

Statistical Analysis of the Capital Structure of the Chemical Industry in Hungary and in the Carpathian Basin in 2013

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Abstract

The study examines the capital structure of the companies operating in the Hungarian chemical industry in the period of 2004-2013. First the database is presented which was used for the examination, then the linear regression, the multivariate statistical method which was used for the identification of the relations between the indicators.

The next part is the descriptive statistical analysis of the indicators determining the way of business, the changes are explained at company level as well. The trend analysis of the capital structure indicators affects the chemical industry in the neighboring countries also, so the financial policies of the different time horizons will be compared.

The main conclusion of the study is that in the examined countries the chemical companies are characterized by a different capital structure policy and the composition of the explanatory variables show significant differences. The earlier formulated theories are only partially valid considering the examined sample, although beyond the involved index numbers the macro factors play a significant role in the explanation of the model as well

Keywords: Chemical Industry, Capital Structure, Profitability

JEL CODES: L65, M20

Introduction

During my analysis I try to show the changes taking place in chemical industry, I have done more in-depth analysis in case of Hungary, but in case of ratios describing capital structure, firms in neighboring countries also have been involved in the analysis searching after different funding models. I try to deliver a comprehensive picture about the profitability ratios of the sector's companies, about their changes over time therefore we receive answer how the sector reacted on the challenges of the crisis. The purpose of the analysis beyond the general descriptive statistical analysis is the examination of the relationship between capital structure and profitability, and the trend analysis of the ratios.

Material and Methods

The database has been downloaded from the system called Orbis of the credit report provider Bureau van Dijk and in some cases the analyses and the data aggregation were performed

with the help of tools integrated into the online platform. Companies engaged in chemical industry from Hungary, Croatia, Slovenia, Serbia, Romania and Slovakia were selected during the sorting. In this case I consider the activity of NACE code 20 „Manufacture of chemicals and chemical products” under chemical industry. In Hungary activities marked with 19-22 codes also belong to chemical industry but these include activities which separately well define a sector such as manufacture of basic pharmaceutical products and pharmaceutical preparations (NACE 21.). Manufacture of coke and refined petroleum products (NACE 19) is not part of chemical industrial statistics of EU anyway. The database contains basic data and financial reports of those companies which are registered with the examined activity during the given period and complied with the obligation of filling their financials.

Financial reports for 2013 can be found in case of 574 Hungarian companies in the database related to the examined activity, 503 from this had operating revenue. Most companies fulfilled the first criteria in Romania, here 886 companies have financial reports. Data is available in case of 283 companies in Serbia, 226 in Slovakia, 222 in Croatia and 77 firms in Slovenia.

The examination of the relationship between the capital structure and the profitability were performed by linear regression analysis (SAJTOS L. – MITEV A. 2007; HUZSVAI L. 2004-2011). By this method it is very important that the independent variables have to be measured on a high level and the financial ratios meet these criteria. The relationships were characterized by three parameters, by the coefficient of determination (R^2), the regression beta and the significance level. The coefficient of determination shows that how much proportion of the variance of the dependent variable can be explained using the independent variable. The Beta value measures how strongly influence the independent variable the dependent variable, while the level of significance verifies the existence of a linear relationship. The aim of the examination was to learn what are the indicators that affect mostly the individual capital structure ratios, respectively the strength of relationship in the different countries. I did not intend to create a uniform model as I assumed that not the same variables will be determinative in the different regional segments, so the regression analyzes were performed separately for all the examined countries. I have chosen from the methods of variable selection the Forward method, which puts into the model the independent variables independently, namely in order of the correlation with the dependent variable.

The selection of the first variable was based on the Pearsons-type linear correlation, but the other incoming variables have been determined by the strength of the partial correlations. (BARNA I. – SZÉKELYI M. 2002). Because the aim of the regression analysis was to find the correlations between the capital structure and the index numbers describing the way of business so I have omitted from the sample those firms that considering the financing trends cannot be considered active players of the sector. So during the regression I have omitted the companies which don't have any negative shareholder's funds and revenue.

