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# Influence of Selected Determinants on the Financial Structure in the Civil Engineering Companies in the Selected Countries

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**Abstract**

Analyzing and deciding on capital structure is one of the core activities of any company, as evidenced by the vast amount of research. Each sector is characterized by a different capital structure. This article deals with the impact of profitability, non-debt tax shield, GDP growth rate, and inflation rate on the overall, long-term, and short-term debt of medium and large civil engineering companies. The analysis is carried out for the period 2009–2018 on eleven selected economies, including the extended Visegrád Group and Estonia, Lithuania, and Latvia. The input data is obtained from the Orbis database and the World Bank database. Panel regression using the Generalized Method of Moment is used to analyze the influence of selected determinants on debt.

**Keywords:** financial structure, profitability, non-debt tax shield, GDP growth, inflation.

## Introduction

During their development, companies need financial resources that can be divided according to several fundamental aspects. Taking into account all sources of funding, we get the notion of a "financial structure" that includes both long-term and short-term funds. It is the content of this research to examine the influence of several selected determinants on their financial structure, since determining the optimal financial structure is one of the main activities of any manager who wants to achieve a certain level of profitability of the company and on the other hand wants to keep the financial risk as low as possible.

The significance of this issue is evidenced by a vast number of studies, some of which date back to the beginning of the last century when economics began to be dedicated to the issue of corporate finance for the first time. However, a groundbreaking and fundamental study was written in 1958 by economists Modigliani and Miller under the title "The Cost of Capital, Corporation Finance and Theory of Investment." This study has become an essential element and has contributed to the emergence of two fundamental theories of capital structure. The first is the trade-off theory, whose leading representatives are Brealey et al. (2011). The main idea of the theory is to find the optimal capital structure by finding a balance between the costs of financial distress and the tax shield. The second theory and notional counterpart (for determining the impact of individual determinants) is the pecking order theory, led by Myers (1984). At the heart of this theory is the claim of preference for financial resources by companies, which should prefer their resources rather than foreign ones.

The work of Modigliani and Miller and the two theories began to be followed by and continues to be followed by other authors who constantly seek or confirm the impact of various determinants on the capital or financial structure of companies. Initially, studies focused primarily on large, often listed companies from highly developed countries. However, today, the authors are not limited in terms of industry, size, or geographical location. Consequently, there are no definite conclusions about the influence of determinants as the results of the research depend on the sector selected, the number of companies selected, and the country of origin.

The benefit of this research should be the size and complexity of the sample, which includes

over 6,500 medium and large sector companies (all companies from Orbis database), thus characterizing the behavior of civil engineering companies in each country. At the same time, selected countries will be examined individually in panels by size and state.

## Literature overview

As mentioned above, one of the main tasks of managers is also to decide on the financial structure in a company, taking into account several factors. These factors are divided into those that are inside the company and those that are outside the company. This research deals with representatives of both groups. Profitability and a non-debt tax shield are among the in-house determinants, while macroeconomic development and inflation are out-of-company determinants. In the following paragraphs, the links of the individual determinants will be discussed.

The first in-house determinant is profitability, which most researchers include in their research. This determinant tends to have a negative relationship with debt (even when divided into three forms of debt), but like all determinants of the capital structure, profitability may also show a positive relationship with debt. From one point of view, as profits grow, the creditworthiness of companies that move away from the risk of bankruptcy and companies are more attractive to creditors is increasing. Secondly, higher profitability brings higher retained profits, which are an excellent source of funding.

Negative binding is the most common result and has been confirmed by a number of authors, including Toy et al. (1974), Rajan and Zingales (1995), Wald (1999), Gaud et al. (2003), Bauer (2004), Weill (2004), Nivorozhkin (2005), De Haas and Peeters (2006), De Jong et al. (2008), Črnigoj and Mramor (2009), Hernádi and Ormos (2010, 2012), Kayo and Kimura (2011), Onofrei et al. (2015), and Öztekin (2015). A less frequent link is the positive link revealed by the following authors: Aulová and Hlavsa (2013) and Růčková (2015a, 2015b, 2017).

Among the authors who have divided the debt according to duration and at the same time confirmed a negative link belong the following: Michaelas et al. (1999) for all forms of debt, Nivorozhkin (2002) for all types of debt, Chen (2004) for total and long-term debt, Song (2005) for all forms of debt, Cheng and Shiu (2007) for overall and long-term debt, Delcoure (2007) for all types of debt, Bokpin (2009) for total debt, Mohkova and Zinecker (2013) for all forms of debt for Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia, Handoo and Sharma (2014) for total and long-term debt, Lourenço and Oliveira (2017) for overall and long-term debt, Vo (2017) and Huong (2018) for short-term indebtedness. However, some authors have revealed a positive link – Pinková (2012), Mokhova and Zinecker (2013) in Slovenian companies and Klapper et al. (2002) – all these authors for total and short-term debt.

