ACTA UNIVERSITATIS AGRICULTURAE ET SILVICULTURAE MENDELIANAE BRUNENSIS

Volume 63 33 Number 1, 2015
http://dx.doi.org/10.11118/actaun201563010263

INFLUENCE OF COMPONENTS OF NET WORKING CAPITAL ON COSTS OF COMPANIES MANUFACTURING MACHINERY AND EQUIPMENT IN THE CZECH REPUBLIC

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Abstract

MOTLÍČEK ZDENĚK, MATĚJOVÁ PAVLÍNA, MARTINOVIČOVÁ DANA. 2015. Influence of Components of Net Working Capital on Costs of Companies Manufacturing Machinery and Equipment in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis,* 63(1): 263–270.

The approach to working capital management significantly affects the performance of companies. Nevertheless, this effect varies depending on the observed industry and company's size and it may be assumed that it is also dependent on territory differences. The paper presents an empirical research aiming to identify particular links between net working capital and costs of the company. The outcomes indicate a relatively strong positive correlation between the variables, especially in case of inventory. Furthermore he ratio of financial costs to ordinary costs is low, as well as the impact of net working capital components on financial costs. It follows that a focus on collection period would not lead to significant savings. The findings appropriately complement Czech and foreign literature focused more on impact of net working capital or working capital on profitability indicators. Further studies concerning a more detailed analysis of the influence of net working capital on corporate costs are difficult to be found. The present research has been conducted on medium-sized companies located in the Czech Republic and manufacturing machinery and equipment. The obtained results suggest the most suitable area of focus for optimization of working capital in relation to costs for the types of companies defined above.

Keywords: working capital, net working capital, ordinary cost, directs cost, financial cost, inventory, receivables, short-term financial assets, short-term liabilities

INTRODUCTION

All corporate managers need to be concerned with management of assets. A crucial part of asset management is then a net working capital management and setting a suitable policy of working capital. Although the issue of net working capital belongs to the field of operational management, setting up a policy in this area has a significant impact on strategic management in the form of requirements for purchasing, production and storage. Net working capital consists of inventories, receivables and short-term financial assets (Kislingerová, 2010). Consequently, management of net working capital involves management of all its components (Pavelková and Knápková, 2009).

Changes in the size of these items importantly influence corporate costs and revenues. This assumption has been confirmed by authors' preliminary research since a verified model has predicted a significant impact of changes in the size of inventories and receivables on the size of sales. As a result, it can be expected that these changes also strongly influence development of cost items. Similarly to Tomek (2007), authors suppose that providing a longer maturity of receivables and a shorter period of products delivery can result into attraction of new customers and increase of sales. To the contrary, these tools of sales promotion can be reflected by the growth of receivables and inventories, which lead to the increase of costs.

This has been confirmed by Lind *et al.* (2012), who also argued that an increase in components of working capital results in growth of tied-up capital and reduction of return of investment indicator. The authors further stated that changes in average collection period are in most cases compensated by changes in creditor's payment period and therefore a major influence on development of cash conversion cycle can be assigned to inventory turnover. It leads to the idea that for working capital management it is necessary to focus especially on inventory management. Bei a Wijewardana (2012) believed that orientation towards management of appropriate components of working capital is a key issue for each company. According to the authors, it is caused by time constraints and by effects on profitability.

It is obvious that management of net working capital has a significant impact on corporate performance. With respect to working capital management, Pavelková and Knápková (2009) asserted that firm performance is especially influenced by asset turnover. It has been confirmed by Kislingerová and Hnilica (2008). Režňáková (2010) claimed that aggressive policy of net working capital management increases firm performance from owner's perspective because the effect of increase in return on capital employed exceeds the effect of lower profit caused by a decline in sales. The foregoing proposition is in accordance with Vahid *et al.* (2012), who suggested that the company's aim is to achieve the shortest cash conversion cycle. According to Bellouma (2011), the shortening of cash conversion cycle can be viewed as a source of financing for small and medium-sized companies in developing markets. However, as Režňáková (2010) stated, it is necessary to take into consideration the differences between industries. In compliance with Filbeck and Kruger (2005) these differences should remain constant in time.

On the contrary, Banos-Caballero, García-Teruel a Martínez-Solano (2014) assumed a concave relationship between corporate performance and level of working capital. On the basis of their research, it can be assumed that it is suitable to extend the length of the cycle to a certain point, after its achievement it is necessary to commence the reduction of the cycle. The optimum is determined based on the derivation of the observed relationship.

