Models of value creation measurement in different manufacturing industry sectors in the Czech Republic

Petr Sucháneka[[1]](#footnote-1)\*, Martin Štěrbaa

aDepartment of Corporate Economy Faculty of Economics and Administration Masaryk University, Lipová 41a, Brno 60200, Czech Republic

Abstract

The subject of this article is the construction of a model which is able to measure whether an enterprise is creating or destroying value. However, in the light of our previous research, we are not seeking to create a universal model, instead we want to create a set of special models that consider the specificities of different sectors. Therefore, we have created three models especially for the food industry, engineering and transportation. In addition to the differences found within the model structure, we also want to discuss their causes, including more general cross-sectoral differences.

Based on the EVA ratio, we divided each of the surveyed sectors into three groups (creating value, destroying value and enterprises where it cannot be decided whether they create or destroy value – so called “grey zone” enterprises). Based on a study of the literature, about 32 financial ratios were selected which are commonly used to evaluate the performance of a company. Using logistic regression, statistically significant differences were identified between the selected financial indicators within the groups of enterprises creating and destroying value. The statistically significant regression functions represent models capable of distinguishing enterprises that create or destroy the value. By retrospectively comparing them with the EVA ratio, it is possible to set the limits of the relevant models so that they divide the enterprises under examination into three groups (value-creating enterprises, value-destroying enterprises and “grey zone” enterprises).

The aim of the article is to construct value-measuring models in various sectors of the manufacturing industry. We start from the premise that it is very difficult to construct a universal model that is able to measure the value in different sectors equally well. Therefore, using the example of three manufacturing industries (namely the food industry, engineering and transportation), we constructed three models and then compared and discussed the differences observed.

The results confirmed that there are significant differences between the models of value creation within the three sectors which we studied. The main difference in each sector is its capital structure. For each model, we selected a different number of indicators using statistical methods to create the optimal model. It was also discovered that each model has different limitations among the groups. This is a result of the fact that the models are created from different indicators.

The first research limitation is that the focus is only on three sectors. As part of further research, it will be necessary to construct different models in other sectors as well. The second limitation of the research is that it focuses purely on finance, which does not allow many options to identify and discuss the internal and qualitative differences of the enterprises and sectors under examination, which could contribute to increasing the accuracy of the model. The model is constructed from publicly available data, which is both a limitation and an advantage. On the one hand, it limits the ability to inform the user, while on the other, it allows for wide usage without having to know internal data.

Keywords: EVA ratio, value creation model, financial analysis, performance, food industry, construction industry, engineering

JEL Classification: G31, L61, L62, L66

**Introduction**

The subject of this article is the construction of a model (value creation model - VCM), which is able to measure whether an enterprise is creating or destroying value. However, in the light of our previous research, we did not seek to create a universal model but, on the contrary, we wanted to create a set of special models that consider the specificities of different branches. Therefore, the objective of this article is to construct models to measure value creation in various sectors of the manufacturing industry. We start from the premise that it is very difficult to construct a universal model that is able to measure the value in different sectors equally well. Performance and the factors which affect it are different in different branches (cf. Hawawini et al. 2003). This is why we constructed three models on the basis of the three selected sectors of the manufacturing industry (food, engineering and transport), and we subsequently compare and discuss any differences discovered. In addition to the differences found within the models, we also want to discuss the causes of these differences, including general cross-sectoral differences.

There exist many concepts and definitions of value (see, for example, Möller, Törrönen, 2003), and it depends on the perspective of the value, including the place, time and purpose of its definition (Wilson, Jantrania, 1994). In our research we looked at value from the perspective of the company, i.e. the financial value of the company as defined by Möller and Törrönen (Möller, Törrönen, 2003). This concept corresponds with the definition of value in business markets which defines values as "the perceived worth in monetary units of the set of economic, technical, service and social benefits received by a customer firm in exchange for the price paid for a product offering, taking into consideration the available alternative suppliers' offerings and prices" (Anderson et al. 1992). This definition is used mainly in marketing, and the authors also focus primarily on the customer and the value provided by the company to the customer. However, in our research we will focus on the company, emphasizing the value the customer places on the company through the price for its product. Here we can use the financial and accounting concept which identifies value with the value of the company's (active) assets, whether this is the market value or the liquidation value, etc. (Wilson, Jantrania, 1994).

