators.

Shliaga and Gal'tsev (2014) describe two approaches for evaluating the effectiveness of the company – monetary and resources. For monetary approach, results and costs are determined in revenues (inflow) and expenditures (outflow) of cash. For resource approach results characterized by the volume of made production and the costs – the amount of various types' resources spent.

In modern conditions of development of Ukraine's businesses in Trokoz and Orlikovsky' (2014) opinion the most promising of latest management concepts for efficiency control is the concept of Business Performance Management (BPM) and Balanced Scorecard (BSC).

BPM – a relatively new concept of governance denotes a holistic, process-oriented approach to management decisions aimed at improving the capacity of enterprises to assess their financial state and manage the performance of its activities at all levels by bringing together owners, managers, staff and external contractors within the overall integrated environment management. And the concept of BSC is a system of strategic management based on the measurement and evaluation of its effectiveness on a set of indicators, selected in such a way that consider all significant (in terms of strategy) aspects of its activities (Trokoz & Orlikovsky, 2014).

Well-known statistical techniques, which can be used in describing the performance and recognizing the influence of which factors are bigger include: regression; descriptive statistics; correlation; analysis of variance; other multivariate methods; other (primarily nonparametric) (Capon et al., 1990).

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Enterprise efficiency is complex characteristic, so in order to fully analyze the enterprise activity, make the right conclusions about its condition; the following indicators should be considered (Dudukalo, 2012): Profit margin; Total assets return; Fixed assets return; ROE; Return on investment; Residual Income.

Financial ratios have played an important role in evaluating the enterprise's performance. Almost all existing methods include them. Financial ratios together with financial statements are instruments that help managers to monitor the company's performance and figure the best financial strategies out (Ching & Gerab, 2012).

Although, nowadays the usage of nonfinancial indicators is frequently more promoted, financial indicators are able to evaluate the condition of an enterprise precisely based on its previous development (Kotane, 2015).

Theoretically, financial ratios are divided into 5 groups (Robinson, Greuning, Henry & Broihahn, 2009):

- Activity ratios indicate the efficiency of day-to-day tasks performed by company (for example, a collection of receivables and management of inventory);
- Liquidity ratios show whether the company has the ability to meet its short-term obligations;
- Solvency ratios show company's ability to meet long-term obligations;
- Profitability ratios indicate the ability to generate profitable sales from its resources;
- Valuation ratios measure earnings quantity connected to ownership of a specified claim.

Existing approaches of efficiency estimation of management of enterprise's activity are not allowing consideration of efficiency in a comprehensive way (Dudukalo, 2012). This is due to the fact that each approach ignores the impact of factors of functional subsystems as a whole.

In our opinion, only comprehensive assessment can provide the most useful information for the future decision-making process. For the evaluation of past periods and to develop appropriate strategies for the future, a comprehensive analysis should be carried out by the management of the company, it is so, because managers are better informed on the reasons of indicators' changes and what will be potential opportunities for their improvement.

The comprehensive analysis was used in researches: Krivovyazyuk and Kryvoviaziuk' (2014) article contained comprehensive economic analysis as an instrument for improving efficiency of activity of engineering enterprises of Volyn region; in Kryvoviaziuk' (2014) article the comprehensive approach was used to diagnose innovative engineering companies; it was also used for strategy decision-making purposes for the enterprises after conducted diagnostics of the enterprises (Krivovyazyuk, Kryvoviaziuk & Strilchuk, 2013).

### Research Methodology

The researched sample consists of 15 enterprises: 7 enterprises from Portugal and 8 enterprises from Ukraine, which operate in the industrial sector of the economy (paper, pulp and energy; building materials; construction and real estate; steel; automotive industries).

The choice was guided by subsequent requirements: companies should have been listed and had free access of data; they should relate to the industrial sector of the economy of both countries; they are characterized by a similar structure of capital and assets. Economic conditions of the economies of countries are similar from the standpoint of access to resources and methods of state regulation. It allows adequate comparing the efficiency and effectiveness of Ukrainian and Portuguese enterprises.

The multiple linear regression model was used to study the relationship between a dependent variable and one or more independent variables. The model is able to identify the independent effects of a set of variables on the dependent variable (Greene, 2003). The general form of the linear regression model is given in equation 1:

$$y = f(x_1, x_2, \dots, x_k) + \varepsilon \quad [1],$$

where  $y$  – the dependent variable;  $x_k$  – the independent variable;  $\varepsilon$  – a random disturbance of stable relationship;  $n=1,2,\dots,k$ .

