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Impact of working capital management on business profitability: Evidence from the Polish dairy industry

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Abstract: The main purpose of this paper was to examine the causative link between Working Capital Management (WCM) and Return On Assets (ROA) in milk processing companies. Days Sales of Inventory (DSI), Days Sales Outstanding (DSO), Days Payable Outstanding (DPO) and the Cash Conversion Cycle (CCC) were used as WCM metrics. The study was based on micro-data for Polish dairy companies from 2008–2017, retrieved from the Emerging Markets Information Service (EMIS) database. Based on panel regression models, it was demonstrated that extending the DSI and CCC had an adverse effect on ROA, whereas extending the DSO and DPO had a beneficial impact on ROA in dairy companies. Such relationships were mostly characteristic of SMEs which form the largest group of businesses in Poland.

Keywords: milk processing; panel models; profitability; working capital management

Working Capital Management (WCM) is one of key aspects of corporate financial management, primarily focusing on decisions regarding the amount and structure of current assets and current liabilities (Deloof 2003; Sharma and Kumar 2011; Mansoori and Datin 2012). Many companies invest heavily in working capital, which requires them to monitor working capital and its components (inventories, receivables, payables) on a continuous basis because of the effect it has on the profitability and liquidity of their business (Deloof 2003; Gill et al. 2010; Karaduman et al. 2011). An excessive level of working capital inflates the costs of liquidity, and therefore has an adverse impact on profitability. Conversely, if insufficient, working capital may result in increasing the risk of losing financial liquidity and in business disruptions (Van Horne and Wachowicz 2004). Therefore, efforts need to be made to optimize both the amount and sources of working capital. The above also means that working capital must be managed so as to find the right balance between two contradictory objectives: being able to generate value and maintaining liquidity (Shin and Soenen 1998; Wasilewski and Chmielewska 2006; Wasilewski and Zabolotnyy 2009; Sharma and Kumar 2011).

The impact of WCM on corporate financial performance was addressed in many research projects (Jose et al. 1996; Deloof 2003; Garcia-Teruel and Martinez-Solano 2007; Mohamad and Saad 2010; Sharma and Kumar 2011). Usually, the Cash Conversion Cycle (CCC) developed by Richards and Laughlin (1980) was used in these studies as the basic metric of WCM efficiency. Indeed, CCC synthetically reflects the efficiency of managing the components of working capital, i.e. inventories, receivables and payables (Gitman 1974). Findings from relevant research are quite straightforward and suggest that, in the vast majority of cases, the shortening of working capital cycles has a positive effect on profitability. The above relationship is largely corroborated by a meta-analysis carried out by Singh et al. (2017). Based on 46 scientific publi-

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cations indexed in EBSCO, Elsevier, Emerald and Scopus, they concluded that a negative correlation exists between CCC and business profitability.

However, the relationship between WCM and financial performance was relatively rarely addressed with respect to agribusinesses, and yielded ambiguous results. The very few studies carried out in this sector include analyses by Lyroudi and Lazaridis (2000) who focused on the Greek food industry. Their findings confirmed a significant yet positive relationship between the duration of CCC and the rates of return. Similar conclusions were made by Akdoğan and Dinç (2019), who analyzed Turkish food companies. They also demonstrated that extending the CCC had a beneficial impact on business profitability, which suggests that Turkish business managers can generate positive value for owners by extending the CCC to an optimum level. The same causative link was revealed in a study carried out by Thapa (2013) in the US and Canada. In this case, extending the CCC was clearly found to have a positive impact on financial performance. Conversely, opposite conclusions were drawn by Ahmadi et al. (2012) based on research into the Iranian food industry. In light of their findings, extending the Days Sales Outstanding (DSO), Days Sales of Inventory (DSI), Days Payable Outstanding (DPO) and CCC drives a decline in business profitability. They conclude that in order to increase value for shareholders, efforts must be made to minimize these cycles of working capital.

Therefore, the main purpose of this paper is to verify the causative link between Working Capital Management (WCM) and financial performance of Polish food companies whose operations involve milk processing.

