Effect of Liquidity and Profitability on Use of Debt Finance Sources in Manufacturing Industry's Companies in V4 Countries

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Abstract
The analysis of impact of liquidity and profitability on use of debt finance sources is the subject of research. Investigation of just those dependences is based on the idea saying that if the use of debt finances should have positive impact on company functioning, those finances should be gained under the best conditions. Regarding the fact that in V4 countries an obtaining of the debt finances is oriented to bank sector, it is supposed that such company is to be granted the credit, whose profitability is increasing within the time and its liquidity is stable or increasing. This statement would prove the results of trade off capital structures theories. The aim of this article is to find out whether positive functional relation between independent quantities (liquidity and profitability) and dependent quantity (use of debt finances) in manufacturing industry in V4 countries within 2006 – 2013 exists.

Key words: liquidity, profitability, debt finances, panel regression, correlation
JEL codes: G32

1. Introduction

The core thought of discussion being held mainly among academics is an impact of financing arrangement on the size of generated profit as well as whether the management of capital structure can lead to deviation from optimal aim of the company. Here the fundamental aiming conflict can be found though. Under certain conditions, the use of debt finances can become cheaper than using the own sources; at the same time, bigger use of debts increases an effectiveness of tax shield but this way, it leads to decrease of the economic results being reported by the accounting. Capital structure management depends mainly on current values of contributions and costs of debt financing. In the frame of this discussion, it is necessary to seek the impact of different factors on the use of debt financing. This article is focused on impact of two basic factors – liquidity and profitability. Those two factors have been chosen based on two fundamental aims in the companies' business activities. The company should head for increasing effectiveness of business activities. Above that, the companies should focus on their long-term solvency maintenance; solvency can be kept only if the company shows stable liquidity.

Liquidity is immediately connected to the use of debt finances. Mutual relations between liquidity and optimal leverage thus the use of debt financing have been the subject of studies for many years. Liquidity is perceived as the aspect, which enables to catch an option in better way when it comes to unexpected investments or enables the companies to survive unfavourable commercial and economic conditions. In their studies, Williamson (1988) and Shleifer and Vishny (2001) that there exists positive relation between liquidity and use of debt finances. On the contrary, Morellec (2001) and Myers and Rajan (1998) state that relation is built as the negative one. Positive relation is explained by the idea that highly liquid assets is being considered as less effective as it comes to stringency costs because their sale (except financial means) is being realized with the loss (mainly receivables and reserves are meant). However lower value of liquid assets increases the risk that finances would not be granted. In case the manager wants to increase debt value under advantageous conditions, this debt has to be covered by sufficient volume of liquid assets.

Morellec (2001) thinks that assets liquidity (ability to involve them to property sale when providing liquidation) decreases company value and thus also its debt capacity. He also states, that non-

proportional assets liquidity in the company leads to insufficient investment and difficult company development. Contrary to that, Kim et al. (1998) state in their study that sufficient liquidity ex-ante maintains the accessibility of financial means in the future in case the investment is realized. They investigated this relation in the American industrial companies within 1975 – 1995. When considering the relation between liquid assets and total company´s accounting par value, growth of investment options, cash flow and their volatility, indebtedness and risk of bankruptcy are of explaining variables. By their study, positive relation between investment options growth and liquidity has been proved. They also found out though that there exists negative relation between indebtedness (or its growth) and company liquidity.

Opler et al. (1999) provided empiric analysis of the sample of American non-financial companies within longer time period from 1952 to 1994. They came to the same conclusion as for the relation to growth options; nevertheless, they also validated the conclusion of Williams´s study (1988) regarding positive relation between indebtedness and company liquidity. By those studies, effect of liquidity is positive only if the managers do not have any decision-making authority when it comes to assets sale, which lowers the risk of property dispossession. Sibilkov (2007) found out that liquidity increases costs of managerial decision-making and that impact of assets liquidity on leverage depends on combination of secured debt and direct relation between liquidity´s effect on non-secured debt. He also proved that liquidity grows with indebtedness in highly indebted companies and companies with low interest coverage as well as in the companies with low value of long-term assets or value of fixed assets to the value of unpaid debt.

