

DEVELOPMENT OF COSTS OF CAPITAL EMPLOYED IN FIXED ASSETS AND INVENTORIES

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Abstract

Current concept of enterprise performance does not take into account only traditional accounting items but it is widespread to economic items as economic cost or profit leading to economic value added. The enterprise productivity cannot be anymore analysed only from the point of view of efficiency production factor consumption. The level of costs of capital employed has to be added to analyses and decision making processes. Capital is mainly used for financing fixed assets but high level of inventories holds capital as well. This paper is focused on the development of costs of capital employed in fixed assets and inventories. The analysis is based on data collected by Czech Statistical Office for each industry branch from CZ-NACE C. Level of capital employed differs according to enterprise size or industry branch. Modern approaches as lean management or coming industry 4.0 influence the level of capital employed in enterprises. Graphical analysis based on time series will show if this influence is already observable on enterprise data in the Czech Republic.

Key words: total factor productivity, industry 4.0, lean production, Czech Republic

JEL Code: M21, D24, G31

Introduction

Enterprise performance does not depend only on the productivity of production inputs from traditional point of view but also on the productivity of capital employed. The classical productivity concept measures the effect of technical changes on outputs and that represents a driving motor of corporate growth (Praag and Versloot, 2008). The current concept of total value productivity described e.g. in Klečka (2014) takes into account also the cost of capital which cannot be omitted from enterprise decision process making. Although lower amount of capital means lower cost of capital it does not imply enough high output. The amount of used capital has to be balanced which depends on a necessary level of property.

Property mainly consists of fixed assets and inventories. The amount of needed fixed assets and inventories is subject to developmental trends. First there are emerging innovations

of Industry 4.0 (detail in Mařík, 2016) and second there are the on-going process innovations (detail in Synek, 2011). Both influences will lead to significant changes in the amount of needed property. Industry 4.0 is driven by nine technological shifts (Rüßmann et al., 2015) which are mostly connected with investment in fixed assets (Bettenhausen, Oesterle and Zuehlke, 2010) and with replacement of human labour by these new technologies (Rotman, 2013). On the other hand, on-going process innovation activities have pushed down the level of enterprise inventories. Kroes and Manikas (2018) or Hofer, Eroglu and Hofer (2012) analysed enterprise performance influenced by the lean management of inventories. The impact of lean management in broader sense is discussed by Strachotová and Strachota (2017) in the environment of the Czech Republic.

These developmental trends affect or will undoubtedly affect the level of fixed assets and hold inventories which will influence cost of capital employed. This paper will analyse if these developmental trends have been already observable on the Czech data.

1 Indicators and data sample

This chapter introduces indicators which will be further analysed and used data sample. Graphical analysis whose results are mentioned in the following chapter will discover developmental trends in the area of cost of capital employed. First capital employed in fixed assets and second in inventories. The analysis will be based on time series covering the time period 2010-2016 and individual sectors belonging to CZ-NACE C Manufacturing in the Czech Republic.

The analysis works with two data sample. First data source is based on the data published by Ministry of Industry and Trade (2017) from which the variable WACC (weighted average cost of capital) is used for the individual manufacturing branches. The variable WACC presents generally acceptable measure for the price of capital. Second data source is based on national accounts published by Czech Statistical Office (2018). From this source, variables as year production volume in current prices, value of fixed assets and value of hold inventories (both in current prices) are used. Cost of capital employed in fixed assets and inventories is computed as a multiplication of WACC by a selected kind of property (fixed assets, respectively inventories). The values of these two variables are computed for each industry branch and each analysed year. These values are used for the further graphical analysis which should show if there are already observable changes in cost of capital

