

Working capital strategies: Eurozone SBE's challenge to crises

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Abstract

This article investigates the determinants of working capital management (WCM) in the period of the Covid-19 financial crisis, considering 1,101 non-financial small companies (SME's) from the Euro Zone of 9 countries distributed by 6 sectors of economic activity in the period of 2015 to 2021 using the Ordinary Least Squares (OLS) model, robust and quantile Pooled regression. The results indicate that the Covid-19 financial crisis influenced WCM. The firm's determinants, macroeconomic conditions and industry influence WCM, throughout the period. During the Covid-19 period, companies adapted WCM strategies with the aim of increasing the level of self-financing. This behavior is based on the theory of trade-off and pecking order, with the aim of reducing bankruptcy and agency costs. The Covid-19 financial crisis evidenced a tendency towards the adoption of the aggressive WCM strategy to the detriment of the conservative strategy adopted throughout the period. This research contributes to the advancement of knowledge about the determinants of working capital in general and in adverse contingency scenarios, supporting academic discussions and decision makers.

Keywords: Management, determinants, performance, Europe, Covid-19

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1. Introduction

Working capital management (WCM) is important and presents itself as a means that can maximize the value of the company (Deloof, 2003). Thus, for the author, an optimal level of investment in working capital is required, achieved by balancing the amount of inventories and trade credits with accounts payable, and Akbar, Akbar & Draz (2021) include cash, the result of this balance. Thus, the WCM reflects policies and adjustments to the level of current assets and liabilities.

For Neves (2012) financial balance allows the company to operate naturally, without surprises and consents to appropriate expansion decisions. In this connection, for Assaf Neto (2012), the amount of working capital influences liquidity and profitability and, with the consequent effectiveness of WCM, the continuity of the company. With this, it is apprehended that liquidity ensures the full and timely execution of debts while profitability remunerates investors and generates resources for the company to finance itself.

As a WCM proxy, the cash conversion cycle - the time interval between spending on the purchase and receiving the sale, is quite evident in the literature (Deloof, 2003; Banos-Caballero, Garcia-Teruel & Martinez-Solano, 2010; Palombini & Nakamura, 2012; Moussa, 2019; Jaworski & Czerwonka, 2022). The longer this time interval, the greater the investment in working capital and the greater the profitability depending on the trade-off - cost and return, the amount inventories held in the company and the way it is financed.

However, several factors can impact the quality/efficiency of WCM (Prasad et al., 2019). Jaworski & Czerwonka (2022) classify them into three groups: the firm, the macroeconomic conditions (specific to each country) and the industry (economic sector). However, the researchs focuses on analyzing more the factors internal to the firm (Palombini & Nakamura, 2012).

In this connection, WCM decisions are taken at an institutional and/or personal level and are classified by the literature as a conservative strategy and/or aggressive strategy (Deloof, 2003; Altaf & Ahmad, 2019). These two strategies can be better understood in the light of Keynes' (1936) theory of liquidity preference (monetary economic theory), that is, they can be triggered by the need for transaction and precaution and/or by speculation (Keynes, 1985).

However, with the objective of financial balance (Deloof, 2003; Chang, 2018), in which factors both internal and external to the company can be decisive (Palombini & Nakamura, 2012; Moussa, 2019; Jaworski & Czerwonka, 2022), WCM decisions also need to be guided by pecking order (Myers and Majluf, 1984), trade-off (Myers, 1984) and Agency (Jensen & Meckling, 1976) theories - hierarchy of

preference for sources of funds, optimal structure of capital and conflicts of interest or informational asymmetry, respectively.

However, in addition to the factors expressed in the literature specific to the firm, country and sector (Palombini & Nakamura, 2012; Jaworski & Czerwonka (2022), one can point to broader contingencies such as, for example, financial crises and, in this research, the one caused by Covid-19. Thus, based on the above and a priori, one can also pay attention to the theory of Contingency to better understand and substantiate the determinants of WCM.

