INVESTMENT ACTIVITY OF MEAT PROCESSING COMPANIES IN THE CZECH REPUBLIC

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Abstract

The aim of the paper is to assess the economic and structural differences between meat processors with low and high investment activity in the Czech Republic in the period 2008 – 2012. The analysis is based on data from the financial statements of companies (joint stock companies, limited liability companies, cooperatives) in the meat processing industry. The sample of the meat processors is divided into two equal sets according to the investment activity. The investment activity is measured as the change in the long-term assets allowing for the impact of amortization and depreciation. The two sets are compared through the two-sample statistical hypotheses test. Financial indicators of profitability, liquidity, capital structure and labor productivity quantify economic differences between the two sets. The paper verifies the hypotheses that meat processors with higher investment activity have higher debt ratio, use higher public investment support and have higher profitability and labor productivity than meat processors with lower investment activity. The results show significantly higher profitability, labor productivity, turnover and liquidity with higher investment activity. The obvious link between debt ratio, public investment subsidies and investment activity was not established.

Key words: investment activity, competitiveness, meat processing industry, public support
JEL Code: M21, L66

Introduction

Meat processing industry (CZ-NACE 10.1) is one of the key branches of the food processing industry in the Czech Republic (Mezera, Plášil, Němec, 2014). It is demand-driven branch (Čechura, Šobrová, 2008). So, the relationship between consumer perception of quality and the food industry's drive to satisfy consumer needs is complex and involves many different components. To respond to consumer concerns and expectations, science and innovation play a major role in equipping the industry (Troy, Kerry, 2010). Moreover, adjustments to the EU standards and an effort to implement food safety management systems leads to substantial investment outlays (Boratynska, 2012; Tomašević et al., 2013).Horská&Orémus(2008)

emphasize the importance of innovations in compliance with the nutrition trends and the development of marketing relations on all the levels of the supplier-customer relations. Structure and production performance of the sector should be closely linked with the available investment and investment subsidies (Smutka, Steininger, 2013). Since 2004, investments to agriculture and food processing industry including meat processing have been supported from the Rural Development Programme. So, it is important to ex-post evaluate the investment activity in the major part of the "old" programming period (2007 – 2013) in order to quantify investment activity and features of supported and not supported meat processors.

The aim of the paper is to assess structural and economic differences between processors with low and high investment activity in the Czech Republic in the period 2008 – 2012.

1 Data

The analysis was based on 100 meat processing companies filtered from Bisnode database. The final dataset had to meet following requirements.

1) Companies specialized in the meat processing industry (CZ-NACE 10.1) were selected. We can distinguish two main groups of meat processors: i) Processors which process meat and distribute it either by their own means of transport or via dealers. They can also have own outlets, but sales through the outlets are marginal. The group is labeled "V" ii) Processors with majority of sales carried out through their own outlets. The group is labeled "VO". Table 1 shows size of the two groups.
2) Pure traders without own meat processing were not included.
3) Complete income statement and balance sheet in the period 2008 – 2012 without any missing values in key items, such as equity, profit/loss, intermediate consumption, sales.
4) Positive equity. Companies with higher debts than assets were removed since they could distort results of some indicators of profitability (e.g. ROE). Moreover, such companies are often moving towards insolvency.
5) No companies in a bankruptcy.
6) Outliers in investment activity were detected through Grubbs' Single-Outlier Test (1950) and Rosner's ESD Many-Outliers (2011) and removed. A reason of outliers' detection was that companies with extremely high investment activity should increase the size by mergers or other similar structural changes, not naturally by investing in long-term assets.

Tab. 1: Size of "V" and "VO" groups of meat processors

Type of meat processor	Total assets (CZK thousands) Mean	Turnover* (CZK thousands) Mean
V (N = 68)	242769	577475
VO (N = 32)	50777	246110

Note: *Turnover = sum ofallrevenues

Source: own calculation

The sample covers most important meat processors in the Czech Republic as well as small and medium-sized enterprises with own outlets operating in the local market. The largest meat processors (by turnover) in the sample are Vodňanská drůbež, a.s., Kostelecké uzeniny, a.s., Masokombinát Plzeň, s.r.o., MP Krásno, a.s., Masokombinát Poličká, a.s. Table 2 contains basic description statistics of the sample.

The sample covers from 8.35 % (2008) to 5.82 % (2012) of the total population of meat processors in the Czech Republic. The share of sales in the total population was 26.5 % in the period 2008 – 2012. So, the sample represents major meat processors. However, the sample is not random since it does not cover small processors which do not keep accounting.