MATERIAL AND METHODS

The literature review presented above suggests that a generally significant and positive relationship exists between the efficiency of WCM (measured with the duration of its sub-cycles: *DSI*, *DSO* and *DPO*) and the duration of the synthetic cycle (cash conversion cycle), on one side, and financial performance at company level, on the other. This paper verifies the above hypothesis based on 2008–2017 annual financial reports of a balanced panel of 76 Polish milk processing and cheese production companies (NACE 10.51), as published in the Emerging Markets Information Service database (EMIS 2019)[1]. The analysis was carried out on the basis of the entire enterprise population and divided into SME and large enterprises. The analyses used the following indicators of working capital cycles, calculated as per the formulas set out below:

$$DSI_{j,t} = \frac{\text{average level of inventory} \times 365}{\text{operating costs}} \quad (1)$$

$$DSO_{j,t} = \frac{\text{average amount of short-term receivables} \times 365}{\text{sales proceeds}} \quad (2)$$

$$DPO_{j,t} = \frac{\text{average amount of payables} \times 365}{\text{operating costs}} \quad (3)$$

$$CCC_{j,t} = DSI_{j,t} + DSO_{j,t} - DPO_{j,t} \quad (4)$$

where: $DSI_{j,t}$ – Days Sales of Inventory; $DSO_{j,t}$ – Days Sales Outstanding; $DPO_{j,t}$ – Days Payable Outstanding (refers to operating payables for supplies and services); $CCC_{j,t}$ – Cash Conversion Cycle (in days).

In turn, the financial performance of companies was assessed based on the return on operating assets ($ROA_{j,t}$), calculated as follows:

$$ROA_{j,t} = \frac{EBITDA_{j,t} \times 100}{\text{average amount of } OA_{j,t}} \quad (5)$$

where: $EBITDA_{j,t}$ – operating profit + depreciation in company *j* in year *t*; $OA_{j,t}$ – operating assets (property, plant and equipment + intangible assets + long-term receivables + long-term deferred charges + short-term receivables + stocks).

Panel regression tools were used, and the parameters of equations which address separately the *DSI*, *DSO*, *DPO* and *CCC* were estimated in order to determine the strength and direction of impact of WCM cycles on the return on enterprise assets. Also, a set of control variables which are generally regarded as important determinants of *ROA* were used in testing these relationships. Usually, they include different metrics of assets structure, liquidity ratios, company age, company size (measured as incomes or assets value) and growth rates of various other financial metrics (Deloff 2003; Lazaridis and Tryfonidis 2006; Garcia-Teruel et al. 2007). This paper relies on the following set of control variables: $CR_{j,t}$ – current ratio in company *j* in year *t*;

[1]EMIS contains current country and company information from more than 500 sources for emerging markets in Africa, Asia, Australia, Europe, and the Middle East. Arranged by country, this resource includes country profiles; macroeconomic statistics, forecasts, and analysis; reports on financial markets, companies, and industries; exchange rates; analyst reports; and business news (EMIS 2019).

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$TA_{j,t}$ – logarithmized value of total assets in company j in year t; $SFA_{j,t}$ – share of property, plant and equipment in total assets in company j in year t; $AGE_{j,t}$ – age of company j in year t; $\Delta S_{j,t}$ – growth rate of sales proceeds in company j $\left(S_t - S_{t-1}/S_{t-1}\right)$ (%).

The hypothesized impact of WCM on financial performance was tested using the panel data methodology which allows to control and eliminate non-observable heterogeneity (Hsiao 1985). Also, these methods enable avoiding the problem of endogeneity, i.e. the feedback loop between the model's explained and explanatory variables. Hence, the system method proposed by Arellano and Bover (1995) and Blundell and Bond (1998), based on the generalized method of moments, was used to estimate the parameters of panel models. Models estimated on that basis are assessed with the Arellano-Bond test (m_2) and the Hansen test. The m_2 test verifies the hypothesis of autocorrelation in the random effect, and assumes the absence of autocorrelation in the second-order random effect (Arellano and Bond 1991). In turn, the Hansen test verifies the suitability of introducing additional instruments. The null hypothesis is the absence of correlation between instrumental variables and the random effect. If no correlation exists, this suggests the model is specified properly (Blundell and Bond 1998; Labra and Torrecillas 2018).