The second in-house determinant is the non-debt tax shield represented by depreciation. Usually, a negative link with debt is expected, which should be reduced due to depreciation, which is a substitute for taxes and their benefits. Michaelas et al. (1999) for long-term debt, Wald (1999), Klapper et al. (2002) for all forms of debt, Song (2005) for long-term debt, Hernádi and Ormos (2012), Acedo-Ramirez and Ruiz-Cabestre (2014) found a negative link.

Like other determinants, a non-debt tax shield can also show a positive link with debt. Acedo-Ramirez and Ruiz-Cabestre (2014) note that this link can occur if the depreciation value is close to the value of the physical assets that can be used as collateral for debt acquisition, favoring debt growth rather than falling. Positive links may be due to different tax regulations in the countries surveyed, such as Song (2005) for short-term debt, Delcoure (2007) for all forms of debt, Hernádi and Ormos (2010), Aulová and Hlavsa (2013), Mokhova and Zinecker (2013) for Czech (total and short-term debt), Hungarian (all forms of debt), Austrian (all types of debt), Romanian (all forms of debt), Slovenian (long-term debt) and Slovak companies (all types of debt), Correia et al. (2015) for non-financial listed French firms, Bajramović (2017) for companies from Bosnia and Herzegovina.

The following two determinants are out-of-company, and the resulting linkages are very different, especially for these factors. In this case, it cannot be said that most studies have this or that link. The resulting coefficients are also often statistically insignificant for these determinants, and that is why it is appropriate to include them in the studies to collect more statistically significant results, and we could say something about their influence.

The first determinant is economic development represented by the GDP growth rate. The explanation for the negative link is that if the economy is in expansion, companies usually grow profits, of which one category is retained profit, which, as mentioned above, is an own ideal source of funding. On the contrary, the positive link is closely related to the development of the company during the business cycle. Expansion usually increases profits, which puts companies away from the possibility of bankruptcy, and creditors are optimistic and willing to lend to them. Similarly, in a recession, everyone is very skeptical, profits are falling, companies can

go bankrupt, interest rates are rising, and no one borrows as a result of which companies are falling in debt.

Negative binding in studies was confirmed, for example, by Cheng and Shiu (2007), Bastos et al. (2009), Bokpin (2009), Hanousek and Shamshur (2011), Mursalim and Kusuma (2017) for Indonesia. Conversely, the positive linkage was revealed in Salehi and Manesh's (2012) studies in Iran, Çekrezi (2013), Mursalim, and Kusuma (2017) for Malaysia.

The second determinant is the inflation rate, and the possibility of a positive and negative linkage stems from the impact of inflation, as inflation reduces the actual cost of existing debt as a result of a decline in the real interest rate. If the interest rate falls, companies will borrow more, and debt will increase, which indicates a positive link. However, lenders know this effect of inflation and, therefore, often hedge against its rise, which causes a negative relationship.

The negative binding was confirmed by Hatzinikolaou et al. (2002), Cheng and Shiu (2007), Camara (2012), Jõeveer (2012), Çekrezi (2013), Öztekin (2015), Mursalim and Kusuma (2017) for Malaysia and Indonesia. Conversely, studies such as Bokpin (2009), De Haas and Peeters (2006), Sett and Sarkhel (2010), Salehi and Manesh (2012) for Iran, M'ng et al. (2017) for Thailand and Malaysia, Khémiri and Noubbigh (2018) confirm positive link.

## Research methodology

The research focuses on companies from eleven selected countries belonging to the civil engineering sector. Selected countries are the Czech Republic (CZ), Slovakia (SK), Poland (PL), Hungary (HU), Austria (A), Slovenia (SLO), Romania (RO), Bulgaria (BG), Estonia (EST), Latvia (LV) and Lithuania (LT). The sample covered a total of 6,524 companies, of which 5,995 are medium-sized enterprises, and 529 are large enterprises, during the period 2009–2018. The data needed for the research was obtained from the Orbis database. The distribution of companies by country is shown in Table 1.

This research aims to determine the influence of selected determinants on the financial structure of construction companies in eleven selected economies. Based on a review of earlier studies mentioned above, the following links are expected:

1. For overall debt, there is a negative relationship with profitability, depreciation and inflation, and a positive relationship with GDP growth.
2. For long-term debt, there is a negative relationship with profitability, depreciation and inflation, and a positive relationship with GDP growth.
3. For short-term debt, there is a negative relationship with profitability, depreciation and GDP growth, and a positive relationship with inflation.