It also has to be taken into account that higher liquidity lowers expected costs for stringency by creditors and thus it enables the companies to keep higher indebtedness ex-ante and increases optimal amount of debts. This positive relation is in accordance with some trade off capital structure models. Harris and Raviv (1990) state that when choosing suitable level of debt, the investors try to find compromise between current situation and future expected situation under conditions of improvement of effectiveness of operational activity functioning. Liquidity and effectiveness are compared with contribution of debt financing. Except that, Anderson (2002) says that the companies with highly liquid assets prefer higher rate of indebtedness without the change of assets structure. He also confirmed negative relation between short-term help and liquidity in case it comes within the period when the company does not have enough cash. He focused on comparison of Belgian and British companies and within empiric studies he found out that 25% of Belgian companies show ratio of liquid assets above 23%, while in Great Britain, the same ratio of liquid assets only 14% of the companies show.

Let´s summarize liquidity being perceived by particular theories; as for compromise theory, positive functional impact of liquidity on the use of debt finances is expected. This idea is supported by the fact that higher rate of liquidity enables gaining the debt finances under better conditions and influences leverage in positive way. Contrary to that, theory of hierarchic order based on the preference of financing by retained and reinvested profit gives profitability growth to negative functional relation with the use of debt financing. But, it is automatically assumed that the profit is covered by financial means sufficiently (by high liquidity) and thus it is not necessary to use other than own financial sources when investment is provided.

As for profitability, compromise theory says that profitable companies tend to use the other debt finances because of existence and functionality of tax shield. If the companies are profitable then if conditions are not changed, their free finances grow, risk of accessibility of financial means decreases and at the same time, accessibility of debt financing increases as the debts costs are concern. It also means that when profit increases, probability of bankruptcy decreases and stringency costs decreases as well. This leads to statement of trade off theories about positive relation between profitability of own capital and used debt financing. Arguments supporting those statements can be found in many studies, e.g. Brealey and Myers (2000) or Graham (2006). Contrary to that, theories of hierarchic order state that if internal financial sources exist those would be preferred as the consequence of non-existence of additional transaction costs. Debt finances would be used only if lack of not divided profit will occur. In case the profit increases, effort in profit retaining increases as well and surplus of retained profit leads to lower value of debt. This theory perceives the debt as a signal of insufficiency as for the profitability. As the consequence of this, relation between profitability and the growth in use of debt finances is expected. Arguments to support these statements can be supported by the studies of Fam and Frenche (2002), Hovakiman et al. (2001), Beatti et al. (2006) etc.

2. Methodology and Data

The study is focused on the field of manufacturing industry because this area shows the lowest ratio as for the number of companies going bankrupt. There have been gained data about manufacturing industry out of the Amadeus database per individual companies of huge, big and middle size. Small businesses have been excluded from the analysis because of two reasons. Weak accessibility of data was the first reason, while the fact that the financing correction is not of the primary interest (as for small companies' management) is the second one. Generally speaking, small companies have lower option as it comes to financing sources selection. Once the file was generated, such companies were excluded not meeting the condition of compact time row involving the years 2006 – 2013, i.e. within given period, the value of monitored items did not have to be missing for more than 3 years. The setting of tine period was based on data accessibility in the database. Considering this condition, investigated sample thus includes 3483 companies of the Czech Republic, 152 of Hungary, 1263 of Poland and 345 of Slovakia. Those data serve as the base for panel regression. When constructing panel regression model I will use the study of Haas and Lelyveld (2010). Sufficiently wide database enables in the cross-section through the panels of individual variables to achieve great results (by using the Generalized Method of Moments) even within short monitored period. Prucha (2014) states that many panel data stand for the problem of short time period row; if the panel regression is made by the method of the smallest squares on growth tempo, those data are absolutely of no use. By him, Generalized Method of Moments, GMM) represent the way how to research functional relations just between such panel data. Financial data of the annual frequency (gained out of the basic accounting reports) arranged by the panels, are suitable candidate to be researched by regression method. The advantage of GMM contrary to the least squares method is the fact that among regressors, delayed endogenous, explained, dependent variable exist (Hall, 2005). This relation will be generally modelled by the equation (1):

$$DER_{it} = \alpha_1 + \beta_1 * \Delta DER_{it-1} + \beta_2 * X_{1it} + \beta_3 * X_{2it} + \cdots \ldots \ldots \ldots + \beta_n * X_{nit} + \varepsilon_{it} \quad (1)$$

where endogenous dependent variable DER_{it} will be the indicator debt/equity ratio *i*-st firm within time *t* evaluating the use of debt financing, exogenous independent variable is delayed value debt/equity ratio from previous year ΔDER_{it-1}, X_{nit} will be the other factors, which can influence the rate of debt finances usage. Those factors will be: current ratio (L3) and ROE (return on equity). Symbols α_1 and ε_{it} are the constant of the model and residual element in GMM model.

