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Determinants of working capital management in small and medium enterprises: Evidence from Central and Eastern Europe

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Abstract The main purpose of the paper is to identify the determinants of working capital management in the SME sector at the company, industry and country levels. The research is based on the statistical analysis of the financial data of 8,516 SMEs from Bulgaria, the Czech Republic, Hungary, Poland, Romania, and Slovakia in the years 2012-2020. The influence of firm-specific factors on variables describing working capital management has been identified: company size exerts a positive impact, while company growth, tangibility, leverage, and cash flow have a negative effect. In terms of the influence of industry-specific factors, the average values characterising working capital management in a given industry have a positive impact. Finally, regarding country-specific factors, the positive effects of the GDP growth and unemployment level have also been confirmed. The study contributes to the literature by providing strong evidence of (i) firms in an industry using similar working capital management policies and (ii) industry-specific factors being more influential than country-specific (mainly macroeconomic) determinants of working capital management. In this regard, the study highlights new industry- and country-specific factors and also confirms the influence of previously known determinants at the firm level.

Keywords: working capital management, liquidity, cash conversion cycle, small and medium enterprises, Central and Eastern Europe.

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1. INTRODUCTION

Working capital management (WCM) is one of the key areas of financial decision-making in any business. It includes decisions related to determining the levels of current assets and current liabilities and the rate of the turnover thereof while ensuring adequate profitability and liquidity.

WCM research is currently undergoing dynamic development. Literature reviews conducted by Singh and Kumar (2014), Prasad et al. (2019), Nobanee and Dilshad (2021) and Martinho (2021) showed that there are more than 2000 articles on the topic indexed in scientific databases. Most of them focus on two areas: (i) the impact of WCM on company profitability, and (ii) the determinants of WCM. The first two literature reviews (Prasad et al., 2019; Pratap Singh & Kumar, 2014) have indicated, among other things, an existing research gap concerning small and medium enterprises (SMEs). Nobanee and Dilshad (2021) and Martinho (2021) have mentioned only a few papers devoted to this sector. The authors of these papers (Baños-Caballero et al., 2010; Orobia et al., 2016; Sardo and Serrasqueiro, 2022) stressed that WCM determinants of SMEs were studied very rarely and the knowledge in this regard was insufficient. At the same time, there is evidence that the WCM is based on different routines in SMEs and in large enterprises (Zariyawati et al., 2016).

SMEs play a crucial role in modern economies, but they operate under the constraint of numerous barriers limiting their development. Difficulty in accessing capital is the most frequently mentioned such barrier (Beck & Demirguc-Kunt, 2006; European Central Bank, 2014; Kersten et al., 2017). Financing problems cause SMEs to maintain relatively low levels of current assets and high levels of current liabilities (Fazzari & Petersen, 1993). In comparison to large companies, this implies that working capital in SMEs is built under conditions of significant financial distress. This is especially important for economies with less open market traditions, such as the Central and Eastern European (CEE) countries. In these countries, characterised by a worse institutional and capital environment, the operating conditions for SMEs are less stable than in more developed economies.

Appendix 1 presents the list of previous studies conducted among SMEs, which are mainly related to the diagnosis of firm-specific WCM determinants and provide results for economies from the West and the Far East. No such studies concerning CEE were analysed.

Taking the abovementioned observations into consideration, the following research gaps can be found: (i) knowledge of WCM determinants of SMEs is based on a limited number of empirical studies; (ii) there is a lack of studies concerning CEE economies; and (iii) most importantly, WCM determinants remain unidentified at the industry and country levels. For this reason, this paper aims to broaden empirical knowledge on firm-specific factors of WCM in the SME sector. A further aim is to continue to identify determinants of WCM at the industry and country levels. The research sample consists of the financial data of 8,516 SMEs from six CEE countries: Poland, the Czech Republic, Slovakia, Hungary, Bulgaria and Romania, for the years 2012-2020. ANOVA analysis and multiple linear regression based on static panel models were the chosen research methods.

The study makes a threefold contribution to the literature. Firstly, the study has confirmed the same firm-specific WCM determinants for CEE as in other economies. Company size exerts a positive impact, while company growth, tangibility, leverage and cash flow have a negative effect. Secondly, the study has identified the direction of influence of factors that have not previously been studied in the SME sector. This refers in particular to industry-specific determinants (the positive impact of the average values characterising WCM in a given industry), but also to country-specific ones (the positive impact of GDP growth and the level of unemployment). Third, we have found the influence of industry-specific factors on WCM to be twice as strong as country-specific determinants.

The paper is organised as follows. The first part includes the theoretical background related to the determinants of WCM mentioned in the literature. In this section, the research hypotheses are formulated based on a literature review. The second part presents the research material and the method used. The third part presents the empirical results of the study. The paper closes with a discussion and conclusions.

2. THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

A firm's short-term financial policy focuses on two primary tasks: (i) ensuring the profitability of the firm and (ii) maintaining sufficient financial liquidity. The accomplishment of these tasks involves controlling the levels of components of current assets (inventories, receivables, and cash), as well as the speed and quality of their turnover in conjunction with the repayment of current liabilities. These decisions come under an area of corporate financial management known as working capital management (WCM).

Decisions relating to current asset turnover result in a time structure associated with the turnover of individual assets (inventory turnover cycle - ITC, average collection period - ACP). The sum of ITC and ACP reduced by the accounts payable period (APP) determines the cash conversion cycle (CCC). During the CCC, the company operates with a cash deficit. In the literature, the length and variability of the CCC are considered the most important measures of WCM performance (Deloof, 2003; K. Padachi, 2006; Nastiti et al., 2019; Hussain et al., 2022; Tiwari et al., 2023).

