DETERMINANTS OF WORKING CAPITAL MANAGEMENT OF FIRMS IN SELECTED INDUSTRIES IN CROATIA

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Abstract

Considering the theoretical findings and the empirically determined relevance of working capital management (WCM), the paper focuses on identifying the WCM determinants of manufacturing, trade, and information and communication companies in Croatia. The time horizon of the analysis ranges from the year 2008 to the year 2015, and the final sample consists of 19,355 companies or 116,002 firm-year observations. In addition to the methods of descriptive statistics, the Kruskal-Wallis test, Dunn's post hoc test, and panel regression analysis are used as methods of inferential statistics. The results of identifying the determinants of WCM indicate that WCM in the previous year, profitability, and financial constraints significantly positively impact working capital cycles, thus promoting conservative WCM. In contrast, size, growth, fixed investment, annual real GDP growth, and industry indicators were significantly negative predictors of the two WCM indicators used, the cash conversion cycle (CCC) and the net trade cycle (NTC). Accordingly, the latter stimulates aggressive WCM. Given the significantly positive effect of an aggressive WCM strategy on profitability, together with the results of the test of WCM determinants, it is recommen-ded that the firms studied to use these determinants to generally manage net operating working capital in a narrower sense more aggressively and achie-ve its target values.

Keywords: *working capital management, manufacturing, trade, information and communication, Croatia*

1. INTRODUCTION

Taking into account the fact that each firm has its size and structure of working capital, which is subject to change (Tepšić, 1979), and the results of studies examining the impact of WCM on profitability, including those conducted on the sample studied, which show that this impact is significant (Jose et al., 1996; Shin & Soenen, 1998; Deloof, 2003; Lazaridis & Tryfonidis, 2006; García-Teruel & Martínez-Solano, 2007; Baños-Caballero et al., 2012; Afrifa & Padachi, 2016; Lyngstadaas & Berg, 2016; among others), one can problematize the existence of determinants that affect the size and structure of a firm's working capital. Given that understanding the role and determinants of WCM and working capital enable firms to minimize risks and improve

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overall performance, one of the key questions in WCM is what and how determines the size and structure of working capital. In other words, what are the determinants of WCM? Therefore, as Lamberson (1995) and Zariyawati et al. (2010) noted, financial managers today are increasingly trying to determine the fundamental drivers and determinants of WCM and the appropriate level of working capital. Theoreticians and researchers in the field of WCM are also showing a growing interest in identifying WCM determinants.

From the defined research problem arises the general objective of this study - namely, to identify the determinants of WCM and, in synergy with the results of previous studies on the impact of WCM on the profitability of firms of the same sample, to determine their function in increasing the profitability of firms in the manufacturing, trade and information and communication industries in Croatia.

The structure of the paper is as follows. After a literature review on the WCM determinants, the research methodology and results are presented, followed by a discussion of research results, a summary of the conclusion and scientific contribution, a review of limitations, and recommendations for future research.

2. LITERATURE REVIEW

Although the academic and professional community has recognized the need to identify the determinants of WCM, studies on WCM determinants are still not significantly represented in the literature. Moreover, the existing literature is dominated by studies that focus on identifying the determinants of working capital components, while studies on the determinants of WCM

strategies that consider their net effect are not significantly represented in the finance literature (Hill et al., 2010).

One of the reasons for this may be that identifying potential determinants of working capital may seem like an extensive and time-consuming task since there are many potential indicators or candidates for determinants. However, although there are multiple influencing factors, the authors state that their importance is different and variable over time (Vučak, 2012; Manjhi, 2013). Therefore, existing studies are to shorten the list of potential candidates for determinants, adhering to fundamental relationships and economic logic. Since understanding the scope and structure of working capital assumes the selection of a limited number of determinants that have a significant ability to describe it, combining a limited number of different determinants is usually preferred to diversify the sources of information and variables. Indeed, if the model includes hundreds of independent variables, its contribution to simplifying the determination of a firm's working capital size and structure is modest.

In terms of distribution by country, studies are geographically widespread and only slightly more prevalent in developing countries. Regarding sectoral distribution, the empirical studies tend to be conducted on samples of firms from several different industries (multisector samples), which is understandable given the assumption that industry, among other factors, impacts WCM. Moreover, studies on WCM determinants focus predominantly on publicly traded firms and mostly on firms of larger size or firms of all sizes. According to the results, apart from the declarative emphasis on the importance of WCM (Peel & Wilson, 1996), among the selected studies, only Lamberson (1995),

Baños-Caballero et al. (2010), Saarani & Shahadan (2012b), Valipour, Moradi, et al. (2012) and Russo (2013) explicitly state in their studies that they investigate WCM determinants in small or medium-sized firms. Methodologically, studies using inferential statistics methods predominate, with a focus on correlation and regression.

Moreover, it is observed that different authors examine and identify more or less the same (potential) determinants of the working capital size and structure. It is also observed that the (potential) WCM determinants tested and identified in previous studies correspond to the control variables in the WCM effect on firm profitability models. This suggests that there are (potential) direct and indirect effects of the WCM determinants on firm profitability.