As for methodology, there are 3 commonly used ratio indicators. D/E ratio evaluates the financial structure of the company. The use of this indicator is based on the study of Fisher et al. (1989). Debt and equity financing sources enter this ratio. Values higher than 1 signalize bigger usage of external sources, lower than 1 use of own sources. The other used indicator the current ratio is. Liquidity is important because only liquid company can handle its obligations. On the other hand, too high rate of liquidity is unfavourable phenomenon because financial means are bounded by assets, which do not work in favour of significant valorization of finances and "cuts off" the profitability. It is necessary though to search for the balanced liquidity guaranteeing both financial means valorization and ability to handle obligations. At the same time, it is indicator being important as it comes to the price of gained financial sources. Low level of liquidity makes company of high-risk for creditors so interests would reflect such situation. ROE (return on equity) is the last indicator, the analysis will focus on. I have used this indicator because it is significantly influenced by ratio between used external and own finances. For other indicators, capital structure seems to be irrelevant. Return on equity – ROE is used to evaluate effective treatment of the owners´ finances. This indicator is created as the ratio between earnings after taxes and the value of own capital. ROE is generally perceived to be the one of the most important indicators when evaluating the effectiveness. ROE is arranged as independent variable because when financial sources are gained from the banking sector, it plays role when the credit price is determined. Credit price is considered when making decision whether the credit will be used or not.

The aim of this article is to find out whether there exists positive functional relation between independent quantities (liquidity and profitability) and dependent quantity (use of debt finances) in the companies of manufacturing industry in the V4 countries within 2006 – 2013. It is assumed that company´s stability in both areas will lead to higher use of debt finances. Profitability will be in this article perceived as

supporting variable; solvency will be stressed. In connection with above mentioned studies and formulated aim two basic hypotheses can be determined.

H1: With increasing liquidity the use of debt finances increases as well.

H2: With increasing profitability the use of debt finances increases as well.

Formulation of hypotheses is based on the results of trade off theories; hypotheses will be verified or disproved at the sample of the companies of each analyzed country.

3. Solvency Situation in Europe

It can be said that insolvency development of the European companies reflects the economies development after crisis years. Table 1 shows that after stagnation in 2010/2011 a new wave of bankruptcy came. In Western Europe, the number of bankruptcies increased by +1.15%. The worst development indicates France where within last five years the number of companies going bankrupt is the highest. As for intensity of the number of bankruptcies, the worst situation was in Norway, Italy and Spain.

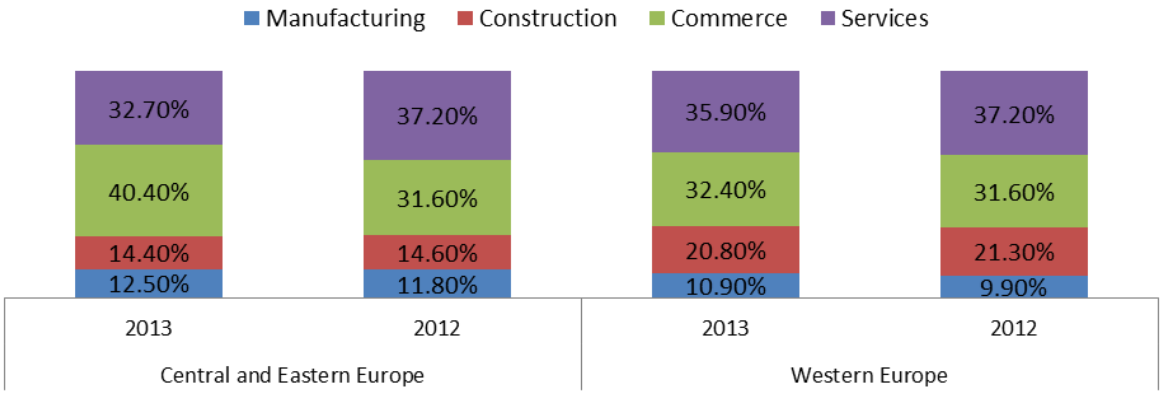
Table 1: Development in Companies Going Bankrupt within 2009 - 2013 in Europe

	2009	2010	2011	2012	2013
Western Europe	178 235	174 463	174 183	190 161	192 340
CEE	n/a	53 351	69 895	97 169	100 984

Source: Creditreform (2014)

As the Central and East Europe (CEE) is concern, in 2013 there were 100 984 bankruptcies reported representing thus increase by 3.5%, contrary to 2012. The highest year-on-year increase reported Bulgaria (243.3%), Croatia (174.2%) and Slovenia (39.2%). If we want to compare ratio of companies going bankrupt and total number of economically active companies, then the biggest relative ratio would be in Serbia (7.93%), Romania (5.67%) and Hungary (3.84%). The Czech Republic reported year-on-year increase by 26.7% (7142 companies going bankrupt in 2012), relative ratio is 0.47%. When evaluating performance of individual economical field, the following result can be seen in Figure 1.

