



## ORIGINAL ARTICLE


**Citation:** Valaskova, K., Kliestik, T., & Gajdosikova, D. (2021). Distinctive determinants of financial indebtedness: evidence from Slovak and Czech enterprises. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 16(3), 639–659. doi: 10.24136/eq.2021.023

Contact to corresponding author: Katarina Valaskova, katarina.valaskova@fpedas.uniza.sk

Article history: Received: 3.05.2021; Accepted: 11.09.2021; Published online: 30.09.2021


### Katarina Valaskova

University of Zilina, Slovakia

 [orcid.org/0000-0003-4223-7519](https://orcid.org/0000-0003-4223-7519)


### Tomas Kliestik

University of Zilina, Slovakia

 [orcid.org/0000-0002-3815-5409](https://orcid.org/0000-0002-3815-5409)

### Dominika Gajdosikova

University of Zilina, Slovakia

 [orcid.org/0000-0001-7705-3264](https://orcid.org/0000-0001-7705-3264)

## Distinctive determinants of financial indebtedness: evidence from Slovak and Czech enterprises

**JEL Classification:** D22; G32; L25

**Keywords:** *indebtedness; financial performance; determinants; construction sector*

### Abstract

**Research background:** Indebtedness indicators are used to monitor the structure of corporate financial resources. The company's share of its own and foreign resources affects the financial stability of the company. A high share of own re-sources makes the company stable, and independent. With a low share, on the contrary, the company is unstable, market fluctuations and credit uncertainty can have serious consequences. However, foreign capital is cheaper, and too high indebtedness ratios can jeopardize the existence of enterprises.

**Purpose of the article:** In general, the economic recession worsens the capital structure of enterprises, especially their debt management. Thus, the paper aims to apply the set of 13 indebtedness ratios to a sample of 779 Slovak and Czech enterprises from the construction sector to determine key microeconomic determinants that may influence the level of indebtedness.

**Methods:** A non-parametric one-way analysis of variance — the Kruskal-Wallis test — was used to determine whether the set of indebtedness ratios is the same across countries, districts, and sizes. For analyzing the specific sample pair of stochastic dominance, the pairwise comparison was realized using the Dunn's test with Bonferonni correction. The Mann-Whitney test was used

Copyright © Instytut Badań Gospodarczych

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

to compare the differences in the set of indebtedness ratios between two independent groups of enterprises, based on their legal form and country.

**Findings & value added:** The level of total indebtedness ratio and the self-financing ratio depends on the region as well as on the size of the enterprise and the legal form. In the case of credit indebtedness and debt-to-cash-flow indebtedness, their dependence on the size of the enterprise and the legal form is obvious. The importance of the region and the legal form of enterprises, vice versa, affect the level of the financial independence ratio. These outputs are relevant for authorities, policy makers, or financial institutions to identify financial constraints that construction enterprises face and, as a result, make a long-term contribution to theory in this field.

## Introduction

The successful operation of business entities and their survival in the long term horizon is influenced by corporate performance, which is one of the key factors for business success. An important part of the performance analysis is the financial analysis, which uses traditional indicators of financial performance, as part of the initial instruments of assessment of the current financial situation of an enterprise and its further development within a given period of time (Majdakova *et al.*, 2020, pp. 1–8). Financial analysis deals with the evaluation of the financial situation of a company, sector, or even the whole national economy using specific financial characteristics. It evaluates the financial health of the subject in terms of four basic attributes, which include liquidity, profitability, activity, and indebtedness (Durmanov *et al.*, 2019, pp. 1377–1386). The purpose of such an analysis is the identification of the financial position of enterprises, their weaknesses and strengths that may contribute to constant improvements and significant progress. The outputs generated by the financial analysis are largely used not only by internal users, such as managers, shareholders, employees, and trade unions, but also by external users, which include future investors, financial institutions — mainly banks, creditors, the state and its bodies, business partners, but even competitors themselves (Pur *et al.*, 2015, pp. 132–149).

Appropriate financial performance is a key to success, which is, however, influenced not only by the internal processes of enterprises, but also by macroeconomic development, which plays a significant role. Changes in economic cycles have a different impact on specific economic sectors. Csanadi (2014, pp. 113–129) affirms that indebtedness increases as a consequence of the global crisis and subsequent intensified state interventions. The current Covid-19 pandemic has had a serious impact on several sections of the economy (Pardal *et al.*, 2020, pp. 627–650; Zinecker *et al.*, 2021, pp. 742–762), which are significantly sensitive to changes in economic cycles (Korzeb & Niedziółka, 2020, pp. 205–234) or have a signifi-

cant impact on the unemployment rate (Svabova *et al.*, 2021, pp. 261–284) – one of them is also the construction sector. As declared by Adhikari and Poudyal (2021), the economic consequences of the pandemic have created a new set of risks in this sector of the economy related to disruptions, delays, or uncertainty in construction projects. The situation in the construction sector is worsened by disorder in supply chains and financial bubbles, which can lead to another recession. Moreover, analyzing the situation in Slovak and Czech construction enterprises which were fully affected by a massive price increase in 2021, the main aim of the paper is to examine the indebtedness of companies in a selected section of the national economy — the construction sector — and clarify the causalities and determinants of indebtedness using appropriate quantitative methods. The paper is original in its analytical section as it tries to depict the crucial determinants which significantly influence the level of indebtedness and thus provide relevant information for managers, creditors, and banks when considering the financial status of enterprises and the financial performance of their business operations. The added value of the research comes from the determination of key microeconomic determinants that may influence the level of indebtedness in Slovak and Czech enterprises.

In connection with the corporate business operation as well as its ability to survive in the market and achieve successful results, financial performance is one of the relatively frequently used concepts. Neumaier and Neumaier (2002) claim that performance uses both equity and debt effectively, and thus aims to achieve the maximum growth in the market value of the company in the long term to ensure the relevant profit level or create appropriate conditions for the future development of profits. When evaluating the company's performance, it is recommended to monitor two types of indicators, financial and non-financial (Buzinskiene, 2019, pp. 10–27). Financial indicators are designed to help the organization decide on financial and inheritance issues. Non-financial indicators serve as drivers to increase the effectiveness of processes in the organization and provide opportunities for continuous performance improvement, technology utilization, generation of production capacity, and increased competitiveness within the production chain (Marquezan *et al.*, 2013, pp. 46–61). Pur *et al.* (2015, pp. 132–149) declare that to measure corporate financial performance, the well-known traditional methods are accompanied by modern approaches, such as Economic Value Added, Market Value Added, Balanced Scorecard, Total Quality Management, or benchmarking. Chikan (2008, pp. 20–28) mentions that the role of competitiveness of enterprises forms a competitive national economy. The given performance, together with the per-

formance of the industry sector, represent a decisive role in the field of international competitiveness (Stefko *et al.*, 2019, pp. 144–160).