Existing studies that integrate working capital components to examine the factors that impact working capital investment assume that firms' decisions to invest in working capital are influenced by numerous factors of an internal and external nature (Hill et al., 2010; Koralun-Bereźnicka, 2014) and are affected by the industry in which the firm operates. Therefore, they recognize and analyze the internal and external WCM determinants and the industry as one of the WCM determinants. Internal determinants primarily focus on the firms' characteristics and, according to Hill et al. (2010), reflect several dimensions of the firm's operating working capital adjustment to its operating and financial conditions. As noted in Korent (2021), a number of (potential) internal WCM determinants are tested and identified in the literature: firm size (Moss & Stine, 1993; Chiou et al., 2006; Baños-Caballero et al., 2009; Hill et al., 2010; Gill, 2011; Afrifa & Padachi, 2016; among others), firm growth (Kieschnick et al., 2006; Nazir &

Afza, 2009b; Baños-Caballero et al., 2010; Zariyawati et al., 2010; Russo, 2013; Haron & Nomran, 2016; among others), profitability (Nazir & Afza, 2009b; Baños-Caballero et al., 2010; Gill, 2011; Wasiuzzaman & Arumugam, 2013; Haron & Nomran, 2016; among others), investment in fixed assets (Fazzari & Petersen, 1993; Baños-Caballero et al., 2009; Russo, 2013; Kwenda & Holden, 2014; Afrifa & Padachi, 2016; among others), financial leverage (Chiou et al., 2006; Nazir & Afza, 2009b; Baños-Caballero et al., 2010; Zariyawati et al., 2010; Gill, 2011; Wasiuzzaman & Arumugam, 2013; Afrifa & Padachi, 2016; among others), and others: operating cash flow, operating cycle, age of the firm, market power, board characteristics, information asymmetry and external financing costs, sales volatility, current ratio, fast ratio, firm regulations, financial difficulties, internationalization of the firm, tax shield, country risk and others.

Given that the investment in working capital depends not only on the characteristics of the firm but also to a significant extent on the environment in which the firm operates (Chiou et al., 2006), in addition to these internal factors, the studies also recognize the impact of the industry and external determinants related to macroeconomic factors. Both should be considered for effective working capital management (Lamberson, 1995; Chiou et al., 2006). In their studies, the authors, along to internal or, which is an isolated case (Lamberson, 1995), exclusively deal with external determinants. External determinants tested or identified in previous studies are GDP growth rate and its variations (Lamberson, 1995; Nazir & Afza, 2009b; Al Taleb et al., 2010; Akinlo, 2012; Manoori & Muhammad, 2012; Abbadi & Abbadi, 2013; Russo, 2013; Wenda & Holden, 2014; Azeem & Marsap, 2015; Onaolapo

& Kayjola, 2015; among others), time dummy (Baños-Caballero et al., 2009; Rimo & Panbunyuen, 2010; among others), interest rate (Baños-Caballero et al., 2010; Abbadi & Abbadi, 2013; among others), and inflation rate (Zariyawati et al., 2010; among others). Koralun-Bereźnicka (2014) considers the country where the firm is headquartered as an influencing variable for WCM, while Haron & Nomran (2016) analyze the model of determinants of WCM separately for the period before, during, and after the crisis.

Taking into account the theoretical assumption that WCM, i.e., inventory management, the provision of trade credit to customers, and the ability of firms to extend the payment of trade payables, and, accordingly, working capital needs, differ between firms in different industries (Filbeck & Krueger, 2005), studies in the field of WCM aim to investigate the significance of these differences (Filbeck & Krueger, 2005; Lončar & Ćurak, 2008b; Hill et al., 2010; Baños-Caballero et al., 2012a; Aljinović Barać et al., 2013; Yazdanfar & Öhman, 2014; Korent, 2018; among others). The focus of the review of the earlier studies is on different industries. When analyzing the sample composition, it was found that the production activities are the most represented ones, i.e., manufacturing, followed by retail and wholesale trade, agriculture, forestry and fishing, mining and quarrying, and construction. Firms from the finance and insurance sectors are often excluded from the studies' samples (Eljelly, 2004; Nazir & Afza, 2009a; Nobanee & AlHajjar, 2009; Mathuva, 2010; Enqvist et al., 2012; Aktas et al., 2015; among others). The specific nature of the firm, accounting standards, and differences in the definition of working capital justify the latter. In addition to the industries mentioned above, some studies excluded other service firms, i.e., all service firms from the samples (Shin & Soenen, 1998; Deloof, 2003; Raheman & Nasr, 2007; Gill et al., 2010; Mathuva, 2010; among others).

Previous studies have tested and identified a limited number of WCM determinants whose direction and impact intensity is still being reexamined due to conflicting results and, most importantly, the fact that they often differ spatially and temporally, among other factors.

3. METHODS

3.1. Hypotheses and research model

Based on the studies and theoretical assumptions about the impact of individual factors on WCM, which are based on various theories of corporate finance (pecking order theory, agency theory, etc.), the Hypothesis H1 assumes that the determinants that significantly affect the WCM of firms in the studied industries in Croatia are internal: WCM in the previous year, firm size, firm growth, firm profitability, investment in fixed assets and financial constraints, real GDP growth as an external determinant, and finally the indicator variable for the predominant industry of the firm. Thus, it is hypothesized that WCM differs significantly as a function of the above internal determinants, external determinants, and industry. Two auxiliary hypotheses were formulated to elaborate on this hypothesis. The first (H1.1) and the second (H1.2) auxiliary hypotheses assume that the determinants of WCM differ for the subsamples of firms depending on firm size and industry, respectively. Firm size and

industry characteristics are not necessarily only key WCM determinants, as extensively documented in the literature, but may also influence other WCM determinants as well as their interactions (Gill, 2011; Valipour, Moradi, et al., 2012; Koralun-Bereźnicka, 2014).

Considering the hypotheses of a comprehensive research project, this paper is the second part of the research model shown in Figure 1 was created. The part of the mentioned comprehensive research presented in this paper is represented in Figure 1 by Hypothesis H2.