The accounting concept of value can also be linked to the shareholder value through measurement based on accounting data (Ezzamel et al. 2008). Researching value in companies today shows that they focus on maximising shareholder value while economic value measurement and financial measurement are integrated to help management achieve their goals (Esbouei et al., 2014). With this in mind, value creation can focus on shareholder value and when assessing it we can use financial indicators including the EVA indicator constructed on the basis of accounting data. Due to its focus on shareholder value, in our research the EVA indicator is constructed from the ROE (EVA equity) indicator (cf. Varaiya et al., 1987).

The EVA indicator also measures financial value, where it is also possible to use traditional ratio indicators (cf. de Wet, 2005). It is also possible to divide into two groups those indicators which can measure financial value; traditional indicators (for example, ROE and ROA) and modern indicators (EVA), which measure the same financial value in a different way (Yalcin et al., 2012).

The EVA indicator is a synthetic indicator which consists directly of accounting data which is arranged into certain relationships, or they are incorporated indirectly into them as part of the influence from the level of risk which the indicator enters into (more detail in the methodology section). If it is possible to measure shareholder wealth (as a healthy company - authors' note) using the EVA indicator (cf. Lee, 1996), it is also possible to use a synthetic indicator assessing the financial health of a company to measure shareholder value. It is also possible to set up a different synthetic indicator to this one which consists of ratio indicators based on accounting data which would then identify the financial value drivers in the accounting of the respective companies. This approach was selected by, for example, the Neumaiers (cf. Neumaierová, Neumaier, 2002), who unlike us constructed one universal indicator for all of the sectors.

**1 Methodology**

Based on the value from the EVA indicator, companies will be divided into three groups. The first group (companies creating value) will consist of companies where the value of the EVA indicator is > 0, the second group (companies from the grey zone - i.e. companies where it is impossible to categorically state whether they create or destroy value) will consist of companies where the value of the EVA indicator is < 0 and at the same time the value of the ROE indicator is > 0. The third group (companies destroying value) will consist of companies where the EVA indicator is < 0 and at the same time the ROE indicator is < 0.

The construction of the EVA indicator is based on methodology from the Czech Republic Ministry of Trade and Industry (Department of Economic Analysis, 2014, pp. 158-161), which is based on the so-called modular formula. This construction was used in order to compare results within the sectors (the sector average according to MPO x the sector average of the selected sample). The general construction for the EVA indicator, which also contains the indicators ROE, cost of equity (re) and amount of equity capital (VK) is as follows::

EVA = (ROE – re) \* VK

The cost of equity is calculated using the above-mentioned modular formula and represents the sum of the risk-free rate of return, business risk, financial stability risk, business size risk and financial structure risk.

After dividing the companies into their respective groups (companies creating value, companies destroying value and companies from the grey zone), a profile analysis will be carried out on each individual company in the groups where companies create and destroy value. The narrowing of the profile analysis to two groups of companies (without the grey-zone companies) is based on the assumption that, among the clearer and more precisely profiled groups of companies (i.e. the groups of companies with more distinct differences in the EVA indicator), the differences between the financial indicators will also be more distinct and obvious. This should then lead to the creation of a better (more accurate) VCM model from these financial indicators.

32 ordinary financial indicators will be used for this analysis (see appendix), again constructed according to the methodology of the Czech Republic Ministry of Trade and Industry (Department of Economic Analysis, 2015).

A profile analysis allows for a comparison of the individual financial indicators in both groups of companies and determines their differences. In order to create a model which would be best able to differentiate those companies creating and destroying value, all of the indicators will be used which will gradually be eliminated so that in the final model there remain only the statistically significant indicators, and at the same time the highest level of the model's explanatory power will also be achieved.

The second step leads to the modelling of indicators using logistic regression. Logistic regression can be used if there are only two expected outcomes – the company either creates or destroys value. This is another reason why the model is only constructed from the value of companies creating and destroying value (without grey-zone companies) according to the EVA indicator.

 The assumption of normality is important for logistic regression. This assumption is met in this model as the data is gathered from the basic set and not only from a selection of data (Pecáková, 2007). At the same time, it is essential that both results are adequately represented in the data (Hendl, 2012). Subsequently, it is possible to construct a logistic regression model in the following form (Hosmer, 2000):



Where Y takes the value in the interval 0 to 1 and, therefore, defines the difference between categories Y = 1 a company creating value and Y = 0 a company destroying value. Specific calculations were made using GRETL statistical software (Gretl, 2016). To verify the reliability of the variables model, a t-test was used with a significance level of p = 5%.