The sources of financing for CCC include (i) short-term bank loans and/or (ii) capital employed. The value of working capital (WC) corresponds to the value of current assets financed by the capital employed (equity plus long-term debt). Its size, in conjunction with the length of CCC, determines the financial liquidity of the company (LIQ), understood as its ability to repay current liabilities. Hence, WC and LIQ are considered to be complementary measures of WCM quality (Wasiuzzaman, 2018; Sabki et al., 2019; Jaworski & Czerwonka, 2022; Hussain et al., 2022; Tiwari et. al., 2023).

The most common explanations of the WCM behaviour of enterprises in the literature are (Koralun-Bereźnicka, 2014; Nastiti et al., 2019): (i) the cash cycle theory, (ii) the operating cycle theory, and (iii) the pecking order theory. The cash cycle theory, formulated by Richards and Laughlin (1980), explains that the cash cycle begins when funds are spent to purchase materials. This is followed by the sale of goods, the collection of accounts receivable, and consequently the receipt of cash. A shorter cash cycle means more efficient WCM (Petersen, 1997; Kieschnick et al., 2006; Raheman & Nasr, 2007; Abuzayed, 2012). According to the operating cycle theory, companies that offer credit to their customers increase receivables and accelerate inventory turnover. However, at the same time, they experience cash shortages that increase the threat to liquidity (Park & Gladson, 1963). While the cash cycle theory considers all components of WCM (current assets and liabilities), the operating cycle theory focuses only on inventories and accounts receivable (Wasiuzzaman & Arumugam, 2013; Rehman et al., 2017). The third theory (the pecking order theory) argues that firms use sources of financing according to a specific order (Myers & Majluf, 1984). They first turn to internal financing, then debt, and use equity issuance as a last resort. By definition, WCM is closely related to the use of internal financing, so satisfying internal financing needs competes with investing in fixed assets.

From the theories indicated above, WCM is influenced by many different factors, which are divided into three groups (Nazir & Afza, 2009; Baños-Caballero et al., 2010; Koralun-Bereźnicka, 2018; Moussa, 2019): (i) firm-specific factors related to the characteristics of the firm and its operations, (ii) industry-specific factors resulting from the characteristics and nature of activity in a particular industry, and (iii) WCM determinants at the country (economy) level, mainly containing the macroeconomic and institutional characteristics of a particular economy. The first group of these factors is widely identified

under the conditions of different economies. Industry- and country-specific determinants are less frequently investigated in the SME sector. Appendix 1 reveals that industry was included in previous studies, but it turned out to be important only as a control variable. However, taking research conducted among large companies into account (Nazir & Afza, 2009; Baños-Caballero et al., 2010; Koralun-Bereźnicka, 2018; Moussa, 2019; Sharma et al., 2020; Hussain et al., 2022), the following research hypothesis can be formulated:

H1. WCM depends on the industry and country in which SMEs operate.

Prior research concerning the SME sector (see Appendix 1) provides evidence for the existence of the following firm-specific determinants: firm size (SIZE), growth rate (GROW), financial surplus/cash flow generated (CF), tangibility (TANG) and debt level (DR).

The operating cycle theory indicates that firm size has a negative effect on the basic measures of WCM; the larger the firm, the more diversified its operations are. This means that current assets constitute a relatively lower share of total assets than they do in SMEs with more homogeneous activities. The lower level of current assets means faster turnover and, consequently, shorter CCC and lower levels of liquidity. In terms of the cash cycle theory and the pecking order theory, the larger the firm, the more the WCM also increases. Larger companies have easier access to long-term financing compared to SMEs, which in turn results in more opportunities to invest in WC. In turn, a larger level of WC means a longer CCC and lower liquidity risk (higher LIQ). Most empirical studies conducted among SMEs to date (see: Appendix 1) have indicated that firm size has a positive effect on WCM measures. Hence, in our study, the following hypothesis was adopted:

H2.1. An increase in the size of SMEs causes an increase in WCM measures.

GROW is a size-related factor affecting WCM. In accordance with the operating cycle theory, increasing sales results in greater demand for inventory and receivables held, i.e. the level of working capital (WC). In turn, this leads to an extended CCC. Such a relationship was detected among SMEs by Singh and Kumar (2017). The cash cycle theory indicates the opposite, as growing firms manage WC more dynamically, making WCM more efficient (the CCC is shorter). Evidence of this trend in the SME sector was provided by Sardo and Serrasqueiro (2022). In conclusion, GROW is a significant determinant of WCM for SMEs, but the direction of its impact remains unrecognised:

H2.2 Firm growth significantly affects WCM.

In accordance with the pecking order theory, the financial surplus generated is used to finance the firm's operations above all. This implies that increasing CF should also increase WC, thereby favouring a longer CCC and increasing LIQ. This direction of the relationship is indicated by the results of a study by Sardo and Serrasqueiro (2022). In contrast, the opposite sign as detected by Baños-Caballero et al. (2010) is consistent with the cash cycle theory, according to which a greater financial surplus induces firms to repay short-term bank loans and, consequently, to shorten the CCC. Thus, the dependence of WCM on CF for SMEs is also observed, albeit without a specific direction, just as for GROW:

H2.3. Financial surplus is an important factor of WCM.

The share of fixed assets in total assets (tangibility - TANG) characterises the capital intensity of the business run. According to all WCM theories (the cash cycle theory, the operating cycle theory and the pecking order theory), increasing TANG implies an alternative capital demand to WCM and consequently a negative relationship between TANG and WCM performance measures. This is also confirmed by empirical studies by Drever and Hutchinson (2007), Baños-Caballero et al. (2010), Elbadry (2018) and Wasiuzzaman (2018):

H2.4. An increase in the share of fixed assets in total assets negatively affects measures of WCM performance.

