Determinants of company indebtedness in the construction industry

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Abstract.
The aim of this paper is to reveal the determinants of indebtedness in the construction industry companies. The construction industry is a specific sector where payment morale is generally poor. It gradually negatively affects other companies in the following sectors. Finding the essential determinants of corporate indebtedness can prevent liquidity problems.
Based on a literature review, the following determinants were selected for analyses: share of fixed assets, interest rate, return on assets, size of the company and its age. Correlation analysis and multiple linear regression analysis have been chosen to determine the influence of the determinants within years 2016-2019.
It was found that the generally recommended fixed asset share determinant was not an appropriate determinant and its possible effect on indebtedness was also proven to be insignificant. Surprisingly interest rates have also classified as insignificant. Significant determinants negatively affecting indebtedness for construction companies were determined as enterprise size and duration. The most important determinant was the return on assets with negative influencing outcome.

Keywords: indebtedness, capital structure, return on asset, construction industry

JEL Classification: M1
AMS Classification: 62, 91

1 Introduction

Construction industry is one of the key sectors of the economy. The share of the construction industry in the gross value added of the whole economy has been between 5% and 7% [11]. Therefore, it is considered as one of the important indicators of the development in the economy.

This industrial sector was deeply affected by the last economic crisis in 2009 and 2010, as evidenced by the proportion of failed loans of up to 28 %, the highest of all branches of industry [6]. Construction sales accelerated significantly year-on-year growth in 2018, but still did not reach the level of 2008. The return on equity (ROE) was 16,47% in 2018 and it is still less than 22,57% from the pre-crisis period of 2008 [11]. Consequences of this crisis are linked with indebtedness and liquidity in this sector. This is gradually negatively affecting other enterprises in following branches.

Identifying and analyzing factors affecting the indebtedness of construction companies could help with prediction of upcoming liquidity problems. Searching of mutual relations can confirm or deny the significance of analyzed determinants. Knowledge of significant factors affecting the indebtedness of companies can help creditors to evaluate the company rating. This eliminates further problems with the repayment of liabilities and secondary insolvency, and therefore it contributes to a healthy business environment.

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2 Literature review and Problem statement

As the essential determinant of the capital structure it is usually mentioned the tax costs and the tax shield. Other factors are based on sector standards and various costs, for example the weight average cost of capital (WACC) and costs of financial distress. Another significant determinants are including, according to Křivská [9], profitability and stability of the company, the asset structure of the enterprise, the business sector, the management of the enterprise and its approach to risk, the structure of ownership and control over the enterprise, financial freedom, the amount of investment, the size of the enterprise, the goodwill and history of the enterprise, the requirements of the credit rating agencies.

Marks [10] deals with the factors of the capital structure in their publication as well. They consider that the approach of shareholders or owners, their requirements for the dividend payout ratio, their relationship to credit and risk, corporate philosophy and the sector, the business life phase, have a major influence on the capital structure. Růčková [14] argues that the capital structure is mainly influenced by the focus of the company's business. She summarizes other factors in four areas: business risk, corporate tax position, financial flexibility, and managerial conservatism and aggressiveness. Singh [15] and Chen & Chen [4] in their researches confirm the importance of the profitability, size and volatility of the enterprise. Oztekin [12] observes a context between indebtedness and company size, tangible assets, and profitability. He states that the capital structure reflects the institutional environment in which it operates.

Aulová and Hlavsa [2] focused on specific sector of Czech farms in their work. The size and asset collateral were identified as the most important determinants. Long-term indebtedness was most affected by size, asset collateral, tax shield and retained earnings. On the contrary, Viviani, J. [16] found out that there is no statistically significant dependence between indebtedness and the size of the enterprise, the structure of assets, the profitability of assets and the tax shield. Prášilová [13] found out in her research that the age of the company has a positive effect on the total indebtedness of Czech companies, and she observed a negative relationship with the profitability of assets. Only the share of fixed assets affected long-term indebtedness. In the ICT sector, it was found a negative relationship of total debt to the size of the enterprise and a positive relationship with the volume of retained earnings. Křivská [9] considers that larger enterprises generally show higher profits and that a higher level of liquid assets is less risky for investors. However, external influences, such as the level of the capital market, legislative processes, the economic policy itself and the mentioned above economic cycle or tax shield [7,8], affect total indebtedness as well.

In previously mentioned studies, the significant relationship to the capital structure was proven only for some determinants. Obviously, a few of described characteristics overlap and complement each other. Since the most of analyses were sector-specific, it is problematic to generalize the results as each sector has its own specificities. In our study, the main goal is to determine the direct effects on construction industry indebtedness.