To verify the validity of the model overall, a chi-squared test was used, which was calculated as follows:



The p-value <0.05 rejects a zero hypothesis, which states that a model without residue is better than had been assumed, which can then be interpreted as meaning the model is reliable (it gives the right results).

The individual financial indicators (including the EVA indicator) are interrelated due to the use of the same or similar input data. Therefore, the multicollinearity of the model variables is also tested within the resulting model. This test measures the intensity of the dependency between two or more explanatory variables, while assessing the capacity of the multicollinearity rate. The multicollinearity (VIF) value calculation is as follows:

VIF(j) = 1/(1 - R(j)^2)

R (j) is a multiple correlation coefficient between the variable j and the other independent variables. The collinearity test supports the model if the minimum value is greater than 1 and less than 10. Within this framework, multicollinearity is permissible.

The equation of the logistic regression of the VCM index model, capable of distinguishing between companies which can create or destroy value, and is constructed using logistic regression, will have the following form:



where: x1 to xn financial indicators are used (see below),

 b1 to bn their coefficients

 a is a constant

For a company to be classified as creating value, it has to achieve values on the VCM index according to established boundaries, boundaries which differ for different sectors and which can be easily read from the enclosed interpretive tables. Based on the boundaries shown in the tables, it can be determined whether a company creates or destroys value. In the interval between these values of the index, the company is classified as a company from the grey zone, where it is impossible to categorically decide if value is being created or destroyed.

**1.1 Research sample**

The companies from the research sample are Czech companies with at least 25 employees and have existed since at least 2013. For the research we used data from 2014. This data is easily available on the Bisnode database. This approach also meant that there was the partial removal of the influence of a company's life cycle, or at least the first phase when a company's performance is significantly lower (cf. Anthony, Ramesh, 1992). For this research the authors selected 2,852 companies (from a total of 3,467, i.e. 82.26 %). Although other companies do exist, they do not comply with the statutory disclosure obligation and, therefore, it is impossible to access their financial data.

Table 1 - Characteristics of the companies in the sample

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sector | CZ NACE | Selected companies overall | Selected companies as a % of the whole | Total number of companies |
| Engineering | C 27, C 28 | 979 | 75 % | 1,320 |
| Transport | H 49 | 886 | 76.8 % | 1,151 |
| Food | C 10, C 11 | 870 | 88.15 % | 996 |

Source: the authors

The research set was divided into three groups according to sector (see table 1 above). Table 1 demonstrates that the number of companies in the individual sectors was similar to the overall number of companies in these sectors. As part of the research each sector was then analysed separately.

**2 Results**

The first step was to carry out profile analyses. These gave the specific values of ratio indicators for the companies and sectors. The second step was to calculate the value of the EVA indicator for all of the companies in the individual sectors and these companies were then divided into companies which destroy value, create value and are from the grey zone (see methodology). The companies from the groups creating and destroying value were then modelled using logistic regression, where the relevant values of the ratio indicators for the companies were used. In this way three models were established for each sector separately. The results from these models were then retrospectively compared across the sample of companies for the individual sectors with the results of the EVA indicator.

**2.1 Engineering**

990 companies were analysed from this sector, of which 544 (55.96% of the companies) create value and 425 (44.04% of the companies) destroy value according to the EVA indicator. In the first phase of the calculation there were also grey-zone companies among the companies destroying value as the initial calculation was carried out directly according to the EVA indicator (these results are shown in table 2). Afterwards, the grey-zone companies were removed from the companies destroying value (i.e. companies whose ROE was positive). Therefore, in reality the number of companies destroying value is smaller. From the results, it is also obvious that the majority of the companies in the sample created value.

Table 2 Engineering – characteristics of the companies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Group of companies | Number | EVA average | EVA max | EVA min | ROE average | ROE max | ROE min |
| Creating value | 544 | 350 012 | 44 968 063 | 20 | 20 % | 639 % | 0.01 % |
| Destroying value | 425 | -675 125 | -19 | -33 170 502 | - 30 % | - 0.09 % | - 531 % |

Source: the authors

For the next step a model was created for the relevant sector using logistic regression. All of the calculated values of the ratio indicators were used from the profile analyses and the statistically insignificant items were removed (according to the p-value above – p>0.05). In this way every model was reduced to the point where it was no longer possible to reduce the number of indicators. Firstly, due to the low p-value (p<0.05), and then due to the reduction of the model's explanatory power. Regardless, we proceeded using the two other models.