The cash cycle theory and the pecking order theory link WCM to a specific type of debt. An increase in long-term debt results in an increase in the level of WC and thus an increased ability to repay liabilities

(LIQ) and to extend the CCC. In the case of short-term debt, increasing bank financing has a similar effect, while the opposite (negative) effect is caused by an increase in trade credit financing. As indicated by the pecking order theory, highly indebted firms are more sensitive to the demand for working capital (WC). This means that they try to increase its efficiency by shortening the CCC. They also have a higher risk of losing liquidity (LIQ). The negative relationship between LEV and WCM is indicated by most studies conducted in the SME sector (see Appendix 1):

H2.5. WCM measures are negatively correlated with SME debt.

Individual industry-specific WCM determinants for the SME sector have not been identified to date. They have been studied in the context of large companies by Filbeck and Krueger (2005), Kieschnick et al. (2006) and Sharma et al. (2020), to name a few, all of whom found that WCM performance measures vary significantly between industries, while variability within the industry is low. This implies that companies try to imitate the WCM of their competitors and follow the industry-average WCM. Transferring this into the SME sector, the following hypothesis can be formulated:

H3.1. WCM measures in SMEs are positively related to the medians of the industry characteristics.

In contrast, Niskanen and Niskanen (2006) showed that industry determines similar policies regarding the financing of current assets with trade credit. This, in turn, implies that WCM may depend on the industry values of these quantities:

H3.2. The WCM of a firm depends on the average measures of current assets and trade liabilities in a given industry.

The country-specific determinants of WCM in the SME sector have also seldom been studied to date. Attempts to do so have been made by Baños-Caballero et al. (2010), Zariyawati et al. (2016), Wasiuzzaman (2018), Tahir and Ashhari (2020) and Angelovska and Valenticic (2020). The assumed variables were two macroeconomic factors, namely GDP growth and interest rates. Only Zariyawati et al. (2016) found a statistically significant negative relationship between the inflation rate and CCC. In the case of large companies, many authors confirmed the dependence of WCM on a number of country-specific factors (Koralun-Bereźnicka, 2014; Oseifuah, 2016; Cetenak et al., 2017; Moussa, 2019; Nastiti et al., 2019; Sarwar, 2020; Sharma et. al., 2020; Tiwari et. al., 2023). Taking factors identified by these authors and the specificity of the SME environment into account, we decided to test two macroeconomic factors: GDP growth (GDP_GROW) and unemployment (UNEMPL), and two institutional factors: access to bank credit (CRED_BANK) and the ease of doing business score (EASE_BUS).

In accordance with the operating cycle theory, during an economic downturn (low GDP growth), the average collection period and especially the accounts payable period slow down, which worsens the efficiency of WCM. This implies a shortening of the CCC and a worsening of LIQ due to the lower financing possibilities for WC (there is a positive relationship between GDP and WCM). The pecking order theory indicates an inverse relationship. Deteriorating economic conditions force the firm to finance more WC from its financial surplus. This means an extension of the CCC and an improvement in LIQ (there is a negative relationship between GDP and WCM). Empirical studies conducted among large enterprises highlight both directions of the relationship: positive (Nastiti et al., 2019; Sarwar, 2020) and negative (Moussa, 2019). It follows, therefore, that:

H4.1. GDP growth affects WCM.

Investment in human resources is an alternative to investment in assets. Lin (2015) showed that higher labour costs encourage firms to improve economic efficiency, among other things, creating incentives to reduce WC investment. In turn, higher unemployment means lower labour costs, i.e. it should cause an increase in WCM measures:

H4.2. Increasing unemployment positively affects measures of WCM.

Limited access to credit is one of the main barriers to the development of SMEs. Therefore, an increase in the share of private sector bank credit (CRED_BANK) should increase SMEs' ability to invest in WCM (Cetenak et al., 2017):

H4.3. A higher share of bank credit in private sector financing increases financing opportunities for WCM in SMEs.

The ease of doing business index (EASE_BUS) calculated for individual countries (economies) by the World Bank includes 10 areas of business law regulation, the results constituting the conditions of enterprise performance in terms of the institutional environment (World Bank database). The higher the index, the more suitable for business activity these conditions are considered to be. This also concerns working capital management (Cetenak et al., 2017):

H4.4. The higher the EASE_BUS index, the higher the WCM measures.

3. RESEARCH MATERIAL AND METHODOLOGY

Data for the study were taken from the ORBIS database (ORBIS database). The research sample includes enterprises that meet the definition of an SME in the EU Commission Recommendation 2003/361/EC, as published in the Official Journal of the European Union L 124, p. 36 of 20 May 2003. The sample does not include data on microenterprises, due to the lack of reliable financial data for most of them. Finally, the sample consists of data from enterprises simultaneously meeting the following criteria: assets of between 2 and 43 million euros, revenues of between 2 and 50 million euros, and a headcount of between 10 and 249 employees. In total, they refer to 8,516 SMEs from the following countries: Bulgaria (1,593), the Czech Republic (831), Hungary (1,388), Poland (2,424), Romania (656), and Slovakia (1,624). The years 2012-2020 constitute the research period. The values of macroeconomic and institutional variables for the country were taken from the World Bank and International Monetary Fund databases. The division of companies into industries was based on the NACE rev. 2 classification (13 industries: B, C, D, E, F, G, H, I, J, M, N, Q, R) (NACE classification). The definition of the variable GROW (percentage increase in sales revenue) limited the final number of periods under consideration to eight years.

Given the presence of errors in the database, we excluded the figures that fell outside the 0-1 range (e.g. the share of debt in all sources of financing, and the share of fixed assets in total assets) and/or did not have positive values (e.g. equity) from the analysis. Then, to avoid the influence of outlier observations, we performed 98% truncation by restricting the study sample by 1% in each tail, yielding a total of 65,569 observations.