Financial crisis, commonly, is a harbinger of scarcity of resources to finance investments, especially operational ones. For this research, the period 2020-2021 was defined as a proxy for the financial crisis caused by Covid-19, characterized by its effects on the supply and demand of products and services with the greatest impact, initially, in Europe.

Therefore, the following research question arises: what is the behavior of WCM determinants in SBE's in the euro zone during the Covid-19 period?

The objective is to identify and analyze the influence of the financial crisis on the determinants and on the WCM at its different levels, quantiles, in SBE's of the euro zone.

The research is relevant because financial crises are commonplace. As an example, in this millennium three stand out with global consequences: Russia-Ukraine war in 2022, Covid-19 in 2020-2021 and subprime that started in the USA in 2008 and provoked/potentiated several subsequent regional crises (economic recession).

For Akbar, Akbar & Draz (2021) WCM is effective and flexible to face adverse contingencies, macroeconomic influences. For Enqvist, Graham & Nikkinen, (2014) it is important because it can avoid financial difficulties and/or insolvency (Akbar, Akbar & Draz, 2021). In summary, in times of financial crisis, efficient WCM is demanded with more urgency, greater understanding of the adverse scenario and requires effectiveness in order to mitigate the effects on the performance/value of the company.

The research findings allow theoretical advances in the literature, especially on the groups of determinants in an adverse contingency scenario, Covid-19, with a robust bibliographic review based on recent papers and with an impact factor and empirical analyzes at different levels of WCM with the use Quantile Regression and Diff-in-Diff analysis.

The paper continues in section 2 with the theoretical framework: (i) Working capital: Concept and theories; (ii) Working capital determinants. Section 3 presents

the research method. In section 4 the results analysis will be described, in 5 the conclusions and in 6 the references.

2. Literature

2.1. Working capital: Concept and theories

For Aktas, Croci & Petmezas (2015) there are several interpretations/definitions of working capital. In the accounting conception, it is defined as the difference between current assets and liabilities and understood as a measure of liquidity (Ding, Guariglia & Knight, 2013; Laghari & Chengang, 2019). For (Akbar, Akbar & Draz, 2021) adjustments to the level of current assets and liabilities reflect the WCM and have the intention the defined amount of working capital optimal or desired (Deloof, 2003).

Also, WCM can be defined in days period – cash conversion cycle. For Deloof (2003) it is the most notorious proxy in the literature, and it compiles the result of the difference between the number of days to carry out accounts receivable and inventories with the period of time to pay the accounts (García-Teruel and Martínez-Solano, 2007; Baños-Caballero, García-Teruel & Martínez-Solano, 2010; Altaf & Ahmad, 2019; Laghari & Chengang, 2019).

In summary for Deloof (2003); Nobanee & Abraham (2015); Chang (2018) and Laghari & Chengang (2019) WCM express short-term financial decisions that seek to define the optimal level of operational investment, however, the need for long-term financing can be created - strategic perspective.

The optimal level of working capital and/or quality of WCM can be supported by several theories depending on the circumstances and/or planning of the company. In this connection, there is a conservative and aggressive strategy that defines the amount/level of investment in current assets and financing with short-term resources, as follows: higher investment and lower financing – conservative and lower investment and higher financing – aggressive. According to Altaf & Ahmad (2019), in the conservative strategy the risk of refinancing and interest is lower with high cost of liquidity; the aggressive strategy has lower financing and agency costs and high illiquidity costs.

In turn, these two WCM strategies can be justified by liquidity preference theory (Keynes, 1936) and agency theory (Jensen & Meckling, 1976). The definition of the level of working capital and/or liquidity can be motivated by the need for the transaction (maintenance of the activity level), precaution (fulfillment of contracts and conditions of future adverse contingencies) and speculation - expectation of opting for financial advantages in maintain inventories (Keynes, 1985). Thus, one can have both a conservative and an aggressive strategy.

However, the manager, in the condition of deciding, can choose one of the two strategies, depending on the greater personal benefit (Jensen & Meckling, 1976).

Thus, based on the above, the trade-off and pecking order theories become fundamental both to achieve WCM quality and to mitigate the agency cost.