The findings of Ng (2011, pp. 599–607) summarize that financial performance is usually measured by the evaluation of various financial statements and reveals the competencies and performance of the company. It also monitors and evaluates the implementation of a corporate strategy as a basis for future planning of organizational goals, within which it is possible to predict and assume a certain state of insolvency.

Thus, financial performance is an important measure, mapping the way enterprises try to generate revenues, manage their debts, and quantify overall financial health. Analysts and investors tend to use and calculate different ratios of financial performance to compare similar enterprises across the same industry, or to compare specific sectors in different countries. The depiction of key determinants, influencing the financial performance of enterprises in the context of their indebtedness, represents the empirical value added of the analysis.

The paper is divided as follows: firstly, the most relevant and up-to-date sources are portrayed in the literature review to explain the background. The sample of the examined enterprises, as well as the methodological steps of the research and the statistical methods used, are depicted in the research methodology. The Results section is devoted to the presentation of the crucial findings, which are discussed in the context of other relevant studies published worldwide. Conclusions summarizes the research outputs and states the limitations and future direction of the research.

## **Literature review**

Financial indicators represent the ratios of relative variables that use two or more figures obtained from the available financial statements. A good set of indicators, if well-chosen and correctly analyzed, can provide the expert with accurate information about how long a company can survive until it reaches a period of financial distress or bankruptcy (Pelaez-Verdet & Loscertables-Sanchez, 2021). Regular measurement and evaluation of traditional, most commonly used financial indicators of profitability, activity, liquidity, or indebtedness can give companies a certain competitive advantage (Melly, 2012, pp. 164–172). Financial problems never manifest themselves all at once, but rather at different stages, such as a decrease in the value of profitability or production, an increase in the need for working capital, a rapid deterioration of the capital structure, or even insolvency. These financial difficulties can be revealed and identified from the relevant

financial statements and, given the unexpected and unfavorable developments of previous periods or changes in financial conditions, they may reflect some key areas (Kliestik *et al.*, 2020, pp. 74–92).

One of the key parameters reflecting financial stability and solvency is the set of indebtedness ratios which are also often used to monitor the capital structure in enterprises (Csanadi, 2015, pp. 147–174). The indebtedness of an enterprise is analyzed to determine the corporate debt, the ability to repay the interests, the ratio of equity and debt, and thus it is possible to reveal the riskiness and profitability of a business entity (Giday, 2013, pp. 271–292). And, as alleged by Alimov *et al.* (2019, pp. 385–399), analyzing the indebtedness of enterprises and calculating the critical debt value is important to detect the bankruptcy bound.

The importance of indebtedness and its effect on corporate investment decisions is declared in a study by Fernandez de Guevara *et al.* (2021). Authors declare in their research that a debt-to-assets ratio higher than 53%, increases the negative effect of indebtedness on business operations. This effect was worsened after the financial recession, because if business entities were highly indebted, banks would become more risk-averse and tighten access to credit. The capital structure of enterprises and the determination of an appropriate debt level has motivated researchers and academicians for several decades. Casni and Filic (2019, pp. 39–52) examine the mutual dependence of cash flow and corporate debt, and similarly to our research, they also prove the importance of the size of the enterprise when analyzing debt management in an enterprise. Majumdar (2014, pp. 833–854) reveals that not only the size of enterprises is a relevant determinant of indebtedness, but also the corporate growth, profitability, and time of operation (firm age); or, as declared by Standar and Kozera (2020), also the income potential. Identification of these determinants is an important measure when ensuring the growth of enterprises within a specified sector of the economy (Onuferova *et al.*, 2020, pp. 95–116). Their importance is declared by Mazzoleni and Pollonini (2021, pp. 159–175), who corroborate that corporate indebtedness is related to growth, financial structure and economic dynamics and evaluate the impact of the mutual interdependence of these determinants on the level of indebtedness. The research by Mijic and Jaksic (2017, pp. 36–40) indicates that corporate debt is negatively correlated with the profitability level, which means that additional debt worsens the financial performance of enterprises.

However, the research by Lopez-Delgado and Dieguez-Soto (2020, pp. 727–762) indicates that family-managed enterprises rely on indebtedness. They also found out that the female directors influenced the level of indebtedness negatively. These facts — family management and the presence of

women in management — must be considered when developing appropriate financial policies for a business. Nonetheless, these findings are in contrast with the study by Hernandez Nicolas *et al.* (2016, pp. 135–164) whose results declare that the higher the percentage of female representatives on boards, the higher the profitability and the lower the level of indebtedness. The research by Klazar and Slintakova (2019, pp. 253–272) on 17 EU Member States in the period 2006–2014 reveals a significant relationship between corporate debt and taxation, mainly when considering the debt-shifting incentives and the capitalization rule. Analyzing the situation in several European countries, the authors also confirm the importance of macroeconomic factors on the corporate debt level. It should be noted that the optimal level of indebtedness differs in specific sectors of the economy. The studies by Culkova *et al.* (2018, pp. 28–42) or Belas *et al.* (2020, pp. 135–159) focus on the indebtedness of enterprises in selected sectors, evaluating the debt level using the total indebtedness and insolvency ratios and financial leverage. Dallabona *et al.* (2019, pp. 54–74) analysed enterprises listed on the BM&FBovespa using multiple linear regression to reveal those variables which explain the corporate indebtedness in the best possible way. They concluded that the current ratio, quick ratio, net worth, return on assets, total assets and firm growth do influence the debt level to the greatest extent. Despite the fact that some enterprises overreach the recommended level of debt, their financial performance is not threatened if the appropriate source of financing is found, which is confirmed in the study by Perez Ragone and Martinez Benavides (2015, pp. 93–121). Moreover, Schicks (2014, pp. 301–324) proclaims that over-indebtedness is lower for enterprises with good debt literacy.