Table 1

**The distribution of companies in the industry by country**

| | CZ | SK | PL | HU | A | SLO | BG | RO | EST | LT | LV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium c. | 678 | 260 | 2115 | 715 | 219 | 110 | 650 | 774 | 133 | 193 | 148 |
| Large c. | 165 | 47 | 158 | 17 | 21 | 11 | 27 | 64 | 4 | 11 | 4 |

*Source*: author's calculations based on data from the Orbis database

### *Variables*

As regards variables, the dependent variable is represented by three forms of debt. The basis is the total debt in the form of the debt-equity ratio (DER), which is a ratio of total liabilities and equity of the company. There is debt divided into long-term debt (DER_L) and short-term debt (DER_S). These variables differ from the primary share in the fact that only the long-term or short-term liabilities of the company appear in the numerator.

Independent variables are four selected determinants, two of which represent the internal environment of the company, and two represent the external environment of the company. Profitability, which is represented by the ROA, is a part of our research and the essential determinant of many studies. In this case, because of the eleven different countries with different taxation, the ratio is made up of pre-tax profit and interest and total assets. The non-debt tax shield (DEPR) is represented by the proportion of depreciation and total assets. The external environment is represented by the GDP growth rate (GDP) at market prices and the inflation rate (INF).

### *Methodology*

In analyzing the links between the financial structure represented by the three forms of debt in this research and the determinants, several methods can be used, very often some version of the panel regression, that we will use in our study. Panels composed of determinants create more dynamic models and help to maintain firm heterogeneity under the supervision and control. However, the use

of simple panel regression has several pitfalls, such as unsuitability for short time series or ambiguity of results due to incorporation of fixed or random effects; therefore, Arellano and Bond (1991) constructed a two-stage system – Generalized Method of Moments (GMM) that does not have these pitfalls. On the other hand, this model is suitable for shorter time series, adds the lagged value of the dependent variable to the calculation, checks the correlation of errors, etc. After using the model, it is necessary to test whether the model has a certain informative value and can be considered as correct and robust, which is used, for example, the Sargan test. A model can be regarded as robust if the values are higher than 0.05.

The equation of model is estimated as follows:

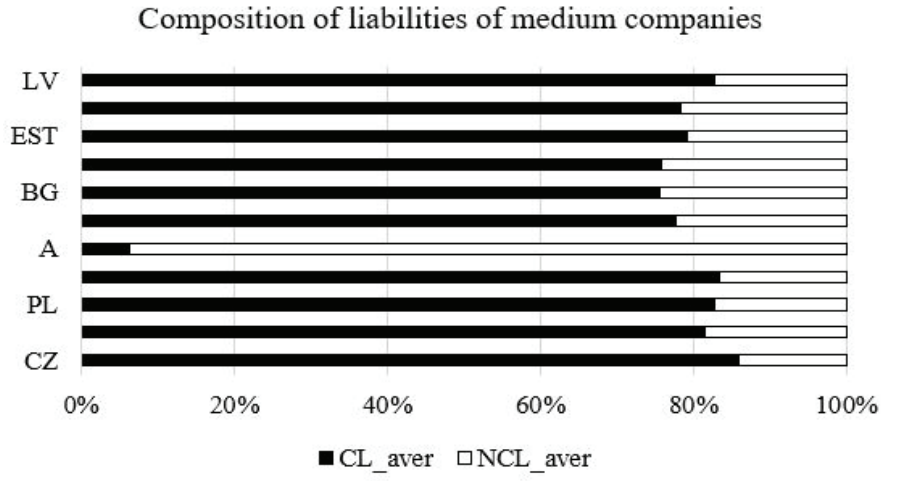
$$DER_{it} = \alpha_0 + \beta_1 * DER_{it\text{-}1} + \beta_2 * ROA_{it} + \beta_3 * DEPR_{it} + \beta_4 * GDP_{it} + \beta_5 * INF_{it} + \varepsilon_{it} \quad (1)$$

## Results and discussions

Because of the missing data, some of the analyses in the next chapter leave the years 2017 and 2018 for the results to not significantly divert.

This research deals with companies that, according to the classification, belong to the construction industry, more precisely one of its parts – civil engineering, whose history dates back to the time before Christ. This industry includes the construction and care of our environment and is related to the public sector, as it includes, for example, construction of roads, bridges, ports, airports, piping systems, railways, dams, shipping channels, etc. It is a cyclical and dynamic industry, which is growing strongly due to the continuing urbanization of the population, for which the existing infrastructure needs to be continuously expanded. At the same time, dynamism lies in the development of new materials and technologies, which are also becoming more environmentally friendly. A vast number of people work in this sector, as these are usually large-scale projects, and as a result, this sector is helping to increase unemployment in an economic downturn. Leaders in this sector are the United States, the United Kingdom, and among other Sweden, France, the Netherlands.