The generalized model to be applied in this work is as follows (equation 2):

$$Y_i = \beta_{0,i} + \beta_{1,i} \cdot X_{1,i} + \beta_{2,i} \cdot X_{2,i} + \dots + \beta_{k,i} \cdot X_{k,i} \quad [2],$$

where:  $Y_i$  is the dependent variable for observation  $i$  (for comprehensive efficiency indicator the variable of ATR was used; for performance indicator the variable of ROA was used), with  $i = 1$  to  $n$ ;

$\beta_{0,i}$  is the constant;  $\beta_{1,i}$  to  $\beta_{k,i}$  are the coefficients of independent variables  $X_{1,i}$  to  $X_{k,i}$  for observation  $i$

$X_{1,i}$  to  $X_{k,i}$  are the variables that may explain the efficiency or performance like calculated indicators given in Appendix I.

Reliable regression analysis requires fulfilment of certain conditions "classical" assumptions (Greene, 2003):

a) Collinearity; It means that two or more of the independent /explanatory/ variables in a regression have a linear relationship. This causes a problem in the interpretation of the regression results. If the variables have a close linear relationship, then the estimated regression coefficients and T-statistics may not be able to properly isolate the unique effect/role of each variable and the confidence with which we can presume these effects to be true (Gupta, 1999).



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Durbin-Watson and collinearity statistics were used. Diagnostic approach to check for multicollinearity after performing regression analysis is to display the Variance Inflation Factor (VIF – a measure of how much the variance of an estimated regression coefficient increases if the explanatory variables are correlated) Higher the value of VIF, greater degree of collinearity. If  $VIF > 10$  there is strong evidence that collinearity is affecting the regression coefficients and consequently they are poorly estimated. Another check for collinearity is the Durbin-Watson statistic. Normally its value should lie between 0 and 4. A value close to 2 suggests no correlation; one close to 0 – negative correlation, and a value close to 4 – positive correlation (“Regression diagnostics”, 2016, p. 47).

b) Normality; Normal distribution can be checked using quantile-quantile (Q-Q) plots and the Kolmogorov-Smirnov Test (K-S Test). K-S Test is a nonparametric test of the equality of continuous, one-dimensional probability distributions that can be used to compare a sample with a reference probability distribution (one-sample K-S Test), or to compare two samples (two-sample K-S Test). If the p-value (given in results output as Sig.) is less than 0.05 then data cannot be considered as normally distributed.

c) Homoscedasticity is an assumption that Standard Deviations (S.D.) of the error terms are constant and do not depend on the x-value. Consequently, each probability distribution for the dependent variable has the same S.D. regardless of the independent variable value.

Breusch-Pagan and Koenker test is used to test for heteroskedasticity in a linear regression model. It tests whether the estimated variance of the residuals from a regression are dependent on the values of the independent variables. The test assumes that heteroskedasticity is not present. If the resulting p-value of Breusch-Pagan and Koenker is less than significance level of 5 %, the obtained differences in sample variances are occurred based on random sampling from a population with equal variances.

Linear regression implements a statistical model that, when relationships between the independent variables and the dependent variable are almost linear, shows optimal results, but in other case the model is faulty. Another limitation of the linear regression modelling is the complete necessity of assumptions fulfilment in order for obtaining reliable results; it's limitation for predicting numeric output; possible inappropriate use for modelling non-linear relationships; difficulty in explanation what the model actually shows and last but not least it's complexity and labour-intensity.

### **Comparison of efficiency and performance of Portuguese and Ukrainian enterprises**

After taking into consideration of all researched articles, methods and approaches, firstly, conduction of comprehensive financial and economic analysis and determination of enterprise efficiency, using as proxy the Asset Turnover Ratio (ATR) and such indicators as: Quick ratio; Liquidity Ratio (LiqR); Cash ratio and debt ratio; Asset utilization or turnover ratios; Profitability ratios; Growth ratios; Asset structure and solvency ratios as the factors that may explain it was made. Secondly, in order to analyse profitability (company's performance) the ROA was used and among factors that explain it the EBITDA margin; Profit margin; NWC turnover ratio; Fixed asset to total assets; Current asset to total assets;

Net operation expenses to net sales ratio; Sales growth ratio; LR; Debt-to-Equity (as capital structure proxy); Interest coverage ratio.

The descriptive statistics on indicators is exhibited in Appendix II.

According to the table, higher quick ratio' mean of Ukrainian enterprises shows that their ability to cover short-term obligations with liquid assets is slightly better. LiqR ratio is also slightly better in Ukrainian enterprises showing higher ability to pay off its short-term debts obligations with its current assets. In case of the cash ratio shows higher availability of cash and cash equivalents in Portuguese enterprises, also in both countries the level of liquidity in terms of cash is poor.