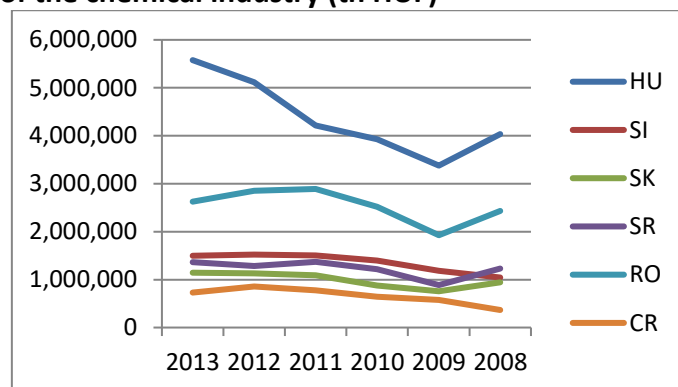
Results

The performance and the profitability of the Hungarian chemical industry

In Hungary growth has continued at the net revenue row since 2009. The decline experienced in the first year of the economic crisis has been worked out by the sector by 2011, at that time the sectoral net revenue was nominally higher than in 2008 or in the previous years (see Figure 1). The 5,57 billion EUR income in the current year is 9% higher than in the previous

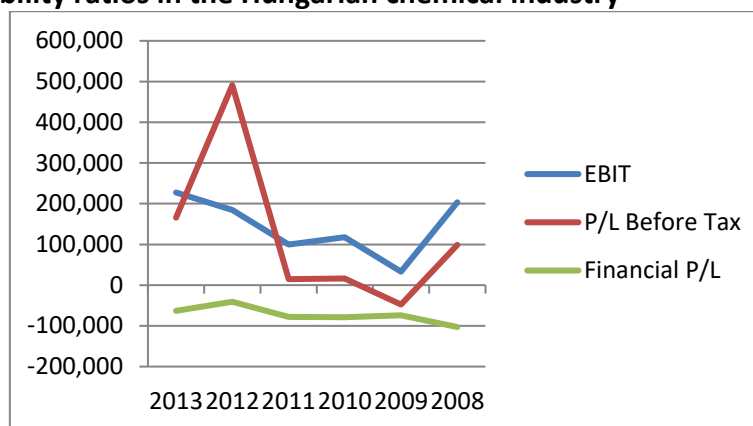
year and 34% higher than in 2008. This increase is mainly explained by the changes at the balance sheet rows of large companies determining the sector. Hungarian market is rather concentrated, 82% of the sectoral net revenue is given by 10 companies and two companies are responsible for 47% like Borsodchem Zrt. and Tiszai Vegyikombinát Nyrt. It turns out from the financial reports of the mentioned companies that in all cases the net revenue has dynamically increased, each case it is higher in the current year than in 2008. Growth realized by these companies virtually identical with the increase experienced in the sector. Change experienced at Borsodchem is the most striking, regarding the net revenue the company became the leader of the sector and has performed 61% increase in the examined ratio during 6 years. The net revenue level of the Romanian, Serbian and Slovak chemical industry looks similar. With the difference that they nominally fall behind the performance of Hungary, the reason might be that the leading companies of the sector have determined other field of activity as their main activity.

Figure 1: Turnover of the chemical industry (th HUF)



Source: Own description based on Bureau van Dijk, Orbis Database

In 2013 the sectoral EBIT was 23% higher than in the previous year and by 12% higher than in 2008. It is clear that the main activity produces more and more income and starts to return to the level before the crisis. From the examined Hungarian companies, 331 performed positive EBIT, 174 companies go to the negative side and the rest closed the year with zero balance. The sectoral financial result is constantly negative, the loss at absolute value was the highest in 2008, it was 102 million EUR (see Figure 2). The 63 million EUR negative result in the current year is slightly worse than in the previous year, at the same time 137 million EUR increase is experienced at current liabilities line and non-current liabilities are also increased. For the latter all items have a demand for interest rate payment that is why I took not only the loans into consideration. In 2012 the P / L before tax has been disfigured by 433,7 million EUR income of Borsodchem Zrt booked at the extraordinary results row. The company has transferred assets to Borsodchem MDI Termelő Kft. established in 2011 which was largely provided under preferential transfer of assets so a single extraordinary positive result was accounted in the books of the company. That is why it is worth examining the profit numbers without extraordinary results. According to this, result of the current year is higher despite the increasing financial losses than in the previous year so the additionally involved foreign capital had a positive result. The experienced growth is due to the 66 billion EUR of TVK (Tiszai Vegyi Kombinát Nyrt.) and the 32 billion EUR increase of Borsodchem booked at the EBIT line. Performance of dominant companies in the sector reveals a mixed picture, this can be seen at the 1st Table in details.