## **Research methodology**

For the purpose of the indebtedness analysis, the construction sector was chosen, as it is one of the most important sectors within the national secondary industry areas; and the one significantly affected by Covid-19 governmental restrictions. Due to the realization of construction and buildings, it is an important part of gross fixed capital formation in the whole economy. The construction industry, as a production sector of the state economy, greatly contributes to the volume of the gross domestic product and also to the growth of any national economy, and it is directly affected by government policies, as governments tend to regulate the economy by reducing public construction during stagnation periods (Öcal *et al.*, 2007, pp. 385–392).

The Amadeus database (provided by Moody's Analytics Company Bureau Van Dijk) contains relevant information and financial data on around 67,200 Slovak and Czech enterprises operating in the construction sector. Considering the relevant subcategories of this sector (not service and support activities), the dataset is formed of 26,457 enterprises. However, as the main aim is to analyse the indebtedness of this sector using 13 different financial indicators, only those enterprises that provide all the necessary data in the monitored period 2015–2020 will be further analysed. The outlying values were also removed from the dataset to ensure the high information value of the research. After the data adjustment, the final dataset consists of 779 enterprises, which could be categorized as follows: 496 enterprises from the Slovak Republic and 283 enterprises from the Czech Republic (66 large, 342 medium-sized, and 371 small enterprises).

Forming the final dataset of enterprises, the analysis of indebtedness was performed. In general, the higher the corporate indebtedness, the higher the business risk. Thus, to reveal the level of indebtedness of selected Slovak and Czech enterprises, these financial ratios were calculated (Table 1).

To calculate the selected indebtedness ratios, several financial parameters (expressed in thous. euros) were used. Their basic descriptive statistics, namely mean, median, standard deviation (st. dev.), and coefficient of variance (CV), are summarized in the following table (Table 2) for each analysed country.

To perform an indebtedness analysis, selected indebtedness indicators were assessed in terms of regions, size, legal form and country. Based on the realized literature review, the following hypotheses were tested at a 5% significance level:

*H1: There are statistically significant differences in the indebtedness ratios of the construction sector across the countries.*

*H2: Individual indebtedness ratios depend on the corporate classification criteria (region, size, legal form) of an enterprise.*

The analysis itself was realized in these methodological steps:

1. Selected indebtedness ratios were calculated for each analysed Slovak and Czech enterprise operating in the construction sector in each year of the monitored period (2015–2020).

2. The normality of the analysed dataset was verified (using either Kolmogorov-Smirnov or Shapiro-Wilk tests according to the frequency of the

subsets of an analysed classification criterion), and the results of the tests indicate that the data does not follow a normal distribution.

3. The Kruskal-Wallis test, a non-parametric alternative to the one-way ANOVA, was used to verify if the indebtedness ratios are the same within the different countries' districts (regions) and size (small, medium-sized, and large enterprises). If the difference in indebtedness ratios was statistically significant, the Dunn-Bonferoni post hoc test was carried out to find the distinctions between the groups of regions and sizes.

4. The Mann-Whitney U test, a non-parametric alternative to the independent t-test, was adopted to compare whether there are any differences in indebtedness ratios based on a legal form of an enterprise (limited liability companies and joint-stock companies) and a country.

## **Results and discussion**

Corporate indebtedness can be measured and evaluated based on different indicators. For the purpose of the research of the indebtedness level of Slovak and Czech enterprises, the main focus is on the following ratios: total indebtedness ratio, self-financing ratio, current indebtedness ratio, non-current indebtedness ratio, credit indebtedness ratio, debt-to-equity ratio, interest coverage ratio, interest burden ratio, debt-to-cash-flow ratio, equity leverage ratio, financial independence ratio, non-current assets coverage ratio and insolvency ratio. The 5-year average values of these indicators for each country are summarized in Table 3.

The *total indebtedness ratio* indicates the amount of the liabilities used by enterprises to finance their needs. As suggested by Kravcakova Vozarova *et al.* (2019), the limit value of the indicator in developed market economies is 70–80%, otherwise 30–60%. Within enterprises in the construction sector, the average value of the ratio was at a level of 73.5% in Slovakia, which means that 1 € of total assets is burdened with 0.735 € of liabilities, compared to 55.6% in the Czech Republic. The *self-financing ratio* shows the extent to which shareholders' funds are used to finance corporate property needs. The value of the indicator should not fall below 20 to 30% (Bartosova *et al.*, 2020). These two indebtedness indicators, total indebtedness ratio and self-financing ratio, are complementary ratios and describe the financial structure of corporate resources. If the total indebtedness decreases annually, the self-financing ratio increases. There was a growing trend in the self-financing ratio in enterprises of both countries within the monitored period. According to the 5-year average values, 1 € of total assets is burdened with 0.273 € of shareholders' funds in Slovak con-



struction entities and 0.434 € in Czech construction entities. The *current indebtedness ratio* monitors how the corporate financial needs are financed using the current liabilities. It is evident that this ratio is slightly lower in Czech enterprises (44 vs. 50.5%). The *non-current indebtedness ratio* maps the level of non-current liabilities needed to finance the corporate business activities; the results show that each euro gets 0.222 € of non-current liabilities in Slovak enterprises and 0.126 € in Czech companies. The *credit indebtedness ratio* expresses the volume of bank loans and overdrafts needed to cover the corporate property needs. Despite the fact that these financial items form the group liabilities, the recommended values should not exceed 50% (Fernandez de Guevara *et al.*, 2021). In both countries, the lowest credit indebtedness ratio was achieved in 2017. In Slovakia it was 12.5 % (caused by the highest level of long-term interest rates in the given year range) and 3.8 % in the Czech Republic — the year where interest rates started to increase and finally boomed in 2019 (OECD, 2021). Comparing the average values of construction entities in both countries, Czech companies use up bank loans and overdrafts to a lesser extent. The *debt-to-equity ratio* shows the level at which the shareholders' fund is burdened with liabilities. The results in the table suggest that the value of this ratio in Slovak conditions has almost doubled compared to Czech entities, and thus, on average, each 1 € of shareholders' fund gets 2.74 € of liabilities (SK), i.e. 1.304 € (CZ). The *interest coverage ratio* portrays the ability of an enterprise to bear the current level of debts. The recommended value of this indicator is a value in the range of 3 and 5 (Bartosova *et al.*, 2020), but the value of this ratio should not fall below 3. Based on the calculated values, it can be said that the ratio of Slovak enterprises is within the limits and 1 € of interests is covered by 4.338 € of earnings before interests and taxes. Czech businesses keep supraliminal values that show that 1 € of paid interest is covered by 10.38 € of earnings. The *interest burden ratio* is the inverse ratio to the interest coverage. If an enterprise has a low-interest burden rate for a long time, it means that it can afford to have a relatively higher share of debt — in the 5-year horizon, the ratio exceeds the value of 10% which corresponds with the debt level of construction enterprises. The *debt-to-cash-flow ratio* estimates the time needed to repay the debts through the generated cash flow. Osagie (2020, pp. 1–11) recommends a period of 3–4 years, however, the calculated average values indicate that in enterprises of both countries, it takes more than 11 years to pay the debts. The *equity leverage ratio* expresses an increasing or decreasing level of corporate indebtedness and a decreasing or increasing level of corporate self-financing. In the monitored period, the value of the leverage ratio had a decreasing trend in both countries, reflecting the growing rate of financ-