Before analyzing the results of the regression analysis, it is necessary to analyze the distribution of sources of funding in individual countries. The graphs below show how diverse the mix of liabilities is. For medium-sized companies, in seven countries except for Austria, it is clear that about 80 % is dominated by short-term liabilities (CL_aver), which makes sense in this sector since a large part of the assets are inventories of building material. This fact is confirmed in the analysis of assets, of which 25.42 % to 34.59 % are fixed assets, and the remaining roughly 70 % are current assets, e.g. inventories. The only exception is Austria, where, on average short-term liabilities account for only 6 %, which is strange, as in this country also 74 % of its assets are current assets. An explanation could be, for example, the value of investments in long-term assets, which would significantly exceed investments in current assets.



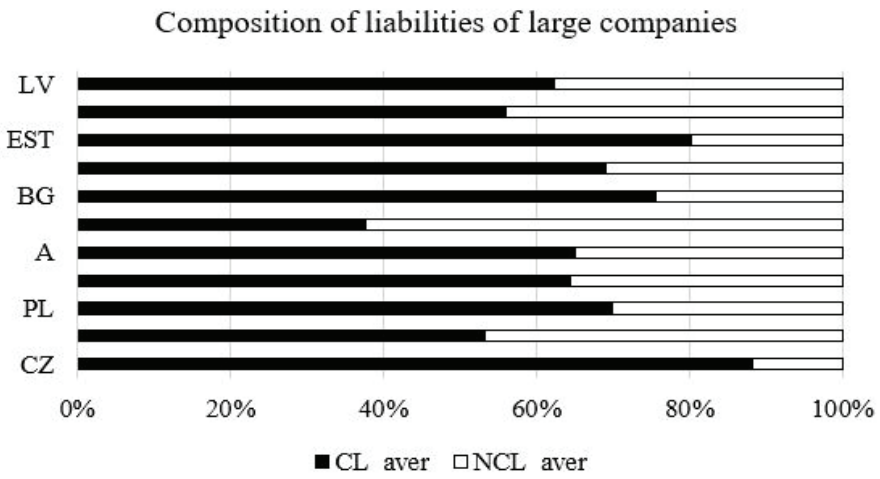



**Fig. 1.** Composition of total liabilities of medium and large companies

*Source*: author's calculations based on data from Orbis databases

Thus, large companies do not show a clear shift towards short-term funding sources, but at the same time, they are at least slightly prevailing except for Slovenia. For these companies, non-current fixed assets account for between 4.7 % and 31.2 % of total assets, with fluctuations in Romanian companies up to almost 67 %. For most companies, such a high proportion of short-term funding can be explained, as in the case for medium-sized companies – many current assets (inventories), enough short-term funding. However, for Slovenian companies, this claim is again not very clever, as 4.7 % of total assets are fixed assets in which they are likely to invest a lot, given 62 % of long-term sources of funding (NCL_ aver). The case of Romanian companies is also different. In this case, on the other hand, long-term assets are either financed by short-term resources or are underfunded.

Table 2

**The average debt-equity ratio in individual countries**

| | CZ | SK | PL | HU | A | SLO | BG | RO | EST | LT | LV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium c. | 102 % | 192 % | 156 % | 135 % | 209 % | 174 % | 148 % | 435 % | 53 % | 200 % | 67 % |
| Large c. | 103 % | 472 % | 301 % | 1025 % | 225 % | 187 % | 95 % | 53 % | 91 % | 122 % | 153 % |

*Source*: author's calculations based on data from Orbis databases

If we look at Table 2, it can be observed that, besides a few cases, the indebtedness of construction companies exceeds its resources; in many countries even many times (e.g. large Hungarian and Slovak companies, medium Romanian companies).

***Results of GMM***

The only method used to analyze dependencies between independent and dependent variables was panel regression using the GMM method. The results of this method are shown for medium-sized companies in Table 3 and large companies in Table 4. It is apparent that for all forms of debt, results are missing for some countries. Unfortunately, the missing models did not fulfill the condition of robustness and, therefore, did not have much informative value. At the same time, we can see in the tables several times the letter X, which indicates a slightly different model for some countries due to the non-stationary time series for inflation, the non-debt tax shield, and the GDP growth rate. Of course, the data could be adjusted to show stationarity, but the results would be harder to interpret.