As the data comes from internal company documents, there is the potential proximity of individual data and potential interaction. This is why a test was carried out to discover potential collinearity (see table 3). With regard to the values arrived at, it is possible to state that the resulting model is acceptable and potential collinearity in the indicators was not found. The p-value was also monitored to see if the individual parameters did not exceed a value 0.05. This was also not found. The chi-squared test of the model achieves a value of 316.51, which is a value indicating that the zero hypothesis can be rejected. The model can be considered to be reliable.

Table 3 - Results of the collinearity test of the model variables

|  |  |  |
| --- | --- | --- |
| Variable | Value of the correlation coefficient | p-value |
| Costs | 1.185 | 0.0099 |
| ROS | 1.179 | 0.0001 |
| Turnover of equity | 1.012 | 0.0005 |
| Interest coverage | 1.001 | 0.0004 |

Source: the authors

The result is a linear regression equation model. For engineering, the following model was constructed:



Where: F1 is costs,

 F2 is interest coverage,

 F3 is ROS,

 F4 is turnover of equity.

The results show that four indicators are decisive for creating value in engineering: costs, interest coverage, ROS and turnover of equity. A growth in these indicators leads to a growth in value with the exception of the costs indicator. With the construction of this indicator, however, it is logical that with a growth in costs the value of the company will drop and vice versa. It demonstrates that in order to increase the value of the company, there are important indicators in engineering within the areas of activity (operation), profitability and company indebtedness. It can be stated that an increase in return on equity leads to an increase in profitability (ROS), which is furthermore supported by a decrease in cost. A growth in interest coverage then indicates that a growth in value can be achieved either by increasing the returns from existing sources or by increasing indebtedness, which will not increase costs (i.e. by increasing the amount of short-term liabilities from trading).

The chi-squared test and the p-value were verified by the individual indicators in the model and the model can be said to be reliable. The model was then retrospectively applied to companies from the engineering sector including those which were originally removed from the sample (the grey-zone companies). This provided information on the explanatory power of the model, and on the basis of this power the company could be arranged into the same group according to the EVA indicator. The results are shown in table 4.

Table 4 - Engineering – Results from testing the model with input data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | CVM values | Number of companies | % of the sample | Conformity |
| area of companies creating value | < 0.248 | 549 | 56.1 % | 95.1 % |
| area of "grey zone" companies | between | 22 | 2.3 % | Not identified |
| area of companies destroying value | > 0.502 | 408 | 41.6 % | 96.8 % |

Source: the authors

Despite a certain imbalance in the individual groups of companies where the value-creating enterprises predominated, the results of the conformity assessment by the VCM and the EVA indicator are very good. Therefore, it is assumed that the model will determine the engineering companies' value creation to a high degree of accuracy.

**2.2 Transport**

For this sector there were 884 companies, of which 612 (69.11% of the companies) create value and 274 (30.89% of the companies) destroy value according to the EVA indicator. For the results shown in table 5, the same characteristics apply as for the engineering companies. Here too the number companies creating value is higher than for companies destroying value, and to a more significant degree than for the engineering companies.

Table 5 - Transport – characteristics of the companies' results

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Group of companies | Number | EVA average | EVA max | EVA min | ROE average | ROE max | ROE min |
| Creating value | 612 | 60 493 | 6 098 360 | 0 | 31 % | 443 % | 0 % |
| Destroying value | 274 | -296 201 | -12 | -11 632 284 | -47 % | -0.08 % | -606 % |

Source: the authors

The data acquired from the transport sector was used to create the following linear regression model:



Where: F1 is interest coverage,

 F2 is overall indebtedness,

 F3 is working capital

 F4 is EBIT.

As the data comes from internal company documents, there is also the potential proximity of individual data and potential interaction. This was why another test was carried out to discover potential collinearity (see table 6). The results demonstrate that the model is acceptable and potential collinearity in the indicators was not found. The p-value was also monitored to see if the individual value parameters exceeded 0.05. This was also not found. A chi-squared test of the model achieved a value of 104.53, which is a value indicating that the zero hypothesis can be rejected. The model can be considered to be reliable.