The trade-off seeks balance or optimal capital structure, relationship between third-party and own capital, to increase performance. For Myers (1984) and Jensen & Meckling (1976) it is necessary that the marginal benefits are equal to the marginal costs of the debt level. Thus, the amount of benefit from the tax savings of the debt is limited to the cost of bankruptcy, agency costs and restrictions on obtaining additional resources (Jensen & Meckling, 1976; Myers, 1984).

Regarding WCM, the trade-off occurs in the level of working capital that provides greater performance. However, for the company's operational continuity, the optimal capital structure must be observed, and, for that, the cash level can be managed - a result of WCM, with a decrease or increase in leverage.

The purpose of the pecking order is to establish an order or hierarchy of preference for sources of funds – first, internally generated funds: cash arising from WCM, performance level and dividend policy and strategies that increase cash flow; continues with the debt with third parties: financing, loans, debt securities; and, as a last option, external resources: own capital with contributions from partners and/or with the issuance of shares (Myers & Majluf, 1984; Myers, 1984).

In view of the above, the relationship established between WCM, and the pecking order theory intends decisions for a conservative and/or aggressive strategy based on Keynes' (1936) motivations and with the aim of mitigating information asymmetry and agency costs (Jensen & Meckling, 1976).

Furthermore, country- and industry-specific determinants (Jaworski & Czerwonka, 2022) add macroeconomic influences, adverse or exogenous contingencies to the firm. In this connection, the theory of contingency needs to be included in the discussions and, a priori, there is the following syntax: contingency environments - reflections on management - financial decisions - WCM quality - performance. Thus, a logical relationship can be established between the contingency of the Covid-19 financial crisis and WCM. According to Zahra (2021) Covid-19 can remodel supply chains and stop business; Backes et al. (2020) predicted different impacts between countries and Ramiah, Zhao & Moosa (2014) identified greater risk aversion and the use of the conservative WCM strategy.

Still, for Lawrence & Lorsch (1967) economic, market and geopolitical conditions can guide the decisions of companies. In short, it appears that the contingency theory is also important/relevant to explain and support WCM.

2.2. Working capital determinants

The determining factors of WCM, according to Baños-Caballero, García-Teruel & Martínez-Solano (2010), Wasiuzzaman (2018), Moussa (2019) and Jaworski & Czerwonka (2022) can be classified/researched in: (i) relation to firm, (ii) specific to each country (macroeconomic conditions) and (iii) associated with the type of industry (sector). The main determinants used in the regression models of the aforementioned studies are: Return on assets (roa); Growth opportunities (cresrec); leverage(alav); Fixed Assets (aft); Macroeconomic factors (atpib); Cash flow (ebitda); Size (lnrec); Sector (sector).

For Baños-Caballero, García-Teruel & Martínez-Solano (2010) the roa explains the WCM with a significant and negative relationship and based on other research justify that higher performance facilitates the raising of external resources and the negotiation with suppliers, allows new investments and thus improves the quality of WCM. Wasiuzzaman (2018) and Moussa (2019) found a positive relationship and justify that with sufficient internal resources there would be no concerns about the quality and/or higher level of working capital.

For Jaworski & Czerwonka (2022) cresrec explains WCM with a negative relationship and suggest that the priority is in the greater tangibility of fixed assets, specifically in the energy industry. For Wasiuzzaman (2018) SBE's have limited access to capital and the available resources would be to sustain growth while Baños-Caballero, García-Teruel & Martínez-Solano (2010) corroborate with previous studies - with growing sales, companies enjoy more credit and, when in decline, offer more conditions to customers. The aforementioned research found a negative relationship between cresrec and WCM, such as that of Moussa (2019), which suggests, however, at the lowest level of WCM, the early receipt and postponed payment of trade credits.

For Moussa (2019), companies with high debt (alav) need internal resources, generated with more working capital, an empirically proven statement. However, Baños-Caballero, García-Teruel, Martínez-Solano (2010) and Jaworski & Czerwonka (2022) point to a negative and statistically significant relationship, and Wasiuzzaman (2018) found no significance.