The inclusion of the methodological assumptions set out above had an impact on the construction and estimation of the following regression models for the return on assets:

$$ROA_{j,t} = \alpha_0 + \gamma ROA_{j,t-1} + x_{jt}^T\beta + DSI_{j,t} + \left(\alpha_j + \varepsilon_{jt}\right), \quad j = 1,\ldots,N, \; t = 1,\ldots,T \tag{6}$$

$$ROA_{j,t} = \alpha_0 + \gamma ROA_{j,t-1} + x_{jt}^T\beta + DSO_{j,t} + \left(\alpha_j + \varepsilon_{jt}\right), \quad j = 1,\ldots,N, \; t = 1,\ldots,T \tag{7}$$

$$ROA_{j,t} = \alpha_0 + \gamma ROA_{j,t-1} + x_{jt}^T\beta + DPO_{j,t} + \left(\alpha_j + \varepsilon_{jt}\right), \quad j = 1,\ldots,N, \; t = 1,\ldots,T \tag{8}$$

$$ROA_{j,t} = \alpha_0 + \gamma ROA_{j,t-1} + x_{jt}^T\beta + CCC_{j,t} + \left(\alpha_j + \varepsilon_{jt}\right), \quad j = 1,\ldots,N, \; t = 1,\ldots,T \tag{9}$$

where: $x_{jt}^T\beta$ – set of control variables; α_j – group effect (constant over time); ε_{jt} – random effect.

The models' parameters were estimated for the entire sample of dairy companies and for sub-samples, i.e. SMEs and large enterprises. The calculations were based on the *xtabond2* estimator (Roodman 2009; Labra and Torrecillas 2018) available in the STATA 15 statistical suite.

RESULTS AND DISCUSSION

Differences in working capital cycles between dairy companies. Table 1 shows the basic descriptive statistics for the duration of and variation in working capital cycles in dairy companies covered by this study (grouped by size). The data suggests that the average duration of the Cash Conversion Cycle (*CCC*) was 16.4 days for the whole sample. This means that dairy companies quite quickly recovered the amounts of money invested in their business operations. The statistics also show that the Days Payable Outstanding (*DPO* = 29 days) and the Days Sales of Inventory (*DSI* = 19.6 days) had, respectively, the strongest and the weakest impact on the conversion cycle.

However, the statistics presented above also reflect considerable differences in the duration of cycles covered by the analysis. This is especially true for the Cash Conversion Cycle and the Days Sales of Inventory. Indeed, the corresponding coefficients of variation (V) are 101.3% and 55.6%, compared to 33.0%

Table 1. Descriptive statistics of working capital cycles in dairy enterprises surveyed

Statistics	Total				Small and medium-sized enterprises				Large enterprises			
	DSI	*DSO*	*DPO*	*CCC*	*DSI*	*DSO*	*DPO*	*CCC*	*DSI*	*DSO*	*DPO*	*CCC*
$\bar{x}$	19.6	25.8	29.0	16.4	19.4	23.7	28.3	14.9	20.1	32.3	31.3	21.0
Min	4.2	0.3	3.7	–26.4	4.2	0.3	3.7	–17.9	6.4	9.3	13.3	–26.4
Max	89.3	88.5	74.6	150.9	89.3	75.6	74.6	150.9	42.5	88.5	59.9	85.4
V (%)	55.6	43.2	33.0	101.3	60.8	41.6	33.2	105.0	37.1	38.4	31.4	88.6
Med	17.4	24.4	27.2	15.3	16.7	22.6	26.7	13.3	19.3	31.1	29.5	21.0

DSI – Days Sales of Inventory (days); *DSO* – Days Sales Outstanding (days); *DPO* – Days Payable Outstanding (days); *CCC* – Cash Conversion Cycle (days); $\bar{x}$ – mean; Min – minimum; Max – maximum; *V* – coefficient of variation (%); Med – median

Source: Own calculations based on EMIS (2019)

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for *DPO*. In turn, the median (Med) value can be observed to exceed the mean value $\bar{x}$ for all cycles. Such relationships reflect a minor left-side asymmetry in the distribution of the operators surveyed.

