THE VALUE PRODUCTIVITY OF SELECTED ENTERPRISES DURING RECOVERING FROM THE CRISIS OF DEMAND – COMPARISON OF SELECTED SECTORS IN THE TIME PERIOD 2010–2014

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Abstract

This paper deals with the analysis of the level and development of productivity of selected Czech enterprises belonging to chosen industry branches. The selected industries are presented by metallurgy, automotive and chemical industry. The analysed time period focuses on their recovery from the crisis of demand in the time period 2010-2014. The computed productivity is the value productivity, namely total value productivity and selected partial productivities. The value productivity is an important factor in achieving the enterprise objectives, especially shareholder value maximization. The paper works with productivity indicators based on the contemporary concept, ie. working with the concept of economic costs and economic profit as in the case of the indicator EVA. This contribution shows and compares differences in productivity levels among surveyed businesses, as well as various significant declines and subsequent various fast recovering. It is done both in terms of total value productivity, therefore for all inputs, as well as of main partial productivities. Inputs having similar strong and persistent decline in productivity as revenues had demonstrated small flexibility in the enterprise. It is a productivity decline guided with progression of these respective unit costs. Contrary there are inputs having a smoother decline in productivity as revenues had.

Key words: value productivity, economic efficiency, different industry branches, Czech Republic

JEL Code: D24, M2

Introduction

Value productivity is a key factor in achieving the enterprise performance and competitiveness. The competitiveness of the Czech Republic is not ideal. Weaknesses of

Czech competitiveness are connected more with inputs than outputs (Nečadová and Scholleová, 2011). The productivity of production inputs presents a concept which measures the influence of technical changes in the productivity and it represents driving motor of corporate growth (Praag and Versloot, 2008). The total productivity depends on the productivity of individual production factors as labour (Pavelka and Löster, 2013), current and non-current assets (Horák et al., 2015), know-how, organization or corporate governance (Bonaci et al., 2011).

This paper shows productivity of enterprises belonging to chosen important industry sectors in the Czech Republic: metallurgy, automotive and chemical industry. This contribution compares values of productivity indicators and their development in the time period 2010-2014. It is the time period when enterprises recovered from the previous crisis of demand. The analysis is a continuation of previous analyses done by authors for metallurgy (Klečka and Čámská, 2013a) and automotive industry (Klečka and Čámská, 2013b). The analysis of total productivity was applied on the data covering the time period 2006-2011 (the time of the crisis of demand or its tightening near time). The results of industry branches' comparison are also based on the analysis of total productivity of chemical industry in the period 2009-2014 published by Klečka and Čámská (2016).

1 Productivity

The productivity is an efficiency of production factors in production. It means efficiency of the transformation of tangible and intangible inputs into tangible or intangible outputs. The productivity can be measured and compared not only on the microeconomic as well as macroeconomic level but also on mezzo level (productivities of sectors and their comparison). Two basic types of productivities can be distinguish (Craig and Harris, 1973) – total productivity and partial productivity (equation 1).

$$\text{total (partial) productivity} = \frac{\text{total output}}{\text{total (partial) input}} \tag{1}$$

2 Used ratios

Measures used in the paper are derived from general formulas displayed by (1). Used ratios expresses the productivity reflecting current level of knowledge. It means that they work not only with accounting costs but also with economic costs and economic profit. Therefore the

ratios reflect principles used in the case of the measure EVA (Economic Value Added). These measures are also adapted to limitations connected with data's collecting.