This has been confirmed by Nazir and Afza (2009, A), who noted that a moderate policy of assets management (i.e. a higher proportion of current assets to total assets) leads to higher profitability. Therefore, it can be assumed that the analysed industry is located on the increasing part of the concave curve described by Banos-Caballero, García-Teruel a Martínez-Solano (2014). This is in compliance with the findings of Tufail (2013).

In contrast, based on the examination of working capital management policy in practise, Bei a Wijewardana (2012) found that 64 per cent of companies in Sri Lanka took aggressive approach to working capital management. On the ground of these dissimilar results, it can be assumed that the differences exist not only between particular industries but also between particular countries and territories.

The concept of territory effects have been proved by other studies, for example by Hill, Kelly and Higfield (2010) or Nazir and Afza (2009, B). Although the studies do not agree in all aspects, both of them have confirmed a positive correlation between the size of cash-flow and working capital expenditures. It follows that companies prefer to invest in working capital rather than in securities or other investment activities. Nevertheless, it cannot be universally determined if companies invest or keep the money.

As it is apparent from studies on motives for holding money, there are several specific factors. According to Bigelli and Sánchez-Vidal (2012), it is mainly company's size and marketability of shares in stock exchanges. These findings are consistent with Al-Najjar (2013). Subramaniam, Tang, Yue and Zhou (2011) added the factor of degree of production diversification and Aydin Ozkan and Neslihan Ozkan (2004) supplemented the issue of separation of ownership and management structures. As another important factor, all mentioned authors considered the financial constraints in obtaining external sources of finance.

Based on the above knowledge, it can be assumed that the research on the impact of net working capital management on corporate performance involves many different aspects since the net working capital is affected by industry and country differences and other factors, such as size and marketability or macroeconomic development.

The objective of the present paper is to determine the relationship between net working capital and corporate costs or, more precisely, the relationship between components of net working capital and costs of medium-sized companies located in the Czech Republic and manufacturing machinery and equipment.

METHODS AND RESOURCES

For investigation of the effect of net working capital on corporate costs, the data of companies of a similar size in the same industry sector have been utilized. This procedure is necessary since the common level of working capital can vary significantly between different industries. Moreover, this level may also vary within one industry because the size of the company strongly influences the access to financial resources.

Consequently, the research is focused on medium-sized enterprises located in the Czech Republic and manufacturing machinery and equipment (i.e. NACE division 28 according to the Statistical classification of economic activities in the European Community). The data have been obtained from

the Amadeus database. In total, 75 companies have met the criteria described above. Then, the cases with insufficient entries have to be eliminated from the study. A complete case contains the information about size of inventories, receivables, short-term financial assets, short-term debts, operating costs and financial costs. After the described selection procedure only 28 companies have satisfied all the requirements. The study utilizes the data of years 2012 and 2011.

The data have been examined using the regression analysis to determine the influence of the components of net working capital on the level of costs; more specifically, with a focus on costs from operating activities, costs from financial activities and costs from ordinary activities (given as the sum of operating and financial costs). For the analysis, both the balance sheet and profit and loss statement data in absolute values (year 2012) and in year-on-year changes have been used. Resulting regression models have become the subject of economic verification. Based on the results of the verification, the model is confirmed or adapted. In the section of results and discussion, only verified models referring to so-called BUE or BLUE estimates are presented. Terms "working capital" and "net working capital" take on different meanings within the text. Working capital is defined as the sum of inventories, receivables and short-term financial assets; net working capital is defined as the difference between working capital and short-term debts.

The following regression models have been proposed:

Model A

$$CC = const. + STC + REC + STFA + STD + \varepsilon, \quad [1]$$

Model B

$$OC = const. + STC + REC + STFA + STD + \varepsilon, \quad [2]$$

Model C

$$FC = const. + STC + REC + STFA + STD + \varepsilon, \quad [3]$$

Model D

$$\Delta CC = const. + \Delta STC + \Delta REC + \Delta STFA + \Delta STD + \varepsilon, \quad [4]$$

Model E

$$\Delta OC = const. + \Delta STC + \Delta REC + \Delta STFA + \Delta STD + \varepsilon, \quad [5]$$

Model F

$$\Delta FC = const. + \Delta STC + \Delta REC + \Delta STFA + \Delta STD + \varepsilon, \quad [6]$$

where
CC.....are ordinary costs,
OC.....are operating costs,
FC .....are financial costs,
Δ .....is a year-on-year change,
const. .is a constant in regression model,
STC.....is level of inventories,
REC ....is level of receivables,
CE.....are short-term financial assets,
STD ....are short-term debts,
ε.....is the random error.