Tab. 2: Basic description statistics of the sample (N = 100)

Description statistics	Total assets (CZK thousands)	Turnover (CZK thousands)
Mean	181331	471438
Standard Deviation	348412	809358
Minimum	904	9718
Maximum	2 116478	4795697
25^{th} percentile	11872	52947
50^{th} percentile (Median)	55594	149375
75^{th} percentile	189151	529154

Source: own calculation

Meat processors in the Czech Republic can use public support either from the Rural Development Programme (RDP) or from the national funds provided the Ministry of Agriculture. Individual data about the total investment expenditures and public support were

provided by the Ministry of Agriculture. The question is whether companies with higher investment support had significantly higher investment activity in the period 2008 – 2012.

2 Methods

The investment activity (IA) in each year "t" is measured as the change in long-term assets allowing for the impact of amortization and depreciation.

$$IA[\%] = \frac{(LTA_t + DEP_t - LTA_{t-1})}{LTA_{t-1}} \cdot 100, \qquad (1)$$

Where LTA describes long-term assets and DEP identifies depreciation and amortization of long-term assets. Then, the mean investment activity in the period 2008 – 2012 was calculated for each company. The sample of 100 companies was divided into two equal-sized groups:

a) The first *group A with higher investment activity* (above median of mean investment activity 9,608 % p.a.),
b) The second *group B with lower investment activity* (below median of mean investment activity 9,608 p.a.).

The two groups were compared on the basis of financial analysis indicators of profitability, capital structure, turnover, liquidity, and labor productivity.

- Profitability indicators (%) – Return on Assets (ROA = EBIT / Total assets), Return on Equity (ROE = EAT / Equity), Return on Sales (ROS = EAT / Turnover), Long-term Profitability (LongR = Retained Earnings / Total assets).
- Labor productivity (LP) = [(Sales of goods – Cost on goods sold) + (Sales of production – Cost of sales)] / Total staff costs
- Capital structure indicators (%) – Debt Ratio (Debt / Total liabilities), Credit Ratio (Bank credits / Total liabilities), Long-term Credit Ratio (Long-term credits / Total liabilities).
- Turnover ratios – Assets Turnover (Turnover / Total assets), Long-term Assets Turnover (Turnover / Long-term assets).
- Liquidity ratios – L3 (Current Assets / Current liabilities including short-term loans), L2 (Current Assets without Inventory / Current liabilities including short-term loans), L1 (Short-term Financial Assets / Current liabilities including short-term loans).

The appropriate two-sample statistical hypotheses test was chosen with respect to normality and equal variance of the two groups. To validate the assumption of normality, the Shapiro-Wilk test was applied. Since data do not mostly follow normal distribution, partly due

to the particularity of financial data that are often bounded with zero (such as liquidity, debt ratio), the conclusion about equal variance was confirmed by the Modified Levene test. The Modified Levene test wasn't able to reject equal variances, so the Mann-Whitney U test (approximation with correction) was selected as the good statistical test in this research.

The paper verifies the hypothesis that meat processors with higher investment activity have higher profitability, higher debt ratio, turnover ratios and labor productivity than meat processors with lower investment activity. Thus, one-sided Mann-Whitney U test was applied. Nevertheless, there is no clear hypothesis about liquidity because of a different way of short term financial management of companies.

The row-column independence between number of supported (1) and not supported (0) companies and investment activity (group A = 1, group B = 0) was tested through two-sided Pearson's Chi-Square test.

The differences in investment activity and ROA between supported and not supported companies (table 9) were tested through Aspin-Welch Unequal-Variance T-Test because data follow normal distribution but Equal-Variance Test does not show equal variance between the two groups.

3 Results

Table 3 provides information about differences in size and investment activity between the two groups. Table 4 contains results of Mann-Whitney U test of differences in profitability and labor productivity indicators between the two groups.

Tab. 3: Differences in profitability and labor productivity

Indicator (Unit)	Statistics	Group A (N = 50)	Group B (N = 50)	H_0 ($\mu_1 - \mu_2$)	Z-value	P-value
Total assets (CZK thous.)	Mean SD	209632.9 310860.2	153029.7 383 393.1	Diff < 0	-1.5063	0.066
Turnover (CZK thous.)	Mean SD	622697.9 886 508.9	320 178.9 700 642.1	Diff < 0	-2.3611	0.0091
IA (%)	Mean SD	25.396 12.515	3.927 3.152	Diff < 0	-8.6138	0.0000

Source: own calculation

Tab. 4: Differences in profitability and labor productivity

Indicator (Unit)	Statistics	Group A (N = 50)	Group B (N = 50)	H_0 ($\mu_1 - \mu_2$)	Z-value	P-value
ROA (%)	Mean SD	4.342 8.189	0.096 6.614	Diff < 0	-3.7054	0.0001
ROE (%)	Mean SD	3.015 46.456	-1.210 88.490	Diff < 0	-3.1057	0.0009
ROS (%)	Mean SD	0.174 6.548	-0.158 2.340	Diff < 0	-3.1057	0.0009
LongR (%)	Mean SD	23.526 31.464	18.620 32.489	Diff < 0	-1.4098	0.0793
Labor Prod. (CZK)	Mean SD	1.462 0.689	1.277 0.367	Diff < 0	-2.4094	0.008

