Return on sales in the Czech building industry? Does firm size matter?

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Abstract. The presented paper explores the link between firm size and returns on sales (RoS) in Czech building companies. We examined how different business sizes relate to the return on sales, considering staff numbers and the RoS movement over a period. The CRIBIS database of CRIF Company - Czech Credit Bureau provided relevant data from 2016 to 2020, including profitable and active building enterprises. The industry analysis involves an empirical approach using industry structure analysis, return on sales analysis and observing its movement from 2016 to 2020. The industry predominantly encompasses small firms of fewer than 25 employees, exhibiting dramatic variations of the average return on sales over the period. Large companies exceeding 250 employees show complete conformity, yet their numbers are small in the construction sector. The correlation analysis revealed that the business size, i.e., staff numbers, is independent of the return on sales. The submitted work suggests a new size classification according to total assets and sales.
Keywords: Cost of capital, size premium, discount rate, valuation

1 Introduction

What are the sizes of building enterprises in the Czech Republic? Must the companies have many employees to be profitable? Experts have been in dire straits answering these questions, given the sluggish demand in the construction industry. Building companies in the Czech Republic are plentiful and lack a qualified workforce, which means fierce competition in the market. The enterprises want to know if size matters in their profitability. The current global economy, according to some authors defined as a new economy, is characterized as turbulent. Emphasis is placed on generating value added [1].

The building industry is imperative for the national economy and socio-economic development, including housing development, facilities and infrastructure. [2] argue that the construction sector involves capital flows, individuality, workforce and requirements. Businesses are the driving force of economies in today's globalized world, especially in developing countries. These companies associate buyers with sellers, but do not participate directly in the ownership or storage of goods, they make revenues through commissions.

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Globally, the goal of any business is to increase the value of an enterprise. To determine the value of the business, traditional financial analysis proved to be inadequate. The need for application and use of new indicators that more accurately measure the efficiency of both the processes and the elements that generate the value caused great interest in the so-called value generators. Value generators refer to activities and capabilities that increase profitability, reduce risk, and promote growth in the company [3].

[4] claim the building industry contributes to the national economy by planning, developing, modifying, and repairing buildings or facilities. The building industry allows investments in social aspects (sport, healthcare, housing etc.), energetics, transport, agriculture and production. The arrival of the pandemic had a negative impact on a number of aspects of business in the construction industry and affected the financial and economic situation of companies in the construction industry in the Slovak Republic. Since this sector is characterized by slower reactions to changes in the economy, the most significant impacts will be even more noticeable in the future, which is why it is also considered a key sector of the Slovak economy [5].

The firm size depends on many external and internal factors. Most enterprises develop their activities relying on sales, profits, staff numbers or the size of premises. [4] assume that many companies competing in ever-changing sectors must expand (increased productive capacity, convenient location, market share etc.) to survive.

Experts have extensively considered the pros and cons of firm size [6] arriving at various conflicting conclusions.

Through time series analysis, it is possible to obtain significant statistics and other necessary data characteristics. Prediction of time series allows predicting future values based on previously observed values. The exact prognosis of the time series is very important for a number of different areas, such as transport, energy, finance, economics, etc. [2].

2 Research aims

The paper explores a link between staff numbers (firm size) and return on sales of Czech building companies from 2016 to 2020.

The study aims to find if the firm size in the Czech building sector reflects its return on sales.

We formulated two research questions:

1. What is the share of different firm size categories (staff numbers) in the Czech building sector between 2016 and 2020?
2. How much is firm size impactful on the return on sales in the Czech building sector between 2016 and 2020?

3 Literature research

There have been many theories why some firms are more profitable than others, analyzing decisive business performance variables. Yet scientists and professionals still cannot hit the nail on the head.

Experts on industrial economy, business organization and finance consider a firm size imperative for interpreting the company's profitability [7].