Table 6 - Results of the collinearity test of the model variables

|  |  |  |
| --- | --- | --- |
| Variable | Value of the correlation coefficient | p-value |
| Interest coverage | 1.001 | 0.0010 |
| Total debt | 1.018 | 0.0026 |
| Working capital | 1.516 | 0.0021 |
| EBIT | 1.512 | 0.0002 |

Source: the authors

The results show that there are four decisive indicators for the creation of value by transport companies: interest coverage, total debt, working capital and EBIT. A growth in all of these indicators leads to a growth in the company value. It shows that for the transport sector there is a decisive influence from debt and liquidity, and its influence on profit (EBIT). The creation of value by transport companies is also linked to the positive effect of financial leverage and it can be stated that a growth in financial leverage and its positive effect on profit increases a company's value. Regarding the growth of working capital and its positive influence on value, it can be stated that the growth of debt should be linked mainly to a growth in long-term debt.

The chi-squared test and the p-value were verified by the individual indicators in the model and the model can be said to be reliable. The model was then retrospectively applied to transport companies including those which were originally removed from the sample (the grey-zone companies). This provided information on the explanatory power of the model, and on the basis of this power the company could be arranged into the same group according to the EVA indicator. The results are shown in table 7.

Table 7 - Transport – Results from testing the model with input data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | CVM values | Number of companies  | % of the sample | Conformity |
| area of companies creating value | > 0.789 | 565 | 63.8 % | 97.2% |
| area of "grey zone" companies | between | 50 | 5.6 % | Not identified |
| area of companies destroying value | < 0.167 | 271 | 30.6 % | 92.3% |

Source: the authors

Despite a certain imbalance in the individual groups of companies where the value-creating enterprises predominated, the results of the conformity evaluation by the VCM and the EVA indicator are very good. Therefore, it is assumed that the model will determine the transport companies' value creation to a high degree of accuracy, particularly for value-creating companies.

**2.3 The Food Industry**

For this sector there were 870 companies, of which 513 (51.81% of the companies) create value and 357 (48.19% of the companies) destroy value according to the EVA indicator. For the results shown in table 8, the same characteristics apply as for the engineering companies. Here too the number companies creating value is significantly higher, a situation which is similar to the engineering companies.

Table 8 - The food industry – characteristics of the companies' results

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Group of companies | Number | EVA average | EVA max | EVA min | ROE average | ROE max | ROE min |
| Creating value | 513 | 192972 | 13 649 896 | 8 | 25 % | 746% | 0 % |
| Destroying value | 357 | -157162 | -2 | -6 820 200 | -31 % | -0.01 % | -609 % |

Source: the authors

The data acquired from the food-industry sector was again used to create the following linear regression:



Where: F1 is current liquidity,

 F2 is the share of own resources,

 F3 is ROS,

 F4 is asset turnover,

 F5 is ROA,

 F6 is net profit margin.

A test was also carried out in this case to discover potential collinearity (see table 9). The results demonstrate that the model is acceptable and potential collinearity in the indicators was not found. The p-value was also monitored to see if the individual value parameters exceeded 0.05. This was also not found. A chi-squared test of the model achieved a value of 152.77, which is a value indicating that the zero hypothesis can be rejected. The model can be considered to be reliable.

Table 9 - Results of the collinearity test of the model variables

|  |  |  |
| --- | --- | --- |
| Variable | Value of correlation coefficient | p-value |
| Current liquidity | 1.242 | 0.0016 |
| Share of own resources | 1.452 | 0.0002 |
| ROS | 1.147 | 0.0009 |
| Asset turnover | 1.009 | 0.0058 |
| ROA | 1.264 | 0.0003 |
| Net profit margin | 1.140 | 0.0002 |