The receivables turnover mean in both countries has high value, but it is slightly better in Ukrainian enterprises, where they are seemed to have an efficient collection of accounts receivable and companies have more customers that pay off their debts quickly. Inventory turnover ratio mean has a higher level in Ukrainian companies. Despite the fact that Ukrainian enterprises have almost all preconditions for good performance, subsequent indicator – NWC turnover ratio shows negative value, which means their use of working capital to generate sales, is not efficient. On the other hand, Portuguese companies in these terms are efficient.

The ATR mean has similar low meaning implying not enough sum of revenue generated. Equity turnover ratio showing the more efficient use of equity to generate revenue in Portuguese enterprises, which mean is higher and equals to 3.645 (S.D. = 2.478). Ukrainian enterprises utilized investment in fixed assets to generate revenue more effectively (FATR mean is higher).

Both Gross profit margin and Profit margin values in Portuguese companies are higher. EBITDA margin is slightly higher in Ukrainian enterprises and equal to 13.7 %. Both sides of enterprises have low ROA, Portuguese companies 0.1 % and Ukrainian – 0.7 %, which shows the effective but not efficient use of assets to generate earnings. The Operating expense to net sales ratio equals to 1.033 (S.D. = 0.38) in Ukrainian side of firms, which indicates high value of costs. In Portuguese enterprise its value is 0.945 (S.D. = 0.10) showing more positive proportion (sales higher than expenses).

Mean growth rates for assets, net profit and sales better in Ukrainian enterprises indicating the clear trend of increase. Portuguese assets and net profit growth rates have negative meaning and indicate the declining trend.

Researching structure of total assets: average of Current assets to total assets ratio in both sides are around 40%, but Ukrainian companies show more variability in its capital structure (Ukrainian S.D. = 20.4% against 14.5% for Portuguese companies). Long-term assets in average are 59 % of total assets (again, according to S.D., the ratio varies more among Ukrainian companies). Accordingly, average percentage of stocks in current assets is higher in Ukrainian enterprises 42.4 %; average percentage of Cash and cash equivalents is higher in Portuguese enterprises and is 21 %. In those cases better S.D. was presented by Portuguese side.

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Analysing the structure of total debt, it may be concluded that in average the short-term financial debt higher in Portuguese enterprises (23 %; S.D. = 11%), but short term in general is higher in Ukrainian firms (61.2 %, S.D. = 29.6%). Total financial debt in total debt higher in Portuguese entities (60.3 %, S.D. = 14.9%).

According to interest coverage ratio, Portuguese entities on the contrast to Ukrainian can pay interest on the outstanding debt (4.78 > -0.661). LR has slightly higher meaning in Portuguese side, where 77 % (S.D. = 15.4%) of capital comes in the form of debt (loans).

During the research the model assumptions were checked; analysis was performed while estimating the model and determining factors of efficiency/performance and measuring the impact of each variable in average in the whole sample and also for each country; the analysis of efficiency/performance was made in the whole sample, for each country and industry.

Results of checking of assumptions for efficiency given in Table 1.

There is no clear collinearity, although while conducting a linear regression analysis, we checked closer collinearity statistic and there were several cases with VIF higher than 10 – which indicated the influence of collinearity on the regression coefficients and consequently they are poorly estimated. After eliminating outliers, the results indicate that there is no collinearity between variables.

Table 1

Results of assumptions check for efficiency model

Test	Indicator	Before crossing out of outliers	After crossing out of outliers
Regression analysis	Adjusted R Square	0,975	0,989
	Durbin-Watson	1,825	1,707
	Number of possible models	12	6
	Predictors	(Constant) including FATR, CATR, LiqR, Quick ratio, Inventory to current assets ratio, Current assets to total assets ratio, ROA, EBITDA margin	(Constant) including FATR, CATR, EBITDA margin, ROA, LiqR, LR
Check of residuals			
Kolmogorov-Smirnov Test	Sample size	90	65
	Asymp. Sig. (2-tailed)	0,058	0,082
Koenker test	(Sig.)	0,018	0,629

Normality was visually checked using Q-Q plots, which showed the existence of outliers. K-S Test checked if residuals had a normal distribution and because the p-value was higher than 0.05, they have a normal distribution. Homoscedasticity check showed that indicator meanings have the same finite variance after eliminating outliers.

The optimal model was chosen due to the rule: “the higher adjusted R square is better”, the one with Adjusted R square equal to 0.989. This chosen model is presented in equation 3.

$$\text{ATR} = 0.701 * \text{FATR} + 0.451 * \text{CATR} - 0.136 * \text{EBITDA margin} + 0.126 * \text{ROA} - 0.076 * \text{LiqR} - 0.039 * \text{LR} \quad [3]$$

The biggest positive influence has FATR (0.701) and CATR (0.451), smaller positive influence has ROA (0.126). Negatively influencing enterprise efficiency are EBITDA margin (-0.136), LiqR (-0.076) and LR (-0.039).