Figure 1: Contribution of the Key Economic Sectors to Overall Insolvency in Western Europe and in Central and Eastern Europe



Source: Creditreform (2014)

The Figure 1 shows that in Western Europe, insolvent companies belong rather to tertiary sector thus commerce and services. Within both years more than 60% of insolvent companies belong to those two sectors. Worsening situation can be seen in commerce, which also includes catering and accommodating services. Similar situation is in Central and East Europe. Tertiary sector includes even more insolvent companies – more than 70% within 2012 – 2013. Contrary to this, manufacturing industry involves the lowest number of the companies with bad liquidity, although this industry belongs to the second biggest field within the whole Europe. Just this fact has leaded me to choose this field.

The companies not having problem with liquidity can deal with the use of debt finances in order to make them function effectively.

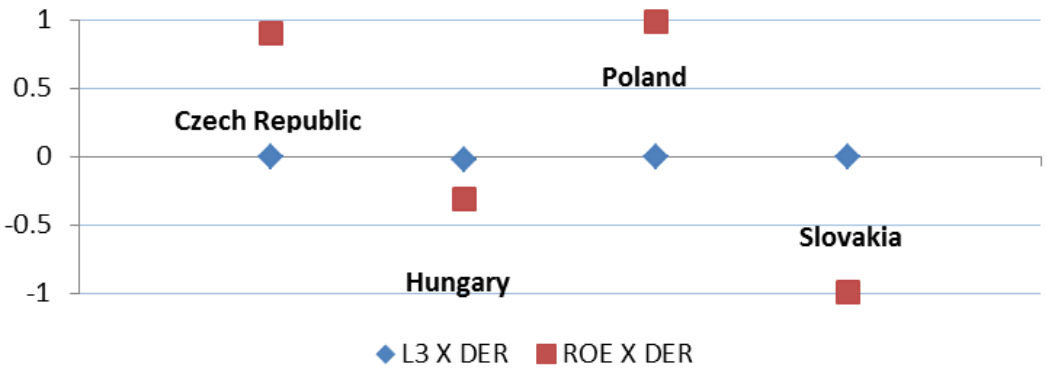
4. Analysis of Functional Relation of Manufacturing Industry in V4 Countries

By the theories and above mentioned studies, the indicators should show mutual dependence. One of the ways how to measure this dependence is using the correlation coefficient. This use would show a direction of dependence though, but it wouldn't measure causality. Correlation is expressed by the following equation (2).

$$k_{XY} = \frac{\mathrm{cov}(X,Y)}{\sigma_X \sigma_Y} \tag{2}$$

where X is mean value of the values matrix debt/equity ratio and Y is mean value of value matrix of ROE or liquidity by particular country. The values of this indicator should move within an interval from -1 to 1. The values close to 1would say that with increase of debt finances use the ROE or liquidity increase as well and contrarily. The values equaling 0 signalize mutual independence. Figure 2 shows the rate of mutual dependence of monitored variables in particular countries.

Figure 2: Correlation of Selected Variables Compared to D/E Ratio in Particular Countries within 2006 – 2013



Source: author´s elaboration by provided analyses

The used sample of the companies in all countries the relation between the using of debt finances and liquidity becomes non-correlated or almost non-correlated. Above that, all results turned out as statistically insignificant. Hypothesis H1cannot be proved neither disproved because positive relation by correlation was found only in the Czech Republic, is very weak and statistically insignificant. As for other countries, correlation turned out negative, very close to 0. So, H1 cannot be proved or disproved neither. In case we compare DER and ROE, it can be said that with increasing profitability the use of debt finances increases as well in the Czech Republic and Poland. Contrary to that situation, Hungary and Slovakia shows opposite experience, i.e. profit growth means lower use of debt finances. This can indicate an effort to withhold the generated profit and its reinvestment. In the frame of correlation analysis, hypothesis H2 can be proved for the Czech Republic and Poland and disproved for Hungary and Slovakia.