ing the company's needs by equity. In general, in European countries, the upper acceptable share of “equity and liabilities” expresses a ratio of 1:3 (Khoja *et al.*, 2019, pp. 1–37). The values of the leverage ratio reach values higher than 3 in Slovak enterprises, which means that companies use a relatively larger share of liabilities for financing. The situation is much better in Czech enterprises (leverage ratio < 3), as this value is only slightly over 2. *The non-current assets coverage ratio* respects the balance sheet golden rule. If the value of a given indicator reaches a value higher than 1, then an enterprise is overcapitalized, i.e. it uses a proportion of long-term resources to cover short-term (current) assets and prefers solvency and stability over revenues. Enterprises of both countries achieve values higher than one in each analysed period, with an average value of 1.724 in Slovakia and 2.198 in the Czech Republic representing the status of overcapitalization in the construction sector throughout the analysed period. Finally, *the insolvency ratio* measures the inability of enterprises to repay their debts. In the monitored period, primary insolvency is typical of Slovak enterprises (1.284), i.e. enterprises are unable to repay liabilities due to their internal problems. The average value of the insolvency ratio in Czech enterprises is below one (0.862), indicating secondary insolvency — enterprises are not able to repay their liabilities due to unpaid receivables of their business partners.

Analysis of the wide range of indebtedness ratios reveals that Slovak enterprises in the construction sector use a relatively higher ratio of debt to finance their business activities, up to 79.40%, while Czech enterprises use relatively the same amount of equity and debt (up to 57.5% in 2018). In both countries, current indebtedness is preferred (max. 57.4 % in 2015 — SK; max 45.5 % in 2018 — CZ); the non-current one is used only up to 24 % (SK), i.e. 13.9 % (CZ). The leverage ratio confirmed a decreasing trend in individual periods, which caused an increase in the degree of their financial independence. The ability of enterprises to repay their liabilities using cash flow also decreased. However, it was found that Slovak enterprises were not able to repay their liabilities due to primary insolvency, while the problem for Czech enterprises was secondary insolvency.

The detailed analysis of the calculated ratios unveils some discrepancies in the indebtedness of construction sectors in analysed national economies. The fact that there are statistically significant cross-country differences was also statistically tested using the Mann-Whitney U test (Table 4).

The results of the Mann-Whitney U test prove, that in the case of non-current indebtedness ratio, interest coverage, and interest burden ratios, there are not any statistically significant differences between the Slovak and Czech enterprises. It is evident that all three indicators are related to interest rates, which developed similarly due to common European mone-

tary policy (however, the increase in interest rates in the Czech Republic in 2018 was more significant and much sharper). The development of long-term interest rates is depicted in Figure 1.

The dataset of enterprises may be considered based on different classification criteria. Thus, the second part of the research is devoted to the description of the statistically significant differences in individual indebtedness ratios considering various legal forms, the size of enterprises, and the region in which the enterprise operates. As the dataset contains several variables with more than two alternatives, e.g. size and region, the Kruskal-Wallis test was applied. The Mann-Whitney U test was used to test the statistically significant differences in indebtedness according to the legal form of enterprises (limited liability companies and joint-stock companies).

Considering the socio-economic analysis in each country, there are several alternatives. For the purpose of this research, a hierarchical system NUTS 3 (small regions for specific diagnoses) was used as a territorial unit. In Slovakia, there are eight regional areas to be analysed, in the Czech Republic 14. The results of the Kruskal-Wallis test reveal very interesting findings (Table 5).

The results indicate that the individual indebtedness ratios, mainly the total indebtedness ratio, self-financing ratio, current indebtedness ratio, non-current indebtedness ratio, debt-to-equity ratio, equity leverage ratio, and the financial independence ratio, are influenced by the region where the enterprise is based. The post hoc analysis is very robust and cannot be displayed. However, the most significant differences were identified between the regions that are located close to the capital cities and those that are not industrially developed.

It should be noted that the size of an enterprise widely influences the possibility of acquiring foreign capital, bank loans, and overdrafts. Small and medium-sized enterprises usually struggle to attract capital to fund their business activities, ideas and endeavours (Durana *et al.*, 2020; Siekelova *et al.*, 2020, pp. 41–56). The Kruskal-Wallis test verifies if there are any statistically significant differences among the enterprises of different size (Table 6).

The results of the non-parametric test indicate that the size of enterprises has a significant impact on some indebtedness ratios — total indebtedness ratio, self-financing ratio, current indebtedness ratio, credit indebtedness ratio, interest coverage ratio, debt-to-cash-flow ratio, financial independence ratio, non-current assets coverage ratio and insolvency ratio. The Dunn-Bonferroni post hoc method was used to compare each pair of groups of enterprises. However, as multiple tests are run, it is necessary to adjust the p-values with the Bonferroni adjustments (Field, 2013). Table 7 sum-

marizes the pairwise comparisons of the post hoc tests on each pair of the group of enterprises for each significant indebtedness ratio.