Figure 1. Research model
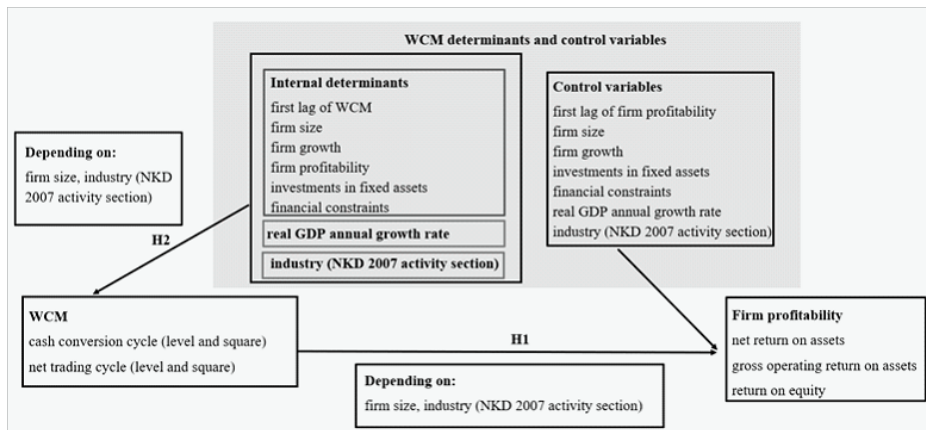
Source: Authors[1].

3.2. Research sample

The study sample includes data on firms registered in Croatia in the manufacturing (C), wholesale and retail trade, repair of motor vehicles and motorcycles industry (G), in information and communication industry (J) according to the National Classification of Activities 2007, excluding those firms that do not exist on the market, do not have employees, do not have positive amounts in sales revenue, operating expenses, total assets, and total equity for the years 2008 to 2015, and are documented in the database of the Financial Agency (FINA).

By independently creating a research sample in the first phase and considering the permanence of firms in the study period, the datasets of all firms in the observed industries from 2008 to 2015 were matched using Excel. After matching, the set of firms consisted of 25,076 firms, and the data sample consisted of 200,608 firm-year observations. Then, using the Stata 14 software package, the observations of firm-years without employees (based on hours worked) that did not have positive amounts for sales, operating expenses, total assets, or total equity were removed from the original data pool. As a result, the sample consisted of 20,472 firms (132,165 observations

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1   The first hypothesis of the model was tested in a previous study (Korent, 2021).

for all firms each year). Finally, due to the presence of outliers, i.e., isolated atypical extreme values, i.e., minimum and maximum values that are the result of unusual circumstances, data entry errors, etc., according to some previous studies (Deloof, 2003; Baños-Caballero et al., 2012b; Lyngstadaas & Berg, 2016; among others), for all indicators of all variables, except for annual growth of real GDP, values below the 1st percentile and values above the 99th percentile in each subsample (small, medium and large firms in Manufacturing (C); small, medium-sized and large firms in Wholesale and retail trade; repair of motor vehicles and motorcycles (G); small, medium-sized and large firms in Information and communication (J)) were eliminated. The final unbalanced sample contains 19,355 firms or 116,002 firm-year observations. Table 1 shows the research sample design according to the two criteria: industry and firm size, including the total number of firms in the first row and the total number of firm-year observations in the second row.

Table 1. Research sample design according to industry criteria and firm size criteria

Industry \ Firm size	Small (S)	Medium (M)	Large (L)	Overall
Manufacturing (C)	5.663 32.112	483 2.319	134 713	6.073 35.144
Wholesale and retail trade; repair of motor vehicles and motorcycles (G)	11.795 68.198	440 1.928	113 523	12.166 70.649
Information and communication (J)	1.785 9.927	42 184	19 98	1.832 10.209
Overall	18.552 110.237	944 4.431	265 1.334	**19.355** **116.002**

Source: Authors.

Note: Number of firms in the first row and the number of firm-year observations in the second row.

3.3. Data and variables

The study in this paper uses secondary data on the companies and macroeconomic data. The data source is the Financial Agency for firm data and the Croatian Bureau of Statistics for macroeconomic data. To test the primary and related auxiliary hypotheses, variables (indicators) were first calculated based on the obtained data. Variables and indicators of variables used in related studies were selected. Variables and indicators of variables were selected based on theory, their statistical significance in previous studies, and the accessibility of the data needed to calculate them (Korent, 2021). The names, abbreviations,

and calculations of all (indicator) variables used for hypothesis testing can be found in Table 2.

WCM is used as a dependent variable, while the following variables are used as regressors, i.e., independent variables: first lag of WCM, firm size, firm growth, firm profitability, investment in fixed assets, financial constraints, industry, and real GDP annual growth rate. Different indicators for a single variable are not considered simultaneously in a single model.

The indicators of variables at the firm level are defined for each firm and year. Therefore, all indicators of dependent and independent variables related to the firm level differ between firms and individual

firms over the years. Although usually firm-specific and time-invariant, industry indicator variables are not so for some firms in the sample because of the observed firm transitions between industries. Thus, contrary to the usual, there is a change in the categorization of the predominant industry for some firms in the observed period. Unlike the usual industry indicator variables, the real GDP annual growth rate changes over time and is independent of the firms in a given year. Finally, to reduce the influence of outliers and to bring the distribution closer to the normal distribution, 1% of the minimum and maximum values of the subsamples of firms according to their size and industry were eliminated for all variable indicators except the real GDP annual growth rate.

Table 2. Variable and indicator names, abbreviations, and calculations

Variable name and abbreviation	Indicator name and abbreviation	Calculation of indicator (variable)
Firm profitability (PRO)	Net Return on Assets (NROA) Gross Operating Return on Assets (BOPRROA) Return on Equity (ROE)	Net return on assets = Net profit / Total assets Gross operating return on assets = Gross operating profit / Total assets Return on equity = Net profit /Total equity
Working capital management (WCM)	Cash Conversion Cycle (CCC) Net Trade Cycle (NTC)	Cash Conversion Cycle = (average inventories / operating costs + average trade receivables/sales revenue – average trade payables / operating costs) * 365 Net trade cycle = (average inventories + average trade receivables – average trade payables)*365 / sales revenue
Firm size	Sales income (LN_SS) Firm size groups (S, M, L)	Firm size = ln (sales income of firm) Firm size groups: small firms (S), medium-sized firms (M), and large firms (L)
Firm growth (GRS)	Firm growth (GRS)	Firm growth = (sales income$_t$ – sales income$_{t-1}$) / sales income$_{t-1}$)
Investment in fixed assets (FATA)	Investment in fixed assets (FATA)	Investment in fixed assets = fixed assets / total assets