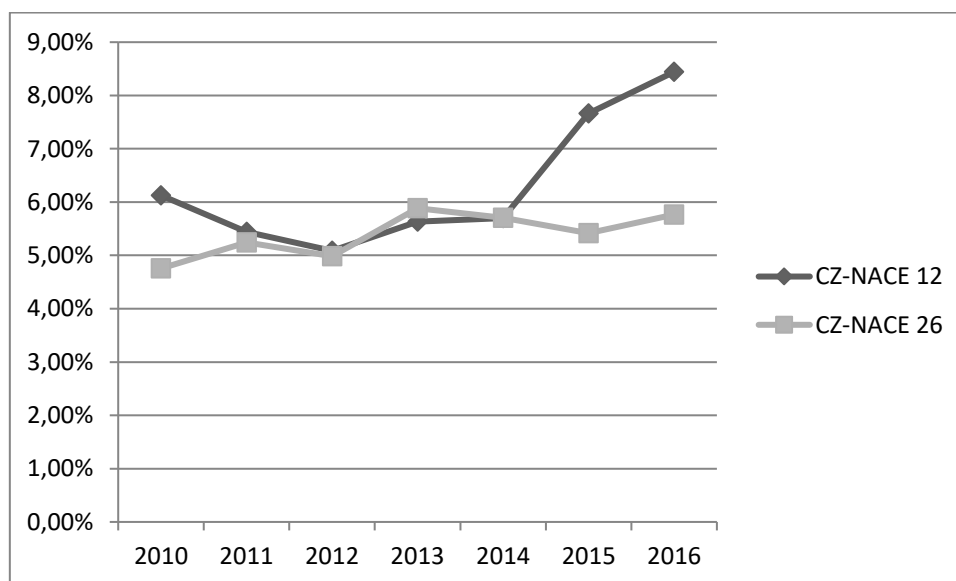
employed in fixed assets and inventories. The possible changes should be caused by Industry 4.0 or on-going process innovations.

It should be noted that the relative change is studied. Absolute decrease or increase of the capital cost could be caused by an expansion or respectively shrinking of the selected industry branch in the Czech Republic during the analysed time period. Therefore, relative indicators are used for the conducted analyses. These relative indicators are represented by ratios which have the cost of capital employed in a numerator and production volume in a denominator. This relative change should omit any size changes and it should especially show developing trends in usage of fixed assets and inventories for enterprise production process.

2 Results

This chapter will introduce the development of cost of fixed capital and cost of hold inventories in different manufacturing sectors in the Czech Republic in the time period 2010-2016. The sectors are divided according to the classification CZ-NACE. On one hand, figures display separately results for cost of fixed capital and cost of hold inventories. On the other hand, the figures separate the sectors with increasing and decreasing trend. The industry branches without an obvious trend were omitted.

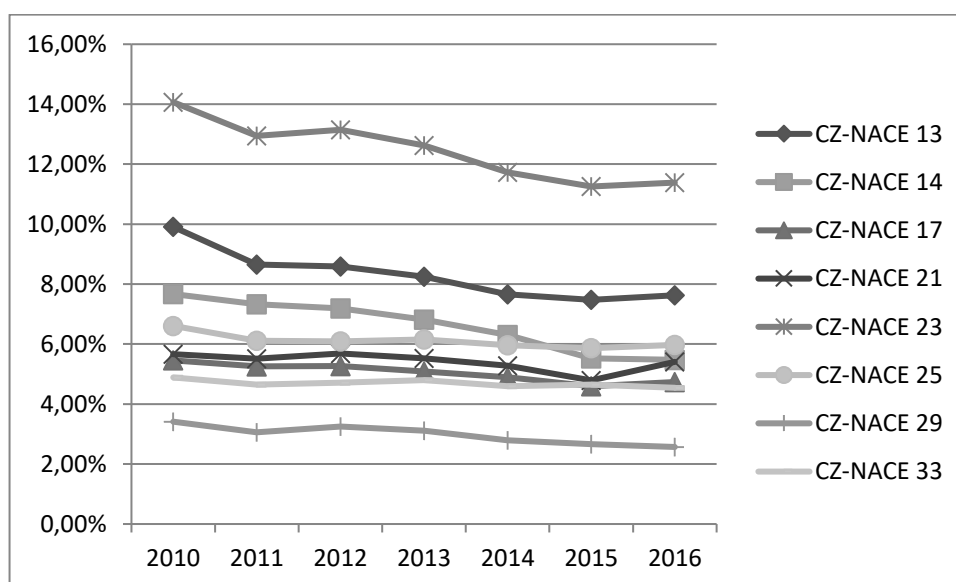
Fig. 1: Industry branches with the significant increase in the cost of fixed capital