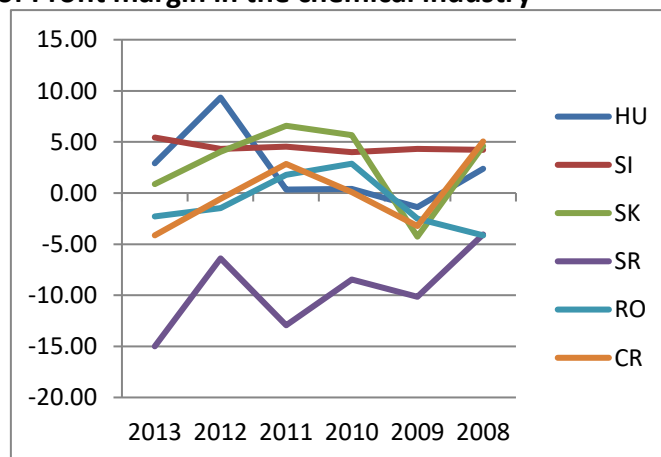
Figure 2: Profitability ratios in the Hungarian chemical industry

Source: Own description based on Bureau van Dijk, Orbis Database

Analysis of the profitability ratios

As it is not possible to measure the efficiency with a single index, I used the system of those indexes which describe the development and level of the sector in a most comprehensive way (BREALEY-MYERS 2003; KOVÁCS E 2006). The indexes have been calculated by correcting the exceptional items. This is due to the previously mentioned distorting effect of extraordinary result in the Hungarian example and effort to international comparability.

There has been no significant change in case of profit margin, efficiency of Hungarian chemical industry seems to push off from the low point in 2009 and trying to get back to the pre-crisis level. The ratio was 2,88% in the current year from what only the Slovenian sector has performed better by 5,38%, minimal volatility was experienced at our southern neighbor during the examined period. The ratio was only positive in case of Slovakia, the other three examined countries produced negative result with significant fluctuations over the years. It is striking that except from Slovenia chemical industry in neither of the countries was able to stay in positive range in 2009 (see Figure 3). This period is considered as the first year of the economic crisis, after that everywhere positive shift can be observed however in three cases fall has been experienced since 2011. Similar movements are observed in case of ROA (return on assets), shape of the curves is practically identical for those experienced in the profit margin.

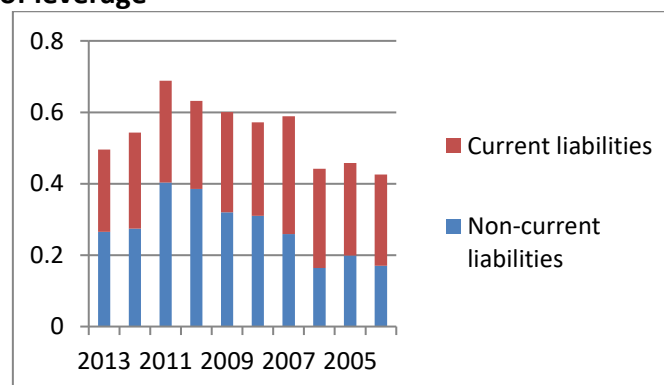
Figure 3: Evolution of Profit margin in the chemical industry

