

IMPACT OF WORKING CAPITAL MANAGEMENT ON SALES OF ENTERPRISES FOCUSING ON THE MANUFACTURE OF MACHINERY AND EQUIPMENT IN THE CZECH REPUBLIC

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Abstract

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A method of managing working capital significantly affects the performance of enterprises. It is possible to assume that this influence might vary with the sector and economic cycle. The paper presents an empirical research which aims to identify individual links between working capital and company's sales. The results indicate a relatively strong positive correlation of these variables or their individual components. Findings complement the gap in the literature written by both Czech and abroad authors since the issue is not widely discussed. The research presented in this paper was carried out on medium-sized enterprises located in the Czech Republic and dealing with the manufacture of machinery and other equipment.

Keywords: working capital, sales, GDP, aggressive management policy, conservative management policy, enterprise, inventories, receivables

INTRODUCTION

Working capital management is essential in any kind of enterprise, regardless of its size or sector. It is related to operational decisions and strategic planning of production and storage capacities. Working capital consists of inventories, receivables and current financial assets (Kislingerová, 2010). The management of working capital is then described as the management of all these components (Pavelková and Knápková, 2009). Focusing on the individual components of working capital, it may be assumed that there will be a significant positive correlation between working capital and company's sales.

In accordance with Tomek (2007) and Sarangi (2009), it can be supposed that the impact of working capital on sales could be deduced from the effect of services added to the product. For the purposes of the research, the time of product delivery and the length of supplier credit are especially considered as these additional services. It may be expected that the increase in scope of these value-

added services according to customers' needs cause an increase in sales due to the acquisition of new customers. The ability to deliver products quickly and to provide a longer maturity period can be derived from the size of inventories and receivables. In this regard, it can be expected that a shorter delivery times of products is associated with higher level of stocks held and a longer maturity period of invoices issued is associated with higher level of receivables. For these reasons, it can be assumed that an increase in working capital results into the increase in sales and that this relationship will be either linear or concave.

It is evident that working capital management significantly influences the corporate performance and that it is an issue that managers must deal with. According to Pavelková and Knápková (2009), working capital management affects the business performance, especially assets turnover. This has been confirmed by Kislingerová and Hnilica (2008). Režňáková (2010) states that an aggressive policy of net working capital management increases

the company's performance from the perspective of the owner, because the effect of an increase in the return on invested capital exceeds the effect of a lower profit due to a decline in sales. According to the author, the increase in performance may be realized by the shortening of cash conversion cycle. This is in line with previous ideas and it provides some directions for working capital management.

However, this idea can be misleading since its construction is not based on a specific relationship between the level of working capital and the volume of sales. It may be assumed that this relationship varies for different industries. The same phenomenon can be observed even in case of net working capital itself, as shown by Režňáková (2010). According to Filbecka and Kruger (2005), these differences between sectors should be constant in time. Moreover, as stated by Pirvutoiu and Popescu (2009), an aggressive management of net working capital increases the risk of company's insolvency. It is obvious that only a limited number of studies written by the Czech authors are devoted to this issue and that these studies do not provide sufficient guidance to working capital management.

Recommendations and instructions for setting the optimal level of working capital and net working capital are difficult to be found in foreign studies as well. There exist several directions of existing research. Similarly to the Czech authors, Bellouma (2011) sees in the shortening of cash conversion cycle the possibility to release liquidity, which can be subsequently used to finance capital investments. According to the author, a reduced need for working capital can be regarded as the effect of such investments. Longinidis and Georgiadis (2013) also agree with this conclusion.

To the contrary, Banos-Caballero, García-Teruel and Martínez-Solano (2014) are focused on searching for the optimum level of working capital. The authors assume a concave relationship between the corporate performance and the level of working capital. This level is measured by the cash conversion cycle. Based on the obtained results, the authors believe that it is good to extend the length of cash conversion cycle to a certain point and after reaching this point it is better to reduce it. This optimum can be determined from the derivation of the relationship.