These conclusions are largely true for SMEs, too. Indeed, the mean duration of *CCC* in that group was 14.9 days which means that small and medium-sized dairy companies needed little time (less than average) to recover the amounts of money invested in their business operations. In their case, too, the *DPO* (28.3 days) and the *DSI* (19.4 days) had, respectively, the strongest and the weakest impact on the Cash Conversion Cycle. In this size class, the *CCC*s and *DSI*s strongly differ between companies (105.0% and 60.8%) and exhibit left-hand asymmetry in their distribution, too.

Compared to the overall sample and to SMEs, large enterprises report a relatively longer Cash Conversion Cycle (*CCC* = 21 days). Although they have a similar duration of *DSI* (20.1 days) and *DPO* (31.3 days), it takes more time for them to recover their receivables (*DSO* = 32.3 days). However, in this class size, too, the *CCC* largely differed between the companies (V = 88.6%) whereas in the case of other cycles, the variation was relatively smaller (and below average).

Estimation results for the relationship between working capital cycles and ROA. The estimation of parameters of regression models was preceded by an analysis of correlation. Table 2 presents the Pearson's linear correlation coefficients for all the variables under consideration. The analysis suggests that *ROA* is, on the one hand, negatively correlated to *DPI* and *CCC* and, on the other hand, positively correlated to *DSO* and *DPO*.

Hence, these relationships are multidirectional and not fully consistent with findings from other research which generally reveal that extending any of the working capital cycles has an adverse effect on operating profitability. Also, data in Table 2 suggests that profitability is strongly and positively related to growth in sales proceeds (ΔS) and to the size of the company (*TA*), and is negatively related to company age (*AGE*) and assets structure (*SFA*).

Tables 3–6 present the parameters of *ROA* equations. The autocorrelation test (m_2) results presented in the tables show that moment conditions used in the estimation process are correct for all models, and that no second-order autocorrelation exists in them. Therefore, the instruments used in estimations are adequate. The Hansen test, too, suggests that the models are specified properly. This is because correlation between instrumental variables and the random effect was not found in any of the models, which is consistent with the null hypothesis.

Considering the parameters of regression models estimated for all enterprises sampled (Table 3), it can be noted that all types of working capital cycles exhibit a statistically significant relationship with *ROA*. However, these relationships vary in direction, which is consistent with the analysis of correlation. Indeed, negative regression coefficients of the Days Sales of Inventory (*DSI*) and Cash Conversion Cycle (*CCC*) suggest a negative impact of the extension of these periods on the return on operating assets in dairy companies. Conversely, positive coefficients of Days Sales Outstanding (*DSO*) and Days Payable Outstanding (*DPO*) reflect the beneficial impact of extending these cycles on *ROA*. However, considering the absolute values of regression coefficients for these cycles, it is difficult not to notice that their impact on profitability varies quite strongly. Indeed, a one-unit increase in the *DSI*

Table 2. Correlation matrix (Pearson's correlation coefficients) for the whole sample of enterprises

	DSI	*DSO*	*DPO*	*CCC*	*CR*	ΔS	*TA*	*AGE*	*SFA*	*ROA*
DSI	1.000	–	–	–	–	–	–	–	–	–
DSO	0.099***	1.000	–	–	–	–	–	–	–	–
DPO	0.015	0.373	1.000	–	–	–	–	–	–	–
CCC	0.713***	0.522***	–0.316***	1.000	–	–	–	–	–	–
CR	0.090**	–0.112***	–0.357***	0.019***	1.000	–	–	–	–	–
ΔS	–0.106***	0.014	–0.062	–0.024	–0.071	1.000	–	–	–	–
TA	0.188***	0.328***	0.283***	0.181***	–0.101***	0.122***	1.000	–	–	–
AGE	–0.182***	–0.186***	–0.095**	–0.189***	0.009	–0.077	–0.098	1.000	–	–
SFA	–0.074	–0.004	0.149***	–0.137***	–0.457***	–0.016	–0.102***	0.004	1.000	–
ROA	–0.102**	0.099**	0.091**	–0.087**	–0.049	0.470***	0.222***	–0.131***	–0.129***	1.000