Variable name and abbreviation	Indicator name and abbreviation	Calculation of indicator (variable)
Financial constraints (FCON)	Financial leverage (LEV) Probability of financial distress (ZSCORE)	Financial leverage = total debt / total assets The probability of financial distress is quantified by adjusting Altman's (1968) Z-score estimate for private firms (Altman, 2000), according to the following expression: $Z\text{-Score}_{it} = 0.717*X1 + 0.847*X2 + 3.107*X3 + 0.420*X4 + 0.998*X5$, where $X1$ = net working capital / total assets; $X2$ = retained earnings / total assets; $X3$ = profit (earnings) before interest and taxes / total assets; $X4$ = book value of capital/book value of total liabilities; $X5$ = sales income / total assets.
Real GDP annual growth rate (GDPGR)	Real GDP annual growth rate (GDPGR)	The data source is the Croatian Bureau of Statistics.
Industry (IND)	The industry is defined as the activity section of the National Classification of Economic Activities 2007. The survey includes three industries: Manufacturing (C), Wholesale and retail trade, repair of motor vehicles and motorcycles (G), and Information and communication (J).	An indicator variable measures the industry. Since the industry variable has three modalities, two indicator variables were introduced. One indicator variable (INDiG) takes the value 1 for firms whose predominant industry is activity section G and 0 otherwise. In contrast, the other indicator variable (INDiJ) takes the value 1 for firms whose predominant industry is activity section J and 0 contrarily.

Source: Authors.

3.4. Methods and model specification

To test the hypothesis, in addition to descriptive statistics methods, the following inferential statistics methods are used: Kruskal-Wallis population equality test, Dunn's posthoc test, and panel regression analysis. The Kruskal-Wallis population equality test and Dunn's posthoc analysis are used to test the presence of significant differences between the means, i.e., the median, of the WCM indicators for the observed subsamples of firms, given that the assumptions for applying appropriate parametric tests are not met. This allows us to study the influence of the firm size and its industry and their combinations on the firm's WCM.

After testing the significance of the differences in the means of the indicators of WCM, the model of the determinants of WCM is designed, and the corresponding regression parameters are estimated. For this purpose, panel regression is used, the choice of which is determined by the nature of the hypothesis and the data used. Different specifications of panel regression models are tested. The specifications of panel regression models for hypothesis testing differ concerning the indicators of the variables they cover. In the context of a set of variable indicators and considering the number of indicators of the dependent variable and the tested determinants of WCM, it is evident that many combinations, i.e.,

panel regression models, can be formulated. To reduce the study to consideration of a reasonable pool of models, for the present empirical analysis, models with predetermined potential determinants are considered, and there are no more indicators of the same potential determinant in the model. Since a dependent variable with two indicators and eight potential determinants with 12 indicators were defined, 12 models were formulated according to the product rule.

The variables, particularly the WCM in the previous period, whose inclusion determines the dynamic specification of the model, are defined based on theoretical and empirical evidence underlying the hypothesis. Theoretical findings from the field, the results of previous studies, and the results of the conducted (preliminary) empirical study point to the problem of endogeneity. In this study, this problem results from reverse causality and unobserved heterogeneity. In the context of reverse causality, the firm's profitability, sales, and growth influence WCM, and the latter may also influence the former (Hill et al., 2010).

Consistent with previous studies (including Baños-Caballero et al., 2010; Russo, 2013), dynamic panel regression is used to control for the endogeneity problem and consider the WCM dynamism.

Models are specified and tested as linear dynamic panel models with firm-specific fixed effects:

$$WCM_{it} = \alpha + \rho * WCM_{i,t-1} + \delta_1 * LN\_SS_{it} +$$
$$\delta_2 * GRS_{it} + \delta_3 * PRO_{it} + \delta_4 * FATA_{it} + \delta_5 *$$

$$FCON_{it} + \delta_6 * GDPGR_t + \delta_7 * IND_{iG} +$$
$$\delta_8 * IND_{iJ} + \eta_i + \upsilon_{it},$$

where i stands for the firm and t for the year, WCM and regressors are determined as before, α stands for a constant, ρ for a rate of adjustment, and ε_{it} symbolizes a random error.

To test the first and second auxiliary hypotheses, the defined models are estimated for subsamples of firms as a function of their size or industry and additionally for those determined simultaneously by industry and size. As for firm size, the regression models in question are assessed separately for small firms, medium-sized firms, and large firms. Moreover, the potential WCM determinants are tested separately for each industry and each combination of industry and firm size. Due to collinearity, the industry indicator variables are excluded from the observed models for the subsamples of firms by industry and the subsamples by industry and firm size.

All defined models for all associated (sub)samples are assessed using the best-fitting, two-stage robust Arellano-Bover/ Blundell-Bond estimator. This estimator was used, for example, by Baños-Caballero et al. (2010). Applying the above method, real GDP growth was declared the exogenous variable, industry indicator variables were specified as predetermined, and all other variables were set as endogenous variables. The industry indicator variables, real GDP growth, and lags dated from (t-2) and earlier of all endogenous variables were used as their instrumental variables. Applying this estimator to estimate the twelve model specifications, defined in the context of a set of variable indicators, for the entire sample as well as for the observed 15 subsamples of firms yields 192 tests, i.e., estimates (12 models * 1 estimator * 16 (sub)samples). Compared to the previously published paper (Korent, 2021), the analysis carried out in this paper is more

extensive and has a different focus. The previous paper focused on examining the impact of a single determinant (first lag of CCC) and the existence and speed of continuous partial adjustment processes to achieve the firms' target levels of CCC. This paper deals with identifying and explaining the pool of WCM determinants and the study of their robustness in different subsamples and depending on different ways of measuring dependent and independent variables. The analysis conducted in the paper by Korent (2021) was carried out for one indicator of dependent variable (CCC) and an indicator for each of the independent variables for nine subsamples (small, medium-sized, and large firms in Manufacturing (C); small, medium-sized and large firms in Wholesale and retail trade; repair of motor vehicles and motorcycles (G); small, medium-sized and large firms in Information and communication (J)). The analysis conducted in this paper was performed for two indicators of the dependent variable (CCC and NTC), three indicators of profitability (NROA, BOPRROA, and ROE), and two indicators of financial constraints (LEVERAGE and Z-SCORE) for the previously mentioned 16 (sub) samples. As a result, 192 models are tested in this paper and only nine by Korent (2021).