Appendix 2 shows the definition of the variables included in the study. CCC, LIQ and WC were used as dependent variables to characterise WCM. Variables 4 to 8 are independent variables corresponding to firm-specific factors, variables 9 to 13 represent industry-specific determinants of WCM, and variables 14 to 17 are related to country-specific factors. Table 1 shows the descriptive statistics of the distribution of the variables used in the study.

Table 1

Descriptive statistics of the research sample

No.	*Variable*	Mean	Median	Std. Dev.	Min.	Max.
1.	CCC	66.844	50.417	76.334	-95.376	615.900
2.	LIQ	2.628	1.567	3.281	0.145	30.239
3.	WC	0.242	0.228	0.289	-0.975	0.995
4.	SIZE	8.706	8.607	1.082	6.454	13.392
5.	GROW	0.039	0.026	0.205	-0.568	1.070
6.	CF	0.110	0.086	0.541	-7.421	143.800
7.	TANG	0.351	0.309	0.262	0.000	0.999
8.	DR	0.503	0.517	0.252	0.000	1.000
9.	IND_CCC	51.737	53.032	25.992	-67.338	543.630
10.	IND_LIQ	1.637	1.570	0.702	0.000	29.345
11.	IND_WC	0.214	0.219	0.132	-0.701	0.919
12.	IND_CUR_ASSET	0.640	0.694	0.216	0.000	0.996
13.	IND_PAYABL	33.890	32.899	13.366	0.000	266.040
14.	GDP_GROW	0.024	0.032	0.028	-0.060	0.079
15.	UNEMPL	0.072	0.068	0.032	0.020	0.142
16.	CRED_BANK	0.494	0.508	0.097	0.248	0.676
17.	EASE_BUS	0.727	0.727	0.031	0.650	0.779

Source: Own elaboration.

The median CCC is 51 days, while the arithmetic mean is 67 days. For LIQ, the mean is 2.6, while the median is 1.6, which indicates relatively high liquidity in the SME sector. For WC, the difference between the arithmetic mean and the median is smallest in relative terms. The values of the median and arithmetic mean for DR, SIZE, TANG, UNEMPL, EASE_BUS, IND_CUR_ASSET, IND_LIQ, and IND_WC are similar as well. There are noticeable differences between the arithmetic means and medians for the remaining variables. The observed negative values of CF are due to the negative value of net profits, while the negative values of GROW mean a decrease in sales revenue. The negative values of IND_CCC and IND_WC indicate negative values of working capital in the industry combined with the negative length of the cash conversion cycle.

Appendix 3 contains the Pearson correlation coefficients calculated for all pairs of variables. They show neither strong nor very strong correlation between any of the pairs (<0.5). This means that there are no strong direct two-sided dependencies between particular variables. The test of multicollinearity was extended to include the calculation of variance inflation factors (VIF). The results are presented in Appendix 3. VIF levels lower than 10 confirm the lack of multicollinearity issues between variables in the estimated models (Cleff, 2019).

Research methods have been applied in accordance with the hypotheses formulated. Thus, the first step of the study is to verify whether CCC, LIQ and WC depend on the industry and the country (verification of H1). For this purpose, a two-factor analysis of variance (ANOVA), which is applied to resolve the existence of differences between averages in several populations, was used (Lynch, 2013). This diagnostic method was previously used by Gungoraydinoglu and Öztekin (2011), Jõeveer (2013) and Czerwonka and Jaworski (2021), among others, in the identification of capital structure determinants. Jaworski and Czerwonka (2022) and Koralun-Bereźnicka (2014) also applied ANOVA in studies related to WCM. Apart from showing the differences between averages, ANOVA shows the scope of the explanation of volatility of a dependent variable. If the populations analysed are not normally distributed, the Kruskal-Wallis test can be used instead of the ANOVA procedure. It provides a non-parametric alternative to the analysis of variance, allowing the detection of differences in means or medians between populations (Cleff, 2019). This test was applied to verify the results of ANOVA.

In the next step, diagnostics of the relationship between the different factors that may affect the variables CCC, LIQ and WC were conducted (verification of H2.1 - H4.4). The previously defined variables corresponding to firm-, industry- and country-specific factors have been taken as likely determinants of these quantities. Several econometric models can be applied for this purpose. The basic methods for modelling panel data are OLS (ordinary least squares) estimation of the pooled model, the fixed effects model and the random effects model. GMM estimation can be used for the examination of dynamic effects (Greene, 2003). We did not consider dynamic models because WCM is a short-term issue and decisions result in changes over the year, so there is no point in lagging variables. Panel model estimation using the pooled method is acceptable when individual effects are not present, and the panel is treated as a cross-sectional data set. The Breusch-Pagan test is used to check for the presence of individual effects. When individual effects are present, two cases should be considered - fixed effects and random effects. The choice between a fixed effects model and a random effects model is made based on the Hausman test (Greene, 2003). Statistical calculations were performed using GRETL and STATISTICA software.

The model applied in the study is as follows:

$$CCC_{it} | LIQ_{it} | WC_{it} = \beta_0 + \beta_1 CF_{it} + \beta_2 DR_{it} + \beta_3 GROW_{it} + \beta_4 SIZE_{it} + \beta_5 TANG_{it} + \beta_6 GDP\_GROW_{it} + \beta_7 UNEMPL_{it} + \beta_8 CRED\_BANK_{it} + \beta_9 EASE\_BUS_{it} + \beta_{10} IND\_CUR\_ASSET_{it} + \beta_{11} IND\_PAYABL_{it} + \beta_{12} IND\_CCC \mid IND\_LIQ \mid IND\_WC_{it} + \varepsilon_{it} | \mu_{it} | \varepsilon_{it} + \mu_{it}, \quad (1)$$

Similar methods were applied in the majority of studies mentioned in Appendix 1. Thus, our results may be compared with the results of prior research.