When using GMM model (as determined in the introduction of this article) attention was paid to development of the use of debt finances (DER) and whether it is influenced by achieved liquidity, effectiveness and use of debt finances within previous time period. The reason for using GMM model after correlation analysis is in effort to determine clearly dependent and independent quantities. This could not be done in the frame of correlation analysis. The relation is expressed by the following equation (3):

$$DER_{it} = \alpha_1 + \beta_1 * \Delta DER_{it-1} + \beta_2 * L3_{it} + \beta_3 * ROE + \varepsilon_{it} \tag{3}$$

where endogenous variable DER_{it} represents the use of debt finances i^{st} firm within time *t*, delayed value DER of previous year ΔDER_{it-1} , liquidity development $L3_{it}$ and ROE development are of exogenous independent variables. Symbols α_1 and ε_{it} are model´s constant and residual part in GMM model. Situation is gradually modelled at the sample of V4 countries companies. Table 2 shows the situation in the Czech Republic involving 3483 companies of manufacturing industry.

Table 2: Debt/equity Ratio as Dependent Variable in the Czech Republic

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DER(-1)	-0.003419	0.001584	-2.159029	0.0309
L3	0.000155	3.39E-05	4.588712	0.0000
ROE	32.86009	1.429264	22.99092	0.0000
Effects Specification				
Cross-section fixed (orthogonal deviations)				
Mean dependent var	1.301543	S.D. dependent var		671.1097
S.E. of regression	267.3280	Sum squared resid		1.44E+09
J-statistic	18.84226	Instrument rank		23

Source: author´s elaboration by provided analyses

Out of the table it is clear that analyzed sample shows positive relation in both context profitability and liquidity. It can be also seen that relation between the use of debt finances and liquidity is significant although both independent quantities have the same statistical significance. Model also proves that with increasing profitability the use of debt finances also increases and bigger use of outside sources is quite connected with strengthening of companies' liquidity. Opposite tendency is seen when considering previous use of debt finances. It basically means that within monitored time period the companies of manufacturing industry tend to use debt financing less if they used them within previous year. At the same time though, it is true that if profitability increased and liquidity was strengthened the use of debt financing was increasing. From the point of view of formulated hypotheses, it can be said that in the Czech Republic both hypotheses were proved although positive relation by L3 is very weak. Table 3 shows the situation in Poland, the second biggest sample (1263 companies).

Table 3: Debt/equity Ratio as Dependent Variable in Poland

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DER(-1)	-0.157527	0.004166	-37.81242	0.0000
L3	-0.027346	0.021163	-1.292182	0.1963
ROE	4.807496	0.002294	2096.015	0.0000
Effects Specification				
Cross-section fixed (orthogonal deviations)				
Mean dependent var	-9.309408	S.D. dependent var		365.3110
S.E. of regression	64.63910	Sum squared resid		26368700
J-statistic	27.00696	Instrument rank		23

Source: author´s elaboration by provided analyses

The analysis provided by GMM model in Polish companies of manufacturing industry indicated that liquidity has negative functional dependence; at the same time it can be said that it can be generalized because the results turned out statistically insignificant. Statistically significant relation only the use of debt finances in previous period and return on equity has. Profitability is connected to positive functional dependence. In practice it means that if company´s economy is supported by increasing profitability the companies use debt financing more. Contrarily, the use of debt financing within previous year shows negative functional dependence. It means that if debt financing was used in previous time period then within following period it decreases. To make decision on hypotheses, in case of Poland it is not as clear as it was in case of the Czech Republic. As for profitability, hypothesis H2 can be proved but as for liquidity it has to be disproved because of achieved negative relation; nevertheless, this decision cannot be generalized because the results are statistically insignificant. The other two analyzed countries had much more smaller samples. Especially, gaining the data from

Hungary was very difficult; database Amadeus reports only 152 companies. Table 4 indicates the results gained from Hungary.