4. RESULTS

A systematized and clear presentation of the research results can be found in Table 3[2]. All eight determinants tested were identified as significant for the entire sample of firms in the observed period. It should be noted that after controlling for other determinants, the indicator variable for trade industry was found to be significant in the

context of the CCC but not in terms of its impact on the NTC of firms. However, the results of the Kruskal-Wallis test and Dunn's post hoc analysis showed statistically significant differences in both the CCC and the NTC among all subsamples of firms by industry and firm size.

In the context of the subsamples of size, the results of the tests performed show that among the determinants observed, the first lag of the WCM indicator, the growth of the firm sales revenue, the financial leverage ratio, the Z-score under the CCC, and the growth of real GDP are determinants that consistently or predominantly significantly determine the WCM of small, medium, and large firms. Although these common determinants of WCM, including the first lag of WCM and firm growth, are fully robust, the determinants of WCM differ by size for the firms studied. Moreover, the presence of significant variable indicators is highest for the subsample of small firms and lowest for the subsample of large firms.

Both the results of the test and the identification of the determinants of WCM for the subsamples by industry indicate differences in the set of determinants of WCM among firms in the selected industries. Despite the differences in the identified determinants of WCM across the observed subsamples, the following determinants determine the WCM of firms from all three observed industries: WCM in the previous year, firm growth, investment in fixed assets, leverage concerning the CCC, and Z-score. Discrepancies between the subsamples arise from differences in financial leverage, profitability, size, and annual real GDP growth.

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2 Due to the size, statistical printouts of the tests performed are available in an online appendix to this paper. The results were marked as significant at the usual significance levels of 1%, 5% or 10%.

In addition to testing and identifying the determinants of WCM for the entire sample and subsamples by size and industry, additional tests of the effects and identification of the determinants of WCM were conducted for companies by size and industry. From the viewpoint of significant phenomena in the analyzed models and subsamples, defined by the size class rather than the industry, the most robust factors are the first lag of WCM and firm growth. Fixed asset investment, financial leverage and Z-score as indicators of financial constraints and real GDP growth follow the latter. Regardless of its indicator, profitability and firm size were found to be the least significant determinants. The indicator variable for information and communication appears more often significant than the indicator variable for trade in the (sub)samples for which industry was tested as a determinant.

In the (sub)samples where they are significant, the tested factors show the same influence on the WCM of the respective firms. First lag of WCM, firm profitability, and financial constraints, as measured by financial leverage, significantly positively affect WCM and thus promote conservative management. In contrast, the variables of size, growth, fixed investment, Z-score, real GDP growth, and industry indicators are significant negative predictors of the CCC and NTC. This leads to more aggressive working capital management.

Table 3. Signs and significant levels of potential WCM determinants for the whole sample and the observed firms' subsamples

| (Sub)sample -Dependent variable indicator | WCM_{t-1} | LN_SS | GRS | PRO | | | FATA | FCON | | | IND | |
				NROA	BOPRROA	ROE		LEV	ZSCORE	GDPGR	for G	for J
Whole sample - CCC	+***	-***	-***	+***	+***	+***	-***	+***	-***	-/-*-**	-*	-***
Whole sample – NTC	+***	-***	-***	+***	+***	+*/+**	-***	+***	-***	-**	-	-***
S - CCC	+***	-***	-***	+***	+***	+**/+***	-***	+***	-***	-/-*/-**	-	-***
S - NTC	+***	-/-***	-***	+***	+***	+*/+**	-***	+***	-***	-**	-	-***
M - CCC	+***	-	-***	+	+	+	-***	+**	-*	-***	-***	-**
M - NCC	+***	-	-***	+	+	+	-***	+***	-	-***	-***	-***

Determinant				PRO				FCON			IND	
(Sub)sample -Dependent variable indicator	WCM_{t-I}	LN_SS	GRS	NROA	BOPRROA	ROE	FATA	LEV	ZSCORE	GDPGR	for G	for J
L - CCC	+***	-	-***	+*/+**	+	+	-	+*/+**/+***	-*	-***	-	+
L - NTC	+***	-	-***	+*/+**	+	-	-	+/+*/+**	-	-***	+	+
C - CCC	+***	-	-***	+/+***	+/+***	+	-***	+***	-***	-	N/A	N/A
C - NTC	+***	-/+	-***	+/+**	+/+**	+/+*	-***	+***	-***	-	N/A	N/A
G - CCC	+***	-***	-***	+***	+**/+***	+*/+**	-***	+***	-***	-	N/A	N/A
G - NTC	+***	-/-**	-***	+***	+*/+***	+	-***	+***	-***	-	N/A	N/A
J - CCC	+***	-	-***	+***	+***	+*	-***	+*	-**	-**	N/A	N/A
J - NTC	+***	-	-***	+***	+***	+**	-***	+	-**	-***	N/A	N/A
CS - CCC	+***	-	-***	+/+***	+/+***	+	-***	+***	-***	-	N/A	N/A
CS - NTC	+***	-**	-***	+**	+*	+*	-***	+***	-***	-	N/A	N/A
CM - CCC	+***	-	-***	+***	+**	+***	-**	+**	+	-***	N/A	N/A
C M- NTC	+***	-	-***	+	+	+**	-***	+**	+	-***	N/A	N/A
CL - CCC	+***	-	-***	+**/+***	+	+/+**	-	+/+*/+**	-	-	N/A	N/A
CL - NTC	+***	-	-***	+/+*	+	+	-	+	-	-*	N/A	N/A
GS - CCC	+***	-***	-***	+***	+/**+***	+*/+**	-***	+***	-***	-*	N/A	N/A