Table 3

**Results of the GMM model for medium-sized companies**

| | DER(-1) | ROA | DEPR | GDP | INF |
|---|---|---|---|---|---|
| **Total debt** | | | | | |
| CZ | -0,131[a] | | | -19,896[b] | |
| SK | 0,243[a] | | | | X |
| A | 0,101[a] | | | 83,102[a] | -108,822[a] |
| SLO | -0,676[a] | 0,001[a] | X | | X |
| BG | -0,042[a] | | -18,998[a] | -76,208[a] | X |
| EST | 0,408[a] | -1,070[a] | | -4,607[b] | |
| LT | -0,103[a] | | X | | 58,273[a] |
| **Long-term debt** | | | | | |
| SK | 0,094[a] | | | | X |
| HU | 0,004[a] | 0,003[a] | -105,707[a] | | 56,856[a] |
| A | 0,106[a] | | | 94,728[a] | -120,457[a] |
| SLO | -0,109[a] | 0,000[a] | X | 15,790[a] | X |
| RO | 0,047[a] | | | 13,511[a] | 21,208[a] |
| **Short-term debt** | | | | | |
| CZ | -0,112[a] | | | | |
| SK | 0,244[a] | | | 20,150[a] | X |
| HU | -0,132[a] | 0,008[a] | -10,445[a] | | |
| A | 0,370[a] | 0,875[a] | -1,009[a] | 0,124[a] | -3,073[a] |
| SLO | -0,195[a] | 0,001[a] | X | -15,379[a] | X |
| BG | -0,068[a] | -15,250[a] | | -60,303[a] | X |
| EST | 0,410[a] | -0,881[a] | | | |

*Source*: author's calculations based on data from Orbis databases
Symbols [a] and [b] indicate significance at 1 % and 5 %.
Letter X indicates a non-stationary time series for inflation and a non-debt tax shield.

The first relationship examined, which is part of the GMM model, was the relationship between past and future debt. We can see that in both tables, these variables are statistically significant in all models and that slightly positive relationships prevail, which in almost all cases have very low coefficients, and therefore past indebtedness has a very negligible effect on future debt. However, for large Austrian companies in the case of total and long-term debt, this link is strong and positive compared to other results. This result means that the use of debt financing in the past will lead to an increase in the following period.

For profitability, a negative relationship with all forms of debt was assumed. This expectation is fulfilled for the sixteen resulting coefficients, while the remaining twelve coefficients were not fulfilled. Apart from two cases (medium-sized Estonian companies for short-term debt and large Slovak companies for total debt), negative coefficients are relatively high and are therefore strong links. Thus, more profitable companies will use more of their funding sources, such as retained earnings, as profits grow. On the contrary, the positive coefficients are rather low, and the increase in profitability does not have such a significant impact on the increase in debt.

Table 4

**Results of the GMM model for large companies**

| | DER(-1) | ROA | DEPR | GDP | INF |
|---|---|---|---|---|---|
| **Total debt** | | | | | |
| SK | 0,247[a] | -30,929[a] | -45,036[a] | X | 152,619[a] |
| PL | -0,019[a] | 6,375[a] | 96,334[a] | 79,917[a] | |
| HU | -0,216[a] | -219,511[a] | X | 4769,414[a] | X |
| A | 2,228[a] | | | | |
| BG | 0,094[a] | -1,315[a] | -6,760[a] | 7,070[a] | X |
| RO | 0,018[a] | -10,548[a] | 492,639[a] | 125,180[a] | X |
| LT | -0,014[a] | -10,814[a] | X | 423,032[a] | -260,352[a] |
| **Long-term debt** | | | | | |
| SK | 0,208[a] | -0,731[a] | -1,178[a] | -7,436[a] | X |
| PL | 0,138[a] | 2,275[a] | 22,708[a] | | 5,295[a] |
| HU | -0,240[a] | -4,785[a] | X | 151,276[a] | X |
| A | 2,324[a] | | | | |
| BG | 0,078[a] | 0,124[a] | -1,710[a] | 3,143[a] | X |
| RO | 0,026[a] | -0,302[c] | 18,462[a] | | X |
| LT | -0,011a | | X | 135,193[a] | -49,339[a] |
| **Short-term debt** | | | | | |
| CZ | -0,121[a] | -5,387[a] | | -6,169[c] | -25,445[a] |
| SK | -0,086[a] | -15,313[a] | -23,447[a] | -8,546[a] | X |
| PL | -0,031[a] | 1,417[a] | 45,020[a] | 78,467[a] | |
| HU | -0,188[a] | -187,356[a] | X | 4965,693[a] | X |
| A | 0,277[a] | 2,106[b] | | -28,120[a] | 25,929[a] |
| BG | 0,098[a] | -1,438[a] | -5,047[a] | 4,013[a] | X |
| RO | -0,078[a] | 1,146[a] | 268,033[a] | 77,138[a] | X |
| LT | -0,199[a] | -9,657[a] | X | 269,777[a] | -219,604[a] |

*Source*: author's calculations based on data from Orbis databases
Symbols [a], [b], or [c] indicate significance at 1 %, 5 %, or 10 %.
Letter X indicates a non-stationary time series for inflation, GDP, and non-debt tax shield.