The pairwise tests considered three pairs of enterprises according to their size. The results prove strong evidence (Bonferroni adj. sig. is below the significance level) of differences between: i) small and large enterprises in all significant indebtedness ratios; ii) small and medium-sized enterprises almost in all ratios, confirming the tough role of small enterprises in the market. Large and small-sized enterprises differ significantly in the insolvency ratio, non-current coverage ratio and credit indebtedness ratio. Despite the fact that the Kruskal-Wallis test reveals statistically significant differences among enterprises by current indebtedness ratio and financial independence ratio, the post hoc analysis does not disclose any other pairwise differences. The significance of firm size in the indebtedness level is in accordance with the findings of Kaur and Singh (2014, pp. 123–131) or Casni and Filic (2019, pp. 39–52) who proved the dependence between the company's size and the debt level using the multiple linear regression model. The importance of firm size, as a crucial determinant of corporate indebtedness, is also declared in the research by Majumdar (2014, pp. 833–854) focused on the unlisted private manufacturing enterprises in India. The study conducted in the Romanian environment (Rusu & Roman, 2017, pp. 276–285) confirms, which is generally consistent with other relevant empirical studies, that not only firm size, but also corporate growth, profitability, and earnings volatility are important explanatory variables of corporate indebtedness. However, the results of Mukhibad *et al.* (2020, pp. 29–37) indicate that the size of a company, as well as return on assets and return on invested capital, do not have any impact on the corporate debt policy.

The last step of the analysis was to verify any significant differences in the level of the indebtedness caused by the legal form of business. The Mann-Whitney U-test was run to unveil any relevant discrepancies between the limited liability companies and joint-stock companies operating in the construction sector (Table 8).

The outputs of the Mann-Whitney U test confirm significant differences in total indebtedness, self-financing, credit indebtedness, interest coverage, financial independence, insolvency, and debt-to-cash-flow ratios, and it is evident that the legal form of business plays an important role.

Regardless of the assessed qualitative variables (size, legal form, region), it can be argued that the differences in some indebtedness indicators are specific to each assessed qualitative variable. The total indebtedness ratio and the self-financing ratio — the impact of each variable under consideration is evident, i.e. the level of these indebtedness ratios depends on the region as well as on the size of the enterprise and the legal form. In the

case of credit indebtedness and debt-to-cash-flow indebtedness, their dependence on the size of the enterprise and the legal form is obvious. The importance of the region and the legal form of enterprises, vice versa, affect the level of the financial independence ratio.

An appraisal of the calculated values allows a summary of the capital structure of construction enterprises in both countries. The capital structure of Slovak companies is not relatively (1:1) balanced. The balance sheet golden rule was violated. Foreign sources (liabilities) have a larger share in the capital structure, accounting for up to 73% of the total capital, while shareholders' funds only make up around 27% of the total capital, which means that Slovak enterprises operating in the construction sector (compared to Czech enterprises) prefer to finance their business activities or debt repayments with a relatively larger share of foreign sources (up to 16% more).

## **Conclusions**

The financial performance of companies can be measured using financial analysis, which is an important part of corporate financial management. It plays an important role in assessing the current situation, predicting its future development and helping to coordinate the current market situation. The financial analysis includes a ratio analysis, and the analysis of corporate indebtedness is one of the most important, as it helps to evaluate the financial stability and solvency of enterprises. In the case of corporate indebtedness, it is important to know the capital structure of the company, as well as the volume of liabilities.

The average value of the total indebtedness ratio for Slovak enterprises is at a level of 73% and 57% for Czech companies, so the profitability and financial independence of Slovak companies is relatively low. Czech companies are less indebted, and use a lower number of short-term, long-term foreign sources and bank loans in their business activities. In terms of debt repayments, Slovak enterprises manage to repay their debts on average only 0.65 years earlier than Czech companies. Czech companies are dominated by a lower level of indebtedness, which also means a higher level of financial independence. There is a significant difference between the enterprises in the level of the insolvency ratio, where Slovak companies suffer from primary insolvency and Czech companies from secondary insolvency. Debts measure the share of foreign sources in the total capital. Creditors prefer lower debts because it gives them more certainty that their receivables will be satisfied if the company is financially distressed. However,

owners are interested in a higher level of debt because it increases their return on capital. Identification of crucial microeconomic determinants (firm size, legal form and region of operation) in the process of indebtedness determination in the construction sector seems to be an important issue for policymakers, financial managers, creditors, banks and financial institutions to recognize the financial constraints that these enterprises face.

The perspectives of Slovak and Czech enterprises operating in the construction sector can be considered relatively identical given that the situation and performance of these economies are at a comparative level. Enterprises operating in the construction sector of both countries achieve a positive profit in the analysed period and generate revenues from operating activities, so in this context, the level of indebtedness can be considered optimal. However, in the coming period, the performance of these companies, as well as the economy as a whole, can be expected to stagnate and be largely influenced mainly by the effects and consequences of the coronavirus pandemic. For enterprises operating in the construction sector, a significant decline in their construction output is anticipated as their activities are closely linked to macroeconomic development, more expensive financing and the risks posed by the global economy.

Thus, it would be interesting to map the situation in the enterprises also after the pandemic period, and not only in these two countries, but to broaden the research to the countries within the Visegrad group and compare the level of indebtedness in the construction sector before and after the pandemic period, which could be perceived not only as a limitation of the research, but as a challenge for further research direction. Nonetheless, similar problems with debt management could be portrayed in other sectors and time horizons as well.

## References

- Adhikari, K., & Poudyal, L. (2021). Future of construction industry: COVID-19 and its implications on construction projects and risk management – a review. *Preprints*. doi: 10.20944/preprints202104.0383.v1.
- Alimov, D. A., Obrosova, N. K., & Shananin, A. A. (2019). Enterprise debt analysis using a mathematical model of production, considering the deficit of current assets. *Lobachevskii Journal of Mathematics*, 40(4), 385–399. doi: 0.1134/S1995080219040024.
- Bartosova, V., Paliderova, M., Jaros, J., & Kovalova, E. (2020). *Financial reporting and analysis*. Žilina: EDIS.