The final models of efficiency by country are given in following equations and Table 2.

Table 2

The model of efficiency for Portuguese and Ukrainian enterprises

Variables	Portugal			Ukraine		
	Standardized Coefficients Beta	T	Sig.	Standardized Coefficients Beta	T	Sig.
(Constant)		3,608	0,001		1,702	0,111
Fixed Asset Turnover Ratio (FATR)	0,727	38,433	<0,001			
Current Asset Turnover Ratio (CATR)	0,464	32,208	<0,001			
Short-term financial debt to total debt	0,037	2,551	0,017			
Leverage Ratio (LR)	-0,058	-3,479	0,002			
Net profit growth ratio	0,045	2,962	0,006			
EBITDA margin	-0,040	-2,857	0,008			
Short-term debt to total debt				0,825	8,571	<0,001
Return on Assets (ROA)				0,511	5,593	<0,001
Interest coverage ratio				-0,351	-3,640	0,003
Adjusted R Square		0,994			0,859	
Durbin-Watson		1,785			1,530	
F-test		919,053			35,508	
Sig.		<0,001			<0,001	

$$\text{ATR (Port)} = 0.727 * \text{FATR} + 0.464 * \text{CATR} + 0.037 * \text{Short-term financial debt to total debt} - 0.058 * \text{LR} - 0.04 * \text{EBITDA margin} \quad [4]$$

The biggest positive influence on ATR in Portugal has FATR (0.727) and CATR (0.464), smaller positive influence has Net profit growth ratio (0.045) and Short-term financial debt to total debt (0.037). Small negative impact made by LR (-0.058) and EBITDA margin (-0.136).

$$\text{ATR (Ukr)} = 0.825 * \text{Short-term debt to total debt} + 0.511 * \text{ROA} - 0.351 * \text{Interest coverage ratio} \quad [5]$$

The biggest positive influence at Ukrainian enterprises has a short-term debt to total debt (0.825), also ROA has a positive impact (0.511), the opposite correlation with ATR has

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Interest coverage ratio (-0.351). Accordingly, the factors that explain efficiency among Portuguese enterprises are different from Ukrainian ones.

Efficiency analysis. Our sample consists of 90 cases. Reviewing of normality showed the existence of several outliers. After correcting sample by the use of regression analysis, calculation of p-value and selecting reliable variables, 49 valid cases are left. In this part, the research hypothesis (RH1: Enterprise efficiency indicator (comprehensive indicator – ATR) equals to 1) was checked using the one sample t-test (Table ). The model results can be described as next: 0 – means inefficiency; 1 – efficiency.

Table 3

Result of One-Sample T-test for Asset Turnover Ratio

Descriptive statistics	n		Mean	Std. Deviation	Std. Error Mean	
		65		0,731204	0,3834501	0,0475611
One-Sample T-test for Asset Turnover Ratio (Test Value = 1)	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
	-5,652	64	<0,001	-0,2687961	-0,363810	-0,173782

Given the results (Table ), ATR mean is 0.73 (S.D. = 0.38) which is statistically significantly different from the test value of 1. It has been concluded that enterprises are efficient.

Nonparametric 2-independent samples t-test is used to compare the means of efficiency for two independent groups of Ukrainian and Portuguese enterprises (Table 4).

Table 4

Result of Mann Witney after eliminating outliers

	Ranks				Test Statistics for ATR	
	Country	n	Mean Rank	Sum of Ranks	Mann-Whitney U	269,000
Asset turnover ratio	Portuguese	42	27,90	1172,00	Wilcoxon W	1172,000
	Ukrainian	23	42,30	973,00	Z	-2,936
	Total	65			Asymp. Sig. (2-tailed)	0,003

First of all the distribution should be checked. P-value is less than 0.05 which means that efficiency of Ukrainian and Portuguese enterprises have statistically significant different efficiency.

In order to compare efficiency by country descriptive statistics are displayed in Table .

Table 5

The level of efficiency results by country

	n	Minimum	Maximum	Mean	Std. Deviation
Asset Turnover Ratio (Portugal)	34	0,2044	1,4639	0,6280	0,3064
Asset Turnover Ratio (Ukraine)	30	0,2356	1,6740	0,9197	0,4419

Given the average of efficiency by country it seems that in average Ukrainian enterprises are more efficient.

In order to find out if there is a difference in efficiency by sector in which enterprise is functioning, Shapiro-Wilk test was used (sample does not follow a normal distribution and  $n < 30$ ). Descriptive statistics and results of Kruskal Wallis test is shown in Table .