Source: own calculation

A higher investment activity is connected with larger meat processors. The difference in size between the two groups is more obvious in turnover (at $\alpha = 0.01$) than in total assets (at $\alpha = 0.1$). The reason for this finding is that companies with higher investment activity have concurrently higher productivity of total assets and long-term assets as well (i.e. higher assets turnover and higher long-term assets turnover, see table 5).

The results in table 4 clearly reject the null hypotheses about equal profitability and labor productivity between the two groups. Meat processors with higher investment activity had higher profitability and labor productivity than meat processors with lower investment activity. It is clear that more profitable companies invest more money in upgrading equipment and buildings. Differences in the Long-term profitability is significant only at $\alpha = 0.1$. So, the short-term profitability both for shareholders (ROE) and for the company (ROA) is more important determinant of investment activity in the meat processing industry. The finding should be important for policy makers who should support small and medium companies with lower profitability to enhance their competitiveness.

Tab. 5: Differences in turnover indicators

Indicator (Unit)	Statistics	Group A (N = 50)	Group B (N = 50)	H_0 ($\mu_1 - \mu_2$)	Z-value	P-value
Assets Turnover	Mean SD	4.672 3.307	3.774 3.665	Diff < 0	-2.4301	0.0076
Long-term Assets Turnover	Mean SD	31.211 84.199	22.635 78.326	Diff < 0	-2.5404	0.0055

Source: own calculation

The profitability and productivity are not only the important criteria for investment decision-making. The differences in the capital structure between the two groups are captured by the table 6. The hypothesis about higher debt ratio of companies with higher investment activity was not confirmed. That's why we also put results for two one-sided hypotheses in the table 6.The companies with lower investment activity had significantly higher debt ratio. The differences in credit ratio and long-term credit ratio between the two groups are not significant.

So, the investment activity depends on sufficient profitability which creates essential conditions for more investments using retained earnings/equity. It could be also an explanation of lower debt ratio and credit ratios in companies with higher investment activity. Alternatively, companies with higher investment activity had slightly higher long-term credit ratio probably due to the higher credibility caused by bigger size and higher profitability.

Tab. 6: Differences in capital structure

Indicator (Unit)	Statistics	Group A (N = 50)	Group B (N = 50)	H_0 ($\mu_1 - \mu_2$)	Z-value	P-value
Debt Ratio (%)	Mean SD	54.437 23.583	63.704 24.723	Diff < 0 Diff > 0	2.0992 2.0923	0.9821 0.0182
Credit Ratio (%)	Mean SD	12.269 12.822	13.792 13.376	Diff < 0 Diff > 0	0.9368 0.9299	0.8256 0.1762
Long-term Credit Ratio (%)	Mean SD	6.326 10.691	5.347 7.945	Diff < 0 Diff > 0	0.9431 0.9360	0.8272 0.1746

Source: own calculation

Table 7 compares liquidity ratios between the two groups of meat processors. Since there were no clear hypotheses about differences in liquidity, we calculated both of the one-sided tests.

Tab. 7: Differences in liquidity ratios

Indicator (Unit)	Statistics	Group A (N = 50)	Group B (N = 50)	H_0 ($\mu_1 - \mu_2$)	Z-value	P-value
L3	Mean	1.788	1.366	Diff < 0	-1.9889	0.0234
	SD	1.898	1.882	Diff > 0	-1.9958	0.9770
L2	Mean	1.452	1.033	Diff < 0	-2.3887	0.0085
	SD	1.638	1.495	Diff > 0	-2.3956	0.9917
L1	Mean	0.648	0.286	Diff < 0	-2.9264	0.0017
	SD	1.501	0.949	Diff > 0	-2.9333	0.9983

Source: own calculation

There are significant differences in all levels of liquidity ratios between the two groups. Companies with higher investment activity had higher liquidity than companies with lower investment activity. It could be explained by different strategy of financial management arising from significantly higher profitability and size of companies with higher investment activity. The mean liquidity ratios in the group A meet the recommended levels of liquidity ratios for industry. The mean liquidity ratios in the group B are at the bottom bounds of recommended levels of liquidity ratios for industry.

The last part of the analysis devotes to the investment subsidies. It is interesting to find out whether there are any connections between public support (Yes = 1, No = 0) and investment activity (Group A = 1, Group B = 0) in the meat processing industry.