2.1 The total productivity ratio

The total productivity expresses the relationship of all outputs to all inputs. The current concept of the total productivity takes into account not only costs of consumption (and depreciation) but also costs of capital employed. The costs of consumption (and depreciation) are derived from accounting costs (decreased by interests because they are a part of the costs of capital employed). The costs of capital employed (capital tied up) are costs of capital (equity and liabilities) which is used for financing enterprise's assets (total long-term and current assets). The exact method of calculation is displayed by equations (2) and (3).

$$\text{Total productivity} = \frac{\text{Total revenues}}{\text{Costs of consumption and binding of inputs}} \tag{2}$$

$$\text{Costs of consumption and binding of inputs} = \text{Total costs (accounting)} - \text{interests} + \frac{WACC}{1-t} \times \text{Total assets} \tag{3}$$

The used price of capital tied up is WACC (Weighted Average Costs of Capital). The variability of WACC in time and space is a consequence of factors which would distort productivity (eg. some changes due to inflation) but also of factors which should be reflected (ef. different risk levels). The analysis is therefore a compromise. In order to reduce the distortion WACC for all analysed years is equal to value corresponding to the last year, constant WACC 2014. In order to take into account the risk differences the differentiation of WACC among sectors is maintained. The used values are 10.38% for metallurgy, 7.27% for automotive industry and 9.56% for the chemistry industry (Ministry of Commerce and Trade, 2015). The tax rate (t) is equal to 19%.

2.2 The partial productivity ratios

The ratios of partial productivities focus on particular kinds of inputs. Author work with partial productivity of consumption (and depreciation) of inputs (4) and partial productivity of tied up capital (5).

$$\text{Productivity of consumption (depreciation) of an input} = \frac{\text{Total revenues}}{\text{Costs of consumption of an input}} \tag{4}$$

The costs of consumption are expressed as the difference between total costs and interests of liabilities.

$$\text{Productivity of inputs tied up} = \frac{\text{Total revenues}}{\text{Costs of tied up capital}} \qquad (5)$$

The above mentioned costs of tied up capital are expressed as WACC × $(1\text{-}t)^{-1}$ multiplied by the value of all long-term and short term assets.

2.3 The time indices of productivity

Static productivity measures have usually comparable explanatory power as some commonly used ratios of financial analysis. Dynamic productivity measures (comparing productivity in different time frames) have potential to register the size and influence of changes in productivity. Separated data about inputs and outputs prices as well as about physical volumes of inputs and outputs are necessary (Klečka, 2008). Division of data for prices and physical volumes were not available for this analysis. This weakness is at least partially compensated by the exclusively used of ratios where changes of prices are compensated in the extent how these changes are similar for inputs and outputs. The above-mentioned step leading to reducing distortion of productivity indicators due to changes in prices is accompanied by a time fixation of WACC. WACC are fixed for the part of reflection that involves tied up inputs. The development of productivity is expressed as standard time base indices whose content is obvious from further presented figures.

3 Development of productivity of selected enterprises operating in the selected industry sectors in the Czech Republic

Automotive industry, metallurgy and chemistry industry belong to the most important industry sectors in the Czech Republic (Czech Ministry of Foreign Affairs, n.d.). The level of total productivity and therefore level of performance and competitiveness of enterprises belonging to these sectors is very important.

3.1 Data sample

The analysis in this appear is processed on the enterprise data which were obtained in the necessary structure and completeness from the corporate database Albertina. Besides the already mentioned criteria of data availability other criteria were that the enterprise employees

more than 10 people and enterprise activities have not been disrupted during the entire five-year examined period.

The analysis is processed on the data of 104 metallurgical enterprises with the total value of assets 153 293 465 000 CZK and revenues 156 265 168 000 CZK in the year 2014, on the data of 212 automotive firms (including car manufacturers as well as their parts' suppliers) with the total value of assets 334 621 039 000 CZK and revenues 578 372 464 000 CZK in the year 2014 and finally on the data of 500 chemistry enterprises with the total value of assets 279 421 084 000 CZK and revenues 410 145 448 CZK in the year 2014.

It should be noted that these figures about the number of enterprises and the values of total assets and revenues in the selected industry branches do not reflect the correct current industry structure in terms of the number of enterprises and even in terms of the values of total assets and revenues. On the other hand it does not distort the analysis because of observed productivity characteristics in relative terms. Not reflecting the current industry structure is caused especially by the criteria of data availability. The data availability is very limited because enterprises do not want to publish their results although it is an obligation set up by the law (Strouhal et al., 2014). Because of the data unavailability in the required format the largest enterprises from automotive industry Škoda Auto, Inc. was not involved. Škoda Auto, Inc. reports the data according to IFRS methodology with which the used data source corporate database Albertina is not fully compatible. Reporting according to different accounting methodologies has an impact on productivity indicators as well (Klečka and Čámská, 2015). It is also proved by the obstacles of fair value in IFRS, detail in Bonaci et al. (2010).