Table 6

The level of efficiency results by industrial sector

Asset Turnover Ratio	n	Minimum	Maximum	Mean	Standard Deviation	Shapiro-Wilk sig.
Industry	Paper	24	0	2,2304	0,7407	0,7370
	Automotive	12	0	1,4639	0,6923	0,5640
	Building materials	18	0	1,0403	0,5547	0,3562
	Steel	18	0	1,5248	0,6351	0,5134
	Building	18	0	0,6814	0,4965	0,1976

After checking significance p-value in Shapiro-Wilk test to standard  $\alpha=0.05$  – in this case  $\alpha > 0.05$  in some industries. Thus, there is a difference in efficiency regarding the industry sector. As in descriptive statistics of Table is shown, the average efficiency is slightly higher in the paper industry and slightly lower in building enterprises.

Results of checking of assumptions for performance given in Table 7.

Table 7

Results of assumptions check for profitability model

Test	Indicator	Before crossing out of outliers	After crossing out of outliers
Regression analysis	Adjusted R Square	0,917	0,923
	Durbin-Watson	1,619	1,396
	Number of possible models	8	5
	Predictors	(Constant) including Profit margin, EBITDA margin, log(TA), Debt to equity ratio, Number of employees, Operating expense to net sales ratio	(Constant) including Profit margin, FATR, EBITDA Margin, Country, Debt to equity ratio
Check of residuals			
Kolmogorov-Smirnov test	Sample size	68	63
	Asymp. Sig. (2-tailed)	0,840	0,986
Koenker test	(Sig.)	0,748	0,095

A closer look at the variables highlighted few cases which prove the existence of collinearity, which was avoided by eliminating outliers. K-S Test for normality resulted in

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improved significance after crossing outliers. Homoscedasticity check showed that heteroskedasticity is not present as an indicator.

The optimal model for performance was chosen due to the same rule as efficiency and it is given in equation 6.

$$\text{ROA} = 0.678 * \text{Profit margin} + 0.236 * \text{FATR} + 0.277 * \text{EBITDA margin} + 0.137 * \text{Country} + 0.122 * \text{Debt to equity ratio} \quad [6]$$

All of the variables have a positive influence, the biggest impact belongs to Profit margin (0.678). These factors explain 92.3% of performance's variance.

The final model for Portuguese and Ukrainian enterprises is given in equations 7-8 and Table 8.

$$\text{ROA (Port)} = 0.137 * \text{FATR} - 0.221 * \text{CATR} + 0.152 * \text{Debt to equity ratio} + 1.110 * \text{Profit margin} - 0.102 * \text{Interest coverage ratio} \quad [7]$$

In case of Portuguese enterprises, variables are statistically significant, and each factor influences dependable variable differently. The biggest positive influence on ROA has Profit margin (1.110), a bit smaller impact have Debt to equity ratio (0.152) and FATR (0.137). Small negative impact is made by CATR (-0.221) and Interest coverage ratio (-0.102).

Table 8

The model of profitability for Portuguese and Ukrainian enterprise

Variables	Portugal			Ukraine		
	Standardized Coefficients	T	Sig.	Standardized Coefficients	T	Sig.
	Beta			Beta		
(Constant)		0,548	0,588		1,314	0,206
CATR	-0,221	-8,224	<0,001			
FATR	0,137	4,572	<0,001			
Debt to equity ratio	0,152	4,785	<0,001			
Interest coverage ratio	-0,102	-2,895	0,007			
Profit margin	1,110	30,729	<0,001	0,668	7,375	<0,001
EBITDA margin				0,433	4,781	<0,001
Adjusted R Square	0,979			0,883		
Durbin-Watson	1,830			0,546		
F-test	311,594			68,991		
Sig.	<0,001			<0,001		

$$\text{ROA (Ukr)} = 0.668 * \text{Profit margin} + 0.433 * \text{EBITDA margin} \quad [8]$$

In the model for Ukrainian enterprises, two factors have a different level of influence on ROA. The biggest positive impact has Profit margin (0.668), EBITDA margin also has a positive impact (0.433). Profit margin influences both models of performance for Ukrainian and Portuguese enterprises, but there is a significant difference between those two models.

Analysis of performance. Our sample consists of 90 cases. Analysis of normality showed the existence of several outliers. Correction of the sample was made using the regression analysis, calculation of p-value and selecting reliable variables. In the end, we get 63 valid cases. In this part, the research hypothesis (RH2: Enterprise performance indicator higher than 0) was checked using the one sample t-test (Table ).