Source: Own description based on Bureau van Dijk, Orbis Database

Analysis of the ratios of the leverage

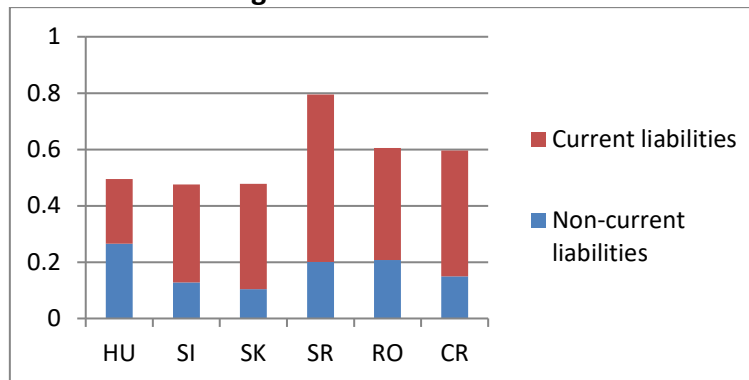
The indicators of the leverage of the Hungarian chemical industry indicate a significant change in the examined period (see Figure 4). The period until 2004-2006 was characterized by the relative low level of liabilities. This time the rate of the current liabilities is 25% and exceeds the rate of the non-current liabilities and the rate of the liabilities hardly exceeds the 40 % of the total liabilities & equities as well. This tendency hasn't changed until 2007 when the rate of the liabilities has risen almost to 60 %. The current liabilities still dominate the composition of the total debt, but from 2008 the non-current liabilities began to dominate. The rate of the liabilities culminated in 2011 when the indicator showed 69% and the 49 % in 2013 is the result of the decrease in the subsequent two years. Noticeable that the change of the rate of the non-current liabilities is the cause of the fluctuation, the proportion of the current liabilities showed much smaller fluctuation. Based on this 3 periods can be distinguished based on the indicator of the leverage: low level of liabilities in the period of 2004-2006, high leverage and the increase of the proportion of the non-current liabilities in the period of 2007-2011, finally the last two years indicate the rate of the liabilities between the two other periods and the decreasing role of the non-current liabilities. It is important to note here that this change wasn't caused by the nominal decrease of the liabilities, but by the growth of the sectoral shareholder's funds. It is partly due to the profit of the branch, which was realized in the earlier year but wasn't paid out as dividend but on the other hand belongs to the sector with the 894 million EUR shareholder's found of the in 2012 founded 3SZV Zrt., which at the same time physically doesn't exist. The wealth is made up of the intellectual property of the three founders, and so it distorts significantly the sectoral leverage. If we ignore the data of this company than we can see a more moderate decrease in the proportion of the liabilities. The market is strongly concentrated in the case of the non-current liabilities as well, 89 % of the total portfolio can be related to 5 large companies, Borsodchem Zrt. stands out from them, as it has 58% from the examined type of liability.

Figure 4: Evolution of leverage



Source: Own description based on Bureau van Dijk, Orbis Database

The ratio of the leverage of the examined countries shows a different picture in the chemical branch (see Figure 5). The rate of the liabilities is the highest in the cases of the Serbian chemical companies, where there are several companies owning 0 EUR shareholder's funds among the companies with the highest revenue. In these cases the owner is either the Serbian state or the state privatization agency.

Figure 5: Evolution of short and long term liabilities

Source: Own description based on Bureau van Dijk, Orbis Database

Due to the extremely low level of the shareholder's funds the rate of the branch liabilities is almost 80 %; and 60% of this are the current liabilities. The Romanian and Serbian sectors show almost the same picture with their ratios of the leverage of about 60%. In the former case the proportion of the non-current liabilities is 21 % and it is the highest following Hungary. In the examined branches the rate of the liabilities is less than 50 % in Hungary, Slovenia and Slovakia and the proportion of the non-current liabilities is the lowest (12,8 , respectively 10, 4 %) in the two latter cases.

Similarly to the Hungarian example the market of the non-current liabilities is concentrated towards the large enterprise sector in the examined countries. It is partly due to the high risk of the SMEs and the lack of coverage so the banks are not willing to grant credit or are willing to do so only for quite a high additional spread.