4. RESEARCH OUTCOMES

Table 2 shows the results of the ANOVA conducted for all WCM measures according to the two assumed differentiation criteria (industry and country).

Industry affiliation explains: 3.7% of CCC variation, 3.9% of LIQ variation, and 0.5% of WC variation. In terms of country, these figures are 2.2% for CCC, 1.2% for LIQ and 0.2% for WC respectively. The Kruskal-Wallis test was used to verify the results obtained by the ANOVA. The results are presented in Table 3 and confirm the conclusions of the ANOVA. Industry and country differentiate the entities analysed in terms of average CCC, LIQ and WC.

Table 2

ANOVA analysis of the impact of country and industry on variation of WCM measures

Effect	One-dimensional significance tests for CCC Parameterisation with sigma-restrictions Decomposition of effective hypotheses Sum of squares	df	Mean squares	F	p-value
CCC					
Constant	50426534	1	50426534	9339.6	0.00
Industry_EMIS	16272075 **(3.70%)**	12	1356006	251.1	0.00
Country	9527529 **(2.17%)**	5	1905506	352.9	0.00
Error	413722177 **(94.13%)**	76626	5399		
LIQ					
Constant	863342	1	863342.0	4907.5	0.00
Industry_EMIS	559782 **(3.94%)**	12	46648.5	265.2	0.00
Country	173888 **(1.22%)**	5	34777.5	197.7	0.00
Error	13480369 (94.84%)	76626	175.9		
WC					
Constant	514.37	1	514.37	405.98	0.00
Industry_EMIS	443.41 **(0.45%)**	12	36.95	29.16	0.00
Country	227.33 **(0.23%)**	5	45.47	35.89	0.00
Error	97082.93 (99.31%)	76626	1.2670		

The numbers in parentheses represent the share of the sum of squares for individual variables in relation to the total sum of squares.

Source: own elaboration.

Table 3

Non-parametric Kruskal-Wallis ANOVA test

Variable	*df*	*N*	*Test H*	*p-value*
CCC				
Industry_EMIS	12	76644	4634.21	0.00
Country	5	76644	1312.67	0.00
LIQ				
Industry_EMIS	12	76644	821.30	0.00
Country	5	76644	2725.96	0.00
WC				
Industry_EMIS	12	76644	4530.26	0.00
Country	5	76644	1992.88	0.00

Source: own elaboration.

Table 4 shows the results of estimating the parameters of the models used in the study for each of the independent variables and the results of tests to determine the significance of the entire model and to indicate the choice of version of the model. A fixed-effects model was used to estimate the parameters of the models for each dependent variable (CCC, LIQ, WC), driven by the Breusch-Pagan ($p < 0.0001$) and Hausman ($p < 0.0001$) test values. To confirm the stability of the relationships indicated by models 1, 3 and 5, re-estimation was performed in configurations containing only statistically significant variables (models 2, 4, 6).

Table 3

Results of model estimations

Model	1	2	3	4	5	6
Dependent variable	CCC	CCC	LIQ	LIQ	WC	WC
Model	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects
Const	-61.344*** (16.336)	-68.099*** (10.675)	5.085*** (0.791)	6.002*** (0.455)	0.738*** (0.034)	0.767*** (0.026)
SIZE	16.076*** (1.206)	16.135*** (1.197)	0.288*** (0.051)	0.275*** (0.050)	0.013*** (0.003)	0.013*** (0.003)
GROW	-28.211*** (1.172)	-28.228*** (1.172)	-0.301*** (0.040)	-0.293*** (0.039)	-0.013*** (0.002)	-0.013*** (0.002)
CF	-24.630*** (3.496)	-24.416*** (3.485)	-0.809*** (0.125)	-0.800*** (0.125)	0.013*** (0.005)	0.013*** (0.005)
TANG	-72.413*** (3.566)	-72.328*** (3.565)	-3.661*** (0.178)	-3.658*** (0.178)	-0.803*** (0.008)	-0.803*** (0.008)
DR	-24.800*** (2.676)	-25.010*** (2.655)	-6.842*** (0.168)	-6.825*** (0.167)	-0.739*** (0.008)	-0.739*** (0.008)
IND_CCC	0.614*** (0.034)	0.618*** (0.034)				
IND_LIQ			0.501*** (0.081)	0.499*** (0.080)		
IND_WC					0.158*** (0.013)	0.160*** (0.013)
IND_CUR_ASSET	-0.262 (0.839)		0.011 (0.044)		-0.055*** (0.005)	-0.055*** (0.005)
IND_PAYABL	-0.050 (0.045)		-0.004** (0.002)	-0.003* (0.002)	-0.000* (0.000)	-0.000* (0.000)
GDP_GROW	25.548*** (6.076)	26.926*** (5.635)	0.174 (0.290)		-0.040*** (0.011)	-0.041*** (0.011)
UNEMPL	57.259*** (15.418)	55.469*** (10.336)	1.118 (0.773)		0.138*** (0.030)	0.114*** (0.022)
CRED_BANK	-6.918 (5.374)		-0.081 (0.243)		0.018 (0.011)	0.019* (0.011)
EASE_BUS	-1.349 (16.707)		-1.218 (0.783)	-2.272*** (0.511)	0.040 (0.032)	
No. of observations	64,516	64,516	64,402	64,402	65,569	65,569
Joint test on named regressors	F(12, 8427) = 132.15 p < 0.0001	F(8, 8427) = 196.68 p < 0.0001	F(12, 8432) = 203.40 p < 0.0001	F(8, 8432) = 333.68 p < 0.0001	F(12, 8464) = 1856.61 p < 0.0001	F(10, 8464) = 2023.93 p < 0.0001
Breusch-Pagan test	LM=99470 p < 0.0001	LM=99497 p < 0.0001	LM=57012 p < 0.0001	LM=57808 p < 0.0001	LM=95405 p < 0.0001	LM=95465 p < 0.0001
Hausman test	H=404.94 p < 0.0001	H=389.42 p < 0.0001	H=173.44 p < 0.0001	H=121.41 p < 0.0001	H=97.93 p < 0.0001	H=94.16 p < 0.0001

* dependence is significant at the level of 0.1; ** dependence is significant at the level of 0.05; *** dependence is significant at the level of 0.01 (standard errors in parentheses)
Source: own elaboration.