**Significant at 95%, ***significant at 99%; *DSI* – Days Sales of Inventory; *DSO* – Days Sales Outstanding; *DPO* – Days Payable Outstanding; *CCC* – Cash Conversion Cycle; *CR* – current ratio; ΔS – growth rate of sales proceeds; *TA* – total assets; *AGE* – age of company; *SFA* – share of property, plant and equipment in total assets; *ROA* – return on operating assets

Source: Own calculations based on EMIS (2019)

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Table 3. Parameters of return on assets (ROA) models for the whole sample of enterprises

Variables and tests	Model 1	Model 2	Model 3	Model 4
ROA_{t-1}	–0.042 (0.541)	–0.052 (0.451)	–0.052 (0.462)	–0.043 (0.542)
SFA	–18.85 (0.000)	–18.77 (0.000)	–18.38 (0.000)	–18.67 (0.000)
CR	–2.127 (0.023)	–2.193 (0.013)	–1.911 (0.030)	–2.028 (0.038)
TA	1.207 (0.005)	0.977 (0.028)	0.944 (0.031)	1.167 (0.005)
AGE	–0.024 (0.164)	–0.016 (0.362)	–0.017 (0.349)	–0.023 (0.189)
ΔS	23.83 (0.000)	24.15 (0.000)	23.41 (0.000)	24.46 (0.000)
DSI	–0.101 (0.040)	–	–	–
DSO	–	0.033 (0.035)	–	–
DPO	–	–	0.037 (0.023)	–
CCC	–	–	–	–0.046 (0.027)
Constant	5.353 (0.132)	4.616 (0.111)	3.294 (0.170)	4.332 (0.450)
m_2	–0.45 (0.656)	–0.56 (0.578)	–0.58 (0.563)	–0.50 (0.619)
Hansen	14.61 (0.201)	14.28 (0.218)	14.44 (0.209)	14.59 (0.202)
Number of instruments		19		
Number of observations		608		
Number of groups		76		

The values in brackets indicate the level of significance of the variables or tests; m_2 – a serial correlation test of second order using residuals of first differences, asymptotically distributed as $N(0,1)$ under null hypothesis of no serial correlation; Hansen test is a test of over-identifying restrictions distributed asymptotically under null hypothesis of validity of instruments such as *Chi*-squared; *SFA* – share of property, plant and equipment in total assets; *CR* – current ratio; *TA* – total assets; *AGE* – age of company; ΔS – growth rate of sales proceeds; *DSI* – Days Sales of Inventory; *DSO* – Days Sales Outstanding; *DPO* – Days Payable Outstanding; *CCC* – Cash Conversion Cycle

Source: Own calculations based on EMIS (2019)

Table 4. Parameters of return on assets (ROA) models for small and medium enterprises

Variables and tests	Model 1	Model 2	Model 3	Model 4
ROA_{t-1}	–0.053 (0.506)	–0.073 (0.351)	–0.069 (0.392)	–0.058 (0.473)
SFA	–26.14 (0.000)	–24.20 (0.000)	–24.74 (0.000)	–26.23 (0.000)
CR	–3.269 (0.005)	–3.100 (0.006)	–3.044 (0.006)	–3.275 (0.005)
TA	1.713 (0.018)	1.503 (0.027)	1.628 (0.021)	1.639 (0.029)
AGE	–0.020 (0.287)	–0.009 (0.632)	–0.012 (0.553)	–0.019 (0.304)
ΔS	26.11 (0.000)	27.84 (0.000)	27.89 (0.000)	26.80 (0.000)
DSI	–0.101 (0.024)	–	–	–
DSO	–	0.061 (0.036)	–	–
DPO	–	–	0.069 (0.019)	–
CCC	–	–	–	–0.059 (0.031)
Constant	5.342 (0.462)	6.355 (0.0392)	5.916 (0.417)	5.986 (0.395)
m_2	–0.40 (0.689)	–0.52 (0.600)	–0.53 (0.598)	–0.46 (0.648)
Hansen	13.33 (0.273)	12.55 (0.323)	12.74 (0.311)	13.53 (0.260)
Number of instruments		19		
Number of observations		456		
Number of groups		57		