Although in the examined database there are altogether 48 companies where the statistical number of employees reaches 250, the 60 % of the non-current liabilities can be found by these companies. On the other hand the share of the section - containing most companies operating with less than 10 employees - is almost more than 3 % (which is at the same time higher than their share from revenue) of the sector.

The results of the regression analysis

I have examined the correlations between the capital structure and the ratios of the profitability with linear regression (see Table 2 in the supplement). Among the independent variables there are ratios concerning the efficiency, liquidity, tax, the composition of assets and the size of the company. The latter is measured with the natural-based logarithm and it is among the variables assuming that larger companies can get credit more easily considering the existence of collateral security and the low level of the bankruptcy risk. From the indicators which measure the profitability, the return on assets (ROA), Return on net equity (ROE), earnings before interest rate (EBIT%) and return on assets have been included into the examination. In the case of the composition of assets the proportionate share of the current assets and the stock index have been used. My decision can be justified by the fact that the given assets can be involved as securities. I have chosen from the liquidity indicators the liquidity ratio and the tax impact indicator, compares the paid tax to the P/L before taxation. First I performed the regression calculations for the entire sample, where the model's explanatory power is 23% in the case of the shareholder's funds of the liabilities. So the variables taken into account explain 23 % of the changes of the leverage. So a significant proportion remains unexplained, which can be explained by other corporate and other macro

factors that aren't included in the model. First the liquidity ratio has been involved as the correlation with the dependent variable was here the highest. However, after the entry of all the other variables, the profit margin was the most influential. As the indicator increases 1 unit the value of the dependent variable decreases 0.61%, so it influences the proportion of the liabilities negatively. However the impact of the indicator related to the earnings before interest rate is positive, so it is ascertainable that the reversal of the direction of the movement is due to the impact of the result of the financial P/L. The profitability of the main activity has a positive impact on the proportion of liabilities, however, in this way the extended financial expenses in the row of the profits after tax will lead to a negative effect. The impact of liquidity is negative as well, and it supports the hypothesis that the companies with high profit don't need liabilities, as they rather finance themselves with shareholder's funds. The indicator of the ROA and ROE moves differently with the dependent variable, the effect of the former is significantly negative on the entire sample, while the latter has a positive effect. The indicator describing the proportion of the tangible fixed assets has a negative value as well. This seems to be contradictory to my earlier assumption according to the ROA which can be considered as a higher provision through the increase of the creditability affects positively the proportion of the liabilities. Therefore the behavior of the indicator has an important message in the case of the current/non-current liabilities. The company size was not significant in the whole sample considering the proportion of the liabilities, so the nominally high amount of the liabilities is not coupled with this explanatory factor. The tax effect does not show a significant relationship either, so it is conceivable that the chemical companies of the region typically do not use this tax savings opportunity. The explanatory power concerning the non-current liabilities is 7.63% for the total sample, which is significantly lower than the explanatory power of the model examining the proportion of the liabilities or the current liabilities. This is due to the role of the other previously mentioned factors, so the indicators describing the management of the company are not the factors which determinate the proportion of the non-current liabilities. The most interesting of the three significant indicators is perhaps the performance of the size of the company. The generally accepted assumption seems to be proved here that the larger firm size is associated to a more efficient capability of asset inclusion. The direction of the relationship is positive, while the coefficient is weak and the variable has influencing power only in Hungary. The indicator of the ratio of the tangible fixed assets is significant here as well and has a positive direction, proving the positive effect of the presence of the securities for the credibility. The two variables with the greatest influencing effect are the profit and the EBIT margin. The impact is a bit stronger than in the case of the proportion of the liabilities and the direction is the same as well. The other indicators do not have a significant impact on the variable of the proportion of the non-current liabilities, so the explanatory power may be found among the factors that aren't included in the model. In the case of the proportion of the current liabilities the strongest is the explanatory power, 25,76%. The variable involved first is the ratio of liquidity here as well like in the case of the liabilities and the direction of the relation is similarly negative. So despite the fact that in practice the higher liquidity is associated with a higher creditability, these companies do not use this. On the one hand they can finance themselves from their own capital, on the other hand the costs of drawing the liabilities do not affect the borrowing in a stimulating way. ROE, ROA behaves similarly like in the full sample, the effect of the ROA has a negative direction and the effect of the one describing the shareholder's fund is weakly positive. The proportion of tangible fixed assets appears here as well, like significant variable, however it has a negative impact on the proportion of the

current liabilities. The high ratio of the tangible fixed assets presumably is coupled with a way of business that eliminates the inclusion of additional resources.