Source: authors based on CZSO (2018) and MIT (2017)

Figure 1 shows industry branches whose cost of fixed capital compared to the production volume increased during the analysed time period. There are only two industry branches with significant increase, specifically CZ-NACE 12 Manufacture of tobacco products and CZ-NACE 26 Manufacture of computer, electronic and optical products. Observed differences in CZ-NACE 12 could be explained by high concentration in the industry to which one extra-large enterprise belongs in the Czech Republic. Philip Morris had heavily invested and these investment activities have not been fully shown up in sales yet. However, further detailed analysis could discover that these investment activities would lead to mass automation and implementing innovation of Industry 4.0. The similar conclusion of implementing innovation of Industry 4.0 could be stated for CZ-NACE 26.

Fig. 2: Industry branches with the significant decrease in the cost of fixed capital



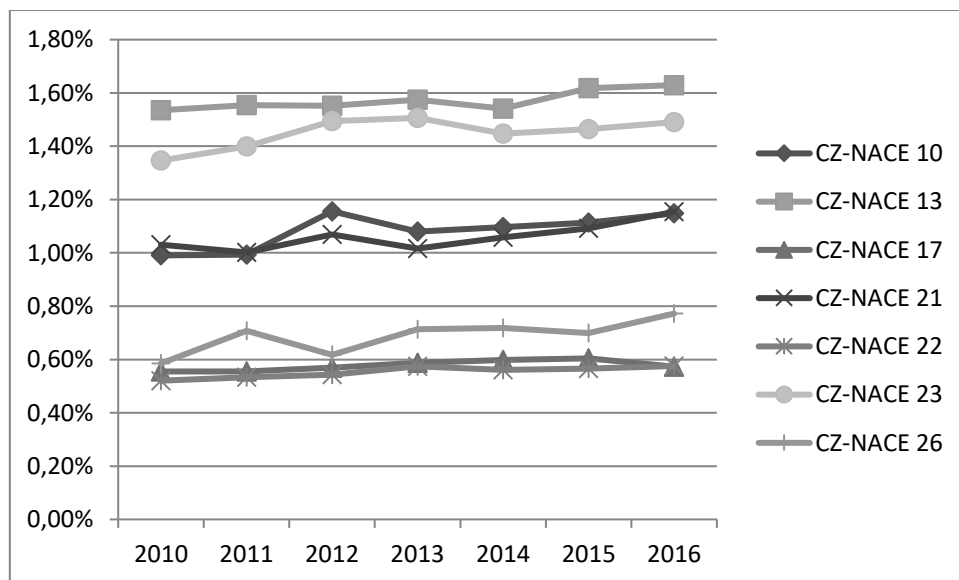
Source: authors based on CZSO (2018) and MIT (2017)

Figure 2 displays results for sectors whose cost of fixed capital compared to the production volume decreased during the analysed time period. The decrease can be observed for many more sectors than the increase although the increase is expected due to coming Industry 4.0. On the other hand, there is an influence of economic cycle. The analysed time period is connected with economic expansion and therefore enterprises can sell higher production volume using the same amount of fixed assets. It should be noted that studied changes are relative and the decrease does not automatically mean that the enterprises use less fixed assets in total. The decreased trend was observed in the sectors as CZ-NACE 23 Manufacture of non-metallic mineral products, CZ-NACE 13 Manufacture of textiles,

CZ-NACE 14 Manufacture of wearing apparel, CZ-NACE 17 Manufacture of paper and paper products, CZ-NACE 29 Manufacture of motor vehicles, trailers and semi-trailers, CZ-NACE 25 Manufacture of fabricated metal products, except machinery and equipment, CZ-NACE 33 Repair and installation of machinery and equipment a CZ-NACE 21 Manufacture of basic pharmaceutical products and pharmaceutical preparations.