Therefore based on above discussion, we selected the most common internal determinants: fixed asset share (SFA), interest rate (IR), return on assets (ROA), enterprise size (S) and duration (D). We neglected a lot of other determinants by the cause of one sector investigation only. External influences were excluded as well due to their general effect.

3 Source data and Methods

The source dataset, available in the public register [1], consist unconsolidated financial statements of fifty companies in the construction industry in the Czech Republic within years 2016-2019. Crucial fact for companies' selection is that they have not been liquidated till 31st August, 2020. Other entrance criterions as the legal form, size and duration, were not implemented.

Our research starts with a technical financial analysis, which evaluates main sample characteristics of the total indebtedness. The correlation analysis and multiple linear regression analysis are utilized to determine the effects and significance of individual determinants.

Powerful software tool Statistics 12 was helpful for our analyses, where the following abbreviations are used: Total Indebtedness (TI), Share of Fixed Assets (SFA), Interest Rate (IR), Return on Assets (ROA), Duration (D) and Size (S). In all presented results, normality is assumed and the significance level is pre-set to $\alpha = 0.05$.

4 Results

Although financial data from the construction industry have not yet reached the situation before the 2008 financial crisis [11], it is obvious that total indebtedness is already reaching recommended level. Sample distribution of total indebtedness, illustrated in Figures 1 and 2, is left skewed. This is confirmed by the average debt lower than the median as shown in Table 1. Moreover it is quite heavy tailed cause of a few companies with quadruple debt compared with average value. The average total indebtedness in the construction industry (51%) overreaches the recommended 40% level of total indebtedness. Nevertheless the median value of total indebtedness (41%) already corresponds to this recommended standard. As in any sector, there are companies with almost zero indebtedness and conversely over-indebted companies with negative equity.

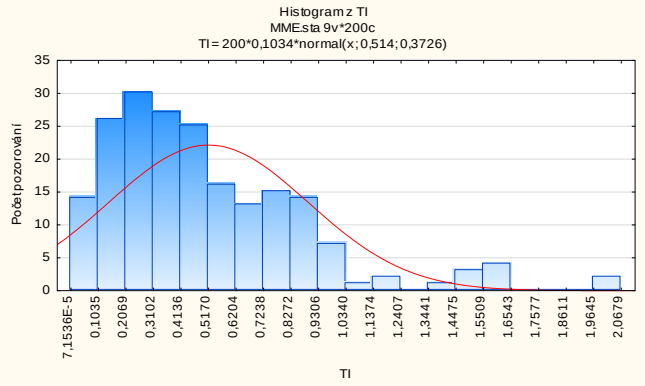

Figure 1 Histogram for the Total Indebtedness

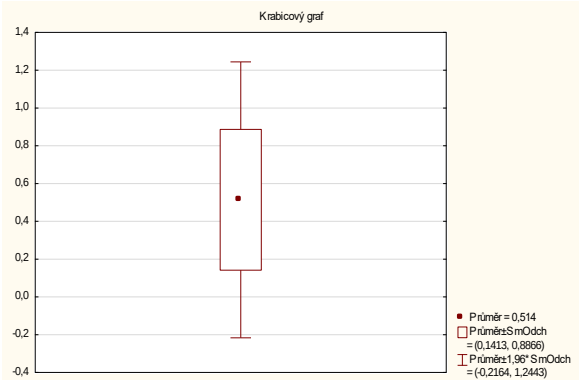

Figure 2 Boxplot of the Total Indebtedness

	N	Average	Median	Minimum	Maximum	Std	Var.coef.	Skew	Kurtosis
TI	200	0,514	0,418	0	2,068	0,373	72,504	1,484	2,886

Table 1 Sample characteristics of the Total Indebtedness

At the beginning of the analyses, correlation matrix within the individual determinants was evaluated to see whether the explaining variables for the total indebtedness were appropriate. Obviously from Table 2, where significant correlations are marked as red, the appropriate determinants are the interest rate (IR), return on assets (ROA), the duration (D), and the size (S). These determinants do not correlate with each other significantly. However, the share of fixed assets (SFA) is not very suitable as a determinant of indebtedness, as it points to a significant correlation with other determinants return on assets, duration and size.