(Sub)sample -Dependent variable indicator	WCM_{t-1}	LN_SS	GRS	PRO			FATA	FCON		GDPGR	IND	
				NROA	BOPRROA	ROE		LEV	ZSCORE		for G	for J
GS - NTC	+***	-/-**	-***	+/+**	+/+*	+/+*	-***	+***	-***	-	N/A	N/A
GM - CCC	+***	-	-***	+/-	+	+	-***	+***	-**	-/-*/-**	N/A	N/A
GM - NTC	+***	+	-***	+/-	+	+	-***	+***	-**	-**	N/A	N/A
GL - CCC	+***	-	-**	+/+*	+	+	+	+	-	-**	N/A	N/A
GL - NTC	+***	-	-**	+	+	+	+	+	-	-**	N/A	N/A
JS - CCC	+***	-	-***	+***	+***	+*	-***	+	-**	-**	N/A	N/A
JS - NTC	+***	-	-***	+***	+***	+**	-***	+	-**	-***	N/A	N/A
JM - CCC	+***	-	-**	+/-	+	+	-	-	+	-*	N/A	N/A
JM - NTC	+***	-	-**	-	+	+	-	-	+	-*	N/A	N/A
JL - CCC	+***	-	-**	+	+	+	-	-	+	-	N/A	N/A
JL - NTC	+***	-	-	+	+	-	-	+	-	-	N/A	N/A

Source: Authors.

Notes: G: trade industry, J: information and communication industry, CS: small manufacturing firms, CM: medium-sized manufacturing firms, CL: large manufacturing firms, GS: small firms in the trade industry, GM: medium-sized in the trade industry, GL: large firms in the trade industry, JS: small firms in information and communication industry, JM: medium-sized firms in information and communication industry, JL: large firms in information and communication industry, WCMt-1: first lag of WCM, CCC: cash conversion cycle, NTC: net trade cycle, LN_SS stand: sales income, GRS: firm growth, PRO: profitability, NROA: net return on assets, BOPRROA: gross operating return on assets, ROE: return on equity, FATA: investment in fixed assets, FCON: financial constraints, LEV: leverage, ZSCORE: the probability of financial distress, IND: industry. The table shows the predominant results of the influence of potential WCM determinants in the tested models. In the case of uniformly distributed results, all are entered. Significance levels: ***1%, **5%, *10%.

5. DISCUSSION

The research results suggest that it is impossible to reject the auxiliary hypotheses and, by their induction, the principal hypothesis of this study. The results of testing the first auxiliary hypothesis are consistent with the findings of Valipour, Moradi, et al. (2012), who conducted a study on Iranian-listed firms. The results of testing the second auxiliary hypothesis are consistent with Hill et al.'s (2010) and Gill's (2011) studies on samples of U.S. and Canadian firms, respectively. These show that the characteristics of size and industry are not only important WCM determinants, as has been extensively evidenced, but also influence the interactions with other factors, i.e., the determinants of WCM.

As mentioned earlier, the effect of the first lag of WCM on current WCM is positive in the models and subsamples of the analyzed firms where it is significant. This is consistent with the results of some previous studies (Baños-Caballero et al., 2010; Abbadi & Abbadi, 2013; Kwenda & Holden, 2014, among others), which suggest that the CCC and the NTC of the firms depend on their values in the previous year, as well as on their target values (Korent, 2021).

The significant negative impact of firm size, consistent with the view of Kieschnick et al. (2006) and Baños-Caballero et al. (2010), suggests that larger firms in the observed (sub)samples use their size-based market power to create better relationships and achieve greater bargaining capacity in their relationships with suppliers on the one hand and customers on the other. In addition, size facilitates the management of the value chain for the firms in question, which requires a high level of coordination between entities and allows a reduction in investment in working capital (Kieschnick et al., 2006 and Baños-Caballero et al., 2010; among others). In the context of the negative relationship between size and working capital investment, larger firms tend to be characterized by greater diversification and a lower risk of failure (Wasiuzzaman & Arumugam, 2013). Accordingly, larger firms with good credit ratings have easier and simpler access to the capital market and keep their cash reserves at a minimum (Wasiuzzaman & Arumugam, 2013).

Together with the size and growth of sales, except for the NTC of large firms in the information and communication industry, WCM turned out to be a significant negative predictor, making it the most robust determinant together with the first lag of WCM. This is consistent with the findings of some previous studies (Baños-Caballero et al., 2010; Gill, 2011; Naser et al., 2013; Haron & Nomran, 2016, among others). The statistically significant negative influence of a firm's sales growth suggests that higher sales growth rates lead to lower working capital investment to increase internal funds. Higher growth rates are associated with more pronounced information asymmetry and a more extreme conflict of interest between owners and creditors (Baños-Caballero et al., 2009; Korent, 2021). In support of the rationale for the negative impact of firm growth on investment of working capital, according to Chiou et al. (2006), those firms already achieving high growth rates dedicate more to WCM and have relatively lower levels of working capital, which in turn manifest in relatively lower working capital demand and needs. Accordingly, firms that have already achieved a planned level of growth may be less likely to expand trade loans to the customers (Deloof & Jegers, 1996; Molina & Preve, 2009; Hill et al., 2010). Conversely, according to Emery (1987) and Petersen & Rajan (1997), firms with

declining sales tend to expand trade credits given to their customers during low-demand periods. Finally, in the context of liabilities, growing firms increase their short-term financing to meet future demand (Zariyawati et al., 2010), and growth itself allows them to access spontaneous forms of financing, i.e., the use of trade credits (Petersen & Rajan, 1997; Cuñat, 2007).

