Analysis of Firm Profitability in Terms of Size Structure in the Czech Food and Beverages Industry

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Abstract: The paper deals with the profitability of enterprises in the food and beverages industry of the Czech Republic and analyses the relationship between the level of profitability and the firm size. The development of the average ROA of individual size groups of enterprises is analysed graphically in period 2003-2013 and the correlation between company size and the level of ROA is statistically validated by using parametric ANOVA.

Based on the analysis it can be concluded that the level of profitability in the Czech food and beverages industry is relatively low, and moreover, there is a tendency to decrease during the observed period. The highest values of ROA are achieved by the largest companies (expressed by the number of employees) and on the contrary, the ROA values of the smallest companies are often negative and in the whole observed period there are significantly lower than ROA values of other size groups of enterprises. The analysis has shown that the level of profitability is determined by the company size. Significant differences in the size of ROA in different size groups were also statistically verified with the use of ANOVA.

Key words: Profitability · ROA · Firm Size · Food and Beverages Industry

JEL Classification: D47 · L11 · L66

1 Introduction

The economic theory says, that under competition, profit rates will tend towards equality. However, the real markets are not perfectly competitive – industries are characterised by market imperfections such as high sunk costs, barriers to entry, asymmetric information and other impediments to competition – which can cause variations in firm profits.

The hypothesis, based on Baumol´s proposition (Hall, Weiss, 1967), says that “large firms have all of the options of small firms, and, in addition, they can invest in lines requiring such scale that small firms are excluded”. Therefore, higher rates of return should be found in large enterprises even in the long run and even in the absence of barriers to entry other than those directly associated with availability of capital.

The relationship between the firm profitability and the firm size is the subject of this paper. On the example of the Czech food and beverages industry, the paper gives an empirical evidence about the variability of profitability in terms of firm size.

In the economic literature, the concept of profitability or performance is often associated with the essence of an enterprise existence, which means the appreciation of the company's capital and consequential increase in company value. However, it is clear that performance is assessed by various market subjects differently because they have different expectations from the company. While for shareholders the performance means the appreciation of the investment, the customers consider the company as efficient if it meet s their needs and requirements. Banks and lenders assess business performance according the ability of an enterprise to meet their obligations, whereas for employees the level of wages and working conditions are important, etc.

The effectiveness of enterprise can be assessed by various indicators, which are expressed quantitatively in order to compare or assess developments in terms of time. The existence of a large number of performance indicators shows that there is no “ideal measure”.

For purposes of this analysis the return on assets (ROA) was chosen, which provides information about the profit, which was made through the investment in business (Jindřichovská, 2013), and is also used in various studies, e.g. Hult et al. (2008), Richard et al. (2009), Šiška and Lízalová (2011).
2 Methods

The aim of this paper is to analyse the profitability of enterprises in the food and beverages industry of the Czech Republic in terms of size structure. The aim is implemented through two partial steps. First, the development of the average profitability of individual size groups of enterprises in the Czech food and beverages industry is analysed graphically in period 2003-2013. Second, correlation between company size and the level of profitability is statistically validated by using parametric ANOVA.

The data for the analysis were obtained from the corporate database Albertina – Gold Edition (Bisnode, 2015). The analysed period is from 2003 to 2013. The sample of the accounting data of enterprises involved in the analysis is made of 12343 observations across 11 years and 10 food sectors in the Czech Republic. Companies are classified in four size groups defined according to the number of persons employed – with 0-19, 20-49, 50-249 and 250 or more persons employed. The profitability was evaluated on the basis of the return of assets ratio (hereinafter referred to as “ROA”), which is defined as follows:

\[
ROA = \frac{\text{EBIT}}{\text{Total Assets}}
\]

The statistical data and graphs were processed with the use of software Gretl and Excel.

ANOVA provides a statistical test of whether or not the means of several groups are equal. The one-way ANOVA was used to determine whether there are differences at the level of the variable of profitability by particular size groups of enterprises. (Hocking, 2013)

The null hypothesis says that means are equal (H0: \( \mu_1 = \mu_2 = \mu_3 = \mu_4 \)) and the alternative hypothesis says that not all means are equal, i.e. at least one of the mean values are different from others. The null hypothesis is rejected or accepted on the basis of statistical significance (the significance level \( \alpha = 0.01 \)).

3 Research results

The development of average profitability (ROA) in particular size groups of food enterprises in the Czech Republic in 2003-2013 is shown in Figure 1.

Figure 1 Average ROA of the Czech food enterprises by size groups in 2003-2013

As seen from the figure 1, the development ROA is not favourable in the Czech food and beverages industry. ROA values are relatively low in all years, moreover, there is a tendency to decrease during the analysed period. The largest companies (measured according the number of employees, i.e. with 250 or more employees) achieve definitely the highest values of ROA in all observed years except 2004 and 2005, when the similar profitability is reached also by smaller enterprises (with 50-249 and 20-49 employees).

On the contrary, ROA values of the smallest enterprises (with 0-19 employees) are significantly lower than ROA values of other size groups of enterprises. Moreover, these enterprises often achieve a negative profitability.
On the basis of the Figure 1 it can be stated, that larger enterprises reach in average higher profitability in the Czech food and beverages industry.

Subsequently, it was statistically verified whether there are differences between different size groups of enterprises within the ROA indicator during the analysed period. For the analysis of comparison of various size groups in terms of ROA the parametric analysis of variance (one-way ANOVA) was used. The ROA ratio was used as the dependent variable, four different size groups of enterprises was used as the factor. The results of ANOVA are presented in the Table 1.

Table 1 The results of the analysis of variance (ANOVA)

<table>
<thead>
<tr>
<th>Size Group</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-19</td>
<td>5967</td>
<td>-0.02562</td>
<td>0.30819</td>
</tr>
<tr>
<td>20-49</td>
<td>2526</td>
<td>0.03885</td>
<td>0.16214</td>
</tr>
<tr>
<td>50-249</td>
<td>3065</td>
<td>0.04385</td>
<td>0.13149</td>
</tr>
<tr>
<td>250+</td>
<td>785</td>
<td>0.06568</td>
<td>0.09118</td>
</tr>
</tbody>
</table>

\[ F(3, 12339) = 5.20464 / 0.056124 = 92.7347 \quad [p-value \ 2.4e-059] \]

Source: Own processing (in software Gretl)

Based on the results of ANOVA, the p-value was lower than the significance level (\( \alpha = 0.01 \)), which allows to reject the null hypothesis and to accept the alternative hypothesis. It is therefore possible to conclude that there have been statistically confirmed significant differences between ROA by size groups of enterprises.

The variability of ROA among four size groups of enterprises can be seen on the box-and-whisker graph in Figure 2. The largest enterprise (with 250 or more employees) show relatively stable values of ROA during the analysed period in comparison with the smallest enterprises, where the values of ROA are very fluctuating.

Figure 2 The variability of ROA within the size groups of Czech food enterprises
4 Conclusions

Based on the graphical analysis of the ROA variable in terms of size structure of enterprises in the Czech food and beverages industry in period 2003-2013, it was found that the size of ROA is determined by the company size (expressed by number of employees). It should be noted that profitability is influenced also by other factors, but the size of the business appears to be a significant prerequisite for achieving higher firm profitability. Significant differences in the size of ROA in different size groups were also statistically verified with the use of ANOVA.

The profitability in the food and beverages industry of the Czech Republic is at a low level, food companies are exposed to competitive pressures from subsequent stages of commodity vertical, i.e. retail. Due to the concentrated structure of the retail market and related market power it can be concluded, that large food enterprises have better position to compete with the retail, as evidenced by the analysis in this paper.

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