Table 9

Result of One-Sample T-test for Return on Assets

Descriptive statistics	n		Mean	Std. Deviation	Std. Error Mean	
		63		0,018210	0,0622157	0,0078384
One-Sample T-test for Return on Assets (Test Value = 1)	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
	-125,652	62	<0,001	-0,981789	-0,997459	-0,966121

Given the results (Table 11), ROA mean is 0.018 (S.D. = 0.062) which is statistically significantly different from the test value of 1. It has been concluded that enterprises are not as profitable and they could be characterized as enterprises with a low-performance level, which still shows that companies on average have a positive performance.

Results of nonparametric 2-independent samples t-test have shown that meaning of p-value is smaller than 0.05 indicating the difference between countries performance models (Table 10).

Table 10

Result of Mann Witney after eliminating outliers for ROA

Ranks					Test Statistics for ROA	
	Country	n	Mean Rank	Sum of Ranks	Mann-Whitney U	233,000
Return on Assets	Portuguese	41	26,68	1094,00	Wilcoxon W	1094,000
	Ukrainian	22	41,91	922,00	Z	-3,143
	Total	63			Asymp. Sig. (2-tailed)	0,002

In order to compare profitability descriptive statistics by state are displayed in Table .

Table 1

Profitability statistics by country

	n	Minimum	Maximum	Mean	Std. Deviation
Return on Assets (Portugal)	41	-0,1131	0,0823	0,0002	0,0419
Return on Assets (Ukraine)	22	-0,1338	0,1947	0,0517	0,0793



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As can be observed from Table 11, Ukrainian enterprises have higher average ROA, meaning higher profitability than Portuguese enterprises. This indicates that there is a difference in performance level among Ukrainian and Portugal companies.

In order to find out if there is a difference in profitability in enterprises by sector they are functioning in, reasoning by small samples of enterprises performance by industrial sectors, Shapiro-Wilk Test (Table 12) was used.

Table 12

Profitability level by industrial sector

Return on Assets	n	Minimum	Maximum	Mean	Standard Deviation	Shapiro-Wilk sig.	
Industry	Paper	15	-0,0106	0,1947	0,0855	0,0609	0,500
	Automotive	6	-0,0144	0,0410	0,0115	0,0230	0,478
	Building materials	14	-0,1338	0,0499	- 0,0167	0,0477	0,212
	Steel	12	-0,1131	0,0823	- 0,0193	0,0621	0,630
	Building	16	-0,0790	0,0416	0,0163	0,0271	0,000

After checking significance p-value in Shapiro-Wilk Test some industries do not follow a normal distribution and have less than 30 cases, which imply that level profitability by sectors has a significant difference.

Thus, there is a slight difference in profitability between industrial sectors, for example, paper industry is the most profitable one among the studied sample. Automotive and building enterprises also give profit, and according to the results of descriptive analysis steel and building materials sectors of the economy in the sample have losses regarding the industry sector.

## Conclusions

In order to conduct a comparison of Ukrainian and Portuguese enterprises, a descriptive and inferential analysis was performed as well as multivariate regressions (through OLS regressions) were applied to identify the factors that may explain the efficiency (measured by ATR) and performance as profitability (measured by ROA) based on collected data.

The final conclusion can have next statements:

1. On average the companies in the sample are efficient.

According to the results average efficiency (ATR) of all enterprises equal to 0.73 (S.D. = 0.38) which in the interval from 0 to 1 is significantly closer to the efficient level that is why enterprises are considered as efficient. While assessing efficiency by country better efficiency belonged to Ukrainian enterprises (mean = 0.92; S.D. = 0.44) compared to Portuguese (mean = 0.63; S.D. = 0.31). There was no significant difference revealed of

efficiency in industrial sectors, but average efficiency is slightly higher in paper industry and slightly lower in building enterprises.

2. Although the average of ROA enterprises (mean = 0.02; S.D. = 0.06) showed that enterprises have low-performance level it is still considered as a positive (between countries there is a slight difference in performance level among Ukrainian and Portugal companies in favour of Ukraine).

3. Companies efficiency is influenced by FATR, CATR, EBITDA margin, ROA, LiqR, LR.

4. Companies performance is influenced by EBITDA margin; Profit margin; NWC turnover ratio; FATR, CATR; Net operation expenses to net sales ratio; Sales growth ratio; LR; Debt-to-Equity; Interest coverage ratio.

In order to improve performance and efficiency enterprises are suggested to pay more attention to the factors determined as a factors with high influence level. More detailed suggestions include next:

- for Ukrainian enterprises – paying attention to the factors of short-term debt to total debt, ROA, Interest coverage ratio in order to be more efficient; Profit margin and EBITDA margin to make their performance better.
- for Portuguese enterprises – in order to improve efficiency to observe and develop factors of fixed assets turnover ratio, current assets turnover ratio, Short-term financial debt to total debt, Leverage Ratio, EBITDA margin. As for profitability, fixed assets turnover ratio, current assets turnover ratio, Debt to equity ratio, Profit margin and Interest coverage ratio are suggested to be tracked.