Google searches, interviews with investors and financial analysts or watching news suggest a deep-seated belief that profits scale with the business size [8].

Staff numbers reflect the firm size better than sales or assets, rendering the question of profitability disputable [9]. [10] say that the profitability analysis is an integral part of the financial analysis of a company. Profit is one of the most commonly used indicators of a company ' s performance and is used to evaluate a company ' s historical performance. Given

their importance, it examines how the available information on a company ' s profit can be used to increase the profitability.

[11] conducted statistical tests to draw reasonable conclusions, including return on sales, capital structures and asset liquidity. The survey involved 61 large enterprises in North America, Europe and Asia, revealing no significant correlation between the firm size and profit rates.

[2] focused on size determinants (total assets, sales and staff numbers), stimulating the performance of 51 small and medium-sized enterprises in Portugal between 1999 and 2003. The dynamic panel regression model showed that all firm size measurements significantly correlate with business performance, including the operating income divided by total assets for SMEs. The authors compared the findings of SMEs with large companies, applying the regression to large firms. The results indicated no link between the firm size and the return on sales.

Empirical research in various sectors, regions and periods deals with profit ratios, revealing that profit-making companies reinvigorate a healthy economy. [7] reached mixed results when analyzing firm size. Although cross-sectional regression proved no significant correlation between the return on sales and total sales and assets, the time series analysis showed a close interrelationship. [12] used KGI and KPI indicators to manage performance, further applied the Balanced Scorecard to micro and small and medium-sized enterprises.

The graphical analysis of 3,139 Czech building companies between 2011 and 2015 indicated a higher return on sales in large enterprises [6].

Gibrat's law contrasts with empirical studies, stating that the firm's growth rate is independent of its size. [13] support this theory, analysing the growth trend of small, medium-sized and large enterprises with high profits. The data reflected 124 building companies registered in Malaysian BURSA between 2003 and 2010. The research revealed that the growth contributed to the return on sales in small and medium-sized construction companies but indicated no involvement in large enterprises. A crisis may arise in any business, so it is essential to focus on any problems in order not to endanger the company viability or to be out of business activity [1].

4 Data and methods

The CRIBIS database (CRIF Company) - Czech Credit Bureau provided the necessary data for the period, including balance sheets, income statements, return on sales, assets, staff numbers and business location. Our analysis observes only the data from active and profit-making building companies, ignoring inactive, loss-making or winding-up firms. The data span 2016 - 2020, falling into the 'F' Section of the CZ NACE Economic activities. The section involves specialized and non-specialized construction activities.

Tables in Excel provide a list of data for each new year, including a table for firm size categories. Table 1 suggests the given business sizes.

Table 1. Firm size categories.

Firm size	**Staff numbers**
Small	1-24
Medium-sized	25-249
Large	250 and more

Source: Own processing.

Then, we explored the firm's involvement in the categories from 2016 to 2020. Table 3 suggests the proportions, including an overview of the firm size trend over the period. Graph 1 below illustrates the summary.

The Excel lists propose the analysis of return on sales for each year, comprising a tabular overview of the average return on sales ('AVERAGE'), minimum ('MIN') and maximum ('MAX') profitability. The time series analysis generates Graph 2, showing the profitability trend throughout firm sizes from 2016 to 2020.

Correlation analysis explores if the firm size contributes to the return on sales, using tabular correlation coefficients for each year in Excel lists. The table of coefficients contains a return on sale value for each analyzed enterprise in one column and the firm size in the second, marked with a rate from Table 2 below.

Table 2. Values of the firm size categories.

Firm size	Value
Small	1
Medium-sized	2
Large	3

Source: Author's elaboration.

Then, the CORELL function in Excel allows replacing matrix one with values of the firm size categories and matrix two with business profitability rates, achieving a correlation coefficient for the given year. The table suggests the correlation coefficients for 2016 - 2020.