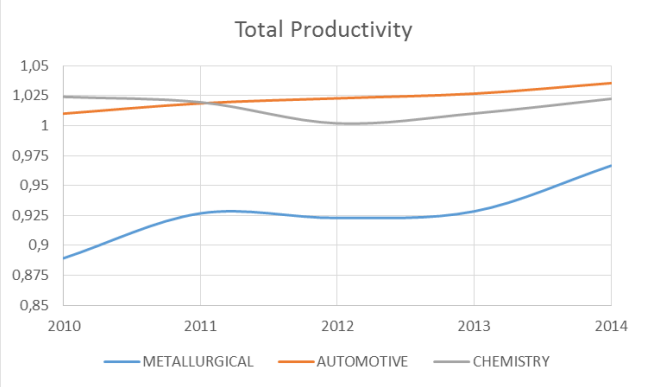
3.2 Results

The results of the analysis displayed by values, figures and interpretations are presented in this part. Among industry sectors huge differences were identified in the size of productivity as well as in the growth during recovering of businesses and markets from the crisis of demand.

Figure 1 proves that there are serious differences among individual sectors in terms of the level of total productivity and its development. The value of total productivity above 1 corresponds to a positive modified economic profit (approximately corresponding to positive EVA). The value above 1 was valid for the enterprises belonging to the chemistry industry (in the year 2010 even the highest productivity – 1.024) and the automotive industry during the

whole analysed period. The total productivity of the automotive industry has consistently grown throughout the examined period. The automotive industry even overtook the first position of the chemistry industry already in the year 2011. The total productivity of the automotive industry was 1.036 at the end of the examined period (2014). The total productivity of the chemistry sector decreased since 2010 but it has started to growth again since 2012.

Fig. 1: Total productivity (The value of output in CZK / the value of inputs consumption and costs of tied up capital in CZK)



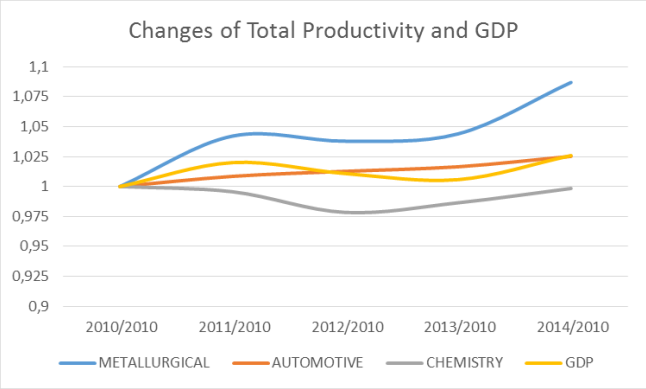
Source: authors

Contrary the total productivity of the enterprises belonging to the metallurgy has been below 1 throughout the examined period. At the beginning it was quite significant (0.889 in the year 2010) it means that economic profits or EVA were negative on average. Although the total productivity of metallurgy was the lowest of the compared industries throughout the examined period it has reached the fastest growth because the value of total productivity was 0.967 in 2014.

Figure 2 expresses the values of basic indices of the total productivity. The comparison of the productivity development is displayed clearly and the development of Czech GDP is added as well. GDP grew at the beginning, then temporarily declined but in total it has increased (the base index 2014/2010 is 1.026). The total productivity of automotive has grown steadily but it has increased to almost the same extent (base index 1.025). The total productivity of chemistry industry decreased slightly till 2012 and then grew. In the year 2014 it reached almost the level of 2010 (base index 0.998). It is necessary to emphasized again that the total productivity of chemistry industry had not decreased below 1 throughout the whole analysed period. The total productivity of metallurgy increased the

most because the base index 2014/2010 was 1.087. Despite the highest rate of growth the total productivity remained the lowest from all compared sectors. Unfortunately it also remained below 1 how it has been already mentioned above.