This has been confirmed by Nazir and Afza (2009, A) who suggest that a more moderate policy of asset management (i.e. a higher ratio of current assets to total assets) increases the profitability. It can be therefore supposed that these authors have examined the industry that occurs in the rising part of the concave curve that was described by Banos-Caballero, García-Teruel and Martínez-Solano (2014). Tufail (2013) has also reached similar conclusions.

These results have been supported by the real behavior of firms and they have been demonstrated when examining the impact of particular variables on working capital expenditures and its size. Hill,

Kelly and Higfield (2010) and Nazir and Afza (2009, B) have dealt with this issue. Despite the fact that the studies do not agree in all aspects, both studies have confirmed a positive correlation between the size of cash-flow and working capital expenditures. From this it may be concluded that firms prefer to invest money in working capital rather than in securities or other investment activities. However, it cannot be generally predicted whether a firm decides to keep money or invest them. As evidenced in the research on motives for money holding, there exist several specific determinants. Bigelliho and Sánchez-Vidal (2012) mention the size of company and marketability of shares on stock exchange markets. This has been also confirmed by Al-Najjar (2013). With regard to other determinants, Ozkan and Ozkan (2004) mention the impact of separation of ownership and management and Subramaniam, Tang, Yue and Zhou (2011) mention the degree of production diversification. The mentioned authors agree on the influence of financial constraints in obtaining external financial resources.

From the above text, it is evident that the issue of working capital optimization is very complex and it is related to several research directions and questions. This study is focused on a comprehensive mapping of the impact of working capital management on business performance. It is our first contribution to the issue and it is followed by further research.

The aim of the present paper is to describe and analyze the relationship between the working capital and company's sales, respectively between the components of working capital and company's sales, in case of medium-sized companies located in the Czech Republic and manufacturing machinery and other equipment.

MATERIALS AND METHODS

In order to investigate the impact of working capital on company's sales, the data of companies of only one sector and a comparable size have been selected. This approach seems to be necessary because the level of working capital in companies of different sectors can significantly vary. However, this level may be different also within one industry because the size of company strongly influences access to financial sources.

The research is focused on medium-sized enterprises located in the Czech Republic and manufacturing machinery and equipment (i.e. section 28 according to CZ-NACE classification). All data have been obtained from the Amadeus database. Size of assets and size of turnover have been chosen as the size criterion. In accordance with the European Commission Recommendation (2003/61/EC), it corresponds to companies whose annual balance sheet total ranges between 10 and 43 million EUR and whose annual turnover ranges between 10 and 50 million EUR. Only

17 companies have met the above-described criteria. The research is based on data from years 2008 to 2011.

Data have been investigated using regression analysis that aims to determine the impact of working capital or its components on the level of sales. The regression analysis was selected mainly because of the comparability of results with previous relevant studies of a similar nature. The absolute values on the balance sheet and the profit loss statement, as well as their annual changes, have been used for the analysis. Final regression models have become the subject of economic verification. Based on the results of this verification, the model is confirmed or adjusted. Only verified models that belong to a group of estimators BUE (i.e. best unbiased estimator) or BLUE (i.e. best linear unbiased estimator) are presented in other sections of the paper.

Using regression analysis, an estimate of the mean value of the dependent variable is to be obtained, which is described by functional relationship of independent variables. The coefficients of independent variables (explanatory variables) indicate the size of the change of the mean value of estimated dependent variable in case of one-unit change of the independent variable, assuming *ceteris paribus*. To make these estimates impartial, consistent and substantial, it is necessary to meet the assumptions of the classical linear regression model. The following requirements have to be fulfilled when working with cross-sectional data:

- the model is correctly specified, linear in parameters and has an additive error term (tested using the RESET test and the LM test),
- the error term oscillates around the mean value (graphic verification),
- the independent variables are not correlated with the error term (verification using the correlation analysis),
- no heteroskedasticity in the model (tested using the White's test or the Breusch-Pagan test),
- no perfect multicollinearity between the independent variables (tested using VIF factors),
- the error term is normally distributed (tested using the chi-square test).