Capital can be employed not only in fixed assets but also in inventories. Lean management practise led to eliminating waste in many forms. One form is presented by holding only the necessary level of inventories which would be enough for the production process and fulfilling customers' needs. However, figures 3 and 4 show that there are more sectors with the increase in the cost of holding inventories than with the decrease.

Fig. 3: Industry branches with the significant increase in the cost of holding inventories

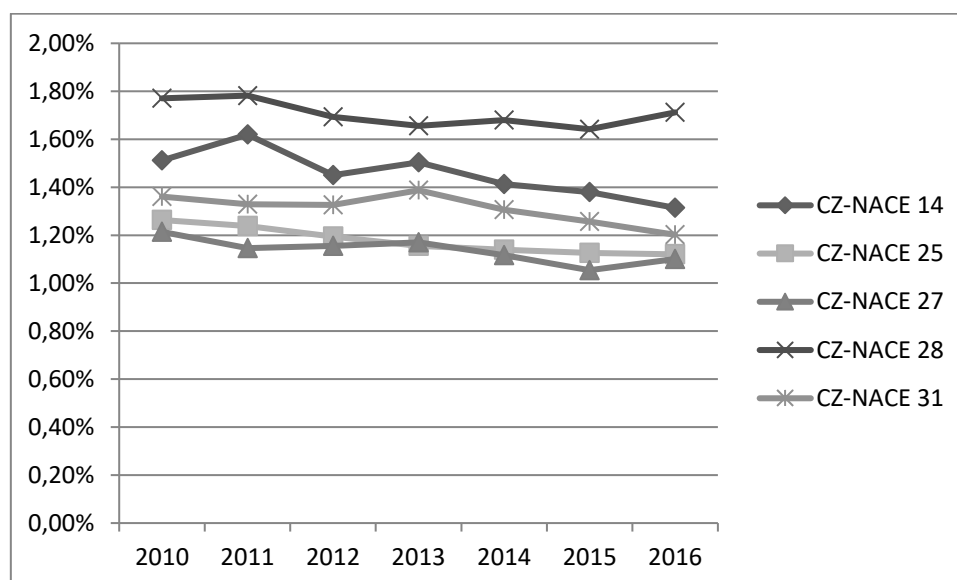


Source: authors based on CZSO (2018) and MIT (2017)

Many industry branches showed a rise in the cost of holding inventories. Specifically they are CZ-NACE 22 Manufacture of rubber and plastic products, CZ-NACE 13 Manufacture of textiles, CZ-NACE 21 Manufacture of basic pharmaceutical products and pharmaceutical preparations, CZ-NACE 26 Manufacture of computer, electronic and optical products, CZ-NACE 10 Manufacture of food products, CZ-NACE 17 Manufacture of paper and paper products and CZ-NACE 23 Manufacture of other non-metallic mineral products. It also can be seen from figure 3 that there are significant differences among the industry

branches. Some sectors are more demanding inventories and therefore their cost of holding inventories reaches higher numbers.

Fig. 4: Industry branches with the significant decrease in the cost of holding inventories



Source: authors based on CZSO (2018) and MIT (2017)

The decrease in the cost of holding inventories was more estimated because of lean management at the beginning. This trend was observable in the sectors as CZ-NACE 25 Manufacture of fabricated metal products, except machinery and equipment, CZ-NACE 14 Manufacture of wearing apparel, CZ-NACE 27 Manufacture of electrical equipment, CZ-NACE 31 Manufacture of furniture and CZ-NACE 28 Manufacture of machinery and equipment n.e.c.

3 Discussion

There are several remarks which should be added to the gained results. Higher cost of capital employed decreases enterprise performance and productivity indicators would reach lower numbers. However, capital employed in fixed assets and inventories is only one production factor and therefore cost of this employed capital creates minority of total enterprise cost. It has to be taken into account also consumption of inventories, utilities and labour which mainly create more than 90% of total cost. Aforementioned statement does not mean that the productivity of capital employed is not a potentially important for achieving enterprise performance and competitiveness.

The analysed time period is short which has several reasons. The time period for the analysis is needed without any extremes and therefore the first year of the time series is 2010. This year can be referred as a recovery start from the economic crisis. The Czech Republic can be hardly marked as a country of high-tech industries and that is the reason why we haven't observed many influences of Industry 4.0 yet.