The data for year 2012 or changes between years 2011 and 2012 are utilized for calculations. Statistical software Gretl is used to build regression models and to verify them. The estimated regression equations are developed on the basis of authors' ideas of the links in the model that results from a preview of the data and their projection in xy diagrams. As a part of modelling in Gretl system, there have been minor adjustments of relations. There also has been an elimination of independent variables that were statistically insignificant and reduce explanatory power of a model. If the model could not be verified, it was replaced by a correlation matrix. The final forms of the models are presented in the results section.

RESULTS

At searching for the relationship between net working capital and corporate costs it is necessary to see how ordinary costs are influenced by the size

I: *Impact of inventories and receivables on ordinary costs*

	Coefficient	Std. Error	t-ratio	p-value	
const	24435.1	5641.88	4.3310	0.00023	***
INV	2.80565	0.518744	5.4085	0.00001	***
REC	3.22738	0.725979	4.4456	0.00017	***
sq_INV	–1.2785e-05	2.92437e-06	–4.3719	0.00021	***

Mean dependent variable	71320.18	Standard deviation of dependent variable	53724.45
Sum squared resid	1.11e+10	Standard error of regression	21516.82
Coefficient of determination	0.857420	Adjusted coefficient of determination	0.839597
F(4. 57)	48.10873	P-value (F)	2.65e-10
Log-likelihood	–316.9167	Akaike criterion	641.8334
Schwarz criterion	647.1622	Hannan-Quinn	643.4625

Source: Authors' calculations

of individual components of net working capital. Firstly, the values of operating and financial costs have been compared. From the comparison, it is evident that operating costs are much higher than financial costs. The ratio of financial costs to ordinary costs appears to be negligible. This initial assumption has been supported by following regression models.

Model A represents the influence of components of net working capital on size ordinary costs. The results are summarized in Tab. I.

Model A is statistically significant, as well as all independent variables, and it describes 85.7% variability of the sample. Within the model specification, the variables of short-term financial assets and short-term debts were excluded. Both eliminated variables were statistically insignificant and besides, the direction of short-term debts was not consistent with economic verification of the model. Moreover, this variable showed collinearity with inventories size. This reflects the fact that most inventories are covered by short-term debts, mainly trade payables. After removing of these two variables, it was possible to verify the model. Collinearity between linear and quadratic component of inventories has been expected, however, on the basis of recommendations of Gujarati and Porter (2009), it has been ignored.

The model belongs to a group of so-called BUE estimations since the residuals do not show a normal distribution.

Results of the model indicate a significant effect of inventories and receivables on ordinary costs where inventories are modelled as a quadratic function. Nevertheless, size of receivables shows a stronger influence on costs. It can be caused by its impact on financial costs, which are not important enough, or by the fact that the size of receivables may reflect the size of production, which is likely to be related to the generating of variable costs. However, the receivables themselves apparently do not generate other than financial and transactional costs. The value of constant member expresses the size of costs if receivables and inventories equal zero. It can be assumed that to some extent it represents the size of fixed costs.

Model B depicts the effect of components of net working capital on operating costs. The model is very similar to previous model. The only difference lies in the size of parameters of individual variables, though they do not vary a lot. Results of the model are given in Tab. II.

From Tab. II it is evident, that differences between model A and model B are minimal, which confirms that the ratio of financial costs to ordinary costs is very low. Verification of model B was accompanied by the same problems as verification of model A. Interpretation of the model is particularly concentrated on changes in comparison with model A. As Tab. III shows, an abstraction of financial costs has meant a decrease in the influence of receivables. This decline of five hundredths is not significant yet and it corresponds to a low proportion of financial costs. The receivables remain the most significant constituent and represent the variable costs caused by satisfying the consumers' demand. A quadratic component of the inventories function is again negative but its value in the order of ten thousandths is very low. The impact of inventories is growing; nevertheless, at a certain point it starts to decline slowly. This phenomenon may be due to volume discounts when purchasing a large amount of inventories.

Model C illustrates the impact of components of net working capital on financial costs. Outcomes of the model are shown in Tab. III.

Model C also belongs to BUE estimations since the residuals do not indicate a normal distribution.