The parameters of all models indicate that the dependence of WCM on firm-specific factors is significant. In the case of the independent variables DR, GROW and TANG, it is always a negative relationship, regardless of the dependent variable. In the case of the SIZE variable, it is a positive relationship. For the independent variable CF, the relationship is negative when the dependent variables are CCC and LIQ, but positive when the dependent variable is WC.

For the industry variables, there is a positive relationship between IND_CCC, IND_LIQ AND IND_WC and their respective variables CCC, LIQ, and WC. IND_CUR_ASSET exerts a negative impact on WC, as does IND_PAYABLE on LIQ. No significant statistical relationship has been confirmed in the remaining models.

For country-specific factors, the fewest dependencies have been observed. CREDIT_BANK has proven to be a statistically insignificant variable in models concerning CCC and LIQ. In the case of WC, it turned out to be significant at the lowest statistical level in only one model. UNEMPL has been shown to have a statistically significant positive effect on CCC and WC. For EASE_BUS one dependency has been observed as well, for which an increase causes a corresponding decrease in LIQ. GDP_GROW has the most extensive effect on WCM measures, with an increase therein causing an increase in CCC and a decrease in WC.

5. ROBUSTNESS CHECK

The study results have also been examined by means of a robustness check. One method of determining whether the effects of interest are stable is to remove or add variables (Lu & White, 2014). Table 3 contains two models for each of the dependent variables CCC, LIQ and WC – the original model with all variables and the final model containing only statistically significant variables. In all these cases, removing variables from the model did not change the signs of the variables that remained in the model. This indicates stability in the direction of the relationships under study.

The robustness check also involved redefining selected variables. The variables SIZE and GROW are based on asset values or sales revenue in many studies. In our study, the variable SIZE is based on assets, while the variable GROW is based on sales revenue. To check the stability of the direction of the examined relationships, models were estimated for all combinations, including the replacement of the variable CF from a variable related to assets to a variable related to sales revenue. Therefore, this offered the possibility to test eight combinations of models for each dependent variable; in total, different versions of 24 models were estimated. It is important to bear in mind a study by Dang et al. (2018), which indicates that the variable SIZE based on assets or sales revenue may have the same sign and significance but may also change. In our case, this could also apply to the variables GROW and CF. Moreover, this change in the definition of the variable SIZE in the Dang et al. (2018) study could also lead to changes in the signs of other independent variables.

In the case of our robustness check, in the analysis of 24 models with different definitions of the SIZE, GROW and CF variables, we observed that the variables SIZE and GROW changed signs depending on the definition for models with the dependent variable CCC. The variable SIZE also changed sign for models with the dependent variables LIQ and WC, while the variable GROW did not change the direction of the relationship in these models. The variable CF lost significance after a change in definition. Among all the other independent variables whose definition did not change, in some of the models, it can be seen that some of the variables lost significance, and the variables GDP_GROW and UNEMPL changed signs in the models with the dependent variable CCC depending on the option of the variables SIZE, GROW and CF. The independent variables that never changed sign or lost significance include DR, TANG, IND_CCC, IND_LIQ, and IND_WC. These five variables thus show particular robustness to changing SIZE, GROW and CF variants; however, the robustness check indicates stability in the direction of all the relationships examined, except for the variables SIZE and GROW, GDP_GROW and UNEMPL, whose relationship is stable when using the selected measure as the basis for the calculation.

6. DISCUSSION

The results of our study support the research hypothesis H1. The variability of all three WCM measures is explained by the company's country (economy) affiliation (approximately 1.2% of the variability of the CCC, LIQ and WC). The industry also differentiates WCM measures for SMEs (2.7% of the variability of the CCC, LIQ and WC). This observation is consistent with most of the previous studies listed in Appendix 1 and indicates that the extent of the influence of industry on the WCM is twice as wide as in the case of country factors. This is a new observation, indicating an opposite relationship as in the case of capital structure determinants (Jõeveer, 2013; Czerwonka & Jaworski, 2021).

The results of the study also confirmed hypotheses H2.1 to H2.5. We have identified the dependence of all WCM measures on assumed firm-specific factors. They were positively influenced by SIZE, which is consistent with the previous findings of all authors listed in Appendix 1 except for those of Sardo and Serrasqueiro (2021). We have found a negative relationship for GROW, TANG and DR, which also confirms the results of previous studies. For CF, we have detected a negative effect on CCC and LIQ, and a positive effect on WC. The former relationship was also identified by Baños-Caballero et al. (2010) and the latter by Sardo and Serrasqueiro (2022).

The analysis of industry-specific determinants of WCM confirmed hypotheses H3.1 and H3.2. The positive relationship between WCM measures and their industry medians indicates that, similarly to large firms (Filbeck & Krueger, 2005; Kieschnick et al., 2006), SMEs conduct similar WCM policies within an industry. The statistically significant negative relationship between WC and the current assets median in an industry indicates that the greater the capital commitment to current assets in an industry, the less efficient the WCM of SMEs. We have observed the same relationship for increasing trade debt. In this case, it is worth noting that it does not affect the level of CCC.