Table 4: Debt/equity Ratio as Dependent Variable in Hungary

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DER(-1)	-0.054237	0.001327	-40.87030	0.0000
L3	-0.227379	0.130517	-1.742138	0.0820
ROE	-0.579398	0.241498	-2.399188	0.0167
Effects Specification				
Cross-section fixed (orthogonal deviations)				
Mean dependent var	0.940331	S.D. dependent var		39.68944
S.E. of regression	42.93869	Sum squared resid		1154176.
J-statistic	19.40296	Instrument rank		23

Source: author´s elaboration by provided analyses

The Table 4 shows that all monitored independent quantities show negative functional relation with different statistical significance. As far as liquidity is concern, it can be said that with its increase the use of debt finances decreases; it indicates that probably debt finances are used mainly to cover lack of finances in companies. From the point of the model it can be said that the result can be statistically significant being around 10%, which slightly decreases informative ability of this result. Nevertheless, this statement can be supported by the company Creditreform, s.r.o., by which Hungary together with Romania belong to the countries with the highest number of bankruptcies (Creditreform, 2014). This supports the result of ROE. Also here it can be seen negative functional dependence indicating that profitability growth causes lower use of debt finances. It could be concluded that the companies tend to reinvest the generated profit more and divide it among the owners less. In both cases the hypothesis can be rejected because neither one of independent quantities did not show positive functional dependence. The last sample of Slovak companies involves 345 companies.

Table 5: Debt/equity Ratio as Dependent Variable in the Slovakia

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DER(-1)	-0.001564	4.59E-05	-34.07833	0.0000
L3	-0.001236	0.000454	-2.721357	0.0066
ROE	-17.50053	0.084872	-206.1993	0.0000
Effects Specification				
Cross-section fixed (orthogonal deviations)				
Mean dependent var	-6.457197	S.D. dependent var		321.4540
S.E. of regression	39.48858	Sum squared resid		3051644.
J-statistic	15.10558	Instrument rank		23

Source: author´s elaboration by provided analyses

Considering functional dependence, relation between dependent and independent quantities is the same as by Hungarian sample. All independent quantities show negative functional relation. There is only one difference. The results of all monitored quantities are statistically significant being about 1% indicating though very good informative ability. But, impact of liquidity and the use of debt finances is very weak, i.e. both those quantities influence the decision on the debt finances use only marginally. Strong functional dependence can be seen when comparing profitability and the use of debt finances. Here is the same relation as Hungary shows thus profitability growth causes less use of debt finances. So, also here we can think that the companies tend to hold the profit and reinvest it in business activities. As for Slovakia though, neither hypothesis can be proved because functional relation showed negative dependence.

5. Conclusion

The aim of this article was to find out whether there exist positive functional relation between independent quantities (liquidity and profitability) and dependent quantity (the use of debt finances) in the companies of manufacturing industry of V4 countries within 2006 – 2013. Expected positive functional relation was based on previously realized studies and assumption that stable financial situation in the company would lead to higher use of debt finances. Two hypotheses have been formulated, which should have proved or disproved the expectations. The results of correlation analysis and GMM model are summarized in the Table 6.

Table 6: Impacts of Particular Quantities on the Use of Debt Finances by Research Ways

	Expectation		Correlation´s impact		Impact in GMM model		
	L3	ROE	L3	ROE	Δ DER	L3	ROE
Czech Republic	+	+	+	+	-	+	+
Hungary			-	-	-	-	-
Poland			-	+	-	-	+
Slovakia			-	-	-	-	-

Source: author´s elaboration by provided analyses

The Table 6 shows that situation is not clear and differences exist in individual country and when used methodology is concern as well. Considering the correlation analysis, expectation has been fulfilled only in the Czech Republic but the level of liquidity significance is above 10% so generalization is not possible. As for other countries, negative functional impact between liquidity and the use of debt finances has been found meaning that even stable solvency situation does not lead to higher use of debt finances. Similarly to the Czech Republic, the results of correlation analysis in Hungary, Poland and Slovakia were about statistically insignificant items being above 10%. Because of this fact, another methodology has been used. In GMM model, only relation between liquidity and the use of debt finances could be marked as the item with low or lower level of significance. Considering ROE, functional dependence has not be the same as with correlation; the Czech Republic and Poland showed positive functional dependence and Hungary and Slovakia showed negative one. Expectations have been fulfilled only by the Czech Republic where both liquidity and profitability showed positive impact on the use of debt finances. As for Hungary and Slovakia, expectations have not been fulfilled at all; if profitability increased, the use of debt finances decreased. Conclusion is that hypothesis 1 (with liquidity increase the use of debt finances) was proved only by the Czech Republic by both analyses correlation and GMM model. As for other countries this hypothesis has to be rejected. The second hypothesis (with increasing profitability the use of debt finances increases) is fulfilled in correlation analysis in all countries. And as for GMM model, it can be proved only by the Czech Republic and Poland; for Hungary and Slovakia has to be rejected.

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