Tab. 8: Differences in liquidity ratios

		Supported		
		0	1	Total
Investment activity	0	39	11	50
	1	32	18	50
	Total	71	29	100

Pearson's Chi-Square test: Chi-Square value = 2.3798, p-value = 0.1229

Source: own calculation

The Pearson's Chi-Square test did not reject the H_0 that investment activity and public support are independent (table 8). There were 29 companies supported from the Ministry of Agriculture and the Rural Development Programme in the period 2008 – 2012, of which 11 had lower investment activity and 18 had higher investment activity. There were 32 companies with higher investment activity without public support. The average investment subsidy of 11 supported companies with lower investment activity was 3 508.58 thousands CZK per one project. The average investment subsidy of 18 supported companies with higher investment activity was 5 725.84 thousands CZK. Table 9 informs about differences in investment activity between supported companies and companies without public support. Since the data follow normal distribution but Equal-Variance Test does not show equal variance between the two groups, Aspin-Welch Unequal-Variance T-Test was applied.

Tab.9: Differences in investment activity depending on public support

Indicator (Unit)	Statistics	Supported (N = 29)	Not supported (N = 71)	H_0 ($\mu_1 - \mu_2$)	T-statistic	P-value
Investment activity (%)	Mean SD	15.494 9.593	14.322 15.620	Diff < 0	-1.5593	0.0614
ROA (%)	Mean SD	2.695 4.994	2.024 8.596	Diff < 0	-0.4867	0.3139

Source: own calculation

The mean investment activity is slightly higher in the group of supported companies. Nevertheless, the difference is not statistically significant at $\alpha = 0.05$. This finding in compliance with previous research studies in the food industry (Mezera, Špička, 2013).

Conclusion

The aim of the paper was to assess structural and economic differences between meat processors with low and high investment activity in the Czech Republic in the period 2008 – 2012. The two-sample statistical tests revealed that companies with higher investment activity are more profitable, have higher labor productivity, assets turnover and liquidity than companies with lower investment activity. Alternatively, there were no differences in debt ratios between the two groups. The results can be important for policy makers which require

assessment of financial health of each subsidy applicant. The public sector should provide investment subsidies to companies with worse (but not too bad) financial condition to encourage the modernization of equipment and buildings. So, the criteria for assessing financial status before application for investment subsidies should be properly set by the Ministry of Agriculture.

In the period 2008 – 2012, there was no statistical difference in investment activity and ROA between supported meat processors and meat processors without investment support. It can be explained by the fact that publicly supported investment expenditures are only of marginal size compared to the size of supported companies, mostly a maximum of 10 % of total assets. However, partial but not significant positive effects of investment subsidies are discernible.

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References

- Boratynska, K. (2012). Predicting Bankruptcy of Selected Companies from The Polish Meat Sector. In A. Zvirbule-Berzina (Ed.) *Economic Science for Rural Development* (Vol. 28, pp. 170-175). Jelgava: Latvia University of Agriculture.
- Čechura, L., & Šobrová, L. (2008). The price transmission in pork meat agri-food chain. *Agricultural Economics - Zemědělská Ekonomika*, 54(2), 77-84.
- Grubbs, F. (1950). Sample Criteria for Testing Outlying Observations. *The Annals of Mathematical Statistics*, 21(1), 27-58.
- Horská, E., & Orémus, P. (2008). Processes and problems of the marketing management adaptation at the EU market: The case of the Slovak meat processing industry. *Agricultural Economics - Zemědělská Ekonomika*, 54(8), 392-398.
- Mezera, J., Plášil, M., & Němec, R. (2014). Hlavní ekonomické ukazatele. In V. Lukeš (Ed.) *Panorama potravinářského průmyslu* (pp. 10-17). Prague, Czech Republic: Ministry ofAgriculture.
- Mezera, J., & Špička, J. (2013). Economic Effects of Investment Support of Adding Value to Food Products. *Agris On-line Papers in Economics and Informatics*, 5(1), 39-49.
- Rosner, B. (2011). *Fundamentals of Biostatistics* (7thed.). Belmont, CA: Thomson-Brooks/Cole.

- Smutka, L., & Steininger, M. (2013). New EU members: Agriculture and investment. In L. Zagata&L. Smutka(Eds.) *Agrarian Perspectives XXII: Development Trends in Agribusiness* (Vol. 22, pp. 116-121). Prague: Czech University of Life Sciences Prague.
- Tomašević, I., Šmigić, N., Đekić, I., Zarić, V., Tomić, N., &Rajković, A. (2013). Serbian meat industry: A survey on food safety management systems implementation. *Food Control*, 32(1), 25-30.
- Troy, D., & Kerry, J. (2010). Consumer perception and the role of science in the meat industry. *Meat Science*, 86(1), 214-226.

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