When evaluating the model at 5% probability level, a model specification test suggests that explanation of financial costs by means of components of net working capital may be extended to other variables. However, this is not an objective of the paper. According to the results, the size of financial costs is influenced by all components of net working capital. The highest impact is observed in the case of receivables that are represented by a quadratic function. The quadratic term is negative but its value is very low, which means that from a certain

II: *Impact of inventories and receivables on operating costs*

	Coefficient	**Std. Error**	**t-ratio**	**p-value**	
const	24040.2	5474.78	4.3911	0.00020	***
INV	2.74803	0.50338	5.4592	0.00001	***
REC	3.17687	0.704477	4.5095	0.00014	***
sq_INV	–1.28012e-05	2.83776e-06	–4.5110	0.00014	***

Mean dependent variable	69667.57	Standard deviation of dependent variable	52190.27
Sum squared resid	1.05e+10	Standard error of regression	20879.53
Coefficient of determination	0.857731	Adjusted coefficient of determination	0.839948
F(4. 57)	48.23157	P-value(F)	2.58e-10
Log-likelihood	–316.0749	Akaike criterion	640.1497
Schwarz criterion	645.4785	Hannan-Quinn	641.7788

Source: Authors' calculations

III: *Impact of components of net working capital on financial costs*

	Coefficient	Std. Error	t-ratio	p-value	
const	–652.292	446.625	–1.4605	0.15829	
STFA	0.116597	0.0462712	2.5199	0.01950	**
STD	0.0437068	0.00673805	6.4866	< 0.00001	***
REC	0.34451	0.123811	2.7825	0.01086	**
sq_REC	–1.86276e-05	7.22013e-06	–2.5800	0.01709	**

Mean dependent variable	1658.407	Standard deviation of dependent variable	2617.170
Sum squared resid	41159570	Standard error of regression	1367.805
Coefficient of determination	0.768882	Adjusted coefficient of determination	0.726861
F(4. 57)	18.29737	P-value(F)	9.51e-07
Log-likelihood	–230.5126	Akaike criterion	471.0252
Schwarz criterion	477.5044	Hannan-Quinn	472.9518

Source: Authors' calculations

IV: *Impact of changes in net working capital components on changes in ordinary costs*

	Coefficient	Std. Error	t-ratio	p-value	
Const	8255.42	2829.42	2.9177	0.00797	***
ΔINV	1.78168	0.519808	3.4276	0.00241	***
ΔREC	1.63049	0.525891	3.1004	0.00522	***
sq_ΔINV	–2.42211e-05	5.96405e-06	–4.0612	0.00052	***
sq_ΔREC	9.0461e-05	3.38975e-05	2.6687	0.01403	**
ΔSTFA	–0.58462	0.328651	–1.7788	0.08909	*

Mean dependent variable	9825.500	Standard deviation of dependent variable	26151.05
Sum squared resid	3.85e+09	Standard error of regression	13229.04
Coefficient of determination	0.791485	Adjusted coefficient of determination	0.744095
F(4. 57)	16.70159	P-value(F)	7.60e-07
Log-likelihood	–302.0788	Akaike criterion	616.1575
Schwarz criterion	624.1508	Hannan-Quinn	618.6011

Source: Authors' calculations

point the rate of growth of costs due to receivables will slow down. Surprisingly, the lowest effect can be noted in the case of short-term debts. Consequently, it can be concluded that the vast majority of working capital is permanent and financed by long-term sources or trade-payables. Interest-bearing short-term debts are then used only for financing of unexpected fluctuations.

For accuracy improvement of above-mentioned findings that are based on the regression of absolute values, the year-on-year changes are taken into account. Two regression models A and B have been developed, model F could not be built. It was therefore replaced by a correlation matrix.

Model D describes the influence of changes in net working capital components on changes in ordinary costs. This model is presented in Tab. IV.

Model D has to deal with verification problems caused by correlation between linear and absolute members of explanatory variables. As with previous models, based on recommendation of Gujarati and Porter (2009), these shortcomings have been ignored. The model is statistically significant and it describes 79.1% variability of the sample. All individual independent variables are statistically significant; however, the short-term financial assets are significant only at 10% probability level. Results of the model indicate that even if the components of net working capital did not change, the costs would markedly increase. This phenomenon may be caused by increasing fixed costs, which may result from increasing capital-labour ratio. The greatest influence on the changes in ordinary costs has been observed in the case of inventories. Nevertheless, this influence begins to decline from a certain point. To the contrary, the impact of receivables is initially slightly lower but from the inflection point it evinces a very moderate under proportional increase. Rather unexpectedly, short-term financial assets are negatively correlated with ordinary costs. It can be supposed that this is due to management's effort to have a financial pillow for unpredictable events. If there is a growth of free cash over the required minimum level, the appropriate way of their allocation is sought. For example, this may be cash discounts, which would decrease the operating costs due to reduction of material inputs. However, the impact is not large, which is indicated by a lower