With exceptions, the significant positive effect of profitability on the CCC and NTC of the observed firms suggests that higher profitability rates lead to relatively greater WCM conservatism, which is consistent with the results of most previous studies (Chiou et al., 2006; Nazir & Afza, 2009b; Gill, 2011; Saarani & Shahadan, 2012a; 2013; Onaolapo & Kayjola, 2015; among others). This potentially points out that highly profitable firms have abundant investment resources and are therefore not burdened with aggressive WCM (Chiou et al., 2006; Nazir & Afza, 2009b; Korent, 2021). Considering the significantly positive effect of profitability on WCM and the negative effect of the latter on profitability found in previous studies, and following the results by Awad & Jayyar (2013), the existence of mutual causality between profitability and WCM can be assumed. In this regard, it is evident that aggressive WCM generally increases the profitability of the firm, while on the contrary, as mentioned above, higher profitability of the firm promotes the relaxation of the WCM strategy, which manifests itself in a lengthening of the observed cycles.

Moreover, a significant lengthening of the observed cycles is also due to a decline in firms' fixed capital investment, which, together with the indicators of WCM in the previous year and sales revenue growth, are the strongest determinants of WCM of the analyzed firms. Although theoretical considerations suggest a potential dual relationship between investment in working capital and investment in fixed assets, the results of this study are consistent with the findings of previous studies (Fazzari & Petersen, 1993; Baños-Caballero et al., 2010; Manoori & Muhammad, 2012; Mongrut et al., 2014; Afrifa & Padachi, 2016; among others), which generally indicate that fixed asset investment significantly negatively affects working capital investments. This means these two categories of investments compete for the same available resources (Kwenda & Holden, 2014). Considering that firms in a situation of financial constraints make the amount of investment in fixed assets harder and more expensive (Manoori & Muhammad, 2012), and taking into account their preferences for higher returns (Wasiuzzaman & Arumugam, 2013), the advantage of fixed asset investment is understandable.

As one of the determinants tested and identified, financial constraints in this paper were measured by two indicators: financial leverage and Z-score. In terms of identical economic effects suggesting that financial leverage and Z-score are mutually interchangeable determinants of WCM, with diagnosed exceptions, financial leverage is found to be a significantly positive predictor, and Z-score[1] is found to be a significant negative predictor of WCM. According to the identified influences, contrary to the pecking order theory, the more highly indebted firms in the identified (sub)samples make larger investments in working capital, suggesting that firms use debt to finance their working capital investments (Korent, 2021). This explanation is consistent with the results of some studies (Appuhami,

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2   The lower Z-score reflects the higher probability of financial difficulties and vice versa.

2008; Valipour et al., 2012; Naser et al., 2013; among others) and contrasts with the results of most previous studies, which suggest that the effect of leverage is consistent (Baños-Caballero et al., 2010; Saarani & Shahadan, 2012b; Azeem & Marsap, 2015; Onaolapo & Kayjola, 2015; among others) or predominantly (Akinlo, 2012; Palombini & Nakamura, 2012; among others) significant and negative (Korent, 2021). The significant and negative impact of the Z-score on CCC and NTC implies that a higher probability of financial distress leads to more conservative WCM, which is consistent with the results of the studies by Baños-Caballero et al. (2009) and Hill et al. (2010).

The importance of an appropriate WCM depends, among other things, on the macroeconomic conditions in the environment. Consequently, in the set of tested determinants of WCM, the real GDP annual growth rate is often identified as significant. The statistically significant negative impact of the real GDP annual growth rate is consistent with the finding of the studies by Chiou et al. (2006) and Manoori & Muhammad (2012) and in contrast to the results of the study by Zariyawati et al. (2010). This suggests that an increase in the upturn and a decrease in the downturn of the real GDP annual growth rate determines the shortening of the observed cycles of working capital and vice versa (Korent, 2021). Thus, the results suggest that the firms mentioned earlier adopt a more aggressive WCM strategy during periods of increasing economic growth and a more conservative strategy during periods of decline.

Finally, the negative sign of the industry indicator variables suggests that there is a significant difference between the impact of the trade industry and the information and communication industry on WCM

compared to the manufacturing industry, i.e., money conversion cycles and net trade cycles in the trade industry and the information and communication industry are significantly shorter than those in the manufacturing industry, ceteris paribus. The presented results support the thesis of the existence of industry effects, i.e., the claim that specific industry characteristics, such as minimum efficient size, industry concentration and structure, capital intensity, type of products, degree of automation, production technology, etc., influence working capital investments. Moreover, they are in line with the majority of research (Hawawini et al., 1986; Weinraub & Visscher, 1998; Filbeck et al., 2007; Lončar & Ćurak, 2008b; Nazir & Afza, 2009b; Zariyawati et al., 2009; Hill et al., 2010; Baños-Caballero et al., 2012a; Aljinović Barać et al., 2013; Naser et al., 2013; Aktas et al., 2015; Afrifa, 2016 and others). In particular, the results of the Kruskal-Wallis equality test and Dunn's post hoc analysis are consistent with the results of methodologically similar studies (Afza & Nazir, 2008; Lončar & Ćurak, 2008a; Aljinović Barać et al., 2013; Yazdanfar & Öhman, 2014; Afrifa, 2016; among others).

Considering the results of research conducted on the same sample showing that aggressive management of working capital leads to higher profitability, it is suggested that financial managers in general, and in particular of small and medium-sized manufacturing firms, to achieve and improve profitability, regardless of macroeconomic conditions and certain specifics for a given industry and firm size category, use the increase in firm size and growth, and the reduction in financial constraints, to generally manage net operating working capital in the narrower sense more aggressively in the narrower sense and achieve its target levels. In the opposite situation, when the

size and growth of the firm decrease and financial constraints are increase, leading to more conservative management of working capital, it is recommended to manage the determinants above in a way that reduces unfavorable influences. In addition, it is advisable to eliminate the direct adverse effects of the decline in profitability, the increase in investment in fixed assets, and the annual growth rate of real gross domestic product by shortening the working capital cycle. In contrast, it is essential to avoid the conservative management of working capital resulting from increasing profitability, decreasing investment in fixed assets, and the annual growth rate of real gross domestic product.