The latter assumption is not necessary, but it is recommended. If the assumption is not satisfied, then these are so-called BLUE estimates. If all assumptions are met, these are so-called BUE estimates.

The following regression models are used to examine the data:

$$\text{Model A} \quad S = \beta_0 + \beta_1 WC + \varepsilon \quad [1]$$

$$\text{Model B} \quad S = \beta_0 + \beta_1 STO + \beta_2 REC + \varepsilon \quad [2]$$

$$\text{Model C} \quad \Delta S = \beta_0 + \beta_1 \Delta WC + \varepsilon \quad [3]$$

$$\text{Model D} \quad \Delta S = \beta_0 + \beta_1 \Delta STO + \beta_2 \Delta REC + \varepsilon \quad [4]$$

where

Ssales,

ΔSchange in sales,

WCworking capital in absolute terms defined as current assets,

ΔWCchange in working capital,

STOstocks,

ΔSTOchange in stocks,

RECreceivables,

ΔRECchange in receivables.

Several similar models have been formed to gain the ideas about the industry, but only the above mentioned models are able to meet the assumptions of the classical linear regression model and have sufficient statistical significance.

RESULTS

The findings presented in the introduction section reveal that although the relationship between the corporate performance and the size of working capital is unknown, it may have a big impact on financial decision-making. It can be assumed that there is a positive correlation between the volume of sales and working capital. Moreover, it can be assumed that the functional relationship is expressed as a straight line or as a concave curve. The concave relationship is expected by Banos-Caballero, García-Teruel and Martínez-Solano (2014), who have examined the effect of net working capital on profitability and have explained the resulting concave shape by rising costs. The costs increase due to the growth of active components of net working capital. In our case, the concave shape would mean that the effect of the growth of working capital components on the growth of sales will decrease with each other unit.

Model A depicts the impact of working capital as independent variable on sales. The result is a linear relationship, which is described in Tab. I.

Model A indicates a linear relationship between the size of working capital and sales, where the size of sales corresponds to 2.47 multiple of the size of the working capital. Model A and the variable of working capital are statistically significant. The regression describes 62% variability of the sample. No violation of the assumptions of classical linear regression model has been found. Contrary to the theory, the value of the constant term is negative. This means that if a company did not have working capital, the sales would be negative, which is not possible. However, the constant term is not statistically significant and therefore, this deficiency will be further ignored.

From the model A, it can be assumed that there is a linear relationship between the size of sales and working capital. Due to the size of the parameter β_1 , it may be supposed that changes in the size of working capital evoke relatively large changes in the size of sales. In order to verify this assumption, model B has been compiled. The model, summarized in Tab. II, describes

I: *Impact of working capital on sales*

	Coefficient	Std. Error	t-ratio	p-value	
Const	-11312	170716	-0.0663	0.94811	
WC ₁₁	2.46609	0.516686	4.7729	0.00030	***
Mean dependent var	736041.4	Standard deviation of dependent variable		426018.6	
Sum squared resid	1.04e+12	Standard. error of regression		272060.0	
R-squared	0.619365	Adjusted R-squared		0.592177	
F(1, 14)	22.78063	P-value(F)		0.000297	
Log-likelihood	-221.8552	Akaike criterion		447.7104	
Schwarz criterion	449.2556	Hannan-Quinn		447.7895	

Source: Authors' calculations

II: *Impact of changes in working capital on changes in sales*

	Coefficient	Std. Error	t-ratio	p-value	
Const	53432.2	25218.4	2.1188	0.05248	*
Δ WC ₁₁	1.37398	0.174201	7.8873	<0.00001	***
Δ sq_WC ₁₁	-1.83298e-06	4.51707e-07	-4.0579	0.00117	***
Mean dependent var	43456.35	Standard deviation of dependent variable		295925.3	
Sum squared resid	1.12e+11	Standard. error of regression		89614.22	
R-squared	0.919759	Adjusted R-squared		0.908296	
F(2, 14)	80.23694	P-value(F)		2.14e-08	
Log-likelihood	-216.3272	Akaike criterion		438.6544	
Schwarz criterion	441.1541	Hannan-Quinn		438.9029	