5 Results

Observing the laid-down criteria, the data set provided the number of Czech building enterprises from 2016 to 2020, filtering the businesses by small, medium-sized and large. Table 3 shows the total of the companies over the period, including their involvement in the category.

Table 3. The firms' involvement in the categories in 2016-2020.

Year	Small firm	Medium-sized firm	Large firm	Total
2016	6,635	782	37	7,454
2017	7,022	989	52	8,063
2018	7,242	1,019	55	8,316
2019	6,598	1,010	58	7,666
2020	4,596	880	55	5,531

Source: Author's elaborations from the CRIBIS database.

Table 3 suggests a slight increase in the total of businesses in the first three years. Years 2019 and mainly 2020 saw a decline of about one-third, 28%. Most enterprises complied with the criteria in 2018, peaking at 8,316. The table further shows the closest involvement of small companies (up to 24 employees), attaching the lowest numbers to large firms (over 249 employees). Figure 1 shows that small companies saw a predominant downward trend in meeting the criteria.

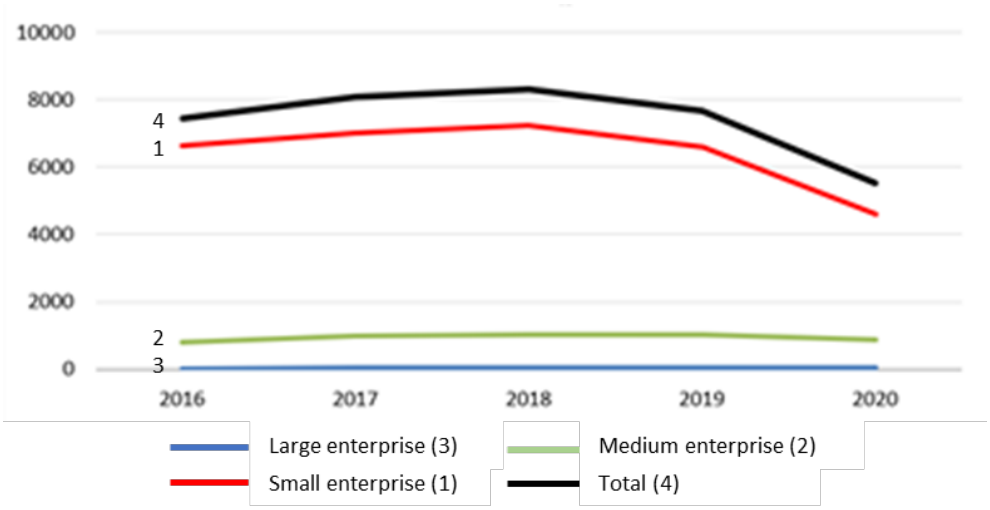

Fig. 1. The trend in enterprise numbers in 2016-2020. Source: Author's elaboration from the CRIBIS database.

We then analysed the return on sales for firm size categories over the period, calculating AVERAGE, MIN and MAX values in Excel. Tables 4, 5, 6, 7 and 8 propose the obtained figures for separate years, respectively.

Table 4. Analysed return on sales (RoS) for 2016.

Firm size	Small	Medium-sized	Large
Average RoS	1.7	0.06	0.1
Max RoS	8.846	1.17	1.23
Min RoS	-5.29	-0.02	0.01

Source: Author's elaboration from the CRIBIS database.

The year 2016 saw small enterprises top the average return on sales to 1.7 and medium-sized companies fall to 0.06. Large firms peaked at 0.1.

Table 5. Return on sales for 2017.

Firm size	Small	Medium-sized	Large
Average RoS	0.55	0.06	0.15
Max RoS	1.498	1.33	5.24
Min RoS	-0.18	-0.13	0.01

Source: Author's elaboration from the CRIBIS database.

The same scenario unfolds for 2017, involving slight modifications in figures. Small enterprises peaked at 0.55, leaving behind medium firms with 0.06, indicating the lowest values. Large corporations reached 0.15.