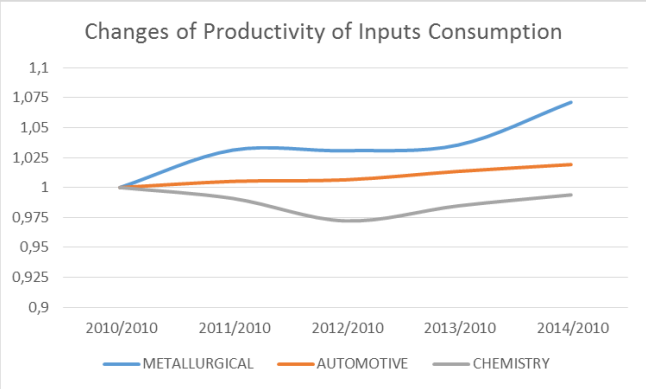
Fig. 2: The comparison between changes of total productivity and GDP Czech Republic (base indices, the year 2010 = 100, GDP in constant prices)



Source: authors

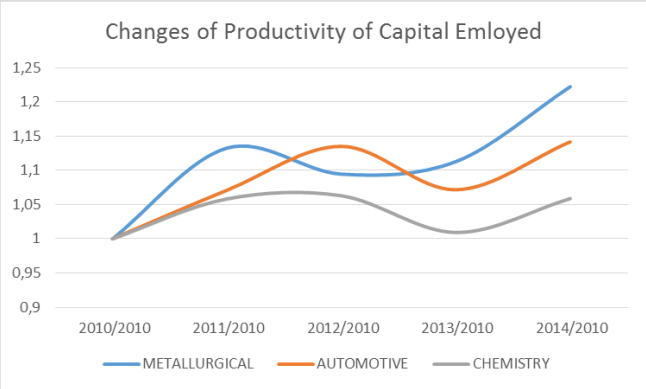
Other figures show differences among sectors in the development of partial productivities. First it is the partial productivity of consumption (and depreciation) of inputs (figure 3) and second it is partial productivity of capital tied up (figure 4). It is true that faster growth, respectively at least relatively slower decline, of some partial productivity is a consequence of higher (better) enterprise adaptability in the use of the particular input. It is valid when we assume that such indication has been fundamentally misrepresented because of large differences in price changes between inputs and outputs.

Fig. 3: Changes of consumption productivity (the year 2010 = 100)



Source: authors

Fig. 4: Changes of capital employed productivity (the year 2010 = 100)



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3.3 Discussion

It is necessary to take into account when the development of partial productivities is compared that their values and characteristics are relative. Influences of level and development of particular partial productivities are determined by the proportion of the individual factors. The proportion can be expressed as a ratio between costs per individual factor and total costs. Ratios of consumption costs and capital employed costs were 89% and 11% in the case of the metallurgy, 95% and 5% in the case of the automotive industry and 93% and 7% in the case of the chemical industry. It has a serious consequence which is common that the total productivity is significantly affected by the partial productivity of inputs consumption and not by the partial productivity of capital employed. That does not mean that the productivity of capital employed is not a potentially usable and important input in the enterprise's performance and competitiveness.

Conclusion

This paper was focused on the analysis of the level and development of productivity of selected Czech enterprises belonging to the industry branches as chemistry industry, metallurgy and automotive. The results have shown that there were significant differences in the level and development of the total productivity and partial productivities among industry sectors. The productivity of automotive industry has steadily increased during the examined period and the value of total productivity was above 1. The productivity of chemistry industry increased as well as decreased during the time period 2010-2014. The productivity of

metallurgy has had increasing trend but the value of the total productivity was below 1 throughout the examined period.

The analysis included in this paper also provides methodological instructions to carry out individual analyses. This can be done by an application of this kind of analysis on the individual enterprise or on the group of enterprises defined by certain characteristics as size, stage of development, sup-branch within the industry and other characteristics.

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