- Belas, J., Gavurova, B., Cepel, M., & Kubak, M. (2020). Evaluation of economic potential of business environment development by comparing sector differences: perspective of SMEs in the Czech Republic and Slovakia. *Oeconomia Copernicana*, 11(1), 135–159. doi: 10.24136/oc.2020.006
- Buzinskiene, R. (2019). Framework for assessing the structure of corporate intangible assets. *Ekonomicko-manazerske spektrum*, 13(2), 10–27. doi: 10.26552/e.ms.2019.2.10-27.
- Casni, A. C., & Filic, J. (2019). Modelling the influence of cash flow on indebtedness of Croatian companies using linear regression model. *Ekonomiska Misao I Praksa – Economic Thought and Practice*, 28(2), 39–52.
- Chikan, A. (2008). National and firm competitiveness: a general research model. *Competitiveness Review*, 18(1/2), 20–28. doi: 10.1108/10595420810874583.
- Csanadi, M. (2014). State intervention, local indebtedness, investment overheating and their systemic background during the global crisis in China. *Ter er Tarsadalom*, 28(1), 113–129.
- Csanadi, M. (2015). Systematic background of local indebtedness and investment overheating during the global crisis in China. *Journal of Chinese Economic and Business Studies*, 13(2), 147–174. doi: 10.1080/14765284.2015.1021114.
- Culkova, K., Tausova, M., Muchova, M. S., Domaracka, L., & Taus, P. (2018). Indebtedness in chosen industrial sectors with regard to the economic development in the world. *Ekonomicky Casopis*, 66(1), 28–42.
- Dallabona, L. F., Goncalves, M., & Radloff, E. G. (2019). Determining factors and indebtedness of the companies listed on the BM & FBOVESPA between the Lula's presidential term (2007-2010) and Dilma's presidential term (2011-2014). *Revista Evidenciacao Contabil & Financas*, 63(3), 54–74. doi: 10.22478/ufpb.2318-1001.2018v6n3.3737.
- Durana, P., Zauskova, A., Vagner, L., & Zadnanova, S. (2020). Earnings drivers of Slovak manufacturers: efficiency assessment of innovation management. *Applied Sciences*, 10(12), 4251. doi: 10.3390/app10124251.
- Durmanov, A., Bartosova, V., Drobyazko, S., Melnyk, O., & Phillipov, V. (2019). Mechanism to ensure sustainable development of enterprises in the information space. *Entrepreneurship and Sustainability Issues*, 7(2), 1377–1386. doi: 10.9770/jesi.2019.7.2(40).
- Fernandez de Guevara, J., Maudos, J., & Salvador, C. (2021). Effects of the degree of financial constraint and excessive indebtedness on firms' investment decisions. *Journal of International Money and Finance*, 110, 102288. doi: 10.1016/j.jimonfin.2020.102288.
- Field, A. (2013). *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll*. London: SAGE.
- Giday, A. (2013). Indebtedness in Central and Eastern Europe Eight years of new EU members. *Public Finance Quarterly – Hungary*, 58(3), 271–292.
- Hernandez Nicolas, C. M., Martin Ugedo, J. F., & Minguez, V. A. (2016). The influence of gender in the direction of Spanish cooperative societies on profitability and indebtedness: an empirical analysis. *Revesco – Revista de Estudios Cooperativos*, 122, 135–164. doi: 10.5209/rev\_REVE.2016.v122.52021.

- Kaur, V., & Singh, G. (2014). Determinants of indebtedness among farmers in rural Haryana. *Indian Journal of Economics and Development*, 10(2), 123–131. doi: 10.5958/j.2322-0430.10.2.040.
- Khoja, L., Chipulu, M., & Jayasekera, R. (2019). Analysis of financial distress cross countries: using macroeconomic, industrial indicators and accounting data. *International Review of Financial Analysis*, 66, 1–37. doi: 10.1016/j.irfa.2019.101379.
- Klazar, S., & Slintakova, B. (2019). Influence of income taxation on indebtedness on non-financial firms. *Politická Ekonomie*, 67(3), 253–272. doi: 10.18267/j.polek.1239.
- Kliestik, T., Valaskova, K., Lazaroiu, G., Kovacova, M., & Vrbka, J. (2020). Remaining financially healthy and competitive: the role of financial predictors. *Journal of Competitiveness*, 12(1), 74–92. doi: 10.7441/joc.2020.01.05.
- Korzeb, Z., & Niedziółka, P. (2020). Resistance of commercial banks to the crisis caused by the COVID-19 pandemic: the case of Poland. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 15(2), 205–234. doi: 10.24136/eq.2020.010.
- Kravcakova Vozarova, I., Kotulic, R., & Vavrek, R. (2019). Disparities in the financial performance of agricultural entities according to the legal form: the case of Slovakia. *Applied Economics*, 51(5), 5999–6008. doi: 10.1080/00036846.2019.1645285.
- Lopez-Delgado, P., & Dieguez-Soto, J. (2020). Indebtedness in family-managed firms: the moderating role of female directors on the board. *Review of Managerial Science*, 14(4), 727–762. doi: 10.1007/s11846-018-0307-y.
- Majdakova, A., Giertliova, B., & Hajduchova, I. (2020). Prediction by financial and economic analysis in the conditions of forest enterprises. *Journal of Forest Science*, 66, 1–8. doi: 10.17221/84/2019-JFS.
- Majumdar, R. (2014). The determinants of indebtedness of unlisted manufacturing firms in India: a panel data analysis. *Management Research Review*, 37(9), 833–854. doi: 10.1108/MRR-09-2012-0193.
- Marquezan, L. H. F., Diehl, C. A., & Alberton, J. R. (2013). Non-financial indicators for performance evaluation: a content analysis study of on-line annual reports of companies listed on BOVESPA. *Contabilidade Gestao E Governanca*, 16, 46-61.
- Mazzoleni, A., & Pollonini, E. (2021). Factors driving indebtedness among small and medium-sized dairy companies. *British Food Journal*, 123(1), 159–175. doi: 10.1108/BFJ-04-2020-0341.
- Melly, C. (2012). Local government indebtedness and debt management in Switzerland causes and consequences. *Public Finance Quarterly – Hungary*, 57(2), 164–172.
- Mukhibad, H., Subowo, S., Maharin, D.O., & Mukhtar, S. (2020). Determinants of debt policy for public companies in Indonesia. *Journal of Asian Finance Economics and Business*, 7(6), 29–37. doi: 10.13106/jafeb.2020.vol7.no6.029.
- Neumaier, I., & Neumair, I. (2002). *Corporate performance and market value*. Prague: Grada Publishing.