Discussion and Conclusions

The explanatory power of the model is the weakest in Hungary, in the cases of the other countries this power is slightly higher, here the quality of the database, respectively the role of the earlier mentioned other external influencing factors can be determinative. In case of the non-current liabilities the same can be noticed as in the total sample, the involved variables explain typically a low proportion, the only exception is Slovenia.

The examination of the individual countries shows a mixed picture regarding the composition of the significant independent variables. In the Hungarian chemical industry the efficiency indicator of the P/L before tax and the earnings before interest rate has the strongest influential effect on the proportion of the liabilities and these have a significant effect in the case of the non-current liabilities as well. The profit margin of the variables is more significant in Slovenia and Slovakia, while they don't influence the proportion of the current liabilities anywhere. Where the effect of the ROE and ROA is significant, there its direction is the same with the ones experienced in the whole sample. In Hungary and Slovenia they don't have any influential impact on the examined indicator of the capital structure, and in the case of the non-current liabilities there was a traceable significant relation only in Romania. The tax effect was significant only in the case of the Slovenian current and non-current liabilities, in the former case the effect has a positive direction, so the beneficial effect of the tax benefit seems to be proved. However in the latter case the effect has a negative direction, these can't be explained by the statements of the study. There are only few places where the proportion of the stock appears as a significant variable. By the Serbian large companies it exerts a weak negative effect on the proportion of the liabilities and the current liabilities. In Croatia the effect is positive. The ratio of the tangible fixed assets has a positive impact on the proportion of the non-current liabilities in the cases of the chemical industries of all countries. Its power is slightly volatile, in the cases of Slovenia, Slovakia and Croatia the power is stronger, in the other countries the influential power of the variable is weaker. Based on this proportion of securities is taken into consideration everywhere in the chemical companies of the examined countries in case of the lending. Regarding the current liabilities there is a significant relationship as well, however it has a negative direction. Here the statement about the entire sample is valid and there aren't different practices in the different territorial units.

The Hungarian chemical industry was able to remain dominant in the region, which is due to the two dominant companies, respectively the narrow circle of other multinational companies. In terms of the profitability high volatility was experienced considering the timeline and the individual countries as well, a clear trend can't be detected. After the 2009 recession the growth was noticeable nearly everywhere, but the next period shows a mixed picture. The level of the leverage in the branch and within this the proportion of the non-current liabilities has increased after the outbreak of the economic crisis suggesting that in this case not the economic performance of the companies operating in the sector and the provisions that can be involved affected the lending policy, but rather other factors like the growth of the demand for funds. The major part of the liabilities is concentrated towards the capital-intensive large companies, where due to the low risk of bankruptcy by the inclusion of the liabilities play a dominant role not the indicators describing their way of business. According to the data from 2013 in our country in a regional comparison the proportion of the non-current liabilities can be considered high, in proportion to the liabilities belongs to

the middle range. The case of Serbia can be considered to be unique due to the mentioned presence of the state, however it draws attention to the different regulation. The regression analysis revealed that the strength and composition of the independent variables are different in each country, the liquidity ratio and the proportion of tangible fixed assets appeared mostly as an influencing factor. The effect and the direction describing the profitability explains the role of the financial expenditure, but they don't appear everywhere significantly. The relatively low level of the explanatory powers suggests that the indicators characterizing the company management explain only quite partly the change of the leverage, the external macro factors has more significant role.