	TI	SFA	IR	ROA	D	S
TI	1,000	-0,089	0,077	-0,187	-0,253	-0,225
SFA	-0,089	1,000	0,110	-0,231	0,434	0,481
IR	0,077	0,110	1,000	-0,117	0,036	0,059
ROA	-0,187	-0,231	-0,117	1,000	-0,089	0,067
D	-0,253	0,434	0,036	-0,089	1,000	0,423
S	-0,225	0,481	0,059	0,067	0,423	1,000

Table 2 Correlation matrix between the Total Indebtedness and selected determinants

Table 2 also shows correlations between total indebtedness (TI) and the influencing variables: fixed asset share (SFA), interest rate (IR), return on assets (ROA), duration (D) and enterprise size (S). There are significant correlations between total indebtedness (TI) and return on asset assets (ROA), duration (D) and size (S). All these determinants negatively affect total indebtedness. The effect of the fixed asset share (SFA) is insignificant and rather negative, the impact of interest rate (RI) is insignificantly positive.

It follows from the above that companies with higher return on assets have lower total indebtedness. It is also true that the older and larger the company the less indebted it is. However, behavior of the interest rate determinant (IR) is interesting as only an insignificantly positive correlation between this determinant and total indebtedness has been shown.

To reveal direct correlation between TI and its determinants without added effects, partial correlations are evaluated and summarized in Table 3. Significant partial correlations are marked as red and they are showing similar results. They confirm the significant negative impact of return on assets (ROA) and duration (D), and the medium and statistically insignificant impact of the interest rate (IR) and size (S). It is verified again that the share of fixed assets (SFA) has almost no effect on the total indebtedness in the construction industry.

Explaining variable	Dependent variable IT
	Partial correlation
SFA	0,019
IR	0,072
ROA	-0,184
D	-0,205
S	-0,115

Table 3 Partial correlations of the Total Indebtedness and selected determinants

The results of the multiple linear regression analysis, summarized in the Table 3, correspond to the previous conclusion as well. The return on assets (ROA) and duration (D) have the significant negative impact, while the share of fixed assets (SFA) and interest rate (IR) do not significantly affect total indebtedness (TI). Nevertheless, the value of the determination index R^2=0,12463333 is showing that regression model is unsuitable for further predictions. **It seems that some significant explaining determinant of indebtedness is missing. Uncovering this mystery will by goal of our upcoming research.**

	b	Std of b	t(194)	p-value
b0	0,839	0,077	10,825	0,000
SFA	0,031	0,116	0,267	0,790
IR	1,874	1,852	1,012	0,313
ROA	-0,436	0,168	-2,603	0,010
D	-0,011	0,004	-2,920	0,004
S	-0,001	0,000	-1,610	0,109

Table 4 Regression analysis coefficients and their significance (black–significant and red–nonsignificant)

5 Discussion and Conclusions

The following describing variables have been chosen for the construction industry in the Czech Republic: fixed asset share (SFA), interest rate (IR), return on assets (ROA), size of enterprise (S) and duration (D). Empirical research results have confirmed that the variable of fixed assets share (SFA) is not suitable as a determinant of total indebtedness (TI), as it is influenced by other determinants: return on assets (ROA), duration (D) and size (S). This determinant has been also classified as insignificant in the research.

Furthermore, another insignificant determinant interest rate (IR) has been identified. The finding that the interest rate is only increasing marginally with increasing indebtedness has been novel and surprising. The most important theories about the capital structure [3] claim that as indebtedness increases, the so-called costs of financial distress begin to infiltrate companies, when creditors (most often banks) demand a higher interest rate for higher risk.

The determinant of the size of the enterprise (S) has been classified as medium-significant with a negative effect on total indebtedness (TI). Correlation analysis identified this determinant as significant, while partial correlation and regression analysis showed medium significance. This is caused by significant correlation between duration (D) and size (S) itself.

Return on assets (ROA) and duration (D) have been determined as the most important determinants of the total indebtedness of construction companies. Both have had a significant negative effect on the indebtedness regardless to analyzing method.

The fact that the longer a company operates on the market, the less indebted it is, is not surprising. Long-term businesses are mostly capital stronger than the newly established companies and therefore, they already have enough capital to cover their assets. For a similar reason, the size of the enterprise (S) is the indebtedness determinant as well. A large enterprise has sufficient equity capital and does not necessarily need debt to finance its activities. These two determinants, duration (D) and size of the enterprise (S), are highly correlated with each other and it is not recommended to use them both in one regression analysis.

It has been confirmed that highly profitable companies have less total indebtedness. This fact is interesting in view of the effect of the tax shield. Economic theories generally recommend the involvement of debt for higher-profited enterprises. The interest on debt is a tax-efficient expenditure and it can reduce the tax base of profitable enterprises. It has been proven that if a company can borrow at an interest rate below the return on assets (ROA) the involvement of this debt increases the return on equity (ROE), i.e. leverage has a positive effect. To sum up, large, long-term highly profitable companies for construction industry do not adopt external capital even if they could benefit from a tax shield.

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