- Mijic, K., & Jaksic, D. (2017). Indebtedness of enterprises and profitability improvement. *Strategic Management*, 22(2), 36–40.
- Ng, S. T., Wong, J. M. W., & Zhang, J. (2011). Applying Z-score model to distinguish insolvent construction companies in China. *Habitat International*, 35, 599–607. doi: 10.1016/j.habitatint.2011.03.008.
- Öcal, M. E., Oral, E. L., Erdis, E., & Vural, G. (2007). Industry financial ratios – application of factor analysis in Turkish construction industry. *Building and Environment*, 42, 385–392. doi: 10.1016/j.buildenv.2005.07.023.
- OECD (2021). Long term interest rates. Retrieved from <https://data.oecd.org/interest/long-term-interest-rates.htm#indicator-chart> (24.5.2021).
- Onuferova, E., Cabinova, V., & Dzurov Vargovagw, T. (2020). Analysis of modern methods for increasing and managing the financial prosperity of businesses in the context of performance: a case study of the tourism sector in Slovakia. *Oeconomia Copernicana*, 11(1), 95–116. doi: 10.24136/oc.2020.004.
- Osagie, R. O. (2020). Financial inclusion: A PANACEA for attaining sustainable development in developing countries like Nigeria. *Ekonomicko-manazerske spektrum*, 14(2), 1–11. doi: 10.26552/ems.2020.2.1-11.
- Pardal, P., Dias, R., Suler, P., Teixeira, N., & Krulický, T. (2020). Integration in Central European capital markets in the context of the global COVID-19 pandemic. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 15(4), 627–650. doi: 10.24136/eq.2020.027.
- Pelaez-Verdet A, & Loscertales-Sanchez P. (2021). Key ratios for long-term prediction of hotel financial distress and corporate default: survival analysis for an economic stagnation. *Sustainability*, 13(3), 1473. doi: 10.3390/su13031473.
- Perez Ragone, A. J., & Martinez Benavides, P. (2015). From the over-indebtedness to the insolvency: stages of debtors crisis, from the comparative European law. *Revista Chilena de Derecho*, 42(1), 93–121.
- Pur, D., Jacova, H., & Horak, J. (2015). An evaluation of selected assets and their impact on the declarative characteristic of ratio indicators in financial analyses. *E & M Ekonomie a management*, 18, 132–149. doi: 10.15240/tul/001/2015-4-010.
- Rusu, V. D., & Roman, A. (2017). Microeconomic determinants of firm indebtedness. Empirical evidence from Romania. In M. Tofan, A. Roman & I. Bilan (Eds). *Eufire 2017: the proceedings of the international conference on European financial regulation*. Iasi: Alexandru Ioan Cuza University, 276–285.
- Schicks, J. (2014). Over-indebtedness in microfinance: an empirical analysis of related factors on the borrower level. *World Development*, 54, 301–324. doi: 10.1016/j.worlddev.2013.08.009.
- Siekelova, A., Androniceanu, A., Durana, P., & Michalikova, K.F. (2020). Earnings management (EM), initiatives and company size: an empirical study. *Acta Polytechnica Hungarica*, 17(9), 41–56. doi: 10.12700/APH.17.9.2020.9.3.
- Standar, A., & Kozera, A. (2020). Identifying the financial risk factors of excessive indebtedness of rural communes in Poland. *Sustainability*, 12(3), 794. doi: 10.3390/su12030794.

- Stefko, R., Jencová, S., Vasaničová, P., & Litavcová, E. (2019). An evaluation of financial health in the electrical engineering industry. *Journal of Competitiveness*, 11, 144–160. doi: 10.7441/joc.2019.04.10.
- Svabova, L., Tesarova, E. N., Durica, M., & Strakova, L. (2021). Evaluation of the impacts of the COVID-19 pandemic on the development of the unemployment rate in Slovakia: counterfactual before-after comparison. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 16(2), 261–284. doi: 10.24136/eq.2021.010.
- Zinecker, M., Doubravský, K., Balcerzak, A.P., Pietrzak, M. B., & Dohnal, M. (2021). The Covid-19 disease and policy response to mitigate the economic impact in the EU: an exploratory study based on qualitative trend analysis. *Technological and Economic Development of Economy*, 27(3), 742–762. doi: 10.3846/tede.2021.14585.

### **Acknowledgments**

This research was financially supported by the Slovak Research and Development Agency — Grant Vega 1/0121/20: Research of transfer pricing system as a tool to measure the performance of national and multinational companies in the context of earnings management in conditions of the Slovak Republic and V4 countries and faculty institutional research KE/2021: The use of quantitative methods to assess corporate indebtedness.

## Annex

**Table 1.** Description and optimal values of analysed indebtedness ratios

Indebtedness ratio	Algorithm	Optimal Value
Total indebtedness ratio	Current and non-current liabilities to total assets	30-60 % 70-80 % in DME
Self-financing ratio	Shareholders funds to total assets	> 20-30 %
Current indebtedness ratio	Current liabilities to total assets	-
Non-current indebtedness ratio	Non-current liabilities to total assets	-
Credit indebtedness ratio	Bank loans and overdrafts to total assets	< 50 %
Debt-to-equity ratio	Current and non-current liabilities to shareholders funds	± 100 %
Interest coverage ratio	Earnings before interest and taxes to interests paid	3-5
Interest burden ratio	Interests paid to earnings before interest and taxes	-
Debt-to-cash-flow ratio	Current and non-current liabilities to cash flow	3-4 years
Equity leverage ratio	Total assets to shareholders funds	max. 4
Financial independence ratio	Shareholders funds to current and non-current liabilities	> 3
Non-current assets coverage ratio	Shareholders fund and non-current liabilities to non-current assets	> 1 overcapitalization < 1 undercapitalization
Insolvency ratio	Current and non-current liabilities to receivables	> 1 primary insolvency < 1 secondary insolvency

Note: DME developed market economies

Source: Bartosova *et al.* (2020), Kravcakova Vozarova *et al.* (2019)

**Table 3.** Average values of indebtedness ratios in individual countries

Indebtedness ratio	5-year average values	
	SK	CZ
Total indebtedness ratio (TI)	0.735	0.566
Self-financing ratio (SF)	0.273	0.434
Current indebtedness ratio (CI)	0.505	0.440
Non-current indebtedness ratio (NCI)	0.222	0.126
Credit indebtedness ratio (CrI)	0.140	0.041
Debt-to-equity ratio (DE)	2.740	1.304
Interest coverage ratio (IC)	4.338	10.380
Interest burden ratio (IB)	0.189	0.106
Debt-to-cash-flow ratio (DCF)	11.304	11.952
Equity leverage ratio (EL)	3.740	2.302
Financial independence ratio (FI)	0.379	0.768
Non-current assets coverage ratio (NCAC)	1.724	2.198
Insolvency ratio (Ins)	1.284	0.862