Source: Authors' calculations

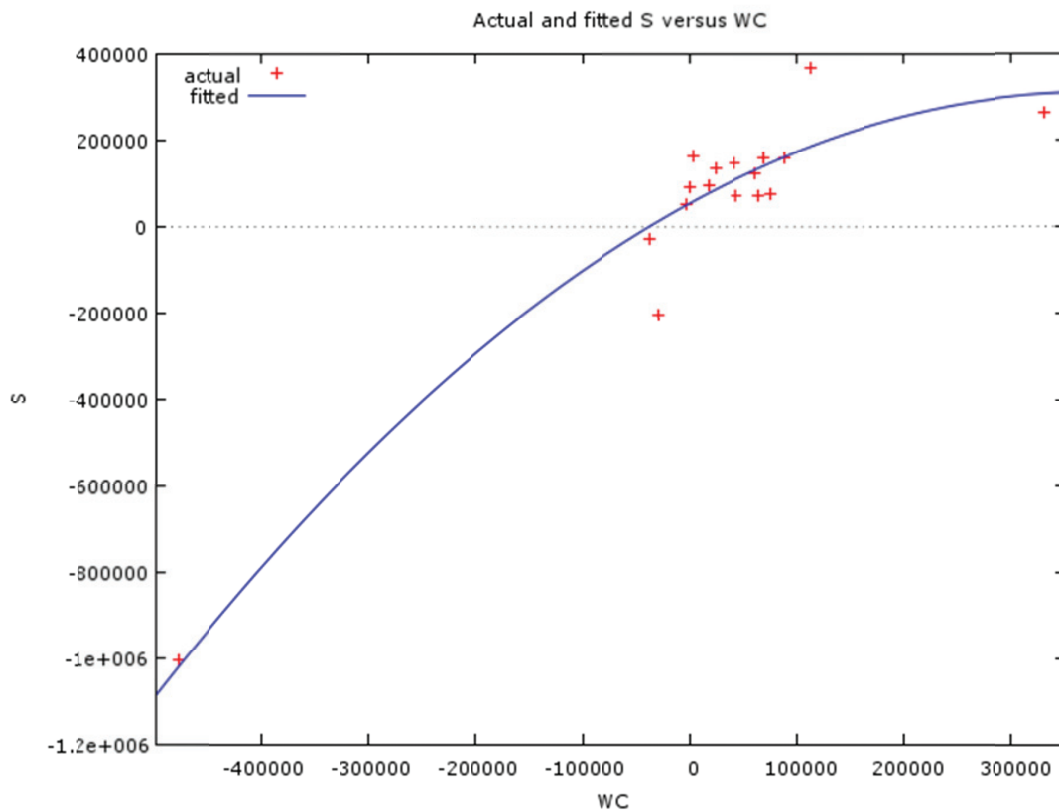
the impact of the changes in working capital on the changes in sales.

Model B describes nearly 92% variability of the sample and it is statistically significant, as well as all independent variables, including the constant term. The constant term is positive, which indicates that sales would slightly increase even at an unchanged level of working capital. The coefficient β_1 , which represents a linear component of quadratic equation, is positive, while the coefficient β_2 , which represents a quadratic component, is negative. This means that the curve has a concave shape. A graphic illustration of the model B is shown in Fig. 1. Despite the fact that model B is more statistically significant than model A and it describes more variability of the sample, some difficulties have appeared with respect to its economic verification. The variance of residues is not normally distributed. Furthermore, according to the White's test model, there is a heteroskedasticity; however, P-value is close to 5% level on which models are tested, thus a problem would not be so severe. Next, the Breusch-Pagan test in its robust version has been performed. Based on the results of both tests, the hypothesis of homoscedasticity of the model can be accepted (P-value of 0.707918, respectively 0.837043). Looking at the graph of actual and fitted values, conclusions about homoscedasticity are being confirmed. Thus, it can be said that the model B belongs to the so-called BLUE estimates.