V: *Impact of changes in net working capital components on changes in operating costs*

	Coefficient	Std. Error	t-ratio	p-value	
Const	8244.89	2731.8	3.0181	0.00632	***
ΔINV	1.76743	0.501873	3.5217	0.00192	***
ΔREC	1.61664	0.507746	3.1840	0.00429	***
ΔSTFA	–0.591525	0.317311	–1.8642	0.07570	*
sq_ΔINV	–2.39566e-05	5.75826e-06	–4.1604	0.00041	***
sq_ΔREC	9.00385e-05	3.2728e-05	2.7511	0.01166	**

Mean dependent variable	9812.714	Standard deviation of dependent variable	25801.79
Sum squared resid	3.59e+09	Standard error of regression	12772.59
Coefficient of determination	0.800328	Adjusted coefficient of determination	0.754948
F(4. 57)	17.63612	P-value(F)	4.79e-07
Log-likelihood	–301.0956	Akaike criterion	614.1912
Schwarz criterion	622.1844	Hannan-Quinn	616.6348

Source: Authors' calculations

VI: *Correlation matrix of net working capital components and financial costs*

ΔFC	ΔINV	ΔREC	ΔSTFA	ΔSTD	
1.0000	–0.2032	0.2245	0.0016	–0.1190	ΔFC
	1.0000	–0.1520	–0.0263	0.9292	ΔINV
		1.0000	–0.4073	0.1402	ΔREC
			1.0000	–0.0911	ΔSTFA
				1.0000	ΔSTD

Source: Authors' calculations

statistical significance of the explanatory variable short-term assets. Changes in short-term debts were excluded from the model since they were not statistically significant and their presence reduced the explanatory power of the model. It suggests that changes in working capital components may be anticipated and may not produce additional pressure on acceptance of new interest-bearing short-term debts.

Model E depicts the impact of changes in net working capital components on operating costs. Results are summarized in Tab. V.

Model E was accompanied by the same problems with verification as model D, but model E meets the assumption of a normal distribution of the error term. Both models are almost identical and their assessment brings the same conclusions. This supports the idea that changes in financial costs are very small and very significant, which has been suggested by data itself. Findings are confirmed by correlation matrix presented in Tab. VI. Results of model E, which deals only with operating costs, indicate that the consideration about the impact of short-term assets and their allocation is correct.

From Tab. VI, it is apparent that none of the components of net working capital has a considerable effect on the financial costs. The correlation can be considered as significant if its absolute value exceeds eight tenths. Results show a very strong positive correlation between changes in the size of inventories and short-term debts. It follows that almost all changes in inventories are financed by short-term debts. Given the other findings, these are probably the trade payables, which expenses are not reflected in financial costs but in operating costs of production consumption.

DISCUSSION

As already demonstrated in the introduction, the authors have agreed on significant influence of net working capital on corporate performance. Moreover, some of the studies have also mentioned the issue of impact of net working capital on costs, namely Tomek (2007), Kislingerová (2010), Režňáková (2010), Bei and Wijewardana (2012) or Lind *et al.* (2012). Nevertheless, a concrete analysis of cost impact is usually neglected.

Bei a Wijewardana (2012) have notified that one of the components is always the most important one and that's why the optimization should be focused on it. With this view it can agreed, besides results from this presented research show the greatest impact of inventories on costs. This finding is consistent with Lind *et al.* (2012); however, the interpretation of it differs.

According to Lind *et al.* (2012), the changes in the size of receivables are compensated by the changes in the size of short-term debts, and therefore they do not have a big impact. Thus, only the inventories

have a significant effect. Nevertheless, in our opinion, the receivables may only affect the financial costs due to their financing and also some of the transaction costs associated with their collection. Owing to the fact that the financial costs are not too significant within the examined sector, the impact of inventories is much more important. Moreover, the inventories are strongly positively correlated with the growth of short-term debts, particularly trade payables. With regard to costs, this state is mainly manifested in production consumption by means of unused discounts and higher input prices.

Acknowledgement

This paper was supported by Grant Agency of the Faculty of Business and Economics, Mendel University in Brno [No. 43/2014].

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