It should be noted that the cost of fixed assets and inventories differs in the industry sectors. These differences were observable from the figures above. There are two main reasons. The first reason is needed proportion of fixed assets and inventories and the second reason is the price of capital. The price of capital is not same in each sector because it takes into account risk.

The changes in the amount of used fixed assets do not depend only on purchasing and selling assets. The value of fixed assets is measured at historical prices following prudence accounting principle which does not take into account possible current higher market price. The same level of fixed assets loses value during years because of depreciation and amortization. It means that the value of fixed assets is decreasing because of accounting although physically the enterprise uses the same property all the time. On the other hand, old property will have to be replaced in the future which will increase the property value. The moment of asset recovery is not same for different industries. It could be 3, 5, 15 or even more years.

Conclusion

This paper was focused on the analysis of changes of the cost of capital employed in the manufacturing. There are different causes influencing the level of capital employed in fixed assets and inventories. On one hand there are lean management practises and on the other hand there is coming innovation of Industry 4.0. These factors should have some estimated influences on the level of fixed assets and on the level of inventories. First, the conducted analysis has shown that expected changes could not be detected in all industry branches. Second, the coming innovation of Industry 4.0 has not appeared on the data yet. Third, there are also other influences as economic cycle which affects the variable production volume and enterprises' behaviour. Economic expansion supports investment activities and broadly spoken non-saving activities which decrease efforts of inventories management.

The results included in this paper just present a starting point for further analyses which would take into account also other factors and influences. It should be noted although

Industry 4.0 is highly discussed nowadays its practical implications has not been widespread yet.

References

- Bettenhausen, K. D., Oesterle, M., & Zuehlke, D. (2010). SmartFactory The intelligent Factory of the Future in the Life Cycle Contributions to the Further Development of Automation. In *11th Branch Meeting of the Measurement and Automation Technology - Automation 2010* (VDI Berichte, pp. 257-260). Baden Baden, Germany: V D I - V D E - VERLAG GMBH.
- Czech Statistical Office. (2018). National accounts. Retrieved May 12, 2018, from http://apl.czso.cz/pll/rocnka/rocnkavyber.makroek_prod
- Hofer, C., Eroglu, C., & Hofer, A.R. (2012). The effect of lean production on financial performance: The mediating role of inventory leanness. *International Journal of Production Economics*, 138(2), 242-253.
- Klečka, J. (2014). Indicators measuring the level and development of enterprise productivity. In 8th International Days of statistic and Economics at VŠE (pp. 668-677). Prague, Czech Republic: Melandrium.
- Kroes, J.R., & Manikas, A.S. (2018). An exploration of "sticky" inventory management in the manufacturing industry. *Production Planning & Control*, 29(2), 131-142.
- Mařík, V. (2016). *Průmysl 4.0: výzva pro Českou republiku*. Management Press.
- Ministry of Industry and Trade (2017). Analýza vývoje ekonomiky ČR za rok 2016. Retrieved May 12, 2018, from https://www.mpo.cz/assets/cz/rozcestnik/analyticke-materialy-a-statistiky/analyticke-materialy/2017/7/Analyza_2016.pdf
- Praag, M., & Versloot, P. (2008). The Economic Benefits and Costs of Entrepreneurship: A Review of the Research. *Foundations and Trends in Entrepreneurship*, 4(2), 65-154.
- Rotman, D. (2013). How technology is destroying jobs. *Technology Review*, 16(4), 28-35.
- Rüßmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P., & Harnisch, M. (2015). Industry 4.0: The future of productivity and growth in manufacturing industries. *Boston Consulting Group*, 9.
- Strachotová, D., & Strachota, S. (2017). Enhancing Productivity in Plastics Industry through the Concept of Lean Production. In *Sustainable Economic Growth, Education Excellence, and Innovation Management Through Vision 2020* (pp. 440-449). Vienna, Austria: Int Business Information Management Assoc-IBIMA.

Synek, M. (2011). *Manažerská ekonomika*. Grada.

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