References

- Barna, I., Székely, M. (2002): Túlélőkészlet az SPSS-hez. Typotex kiadó. Budapest
- Brealey, R., Myers, S. (1993): Modern Vállalati Pénzügyek. Panem Kiadó. 2011 Budapest
- Huzsvai L. (2004-2011): Biometriai módszerek az SPSS-ben. Debreceni Egyetem Mezőgazdaságtudományi Kar, Debrecen.
- Kovács, E. (2006): Pénzügyi adatok statisztikai elemzése. BCE Pénzügyi és Számviteli Intézet. Tanszék Kft. Budapest.
- Sajtos, L., Mlitev, A. (2007): SPSS kutatási és elemzési kézikönyv. Alinea Kiadó. Budapest

Supplements

Table 1. Top companies in the chemical industry

Company name	Country ISO Code	Operating revenue	Number of employees	Operating P/L		Shareholders funds	Non-current liabilities	Current liabilities
		(Turnover) th EUR		[=EBIT] th EUR	P/L before tax th EUR			
		Last avail. yr	Last avail. yr	Last avail. yr	Last avail. yr	Last avail. yr	Last avail. yr	Last avail. yr
1. BORSODCHEM PRIVATE COMPANY LIMITED BY SHARES	HU	1 411 816	2 520	5 874	-45 909	454 156	914 617	442 574
2. TISZAI VEGYI KOMBINAT NYILVANOSAN MUKODO RESZVENYTARSASAG	HU	1 355 591	975	36 156	26 070	406 976	113 237	213 300
3. NITROGENMUVEK VEGYIPARI ZARTKORUEN MUKODO RESZVENYTARSASAG	HU	559 407	n.a.	13 483	7 824	158 395	167 472	85 401
4. DUSLO, A.S.	SK	463 259	2 500	7 770	6 788	268 687	17 330	121 951
5. SOCIETATEA NATIONALA NUCLEARELECTRICA S.A.	RO	459 376	n.a.	102 320	115 060	1 720 026	466 997	424 514
6. HENKEL MAGYARORSZAG TERMELESI ES KERESKEDELMI KORLATOLT FELELOSSEGU TARSASAG	HU	384 762	615	19 547	19 007	54 683	3 188	69 044
7. HIP - PETROHEMIJA	RS	371 769	1 787	-79 555	-114 375	0	15 082	482 532
8. AZOMURES SA	RO	368 738	2 457	27 177	27 677	274 573	4 997	47 128
9. PETROKEMIJA D.D.	HR	335 353	2 294	-38 245	-43 142	57 243	10 152	142 956
10. HELIOS DOMZALE D.D.	SI	320 750	2 191	9 469	3 655	195 472	47 356	110 574

Source: Own description based on Bureau van Dijk, Orbis Database

Table 2
Results of the linear regression

Liabilities/total shareholder's funds and liabilities	All countries			Hungary			Romania			Slovenia			Serbia			Slovakia			Croatia					
	R ²			23,18%			22,35%			34,30%			36,14%			39,01%			26,49%			34,78%		
	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.
Taxation/P/L before tax																								
Turnover/total assets				,056	,206	,000																		
Stocks/total assets																								
Tangible fixed assets/total assets																								
Size of the company																								
ROE																								
ROA																								
Profit%																								
EBIT%																								
Liquidity ratio																								

non-current liabilities/total shareholder's funds and liabilities	All countries			Hungary			Romania			Slovenia			Serbia			Slovakia			Croatia					
	R ²			7,63%			14,75%			4,59%			42,72%			4,95%			16,48%			18,57%		
	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.
Taxation/P/L before tax																								
Turnover/total assets																								
Stocks/total assets																								
Tangible fixed assets/total assets																								
Size of the company																								
ROE																								
ROA																								
Profit%																								
EBIT%																								
Liquidity ratio																								

current liabilities/total shareholder's funds and liabilities	All countries			Hungary			Romania			Slovenia			Serbia			Slovakia			Croatia					
	R ²			25,76%			21,51%			35,21%			40,79%			42,33%			22,02%			44,59%		
	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.	B	coeff.	sig.
Taxation/P/L before tax																								
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