The values in brackets indicate the level of significance of the variables or tests; m_2 – serial correlation test of second order using residuals of first differences, asymptotically distributed as N(0,1) under null hypothesis of no serial correlation; Hansen test is a test of over-identifying restrictions distributed asymptotically under null hypothesis of validity of instruments such as *Chi*–squared; *SFA* – share of property, plant and equipment in total assets; *CR* – current ratio; *TA* – total assets; *AGE* – age of company; ΔS – growth rate of sales proceeds; *DSI* – Days Sales of Inventory; *DSO* – Days Sales Outstanding; *DPO* – Days Payable Outstanding; *CCC* – Cash Conversion Cycle

Source: Own calculations based on EMIS (2019)

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Table 5. Parameters of return on assets (ROA) models for large enterprises

Variables and tests	Model 1	Model 2	Model 3	Model 4
ROA_{t-1}	0.038 (0.819)	0.079 (0.626)	0.078 (0.628)	0.131 (0.480)
SFA	–4.228 (0.578)	–4.367 (0.516)	–5.254 (0.418)	–1.888 (0.747)
CR	0.147 (0.927)	0.485 (0.749)	0.728 (0.641)	1.570 (0.250)
TA	1.066 (0.005)	1.199 (0.031)	1.175 (0.009)	0.288 (0.008)
AGE	–0.048 (0.096)	–0.055 (0.097)	–0.042 (0.132)	–0.046 (0.087)
Δ*S*	17.00 (0.000)	18.33 (0.000)	19.43 (0.000)	19.08 (0.000)
DSI	–0.202 (0.001)	–	–	–
DSO	–	–0.076 (0.026)	–	–
DPO	–	–	0.059 (0.253)	–
CCC	–	–	–	–0.094 (0.021)
Constant	0.242 (0.990)	6.821 (0.103)	–8.249 (0.639)	3.023 (0.860)
m_2	–1.05 (0.296)	–0.16 (0.872)	–1.66 (0.096)	–1.28 (0.199)
Hansen	12.45 (0.331)	10.57 (0.307)	11.44 (0.407)	11.45 (0.407)
Number of instruments	19			
Number of observations	152			
Number of groups	19			

The values in brackets indicate the level of significance of the variables or tests; m_2 – a serial correlation test of second order using residuals of first differences, asymptotically distributed as *N*(0,1) under null hypothesis of no serial correlation; Hansen test is a test of over–identifying restrictions distributed asymptotically under null hypothesis of validity of instruments such as *Chi*–squared; *SFA* – share of property, plant and equipment in total assets; *CR* – current ratio; *TA* – total assets; *AGE* – age of company; Δ*S* – growth rate of sales proceeds; *DSI* – Days Sales of Inventory; *DSO* – Days Sales Outstanding; *DPO* – Days Payable Outstanding; *CCC* – Cash Conversion Cycle

Source: Own calculations based on EMIS (2019)

resulted in a reduction of profitability by 0.101 percentage points, whereas an increase in the *DSO* and *DPO* drove an increase in *ROA* by 0.033 and 0.037 percentage points, respectively. The above means that the extension of *DSI* had a nearly three times greater impact on *ROA* than the extension of *DSO* and *DPO*.

The direction of the impact of control variables (other than AGE which proved to be insignificant) on *ROA* is largely consistent with findings from other research which generally prove that this category of financial performance is positively correlated with the size of the company (*TA*) and growth in sales proceeds (Δ*S*). Furthermore (as confirmed by a number of other studies), inflexible assets characterized by a large share of property, plant and equipment (*SFA*) and a conservative liquidity management policy reflected by a high current ratio (*CR*) also have an adverse effect on *ROA*.