Table 6. Return on sales for 2018.

Firm size	Small	Medium-sized	Large
Average RoS	0.3	0.32	0.11
Max RoS	837.9	254.3	2.81
Min RoS	-1.19	-0.02	0

Source: Author's elaboration from the CRIBIS database.

2018 launched medium-sized enterprises to the first place with 0.32, narrowly defeating small firms with 0.3. Large companies reached 0.11, indicating the lowest return on sales, dropping by 0.4 from the previous year.

Table 7. Return on sales for 2019.

Firm size	Small	Medium-sized	Large
Average RoS	0.46	0.07	0.11
Max RoS	974	0.83	3.1
Min RoS	-1.1	-0.02	-0.04

Source: Author's elaboration from the CRIBIS database.

In 2019, small companies recovered the first position, peaking at 0.46, indicating an improvement of 0.16. Medium-sized firms suffered a relapse to the last place, reaching 0.07 of the average RoS, falling by 0.25. Large organizations were on the level as the previous year, achieving 0.11.

Table 8. Return on sales for 2020.

Firm size	Small	Medium-sized	Large
Average RoS	0.25	0.07	0.12
Max RoS	113	1.49	3
Min RoS	-0.26	-4.67	0.01

Source: Author's elaboration from the CRIBIS database.

Although small firms received the highest average returns in 2020, the profit slumped by 0.21. The scenario was par for the course with medium-sized enterprises, indicating 0.07. Large companies moved up to 0.12, making an improvement of 0.1. Graph 2 suggests the trend of the average RoS from 2016 to 2020 for all size categories.

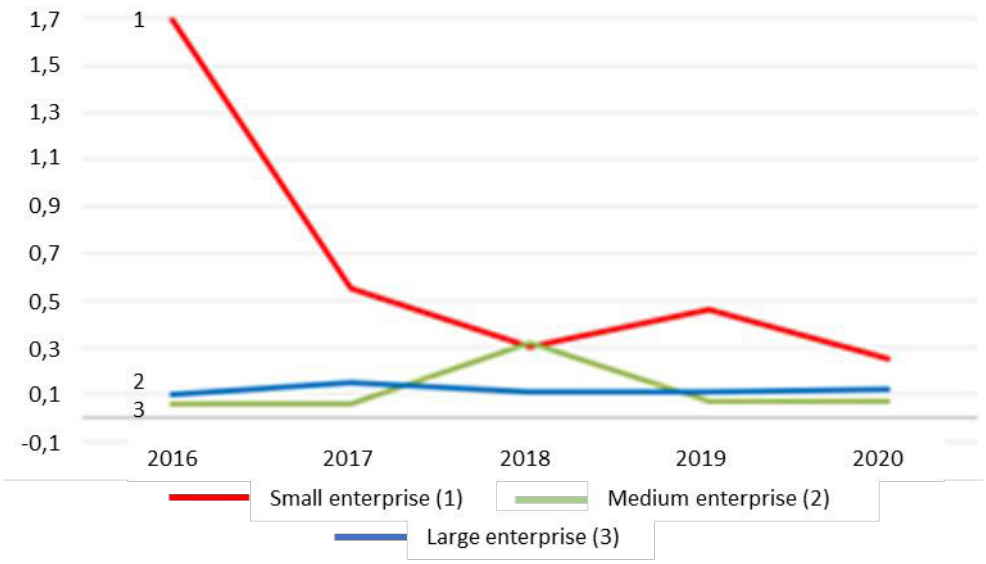

Fig. 2. Average RoS in 2016-2020. Source: Author's elaboration from the CRIBIS database.

Figure 2 shows large enterprises as the most stable entities regarding the average RoS over the period. Medium-sized firms were constant as well, significantly deviating only in 2018. On the flip side, small organizations marked dramatic departures throughout the period.

Table 9. Correlation coefficient for 2016-2020.