Research by Wasiuzzaman (2018), Jaworski & Czerwonka (2022) and Baños-Caballero, García-Teruel, Martínez-Solano (2010) found a negative relationship between aft and WCM. For Baños-Caballero, García-Teruel, Martínez-Solano (2010), with financial restrictions, investment in fixed assets requires working capital resources. Moussa (2019) found no statistical significance.

For Jaworski & Czerwonka (2022) the relationship between atpib and WCM is negative and depends on the sector of activity, however, they state that there is no consensus in the literature. For Moussa (2019), in financial crises, companies

reduce expansion and, thus, tend to increase working capital. Wasiuzzaman (2018) and Baños-Caballero, García-Teruel, Martínez-Solano (2010) found a non-significant result.

For Moussa (2019) the level of ebitda indicates WCM efficiency and, therefore, there is less demand for working capital – an empirically confirmed statement, a significant and negative relationship. On the other hand, Jaworski & Czerwonka (2022) found a positive relationship as well as Baños-Caballero, García-Teruel, Martínez-Solano (2010) who cited other studies to justify that the company's ability to generate internal resources at lower costs is shared.

Wasiuzzaman (2018) and the Baños-Caballero, García-Teruel, Martínez-Solano (2010) state that the cost of financing working capital tends to be lower in larger companies because they have fewer commercial credits and less informational asymmetry - a positive and significant relationship between lnrec and WCM (Jaworski & Czerwonka, 2022). On the other hand, Moussa (2019) found a significant and negative relationship justified by the bargaining power of larger companies.

For Baños-Caballero, García-Teruel, Martínez-Solano (2010) the cash conversion cycle is different between sectors of economic activity (sector) but, however, they did not find significance. Moussa (2019) only argues that there is a significant influence on WCM and Jaworski & Czerwonka (2022) only researched energy companies. Wasiuzzaman (2018) found fewer significant determinants in public SBE's to the detriment of private ones.

3. Research method

3.1. Data

The sample is composed of Eurozone non-financial small business enterprises (SBE's) from nine countries and from six different sectors of economic activity, as shown in Table 1 and Table 2 below. Data collection took place in August 2023.

Table 1. Sample by country

Country	Population	Sample #	%
Austria	160	14	1.27
Belgium	1,025	447	40.60
France	784	143	12.99
Germany	1,010	23	2.09
Greece	2	1	0.09
Ireland	36	4	0.36

Italy	654	308	27.97
Portugal	133	82	7.45
Spain	564	79	7.18
Total	4,912	1,101	100.00

The composition of the sample had the following exclusions, filters in data collection in Refinitiv Reuters Eikon and treatment in excel: companies with values less than or equal to zero/null for cost of goods sold, accounts payable, accounts receivable, inventories, total assets, income, current assets and current liabilities. Thus, the sample corresponds to 1,101 companies and 7,707 observations (from 2015 to 2021).

Table 2. Sample by economic sector

Economic sector	Sample #	%
Basic Materials (<i>bm</i>)	183	16.62
Consumer Cyclicals (<i>cc</i>)	346	31.43
Consumer Non-Cyclicals (<i>cnc</i>)	167	15.17
Energy (<i>ene</i>)	8	0.73
Industrials (<i>ind</i>)	380	34.51
Utilities (<i>uti</i>)	17	1.54
Total	1,101	100.00

A high concentration of companies can be seen in a few countries and sectors of activity: 81.56% are from 3 countries, 14.63% from 2 and 3.81% from 4; 65.94% are in the consumer cyclical and industrials sectors, 31.79% in basic materials and consumer noncyclical and 2.27% in energy and utilities. This concentrated composition of the sample can be decisive in WCM due to macroeconomic conditions - financial crisis of Covid-19, country environment and economic activity sector.