The idea, which appears in the introduction of this article, lies in determination of the effect

of the time of product delivery and the length of supplier credit on the acquisition of new customers. This effect may be considered only if the company's products are comparable to the competition in price and quality. The influence of other marketing mix elements is not reflected in the paper. Under this reasoning, therefore, not all the components of working capital occur, only stocks and receivables are involved. The impact of the size of stocks and receivables on company's sales is investigated in model C. On the basis of X-Y diagrams and test specifications, the use of linear dependence for the two independent variables seems to be the most appropriate. The resulting model C examines the impact of accounts receivable and stocks as the independent variables on sales as the dependent variable. The model is shown in Tab. III.

From the regression results it follows that the model C describes about 71% variability of the sample. It is statistically significant, as well as both independent variables. In consistence with the expectations, the constant term is positive (as opposed to the model A), but it is not statistically significant. The variable of receivables is then statistically more significant than the variable of stocks. For comparison of models' suitability, the adjusted coefficient of determination can be followed. The value of the coefficient indicates that the model C is more relevant than model A. No problems have appeared during the economic verification. Only the residues do not show normal

1: *Impact of changes in working capital on changes in sales*

Source: Authors' calculations

III: *Impact of stocks and receivables on sales*

	Coefficient	Std. Error	t-ratio	p-value	
Const	175545	122182	1.4367	0.17442	
STO ₁₁	2.27701	0.963837	2.3624	0.03442	**
REC ₁₁	2.67333	0.811856	3.2929	0.00583	***
Mean dependent var	736041.4	Standard deviation of dependent variable		426018.6	
Sum squared resid	7.85e+11	Standard. error of regression		245664.3	
R-squared	0.711810	Adjusted R-squared		0.667473	
F(2, 13)	16.05457	P-value(F)		0.000308	
Log-likelihood	-219.6294	Akaike criterion		445.2589	
Schwarz criterion	447.5766	Hannan-Quinn		445.3776	

Source: Authors' calculations

IV: *Impact of changes in stocks and receivables on changes in sales*

	Coefficient	Std. Error	t-ratio	p-value	
Const	37266.2	15056.7	2.4751	0.02672	**
Δ STO ₁₁	2.70653	0.275404	9.8275	<0.00001	***
Δ REC ₁₁	2.55679	0.447182	5.7176	0.00005	***
Mean dependent var	43456.35	Standard deviation of dependent variable		295925.3	
Sum squared resid	5.20e+10	Standard. error of regression		60960.85	
R-squared	0.962868	Adjusted R-squared		0.957564	
F(2, 14)	181.5177	P-value(F)		9.73e-11	
Log-likelihood	-209.7774	Akaike criterion		425.5548	
Schwarz criterion	428.0545	Hannan-Quinn		425.8033	

Source: Authors' calculations

distribution. The model therefore falls into BLUE estimates.

However, model C examines only the relationship between account balances at the end of the year. Consequently, the model is not able to predict the change in sales in case of the change of any of the particular independent variables. The model only shows that the size of sales corresponds to 2.4 multiple of the size of stocks and to 2.7 multiple of the size of receivables. Based on these findings, it can be concluded that the changes in stocks and receivables would have a positive impact on the size of sales. This assumption has been confirmed by model D. The model investigates the impact of changes in stocks and receivables, as independent variables, on changes in sales, as the dependent variable. Results of the regression model D are summarized in Tab. IV.

Model D is statistically significant as well as the constant term and two independent variables. It describes more than 96% variability of the sample. In comparison with previous models, based on the adjusted coefficient of determination, the model best describes the variability of the sample. According to F-test, it has the greatest significance. The model has satisfied all the assumptions of classical linear model including the normal distribution of the error term; thus, it can be classified as BLUE estimates.

Model D has confirmed the linear relationship between the dependent variable and the independent variables. This has been also observed in case of model A and C. With respect to the results of regression analysis, it may be supposed that the sales are very sensitive to changes in stocks and receivables. Nevertheless, such a significant influence, which has been proved by all models, is rather surprising. It is therefore possible that in spite of the positive results of RESET test, the models are not entirely correctly specified. Based on the above models, it may be only concluded that the size of sales or the changes in the size of sales can be described as approximately two and half multiple of the size of working capital or its changes.