The effect of economic development was to be positive on total and long-term debt and negative on short-term debt. Austrian, Slovenian and Romanian medium-sized companies and Polish, Hungarian, Bulgarian, Romanian and Lithuanian large companies fulfill a positive assumption. As regards short-term debt, our expectations are met by Slovenian and Bulgarian medium-sized enterprises and Czech, Slovak, and large Austrian companies. The coefficients for the influence of GDP are also high (for short-term debt), except for Austrian medium-sized companies, even at some companies (large Hungarian companies) very high, in thousands. Together with the non-debt tax shield and the inflation rate, it has the most significant impact on the level of debt.

The last variable examined was inflation, which should have a negative relationship with total and long-term debt and a positive link with short-term debt. These assumptions, as we can see in the tables, are fulfilled or refuted in various ways. Also, these coefficients are high, and there is a visible impact on the debt.

## Conclusion

This research dealt with the financial structure and four selected determinants, two of which represented the internal environment of the company and two of which represented external environment of the company. The subject of the research was companies from the civil engineering sector. The companies came from eleven economies – the Czech Republic, Slovakia, Poland, Hungary, Bulgaria, Romania, Austria, Slovenia, Estonia, Lithuania, and Latvia. Specific determinants were profitability, non-debt tax shield, economic development, and inflation. The financial structure was characterized by debt in three primary forms according to time – total, long-term, and short-term debt. Our assumptions were tested in total by 6,524 companies, which were also divided into medium and large. The monitored period was from 2009 to 2018. The dependence of

variables was analysed by panel regression using the GMM model. The research aimed to determine the influence of selected determinants on the financial structure of construction companies in eleven selected economies.

The link between debt and its lagged value was revealed first. This linkage was statistically significant for all models that met the robustness condition. There was a slight prevalence of the positive link, which indicates that if the company used debt financing in the past period, it would continue to use it in the following period, thus increasing the debt value. A negative link indicates the opposite, i.e., not using debt financing in the future. Unfortunately, in addition to the two cases, the coefficients were very low (in tenths, hundredths or thousands), and therefore we cannot talk about any effect of past indebtedness on the future, as the values will fluctuate minimally. However, this does not apply to large Austrian companies in total and long-term debt, where the coefficients exceed 2.2, and the indebtedness will thus be increased by two monetary units.

The analysis of medium-sized companies revealed far less statistically significant relationships than large companies. Negative profitability assumptions for all forms of debt have been confirmed only for Estonian companies for total and short-term debt and for Bulgarian companies for short-term debt. Positive links have been revealed for Slovenian, Hungarian, and Austrian companies for some forms of debt. Apart from Bulgarian companies, the resulting coefficients were again very low to speak of the impact of profitability on debt. In Bulgaria, the effect is significant. The negative link indicates the preference of own sources of financing at rising profits. The company's earnings during the period under review were likely to continue to increase as Bulgaria was essentially not affected by any economic crisis compared to the remaining countries with statistically significant coefficients.

Another variable that was expected to have a negative impact on all forms of debt was the non-debt tax shield. This link was found only for Bulgarian companies for total debt, for Hungarian companies for long and short-term debt, and Austrian companies for short-term debt. In addition to Austrian companies, the coefficients are relatively high; in the case of Hungary, for the long-term debt even exceeds one hundred. Austrian companies are strongly dominated by long-term debt, so bonds will not have a significant impact on short-term debt. If all these companies continue to invest in fixed assets, they are likely to continue to benefit from depreciation, which reduces profit or loss and is thus own source of financing. As a result, the debt of companies will decrease.

In the case of the effect of economic development on debt, a positive link with total and long-term debt and a negative link with short-term debt was assumed. The assumptions were met or refuted in several countries. Unfortunately, Czech companies found a negative relationship between GDP and total debt. Czech companies are therefore likely to use more of own sources of financing in economic prosperity, which is justified by the fact that the Czech economy did well except for the economic recession in 2012/2013, and companies indeed grew profits, for example retained profits source. The Austrian companies confirmed the expected positive links, even in the case of short-term debt. However, this coefficient is very low, and the effect is minimal. The reason is the dominance of long-term debt. Although the Austrian economy was hit by the 2009 financial crisis, the Austrian government-guaranteed deposits and set aside several billion to stabilize the banking system. Thus, the economy grew for most of the period under review, which companies used to borrow and grow in debt. Slovenian companies show a positive link for long-term debt and a negative relationship for short-term debt. Taking into account the economic developments in Slovenia, when the country was hit by a housing bubble and a banking crisis, the resulting links indicate an increase in debt in times of recession/crisis. Bulgarian companies had a negative impact on overall and short-term debt. This finding means that companies use own resources during economic prosperity, for example, as a result of profit growth. The last stronger link is for Romanian companies, which showed a positive relationship for long-term debt, which is explained by the twenty billion loans to Romania, which was struck by the financial crisis. The loan was used to kick-start the credit market, and so companies had access to debt financing during the crisis.