6. CONCLUSION, SCIENTIFIC CONTRIBUTION, LIMITATIONS, AND FUTURE RESEARCH RECOMMENDATIONS

The presented results allow to accept the research hypothesis and imply that the net operating working capital in narrower sense reflects many dimensions of firms' adaptation to operational and financial conditions and that financial managers should understand their importance and the impact of the influence of WCM on the design of WCM strategies. Given the results of the WCM effect on the profitability of firms in the observed industries in Croatia, which mainly indicates an aggressive WCM strategy to maximize profit, it is suggested that financial managers in general, especially those of small firms and medium-sized manufacturing firms, to achieve and improve profitability, regardless of macroeconomic conditions and specific industry and firm size category characteristics, and consistent with the results of hypothesis testing, ceteris paribus, use an increase in firm size and growth and a decrease in financial

constraints to generally manage net working capital in narrower sense more aggressively and achieve target levels of working capital indicators. These amplify the direct positive effects on firm profitability identified in the previous study. Although a reduction in the firm size and growth and an increase in financial constraints lead to less prudent, i.e., greater WCM conservatism, the opposite is also possible. In this case, it is recommended to manage the above determinants to reduce unfavorable influences. Considering the decline in profitability, the increase in investment in fixed assets, and the real GDP annual growth rate, it can be assumed that the direct adverse effects of the above trends will be canceled out, i.e., amortized, by aggressive management. In contrast, given that increasing profitability and decreasing investment in fixed assets and real GDP annual growth rate leads to less prudent or more conservative WCM, it is advisable to bypass such practice.

Although theorists, researchers, and financial managers are increasingly trying to identify the determinants of working capital today, compared to studies on the impact of working capital management on the profitability, studies on the determinants of working capital management has still received much less attention, which supports the scientific contribution (Appuhami, 2008; Baños-Caballero et al., 2010; Pratap Singh & Kumar, 2014). Moreover, the existing literature related to the latter is dominated by theoretical findings and studies that focus on identifying the determinants of individual working capital components, while theoretical findings and studies on the determinants of operational working capital management strategies that consider their net effect are not significantly represented in the finance literature (Hill et al., 2010). Accordingly, the scientific contribution of this paper consists of a comprehensive and

systematic literature review and investigation of the direction and significance of the impact of potential WCM determinants identified based on existing literature for firms in manufacturing, trade, and information and communication industry in Croatia (for the whole sample, for subsamples of firms by size, by industry, and both by industry and by size), which have not been implemented there so far. Also, compared to previous studies, the contribution is reflected in good spatial and temporal coverage and in the extension of the coverage from listed and large firms to private small and medium-sized firms. Compared to the previously published paper (Korent, 2021), this paper focuses on testing and identifying the WCM determinants of firms in selected industries in Croatia, with an analysis of their robustness, i.e., independence of the influence of industry and size, and different ways of measuring dependent and independent variables. In addition, this paper provides a more comprehensive and indepth analysis, presentation, interpretation, and comparison of the impact of individual WCM factors for the entire sample and for individual subsamples by industry, firm size, and both.

In contrast, the previous paper focused on examining the impact of only one factor (the first lag of CCC) and, relatedly, the presence and speed of the continuous partial adjustment processes to achieve the target of firms' cash conversion cycles. In this paper, 192 models were tested, compared to 9 models in the previous paper. Finally, considering the significant positive impact of an aggressive WCM strategy on profitability, the results of the study of WCM determinants give rise to recommendations for increasing the profitability of the observed firms.

Considering the scientific contribution of the work, it is necessary to point out its limitations. These consist of the inability to generalize the results spatially and temporally, and consequently, in the limited possibility of clarifying the sign and significance of the influence of the variable indicators, as well as the reasons for agreements or contradictions with previous studies. Another limitation, due in part to the unavailability of specific data, is the exclusion of potentially significant variables or alternative indicators for the same. Consequently, it is suggested that future research be directed to mitigate and address the limitations identified.

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ODREDNICE UPRAVLJANJA RADNIM KAPITALOM (URK) PODUZEĆA U IZABRANIM HRVATSKIM INDUSTRIJAMA

Sažetak

Uzevši u obzir teorijske rezultate i empirijski utvrđenu relevantnost upravljanja radnim kapitalom (Working Capital Management – WCM), ovaj se rad usredotočuje na identifikaciju odrednica URK u proizvodnim, trgovačkim te informa-tičkim poduzećima u Hrvatskoj. Vrijeme analize odnosi se na period od 2008. do 2015. godine, dok se završni uzorak sastoji od 116,002 opservacija poduzeća u određenoj godini. Uz metode deskriptivne statistike, u radu se koriste Kruskal-Wallisov test, Dunnove post-hoc testove i regresijska panel analiza, kao metode inferencijalne statistike. Rezultati utvrđivanja odrednica URK ukazuju da URK u prethodnoj godini, profitabilnost i financijska ograničenja pozitivno djeluju na cikluse radnog kapitala te, na taj način, promoviraju konzervativni URK.

Nasuprot tome, veličina, rast, fiksne investicije, godišnji rast re-alnog bruto društvenog proizvoda i industrijski indikatori su značajni negativni prediktori dvaju indikatora URK-a, korištenih u ovom radu (ciklu-sa konverzije gotovine i neto trgovačkog ciklusa) te potiču agresivni URK. Uzevši u obzir značajne pozitivne efekte agresivne strategije URK-a na profitabilnost, a što je konzistentno s rezultatima testa odrednica URK, analiziranim se poduzećima preporučuje korištenje agresivnije strategije za opće upravljanje neto radnim kapitalom, kako bi se ostvarile njegovi ciljevi.

Ključne riječi: *upravljanje radnim kapitalom, proizvodnja, trgovina, informatička industrija, Hrvatska*