Optimization of efficiency and management of the analyzed enterprises can be found in the results of a comprehensive analysis of the factors of influence on the efficiency and effectiveness of their activities. The dynamism of those factors (It) serves as an information base for the development and adoption of tactical and strategic decisions, as well as for improving the management of the investigated corporations.

This research indicated robust results with statistical significance, and thus the conclusions are relevant. Among limitations of the present work were set of requirements that companies should have been listed and had free access to data and function in the industrial sector.

In the future, it is advised to consider expand the sample to other countries and include more enterprises, sub-sampling based on individual enterprises and non-researched sectors of the economy, also, testing the model on sub-periods.

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### Appendix I

Table A1

Indicators used in the work and their formulas and meaning

Group	Indicator	Meaning	Formula
Liquidity ratios	Quick ratio	Shows ability to meet its short-term obligations with liquid assets (excluding inventories); Higher is better.	$\frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}$
	Current ratio	A measure of short-term liquidity; Higher – larger margin of safety.	Current Assets/Current liabilities
	Cash ratio	Shows ability to pay its short-term debts by cash	Cash/Current liabilities
Asset utilization or turnover ratios	Receivable turnover ratio	Indicates the efficiency with which a firm manages the credit it issues to customers and collects on that credit.	$\frac{\text{Sales}}{\text{Accounts Receivable}}$
	Inventory turnover ratio	Shows how many times a company's inventory is sold and replaced over a period.	$\frac{\text{Cost of Goods Sold}}{\text{Inventory}}$
	NWC turnover ratio	Shows how effectively a company is using its working capital to generate sales; Higher is better.	$\frac{\text{Sales}}{\text{NWC}}$
	Asset turnover ratio (ATR)	Shows ability to generate more revenue per euro of assets.	$\frac{\text{Sales}}{\text{Total Assets}}$
	Equity turnover ratio	Determine the efficiency with which management is using equity to generate revenue.	$\frac{\text{Sales}}{\text{Total Equity}}$
	Fixed asset turnover ratio	Measures operating performance	$\frac{\text{Sales}}{\text{Net Fixed Assets}}$
	Current asset turnover ratio	Analyze the efficiency of usage of current assets.	$\frac{\text{Sales}}{\text{Current Assets}}$
Profitability Ratios	Gross profit margin	Used to assess a firm's financial health.	$\frac{\text{Gross Profit}}{\text{Sales}}$
	EBITDA margin	A measurement of a company's operating profitability as a percentage of its total revenue.	$\frac{\text{EBITDA}}{\text{Sales}}$
	Return on equity (ROE)	Measures a corporation's profitability.	$\frac{\text{Net Income}}{\text{Total Equity}}$
	Return on assets (ROA)	Shows how efficient management is at using its assets to generate earnings.	$\frac{\text{Net Income}}{\text{Total Assets}}$
	Operating expense-to-Net sales ratio	The smaller ratio shows the greater the organization's ability to generate profit if revenues decrease.	$\frac{\text{Operating Expense}}{\text{Net Sales}}$

	Profit margin	Shows how much out of every dollar of sales a company actually keeps in earnings.	$\frac{\text{Net Income}}{\text{Net Sales}}$
Growth Ratios	Assets growth ratio	Growth rates refer to the amount of increase that a specific variable has gained within a specific period and context.	$\frac{TA_t - TA_{t-1}}{TA_{t-1}}$
	Net Profit growth ratio		$\frac{\text{Net Income}_t - \text{Net Income}_{t-1}}{\text{Net Income}_{t-1}}$
	Sales growth ratio		$\frac{\text{Sales}_t - \text{Sales}_{t-1}}{\text{Sales}_{t-1}}$
Asset Structure Ratios	Current assets-to-Total assets ratio,	Indicate the extent of total funds invested for the purpose of working capital	
	Inventory-to-Current assets ratio	Shows part of inventory in structure of current assets.	$\frac{\text{Inventory}}{\text{Current Assets}}$
	Cash and cash equivalents-to-Current assets ratio	Shows part of cash and cash equivalents in structure of current assets.	$\frac{\text{Cash and Cash Equivalents}}{\text{Current Assets}}$
	Long-term assets-to-Total assets ratio	Shows part of fixed assets in structure of total assets.	$\frac{\text{Long - term Assets}}{\text{Total Assets}}$
Solvency Ratios	Short-term financial debt-to-Total debt	Shows part of short-term financial debt in structure of total debt.	$\frac{\text{Short - term Financial Debt}}{\text{Total Liabilities}}$
	Short-term debt-to-Total debt	Shows part of short-term debt in structure of total assets.	$\frac{\text{Current Liabilities}}{\text{Total Liabilities}}$
	Interest coverage ratio	Determine how easily a company can pay interest on outstanding debt.	$\frac{\text{Earnings before interest and tax}}{\text{Interest}}$
Debt Ratio	Leverage ratio (LR)	Shows how much capital comes in the form of debt (loans), or assesses the ability of a company to meet financial obligations.	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$
	Debt to Equity ratio	Indicates how much debt a company is using to finance its assets relative to the amount of value represented in shareholders' equity	Debt / Equity
	Total financial debt-to-Total debt	Shows part of financial debt in structure of total debt.	$\frac{\text{Total financial debt}}{\text{Total Liabilities}}$