The last observed variable was the inflation rate, which was expected to have a negative impact on overall and long-term debt and positive on short-term debt. The negative influence was confirmed only by Austrian companies and meant a decrease in debt due to the decline in the real interest rate, which makes real debt lower. The inflation rate in this economy grew in only three years compared to last year, with average values around 1.5 %, which does not seem to be a dizzying amount for a significant decline in debt, as the coefficients are relatively high. A positive link with inflation was revealed by Lithuanian companies for total debt and Hungarian and Romanian companies for long-term debt. In these economies, particularly in the early part of the

period under review, there were high inflation rates, which could give the impression that such a rate would either remain or increase, leading to a higher debt reduction.

The analysis of large companies revealed far more statistically significant relationships than medium-sized companies. Negative profitability assumptions for all forms of debt were confirmed only for Slovak and Hungarian companies for all types of debt, Bulgarian and Lithuanian companies for total and short-term debt, Romanian companies for total, and long-term debt, Czech companies for short-term debt. All these resulting links are tending to use own resources in conditions of increasing profitability.

Conversely, a positive link was revealed in Polish companies for all forms of debt and in Bulgarian companies for long-term debt. The economic development of these countries has been very favourable throughout the examined period and taking into account the fact that more profitable large companies are usually "too big to fail" and more attractive to creditors; the positive link, which means that with the increase in profits, also the increase in debt, is quite expected in this case. Another positive link was found with Austrian and Romanian companies for short-term debt. These economies, as mentioned for medium-sized enterprises, have been hit by the financial crisis, but economies have been supported in some ways by loans or government interventions, and therefore, there may be a positive link in these cases as the credit market has not frozen.

Regarding the impact of the non-debt tax shield, Slovak and Bulgarian companies for all forms of debt have met our expectations of negative ties for all forms of debt. If these companies continue to invest in fixed assets, they are likely to continue to benefit from depreciation, which reduces profit or loss and is thus own source of financing. On the other hand, Polish and Romanian companies showed a positive link for all forms of debt. The only possible explanation is different legislation, as the subsequent analysis revealed that fixed assets are certainly not equal or near the value of depreciation, and therefore this explanation is not possible.

In the area of impacts of economic development, our assumptions were a positive relationship with total and long-term debt and a negative relationship with short-term debt. Hungarian, Lithuanian, and Bulgarian companies showed positive links in all cases. In the case of Hungary, the coefficients for total and short-term debt were in thousands, indicating a strong impact of the GDP growth rate. This situation is due to two factors: firstly, almost 70 % of liabilities are short-term, and secondly, Hungary is one of the economies hard hit by the financial crisis as a result of which the forint has weakened significantly. Unfortunately, it was common in Hungary to have loans in currencies other than the national currency, which in the weakening of the forint meant a vast increase in debt. Lithuania is also one of the countries more affected by the crisis. The development of the Bulgarian economy was mentioned for medium-sized companies, where it had the same positive impact.

Further positive links were found with Polish and Romanian companies for total and short-term debt, which account for about 70% of total liabilities. The issue of Romania was also explained by medium-sized companies. The Polish economy, like the Bulgarian economy, did not recognize the crisis or recession during the examined period, and the growth in debt in times of economic prosperity is not unusual. As for the negative links, these were confirmed by Czech, Slovak, and Austrian short-term debt companies as expected.

The last variable was the inflation rate, which was expected to have a negative relationship with total and long-term debt, and a positive link with short-term debt. The positive assumption was fulfilled only by Austrian companies. In this case, creditors will hedge against possible rising inflation, and therefore there will no longer be an advantage of cheaper debt. Positive links were also revealed for Slovak companies for total debt and Polish companies for long-term debt. The only Lithuanian companies confirmed their expectations of negative ties. These companies, as well as Czech companies for short-term debt, benefited from inflation in the form of cheaper debt.

Subsequent research could consider adding additional determinants.

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**Influence of Selected Determinants on the Financial Structure in the Civil Engineering Companies in the Selected Countries**

Summary

At the beginning of the last century economists began to deal with another area of corporate finance, namely the capital structure, which includes long-term sources of finance. If we also include short-term sources of funding, we get to the financial structure. Deciding on the capital or financial structure is one of the crucial activities of financial managers in companies. The importance of this topic corresponds to the number of studies that have been written since the beginning of the last century. Since then, economists have been researching new theories, new determinants, and other influences every year to explain or facilitate decision-making by managers. Despite the numerous literature and results on this subject, it is still important to pursue this area, as there is no apparent shift towards certain links between determinants and the form of capital/financial structure. Therefore, it is important to examine more and more samples of companies, sectors, and countries to have more results on which to conclude.