The results of our study for country-specific determinants of WCM vary most. In contrast to Baños-Caballero et al. (2010), Wasiuzzaman (2018) and Tahir and Ashhari (2020), we have found a positive effect of GDP_GROW on CCC with a negative effect on WC, which confirms hypothesis H4.1. This feature is similar for large companies, where this relationship is often identified. The second macroeconomic factor, unemployment, positively affects the CCC and WC, which is the same direction as that assumed in hypothesis H4.2. Hypotheses H4.3 and H4.4 are not supported. Access to bank credit does not influence any WCM measure significantly, while improving the institutional conditions of SMEs decreases LIQ values.

7. CONCLUSIONS

The results obtained can be combined into four main groups of conclusions as follows: (i) the main WCM measures depend on the industry and country where SMEs operate, and the doubly broad impact of industry-specific determinants of WCM on SME behaviour when compared to country-specific determinants has been detected, (ii) the study has also provided strong evidence to support firm-specific determinants identified in prior research, (iii) new important industry-level determinants have been identified (medians of current assets and WCM measures in industry), and (iv) new country-specific factors have been diagnosed (GDP growth and unemployment level). These conclusions extend knowledge on WCM determinants and may be used in the formulation of a theoretical model of WCM policies conducted by SMEs. This task should be the subject of further research.

Several implications for business practice result from the study. First, the negative impact of CF and TANG on WCM implies that managers of SMEs need to pay attention to the fact that by generating larger cash flow, it is more attractive for the enterprises to invest in fixed assets, but this may cause difficulties in managing working capital. As a second but related finding, the abovementioned feature is

especially important for industries with a high share of current assets financed by trade credit, as evidenced by the negative correlations of WCM variables with industry medians of current assets and trade credit. The conclusions of the study are also important for policymakers (lawmakers). If they want SMEs to improve the efficiency of working capital management, policymakers should (i) be aware that their industry-level regulations affect SMEs much more strongly than large firms, and (ii) pay attention to the facilitation of firms' macroeconomic conditions.

The limitations of the study concern (i) the inclusion of only six countries from Central and Eastern Europe in the sample and (ii) the exclusion of micro-enterprises from the sample, i.e. those employing less than 10 people and whose value and revenues did not exceed 2 million euro.

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Appendix 1

Empirical studies on WCM determinants in the SME sector

Author	*Research sample and period*	*Dependent variable*	*Positive determinants of WCM*	*Negative determinants of WCM*	*Other determinants*
Drever and Hutchinson (2007)	3,429 Australian SMEs in the years 1994-1998	WC	Age	Tangibility, Profitability	Industry
Baños-Caballero et al. (2010)	4,076 Spanish SMEs in the years 2001-2005	CCC	Size, Age, ROA	Cash flow, Indebtedness, Tangibility	Industry
D. Padachi and Howorth (2014)	145 Mauritian SMEs in 2009	ITC, ACP, APP	Size, Age, Creditor days	-	Industry
Nobanee and Abraham (2015)	5,802 non-financial US SMEs for the period 1990-2004	Current assets/Total assets	Net trade cycle	Long-term debt	Industry
Zariyawati et al, (2016)	The 30 largest and all small firms listed on the Bursa Malaysia stock exchange in the years 2009-2013	CCC	Capital expenditure	Indebtedness, Profitability, Executive compensation, Inflation	-
Singh and Kumar (2017)	254 manufacturing SMEs operating in India for the period 2010-2014	WC	Profitability, Growth	Indebtedness, Cash flow, Tangibility	-
Wasiuzzaman (2018)	986 SMEs in Malaysia from 2011 to 2014	WC	Profitability, Size, Age	Growth, Tangibility,	Firm status
Elbadry (2018)	138 Egyptian SMEs operating in 2010-2013	CCC, ACP, ITC, APP	-	Profitability, Tangibility, Indebtedness	Industry
Sabki et al. (2019)	250 Malaysian SMEs during the period from 2005 to 2013	CCC	-	Cash holdings, Bank loans	Industry
Tahir and Ashhari (2020)	321 Malaysian SMEs in the years 2010-2013	WC	Profitability, Size	Indebtedness	Industry
Angelovska and Valenticic (2020)	27,573 SMEs in Slovenia for 2006-2013	Cash holding	CCC, Profitability	Size, Indebtedness, Liquidity, Cash flow	-
Sardo and Serrasqueiro (2022)	3,994 Iberian manufacturing SMEs for the period 2011–2017	WC	Age, Cash flow, Long term debt	Size, Growth	-

Source: Own elaboration.