**Table 2.** Descriptive statistics of key financial parameters

<b>SK</b>	<b>TOAS*</b>	<b>SHFD</b>	<b>CULI</b>	<b>NCLI</b>	<b>EBIT</b>
<b>mean [€]</b>	2,102.42	596.48	1,022.91	483.03	131.36
<b>median [€]</b>	549.91	124.67	290.48	28.64	26.26
<b>st. dev. [€]</b>	1,766.71	1,623.79	888.00	467.32	548.20
<b>CV [%]</b>	84.0	272.2	86.8	96.7	417.3
<b>SK</b>	<b>LOAN</b>	<b>REC</b>	<b>INTE</b>	<b>CF</b>	<b>NCAS</b>
<b>mean [€]</b>	177.93	674.35	32.97	126.47	627.45
<b>median [€]</b>	13.85	124.89	3.81	42.27	143.86
<b>st. dev. [€]</b>	463.10	778.94	40.54	462.94	1,008.97
<b>CV [%]</b>	260.3	115.5	122.9	366.1	160.8
<b>CZ</b>	<b>TOAS</b>	<b>SHFD</b>	<b>CULI</b>	<b>NCLI</b>	<b>EBIT</b>
<b>mean [€]</b>	5,145.86	2,250.51	2,253.70	642.94	182.79
<b>median [€]</b>	548.16	171.38	217.79	29.62	29.93
<b>st. dev. [€]</b>	5,059.39	2,085.99	2,958.06	650.93	520.03
<b>CV [%]</b>	98.3	92.7	131.3	101.2	284.5
<b>CZ</b>	<b>LOAN</b>	<b>REC</b>	<b>INTE</b>	<b>CF</b>	<b>NCAS</b>
<b>mean [€]</b>	121.37	1,541.47	18.61	258.51	1,309.13
<b>median [€]</b>	0.00	76.26	3.58	48.17	149.78
<b>st. dev. [€]</b>	181.00	2,867.53	158.10	751.36	554.31
<b>CV [%]</b>	149.1	186.0	849.6	290.6	42.3

Note: TOAS total assets, SHFD shareholders funds, CULI current liabilities, NCLI non-current liabilities, LOAN bank loans and overdrafts, REC receivables, INTE interest paid, CF cash flow, NCAS non-current assets

\* financial parameters and their descriptive statistics are expressed in thous. euros

**Table 4.** Mann-Whitney U test (cross-country analysis)

<b>Ratio</b>	<b>TI</b>	<b>SF</b>	<b>CI</b>	<b>NCI</b>	<b>CrI</b>	<b>DE</b>	<b>IC</b>
<b>Sig.</b>	0.000	0.000	0.000	0.654	0.000	0.000	0.123
<b>Ratio</b>	IB	DCF	EL	FI	NCAC	Ins	
<b>Sig.</b>	0.661	0.035	0.000	0.000	0.014	0.000	

**Table 5.** Kruskal-Wallis test (cross-regional analysis)

<b>Ratio</b>	<b>TI</b>	<b>SF</b>	<b>CI</b>	<b>NCI</b>	<b>CrI</b>	<b>DE</b>	<b>IC</b>
<b>Sig.</b>	0.003	0.003	0.002	0.009	0.345	0.029	0.079
<b>Ratio</b>	IB	DCF	EL	FI	NCAC	Ins	
<b>Sig.</b>	0.691	0.478	0.029	0.006	0.565	0.275	

**Table 6.** Kruskal-Wallis test (analysis by size)

<b>Ratio</b>	<b>TI</b>	<b>SF</b>	<b>CI</b>	<b>NCI</b>	<b>CrI</b>	<b>DE</b>	<b>IC</b>
<b>Sig.</b>	0.002	0.002	0.025	0.307	0.003	0.582	0.000
<b>Ratio</b>	IB	DCF	EL	FI	NCAC	Ins	
<b>Sig.</b>	0.123	0.000	0.581	0.030	0.000	0.000	

**Table 7.** Pairwise comparisons of enterprises by size for significant indebtedness ratios

	Test Statistic	Std. Error	Std. Test Statistics	Sig.	Adj. Sig.
<b>Total indebtedness ratio</b>					
Large - Small	-87.088	30.061	-2.794	0.005	0.016
Medium-sized - Small	-46.998	16.868	-2.786	0.005	0.016
<b>Self-financing ratio</b>					
Small – Medium-sized	47.926	16.868	2.841	0.004	0.013
Small – Large	85.165	30.061	2.833	0.005	0.014
<b>Credit indebtedness ratio</b>					
Large – Small	-87.535	30.028	-2.915	0.004	0.011
Large – Medium-sized	-101.966	30.220	-3.374	0.001	0.002
<b>Interest coverage ratio</b>					
Small – Medium-sized	52.197	16.868	3.094	0.002	0.006
Small – Large	122.557	30.061	4.077	0.000	0.000
<b>Debt-to-cash-flow ratio</b>					
Small – Medium-sized	53.536	16.868	3.174	0.002	0.005
Small – Large	115.204	30.061	3.832	0.000	0.000
<b>Non-current assets coverage ratio</b>					
Small – Medium-sized	44.910	16.868	2.662	0.008	0.023
Small – Large	167.283	30.061	5.565	0.000	0.000
Medium-sized – Large	122.373	30.253	4.045	0.000	0.000
<b>Insolvency ratio</b>					
Large – Medium-sized	-118.812	30.253	-3.927	0.000	0.000
Large – Small	-151.828	30.061	-5.051	0.000	0.000

**Table 8.** Mann-Whitney U test (analysis by legal form)

Ratio	TI	SF	CI	NCI	CrI	DE	IC
Sig.	0.000	0.000	0.051	0.691	0.008	0.197	0.016
Ratio	IB	DCF	EL	FI	NCAC	Ins	
Sig.	0.101	0.007	0.197	0.002	0.198	0.015	

**Figure 1.** Development of the long-term interest rate



Source: OECD (2021).