DISCUSSION

The obtained empirical models are further compared with the results of previous studies on this issue. The results of model A to D are in compliance with the findings of Nazir and Afza (2009, A) and Tufail (2013). These authors believe that a more moderate policy of working capital management results into the increase in company's profitability. It also explains some unexpected results in the study by Nazir and Afza (2009, B). Contrary to the expectations, these authors have found that the size of cash-flows and working capital are positively correlated. Companies use free cash flow to increase its working capital, which may be motivated by associated increase in outputs. Moreover, according to Beranová and Basovníková

(2011), the size of sales strongly affects the economic profit. Findings are inconsistent with Režňáková (2010) who states that the decline in sales may be relatively lower than the increase in profitability and the reduction of current assets (i.e. aggressive management) should be more advantageous for the company. This is most evident in the model D. However, it must be said that these conclusions are generic and oriented towards the entire Czech Republic and the author herself has raised the problem of differences in various sectors. The choice of the industry sector may be an explanation for differences in presented findings.

The results of the model B are fully in line with research reported by Banos-Caballero, García-Teruel and Martínez-Solano (2014) since the model represents a concave relationship between the change in sales and change in working capital. To the contrary, models A, C and D are linear and not concave. This may be due to the fact that within the range of this relationship all companies in the sample are to be found on the rising part of the curve and none of them have reached the local extreme. It could also be caused by the fact that model A and C explore the absolute size and not the changes in variables. This presumption is disproved by model D that investigates the changes and is also linear. Moreover, model D is the most relevant since it describes the highest variability of the sample and has the highest statistical significance.

Nevertheless, the results of model D are not stable over time, which is due to a sharp decline in sales in 2009. Subsequently, this occurrence affects the calculation of all the changes except for the change between years 2010 and 2011, which became the basis for model D. In year 2009, the average sales have declined, despite the fact that all the components of working capital have increased. It can be assumed that this phenomenon was caused by the economic crisis. This may be supported by the fact that there was a significant decrease in GDP in the Czech Republic in 2009. Models that have not considered the changes are relatively stable and econometrically verifiable, with the exception of year 2009. Only in 2009, the impact of receivables has significantly increased and the impact of stocks has decreased.

On the basis of the above findings, it can be assumed that future research should explore the relationship between the performance of the national economy and the corporate performance.

It is necessary to emphasize that this article is the first contribution to the issue of examining the impact of working capital on business performance and will be followed by further studies. In particular, the aim is to determine the impact of working capital on costs and to identify the effect of changes in working capital on corporate profitability in selected segment.

SUMMARY

The aim of the present paper was to determine the relationship between working capital and company's sales, or rather between components of working capital and company's sales, in case of medium-sized enterprises located in the Czech Republic and manufacturing the machinery and other equipment (section 28 according CZ NACE classification). The data have been obtained from the Amadeus database. Based on the selected criteria for the size, the sample consists of 17 companies. Within the empirical research, four empirical models have been compiled.

Based on the results of these verified models, it can be assumed that the size of sales is strongly influenced by the size of working capital and particularly by the size of receivables and stocks. Model D appears to be the most appropriate to depict this relationship since it describes the highest variability of the sample and also has the highest statistical significance. Next, it can be said that the increase in stocks by one monetary unit leads to the increase in sales by 2.71 monetary units and the increase in receivables by one monetary unit leads to the increase in sales by 2.56 monetary units. As it has been discussed in the results section, these values are very high and surprising. From the perspective of statistics, a very high explanatory power of the model can be also caused by the opposite effect. The size of demand, which is reflected in the size of sales, may in fact influence the size of stocks and receivables. It can be therefore concluded that for the further research on the impact of working capital on sales, the time-delay effects should be considered in the models.

It should be also noted that the models following the changes are not stable in the analyzed years, which is due to a step change in input data in year 2009. Models based on account balances at the end of the year are stable over time, only in 2009 the structure of impact of independent variables changes.

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