Source: the authors

The results show that there are six decisive indicators for the creation of value in companies from the food industry: current liquidity, share of own resources, ROS, asset turnover, ROA and net profit margin. Some of these indicators operate in a standard manner on value creation, i.e. it is quite logical that the creation of value (its growth) positively influences ROA (its growth) and net profit margin (its growth). The positive influence of current liquidity shows the importance of payment ability, or financial stability, in value creation, and this indicator is also reflected in the EVA indicator. Somewhat more problematic is the effect of the remaining three indicators whose growth usually means a growth in value. However, in the case of the food industry a fall in equity, a fall in ROS and a fall in asset turnover cause a growth in value, which is unusual in the interaction between ROA and net profit margin, which must, on the contrary, rise. In order to lower the share of equity, it is appropriate to include additional foreign capital (long-term is better due to liquidity), at least instead of equity (which is reduced by, for example, the division of profit among shareholders, again with regard to liquidity). As a result, assets will not decrease, instead they will stay the same or will rise slightly, which also leads to increased ROA with the positive effect of financial leverage. With the same revenue this increase will push for a reduction in asset turnover. For the net profit margin to grow at the same time, it is necessary for profit to rise at least slightly, either through rising prices or a fall in costs relating to the product. However, if ROS has also to fall, the company will have to increase revenue outside of its operational activities, either from financial or other earnings.

It is obvious from the above that in the case of food-industry companies, it is very difficult to easily establish the conditions for creating company value. When looking at the weights of the individual indicators in the model, it is clear that the dominant indicators are the share of equity, which must fall, and the ROA, which must rise. This suggests that it is necessary to use the positive effect of financial leverage and through a growth in debt increase EBIT and net profit. With regard to ROS, the third strongest indicator, it is necessary to achieve higher revenue growths in areas other than sales.

The chi-squared test and the p-value were verified by the individual indicators in the model and the model can be said to be reliable. The model was then retrospectively applied to food-industry companies including those which were originally removed from the sample (the grey-zone companies). This provided information on the explanatory power of the model, and on the basis of this power the company could be arranged into the same group according to the EVA indicator. The results are shown in table 10.

Table 10 - The Food Industry – Results from testing the model with input data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   |  CVM values | Number of companies | % of the sample | Conformity |
| area of companies creating value | > 0.912 | 348 | 40.0 % | 87.3% |
| area of "grey zone" companies | between | 172 | 19.7 % | Not identified |
| area of companies destroying value | < 0.818 | 350 | 40.3 % | 89.5% |

Source: the authors

Again, despite a certain imbalance in the individual groups of companies where the value-creating enterprises predominated, the results of the conformity assessment by the VCM and the EVA indicator are very good. Therefore, it is assumed that the model will determine the food-industry companies' value creation to a high degree of accuracy. However, this level will probably be lower than for the engineering companies.

3 Discussion

The results show that in the three chosen sectors, three different VCM models were constructed which have different indicators that act differently on value growth (whilst the growth of the majority of the indicators leads to a growth in value, in some cases a decrease of the indicator leads to a growth in value). It would, therefore, appear that the construction of special VCM is models for the individual sectors is the correct course.

The same indicator did not appear in any of the three models created. From this it can be deduced that there does not exist a universal indicator across the sectors which would be connected with company value. On the contrary, it would appear that these indicators are designed for specific sectors. This demonstrates that value in different sectors is formed in different places, that there exist different forces (the given weight of the relevant indicator), which operate on value creation in different sectors.

The indicators which appeared at least in two of the three models constructed were interest coverage (engineering and transport) and ROS (engineering and the food industry). While in both cases the growth in interest coverage influences the growth in value, meaning that this indicator can be considered to be an important indicator for contributing towards growth in more sectors, the situation is different for the ROS indicator. In the case of engineering, a growth in the ROS indicator leads to a growth in value, but for food-industry companies it leads to a drop in value. It would, therefore, appear that this indicator is the result of different activities or processes in both sectors. In the case of engineering companies, it seems to evaluate the ability to generate profit from the revenue of the company's production, which corresponds with the main activities of the company and the ability to generate value through the ability to create profit from production sales. For food-industry companies it would appear that the growth in value is connected more with the ability to also create revenues from activities other than selling the company's product, where it is mainly about the volume of revenue at the expense of profitability, which might be lower (lower added value meaning a lower price).

When looking at the representation of the basic groups of indicators, it is obvious that the indicators for influencing value across all sectors are profitability (indirectly in the case of transport in the EBIT indicator), activity and indebtedness. Only in the case of food-industry companies is the liquidity indicator added to these groups. In the case of companies from the transport sector, the working capital indicator is represented indirectly by liquidity.