Year	Correlation coefficient
2016	0
2017	-0.01
2018	0
2019	-0.01
2020	-0.02

Source: Author's elaboration from the CRIBIS database.

The monitored period did not see the correlation coefficient getting over zero. Years 2017, 2018 and 2020 witnessed the coefficient drop slightly below zero, i.e. max -0.02 in 2020. The coefficients suggest that return on sales does not depend on the firm size of the building company.

6 Discussion

We formulated two research questions:

1. What is the share of different firm size categories (staff numbers) in the Czech building sector between 2016 and 2020?

We found that the number of analyzed enterprises that met our research criteria increased until 2018, topping 8,316 firms in the same year. The aggregate notably declined between 2019 and 2020, where we can blame the economic restrictions and crisis triggered by the Covid-19 pandemic. Many companies wound up or became loss-making, which was

inconsistent with our parameters. In times of economic crisis, leasing companies can be an alternative way to obtain a loan. However, their value is constantly changing during economic cyclical events [14].

The analysis showed that the Czech building industry mostly involved small enterprises (less than 25 employees) between 2016 and 2020. Small-scale firms comprised more than 80% of all corporations in the sectors over the period. On the flip side, large firms (more than 249 employees) did not exceed 1% in total within the period.

2. How much is firm size impactful on the return on sales in the Czech building sector between 2016 and 2020?

According to our analysis, small enterprises show the sharpest RoS fluctuations, indicating the steadiest return levels in large companies over the period. Medium-sized firms demonstrated profitability divergence only in 2018, keeping constant values for the rest of the period.

Correlation analysis suggests that the RoS of the examined enterprises does not relate to the firm size. At first, the correlation coefficient was 0, rising slightly above zero in the last year.

Our findings are close to those of [4] and [2] who did not prove any significant correlation between the firm size and return on sales. The authors claim that only the total assets are impactful on corporate profitability.

7 Contribution

Experts still cannot see eye to eye on the matter. What is the involvement of firm size in the Czech building industry? Do the enterprises have to have high staff numbers to be profitable? According to this study, the building industry between 2016 and 2020 mostly comprised small firms (low staff numbers). Large companies (over 249 employees) did not exceed one per cent of the analyzed enterprises.

According to the profitability and correlation analysis, staff numbers do not affect the return on sales, indicating that even small firms can generate profit. Small companies are also receptive to violent economic fluctuations, whereas large organizations maintain remarkable consistency. We may argue that small firms are highly susceptible to changes, while large corporations go native dramatic scenarios like the Covid-19 pandemic or increased competition.

The study contributes to existing building companies, informing on the competition in their size category. The work also helps new Czech construction enterprises explore the total of firms in the sector and their involvement according to the staff numbers, advising on the average return on sales in the size categories.

8 Conclusion

We analyzed Czech building companies over 2016 - 2020, focusing on staff numbers and return on sales. The research explored if the firm size impacts the profit in the building industry over the period.

We also defined two research questions: What is the share of different firm size categories (staff numbers) in the Czech building sector between 2016 and 2020, and how much is firm size impactful on the return on sales in the Czech building sector between 2016 and 2020?

The chapter ‘Results’ involved size categories between 2016 and 2020, demonstrated in a graph. Small enterprises, with fewer than 25 employees, had the strongest representation. We calculated the average return on sales for all years, assigning each size category the minimum and maximum profit rate. Small companies witnessed the most dramatic fluctuations, whereas large corporations stayed remarkably constant. The last step included

a possible link between the firm size and return on sales, revealing n connection between staff numbers and profitability.

The study contributes to existing building companies, advising them on the competition in their size category. For new Czech building startups, the work may be instrumental in disclosing the total of enterprises in the sector and their size categories (staff numbers). The study is deficient in having a lack of data on firms that could not be involved in the research.

Further analysis may focus on categorizing companies according to size, considering total assets or sales and exploring the results.

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