The research focuses on companies from eleven selected countries belonging to the civil engineering sector, which is a cyclical and dynamic industry, as it is not necessary to build in times of economic crisis or recession. Regarding the sources of funding, this sector should be characterized by a predominance of short-term funding sources, given that the assets should be dominated by current assets in the form of inventories (building material). Selected countries are the Czech Republic, Slovakia, Poland, Hungary, Austria, Slovenia, Romania, Bulgaria, Estonia, Latvia, and Lithuania. The sample covered a total of 6,524 companies, of which 5,995 are medium-sized enterprises, and 529 are large companies, during the period 2009–2018. The period thus includes the 2009 financial crisis and the European debt crisis. The data needed for the research was obtained from the Orbis database.

In terms of variables, the financial structure is represented by three forms of debt, namely total, long-term and short-term debt in the form of a debt-equity ratio. Individual determinants are profitability, non-debt tax shield, economic development in the form of GDP

growth rate and inflation rate. Detection of dependencies between variables will be done by panel regression using the Generalized Method of Moments method. The robustness test is required for models to be indicative, in this case Sargan's test.

The first relationship found in many countries is the relationship between past and future debt. The results are dominated by slightly positive links, which have very low coefficients in almost all cases, and therefore past indebtedness has a very negligible effect on future debt. However, for large Austrian companies in the case of total and long-term debt, this link is strong and positive compared to other results. This result means that the use of debt financing in the past will lead to an increase in the following period.

Profitability expectations are met for sixteen outcome coefficients, while the remaining twelve coefficients have not been met. Apart from two cases (medium-term Estonian companies for short-term debt and large Slovak companies for total debt), the negative coefficients are relatively high and are therefore strong links. Thus, more profitable businesses will use more of own sources of financing, such as retained earnings, as profits grow. Conversely, the positive coefficients are slightly low for medium-sized companies, and the increase in profitability does not have such a significant impact on the increase in debt. However, for large companies, they already have integer coefficients, and so for Polish companies for all forms of debt, Romanian and Austrian companies can claim that with the rise in profitability, the debt value will increase. The positive links are explained by the economic development of these countries, which in Poland has been very favorable throughout the period and taking into account the fact that more profitable large companies have a lower risk of bankruptcy and are therefore more attractive to creditors; a positive link is quite expected in this case. The Austrian and Romanian economies have been hit by the financial crisis, but the economies have been supported in some ways by loans or government interventions, making the credit market not freezing.

Regarding the non-debt tax shield, only four ties have been proven by medium-sized companies, confirming our assumption. In large companies, far more links were found, namely twelve, half of which confirmed and half refuted our assumption. At the same time, the coefficients of this variable are quite high, and therefore there is a strong link to debt. A negative link indicates that if these companies continue to invest in fixed assets, they are likely to continue to benefit from depreciation, which reduces profit or loss and is thus own source of financing.

Austrian, Slovenian and Romanian medium-sized companies and Polish, Hungarian, Bulgarian, Romanian, Lithuanian large companies fulfill a positive prerequisite for economic development. As regards short-term debt, our expectations are met by Slovenian and Bulgarian medium-sized enterprises and Czech, Slovak and large Austrian companies. The coefficients for the influence of GDP are also high for short-term debt, in addition to the case of Austrian medium-sized companies, even at some companies (large Hungarian companies) very high in thousands. Together with the non-debt tax shield and the inflation rate, it has the most significant impact on the level of debt.

The last variable examined was inflation, the results of which are varied or disproved. A negative impact has been found for medium-sized Austrian and Lithuanian large companies for all forms of debt and implies a decline in debt as a result of a decrease in the real interest rate, which makes real debt lower. The inflation rate in the Austrian economy grew only in three years compared to the previous year, with average values around 1.5 %, which does not seem to be a dizzying amount for a massive decline in debt, as the coefficients are relatively high. The inflation rate in the Lithuanian economy was different, as the economy had a relatively high inflation rate and therefore the advantage of cheaper debt was higher. A positive link with inflation has been revealed for medium-sized Lithuanian companies for total debt and medium-sized Hungarian and Romanian companies for long-term debt. In these economies, particularly in the early part of the period under review, there were high inflation rates, which could give the impression that such a rate would either remain or increase, leading to a higher debt reduction. The positive assumption regarding short-term debt was confirmed only by large Austrian companies. In this case, creditors will hedge against possible rising inflation, and therefore there will no longer be an advantage of cheaper debt.

**Keywords:** financial structure, profitability, non-debt tax shield, GDP growth, inflation.