All of the models are created mainly from ratio indicators. In this regard the transport sector is an exception as two non-ratio indicators appear (EBIT and working capital). It would seem that the appearance of these indicators could be linked to the comparability of the companies in terms of size and with the size of the sample structure, which will need to be confirmed. However, in each case it is shown as legitimate to use absolute indicators when examining the ability to create value in a company.

Conclusion

The results supported our previous research in the sense that is appropriate to create special VCM models for value creation based on individual sectors. For the three sectors of the manufacturing industry under examination it at least confirmed that the special individual models have better explanatory power when applied to the relevant sector rather than one universal model. The models work with different numbers of indicators and with various indicators despite the fact that the groups of indicators are often the same, but the indicators in the model are arranged differently. Only in the case of the transport sector does the growth of all of the indicators positively affect value growth. For the engineering companies the drop in one, and for the food-industry companies a drop in three indicators, contributes towards value creation.

Put simply, it can be said that for all the sectors the key relationship is between indebtedness, profitability and activity, when the creation of value can be identified with the ability to create profit (whether absolutely or relatively) for the company as a whole with the sensible use of debts (with the lowest expense on interest), with the ability to increase a company's efficiency through the return on assets (whether partly or as a whole), and through reducing costs. In some cases (in particular the food industry and transport to a lesser extent), it is necessary to also take into consideration liquidity (working capital). However, at least in the case of the food-industry companies the interdependence of value-creating indicators is untypical (see the opposite effect of ROS and ROA), and that without further analysis it is very difficult to recommend a solution to companies, which would lead to an unambiguous maximization of value.

One of the main limitations of the results is the short time period within which the model was created (based on one year's results). As part of further research, we would like to test the model on data over a longer period. Another limitation is that only three sectors were selected. In future, it will be necessary to create additional models for other sectors. Another definite limitation is the controversial results from the food-industry model. As part of further research, it would be advisable to use modelling and simulation to analyse the financial impact on the creation and growth of a company's value in order to recommend a meaningful strategy to companies which would lead to the creation and growth of value.

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**Appendix**

List of all financial indicators used in the profile analysis

|  |
| --- |
| Current liquidity = current assets / short-term liabilities |
| Total debt = external resources / total assets  |
| Net profit margin = net profit/ operating income + extra income |
| Net working equity = current assets / short-term external resources |
| Net working equity II = profit / operating income + extra income |
| Debt repayment period = external resources – reserves / profit for the accounting period + depreciation |
| EBIT = profit + tax payable + expense interest |
| EVA as a proportion of assets = EVA / total assets |
| Financial leverage = total assets / equity |
| The index of financial leverage = ROA / ROE |
| Self-financing coefficient= equity / total assets |
| Reserves coverage by working equity = net working equity / reserves  |
| Degree of financial independence = equity / (long-term liabilities + short-term liabilities + bank loans and overdrafts) |
| Indebtedness ratio = equity / external resources |
| Cost = total cost / total revenue |
| NWC / long-term resources = (current assets - short-term external resources) / long-term assets |
| NWC / assets = (current assets - short-term external resources) / total assets |
| Turnover of total assets = total revenue / total assets |
| Turnover of long-term assets = total revenue / long-term assets |
| Turnover of current assets = total revenue / current assets |
| Turnover of receivables = total revenue / receivables |
| Turnover of equity = revenue / equity |
| Turnover of reserves= total assets / revenue |
| Immediate liquidity = financial assets / short-term liabilities |
| Share of own resources = equity / total assets |
| Quick liquidity = (current assets – reserves) / short-term liabilities |
| Operating liquidity = (depreciation + EBIT+ reserves) / (long-term liabilities + short-term liabilities – long-term financial assets) |
| ROA = EBIT/total assets |
| ROCE = EBIT / (equity + reserves + long-term liabilities + long-term bank loans) |
| ROE/NWC = ROE / (current assets – short-term external resources) |
| ROS = profit/revenue |
| Interest burden = (short-term + long-term) liabilities - financial assets / balance cash flow |
| Indebtedness CA = (short-term liabilities + long-term liabilities + bank loans and overdrafts) / total liabilities |
| Indebtedness E = equity / external resources |

Source: The authors

1. \* Contact author. Tel.: +420603956385;

 *E-mail address*: suchy@econ.muni.cz. [↑](#footnote-ref-1)