Appendix 2

Variables used in the study

No.	*Variable*	*Abbrev.*	*Measures*	*Application in previous studies*
1.	Cash conversion cycle	CCC	Average collection period + Inventory cycle – Accounts payable period	SME sector: Baños-Caballero et al. (2010), Zariyawati et al. (2016), Elbadry(2018), Sabki et al. (2019), Angelovska and Valenticic (2020)
2.	Current ratio	LIQ	$\frac{current\ assets}{current\ liabilities}$	Large companies: Nastiti et al. (2019), Dang (2020), Jaworski and Czerwonka (2022); SME sector: Angelovska and Valenticic (2020)
3.	Working capital ratio	WC	$\frac{current\ assets - current\ liabilities}{total\ assets}$	SME sector: Drever and Hutchinson (2007), Singh and Kumar (2017), Wasiuzzaman (2018), Tahir and Ashhari (2020), Sardo and Serrasqueiro (2022),
4.	Size of the enterprise	SIZE	$\ln(total\ assets)$	SME sector: Baños-Caballero et al. (2010), Singh and Kumar (2017), Wasiuzzaman (2018), Elbadry(2018), Sabki et al. (2019), Tahir and Ashhari (2020), Angelovska and Valenticic (2020), Sardo and Serrasqueiro (2022)
5.	Growth opportunities	GROW	$\frac{\Delta sales\ revenue}{sales\ revenue}$	SME sector: Drever and Hutchinson (2007), Baños-Caballero et al. (2010), Nobanee and Abraham (2015), Zariyawati et al. (2016), Singh and Kumar (2017), Wasiuzzaman (2018), Elbadry(2018), Tahir and Ashhari (2020), Sardo and Serrasqueiro (2022)
6.	Cash flow proxy	CF	$\frac{net\ profit + depreciation\ and\ amorti}{total\ assets}$	SME sector: Zariyawati et al. (2016), Singh and Kumar (2017), Elbadry(2018), Angelovska and Valenticic (2020), Sardo and Serrasqueiro (2022)
7.	Assets structure (tangibility)	TANG	$\frac{fixed\ assets}{total\ assets}$	SME sector: Baños-Caballero et al. (2010), Singh and Kumar (2017), Wasiuzzaman (2018), Elbadry(2018)
8.	Capital structure (total debt ratio)	DR	$\frac{total\ debt}{total\ assets}$	SME sector: Zariyawati et al. (2016), Singh and Kumar (2017), Wasiuzzaman (2018), Elbadry(2018), Sabki et al. (2019), Tahir and Ashhari (2020); Angelovska and Valenticic (2020)
9.	Cash conversion cycle median in country/industry	IND_CCC	The median of CCC in a particular country	Newly assumed factor/variable based on research by Kieschnick et al. (2006), Filbeck and Krueger (2005)
10.	Current ratio median in country/industry	IND_LIQ	The median of LIQ in a particular country	Newly assumed factor/variable based on research by Kieschnick et al. (2006), Filbeck and Krueger (2005)
11.	Working capital median in country/industry	IND_WC	The median of WC in a particular country	Newly assumed factor/variable based on research by Kieschnick et al. (2006), Filbeck and Krueger (2005)
12.	Current assets median in country/industry	IND_CUR_ASSET	The median of current assets in a particular country	Newly assumed factor/variable based on research by Niskanen and Niskanen (2006)

13.	Trade payables median in country/industry	IND_PAYABL	The median of trade payables in a particular country	Newly assumed factor/variable based on research by Niskanen and Niskanen (2006)
14.	Annual growth of GDP	GDP_GROW	$\frac{GDP\ growth\ (annual\ \%)}{100}$	SME sector: Baños-Caballero et al. (2010), Zariyawati et al. (2016), Wasiuzzaman (2018), Tahir and Ashhari (2020); Large enterprises: Nastiti et al. (2019), Sarwar (2020), Moussa (2019)
15.	Rate of unemployment	UNEMPL	$\frac{Unemployment\ rate\ (\%)}{100}$	Newly assumed factor/variable based on research by Lin (2015)
16.	Domestic credit to private sector by banks	CRED_BANK	$\frac{Domestic\ credit\ provided\ by\ banking\ sector\ (\%\ of\ GDP)}{100}$	Large enterprises: Cetenak et al. (2017)
17.	Index of regulatory performance	EASE_BUS	Ease of doing business score (0 = lowest performance to 1 = best performance)	Large enterprises: Cetenak et al. (2017)

Source: Own elaboration

Appendix 3

Pearson correlation matrix for all variables

SIZE	GROW	CF	TANG	DR	IND_CCC	IND_LIQ	IND_WC	IND_CUR_ASSET	IND_PAYABL	GDP_GROW	UNEMPL	CRED_BANK	EASE_BUS	CCC	WC	LIQ	
1.00	0.03	-0.10	0.16	0.01	0.12	-0.04	-0.11	-0.14	0.03	0.05	-0.15	-0.23	-0.01	0.12	-0.11	-0.04	SIZE
	1.00	0.10	-0.06	0.07	-0.01	-0.03	-0.01	0.03	0.02	0.20	0.03	-0.03	-0.04	-0.07	-0.02	-0.05	GROW
		1.00	-0.02	-0.15	-0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	-0.03	0.04	0.02	CF
			1.00	-0.12	-0.14	-0.10	-0.39	-0.46	-0.03	0.00	0.02	0.04	0.02	-0.13	-0.63	-0.14	TANG
				1.00	-0.04	-0.18	-0.12	0.08	0.11	0.01	0.11	-0.01	-0.05	-0.19	-0.59	-0.55	DR
					1.00	0.17	0.31	0.18	0.18	0.04	-0.10	-0.16	-0.05	0.34	0.15	0.06	IND_CCC
						1.00	0.56	0.17	-0.17	-0.05	-0.13	0.04	0.01	0.07	0.22	0.24	IND_LIQ
							1.00	0.75	-0.14	-0.07	-0.18	0.00	0.01	0.12	0.38	0.17	IND_WC
								1.00	0.04	-0.04	0.02	-0.05	-0.07	0.07	0.26	0.04	IND_CUR_ASSET
									1.00	0.02	0.17	0.08	0.04	0.08	-0.05	-0.06	IND_PAYABL
										1.00	-0.12	-0.23	0.01	0.01	-0.02	-0.02	GDP_GROW
											1.00	0.33	-0.55	-0.03	-0.09	-0.04	UNEMPL
												1.00	0.28	-0.05	-0.01	0.04	CRED_BANK
													1.00	-0.03	0.02	0.00	EASE_BUS
														1.00	0.29	0.24	CCC
															1.00	0.59	WC
																1.00	LIQ
1.15	1.07	1.08	1.31	1.10	1.13			1.30	1.15	1.11	2.42	2.06	2.42				VIF (CCC)
1.13	1.07	1.08	1.30	1.12		1.15		1.31	1.12	1.11	2.47	2.09	2.47				VIF (LIQ)
1.13	1.07	1.08	1.31	1.15			3.04	2.93	1.14	1.11	2.64	2.14	2.50				VIF (WC)

Source: Own elaboration.