Source: based on Ross, Westerfield and Jordan (2008).

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## APPENDIX II

Table A2

Descriptive statistics of economic and financial indicators by country sample (Portugal and Ukraine)

Indicators by country	Portuguese					Ukrainian				
	n	Minimum	Maximum	Mean	S.D.	n	Minimum	Maximum	Mean	S.D.
Quick ratio	42	0,258	1,479	0,802	0,240	48	0,107	7,519	1,356	1,314
Liquidity Ratio	42	0,434	2,128	1,078	0,357	48	0,465	12,084	2,672	2,759
Cash ratio	42	0,032	0,997	0,240	0,245	48	0,001	1,689	0,171	0,340
Receivable turnover ratio	42	1,526	11,959	5,134	2,773	48	0,000	28,170	7,400	8,283
Inventory turnover ratio	42	0,918	12,709	4,214	2,555	48	0,411	37,842	6,840	5,742
Net Working Capital turnover ratio	42	-574,690	513,507	0,237	121,537	48	-327,787	80,740	-5,238	51,290
Asset Turnover Ratio	42	0,204	1,464	0,628	0,306	48	0,000	2,230	0,626	0,656
Equity turnover ratio	42	0,747	12,308	3,645	2,478	48	0,000	13,772	1,516	2,246
Fixed Asset Turnover Ratio	42	0,259	3,487	1,166	0,765	48	0,000	7,231	1,319	1,794
Current Asset Turnover Ratio	42	0,525	4,153	1,721	0,958	48	0,000	7,875	1,772	1,914
Gross profit margin	42	0,126	0,809	0,547	0,159	48	-0,179	0,350	0,122	0,098
EBITDA margin	42	-0,173	0,484	0,137	0,119	29	-0,352	0,836	0,145	0,291
Profit margin	42	-0,320	0,190	0,010	0,090	48	-2,430	0,210	-0,060	0,380
Return on Equity	42	-4,661	0,533	-0,104	0,756	48	-0,574	2,179	0,039	0,393
Return on Assets	42	-0,113	0,082	0,001	0,042	48	-0,275	0,210	0,007	0,111
Operating expense to net sales ratio	42	0,782	1,280	0,945	0,104	45	0,517	3,354	1,033	0,376
Assets growth ratio	35	-0,230	0,410	-0,016	0,129	40	-0,475	1,531	0,077	0,305
Net profit growth ratio	35	-1,640,18	1,485	-47,45	277,143	40	-4,712	91,282	3,369	15,281
Sales Growth ratio	35	-0,434	0,773	0,016	0,237	40	-0,714	1,444	0,056	0,365
Current assets to total assets ratio	42	0,194	0,607	0,401	0,145	48	0,190	0,939	0,412	0,204
Inventory to current assets ratio	42	0,042	0,471	0,246	0,129	48	0,045	0,945	0,424	0,235
Cash and cash equivalents to current assets ratio	42	0,031	0,606	0,210	0,172	48	0,001	0,303	0,057	0,068
Long-term assets to total assets ratio	42	0,393	0,806	0,597	0,147	48	0,061	0,810	0,587	0,205
Short-term financial debt to total debt	42	0,019	0,503	0,230	0,110	48	0,000	0,811	0,191	0,238
Short-term debt to total debt	42	0,127	0,930	0,532	0,208	48	0,072	1,000	0,612	0,296
Interest coverage ratio	42	-9,308	70,569	4,784	13,985	48	-331,766	101,631	-0,661	53,261
Leverage Ratio	42	0,360	0,976	0,769	0,154	48	0,071	3,676	0,521	0,525
Total financial debt to total debt	42	0,355	0,862	0,603	0,149	48	0,000	0,952	0,473	0,292
Debt to equity ratio	42	0,560	40,23	5,760	6,370	48	-8,930	9,310	1,420	2,500