Generally, quite similar conclusions can be drawn from the analysis of model parameters (Table 4) based on the sub-sample of small and medium dairy enterprises. In this size class, too, the reduction of *DSI* and *CCC* was found to have a statistically significant and positive impact on *ROA*, just as the extension of *DSO* and *DPO*. However, it can be noticed that the positive impact of the extension of *DSO* and *DPO* on profitability (Table 4) is relatively stronger in SMEs than in the whole sample of enterprises (Table 3). This is because the coefficients of regression for these cycles (0.061 and 0.069) are clearly higher than in regression models for the general sample. However, despite the differences in how the sub-cycles affect *ROA*, the negative coefficient of regression for the *CCC* suggests that in the case of SMEs, too, it is advisable to manage their working capital so as to reduce the time needed to recover the funds invested. This is because a reduction in *CCC* has a positive effect on *ROA* in the SME sector. Also, just as in the general sample, an increase in sales proceeds (Δ*S*) and in the value of assets (*TA*) has a positive impact on the return on assets in SMEs. Conversely, an inflexible structure of assets and a conservative liquidity management policy (*CR*) have a negative effect. However, the impact these variables have on *ROA* is much stronger in SMEs than in the general sample. Indeed, the coefficients of regression suggest that an increase in incomes (Δ*S*), in assets value (*TA*), in the share of fixed assets in total assets (*SFA*) and

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in liquidity (*CR*) had a much stronger effect on *ROA* in the SME sector.

In turn, when analyzing the parameters of regression models estimated based on the sub-sample of large dairy enterprises (Table 5), it can be noticed that the extension of working capital cycles (other than *DPO*) has an adverse effect on *ROA*. Also, as regards large companies, the negative profitability impacts of extending the *DSI*, *DSO* and *CCC* are considerably stronger than in the general population surveyed (Table 3) and in SMEs (Table 3). In large companies, a one-unit increase in the duration of these cycles reduced the *ROA* by 0.202 percentage points (*DSI*), 0.076 percentage points (*DSO*) and 0.094 percentage points (*CCC*), i.e. stronger by ca. 100% (*DSI*), 25% (*DSO*) and 59% (*CCC*) than in the SME sector. In turn, when considering the control variables, it can be noticed that the number of statistically significant variables is much smaller in that group of businesses. Indeed, the parameters of regression models suggest that *ROA* in this size class is determined by assets value (*TA*) and sales growth (ΔS). In this context, note that as shown by regression coefficients, the impact these variables have on *ROA* is clearly stronger in large enterprises than in SMEs.

CONCLUSION

Both the profitability and liquidity of enterprises are determined by multiple factors. These include the WCM policy which is designed to reasonably set the amounts of working capital and align it with financing capabilities. This means that WCM efforts must include making decisions on the levels of inventories, receivables and payables which result in reducing the operating cycle and the Cash Conversion Cycle (Deloof 2003). However, in practice, WCM strategies can differ strongly from one another, e.g. as a consequence of the company's activity type, industry and size (Singh et al. 2017). The causative links (as identified in the population of Polish dairy companies) between the duration of sub-cycles and of the synthetic cycle, on one side, and the return on assets, on the other, demonstrated that the relationships are multidirectional. In light of regression models developed in this paper, higher *ROA*s may be expected upon a reduction in *DSI* and *CCC* but also upon an extension of *DSO* and *DPO*. This type of relationships was found to prevail in the total sample of dairy companies covered by this study and in the SME sector. The analyses found that in large companies, too, an increase in *ROA* is driven by a reduction in *DSI*s and *CCC*s. However, in this size class (unlike in the SME sector), a negative relationship was discovered between the *DSO* and *ROA*. This means that in large enterprises, accelerating the recovery of receivables from customers can have a beneficial impact on profitability. Note also that despite the differences identified in this paper, the regression models clearly showed that the *DSI* had the greatest effect on profitability levels of dairy companies. Indeed, reducing the *DSI* was much more determinant for *ROA* than other sub-cycles of working capital.

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