3.2. Variables

As a dependent variable and WCM proxy, the cash conversion cycle (*ccc*) was chosen, defined as $[(\text{accounts receivable} / \text{sales}) * 365 + (\text{stocks} / \text{sales}) * 365 - (\text{accounts payable} / \text{sales}) * 365]$ and used in most studies such as Baños-Caballero, García-Teruel, Martínez-Solano (2010), Moussa (2019), Wasiuzzaman (2018) and Jaworski & Czerwonka (2022) among others.

Regarding the independent variables, they almost unanimously correspond to the research used to base the WCM determinants on the theoretical framework, namely: return on assets (*roa*), growth opportunities (*cresrec*), financial leverage (*alav*), fixed assets (*alav*), macroeconomic factors (*atpib*), cash flows (*ebitdalc*), size (*lnrec*), sector (*sector*). The *atpib* variable includes companies from 9 countries in the sample, highly concentrated in a few and, with this, the aim is to

evaluate the effect of the country's level of development on the firm's investment and its influence on the WCM. The *ebitdalc* variable represents the WCM efficiency (Moussa, 2019) weighted by liquidity and therefore indicates lower demand for working capital.

Also, the dummy *dc* was used as a dichotomous variable of interest: being 1 for the Covid-19 period (2020-2021) and the reference 0 for the entire research period. The dummy variable *dc* interacts with the independent variables that determine the WCM in order to verify the behavior of the determinants before and during the period of the Covid-19 financial crisis, as specified in the regression model and in figure 1 below.

3.3. Regression model

The regression models used by Baños-Caballero, García-Teruel, Martínez-Solano (2010), Moussa (2019), Wasiuzzaman (2018) and Jaworski & Czerwonka (2022) were adjusted and specified to meet the objectives of this research.

$$ccc_{it} = \beta_0 + \beta_1 roa + \beta_2 dc + \beta_3 cresrec + \beta_4 alav + \beta_5 atf + \beta_6 atpib + \beta_7 ebitdalc + \beta_8 lnrec + \beta_9 dbm + \beta_{10} dcncind + \beta_{11} roadc + \beta_{12} cresrecdc + \beta_{13} alavdc + \beta_{14} atfdc + \beta_{15} atpibdc + \beta_{16} ebitdalc + \beta_{17} dbmdc + \beta_{18} dcncinddc + \mu_{it} \quad (1)$$

with *ccc* as dependent variable, *roa*, *dc*, *cresrec*, *alv*, *atf*, *atpib*, *ebitda*, *lnrec*, *dbm*, *dcncind*, *roadc*, *cresrecdc*, *alavdc*, *atfdc*, *atpibdc*, *ebitdadc*, *dbmdc* and *dcncinddc* as independent variables of, all explained, computed, sign expectation and hypothesis testing across Figure 1. Regressions coefficients given by β_1 to β_{18} for each independent variable, β_0 the constant and μ the error term.

Figure 1. Regression model variables

Variable	Value	Sign	Obs.
<i>ccc</i> – working capital	$\left(\frac{\text{receivables} + \text{inventory} - \text{payables}}{\text{net sales}}\right) * 365$	n/a	n/a
<i>roa</i> – return on assets	$\frac{\text{net income before taxes}}{\text{total assets}}$	+/-	a,c,d
<i>dc</i> – dummy covid-19	1 for 2020-2021; 0 for remain	n/a	a,b,c,d
<i>cresrec</i> – growth opportunities	$\frac{\text{revenues}_n - \text{revenues}_{n-1}}{\text{revenues}_{n-1}}$	-	a,b,c,d
<i>alav</i> – leverage	$\frac{\text{total debt}}{\text{total assets}}$	+/-	a,b,c,d
<i>atf</i> – fixed assets	$\frac{\text{long term assets} - \text{intangible assets}}{\text{total assets}}$	-	a,b,c

<i>atpib</i> – macroeconomic factors	$\frac{total\ assets}{GDP}$	+/-	a,b,c,d
<i>ebitdalc</i> – cash flow	$\frac{ebitda}{liquidez\ corriente}$	+/-	a,b,d
<i>lnrec</i> – size	revenues logarithm	+/-	a,b,c,d
<i>dbm</i> – dummy <i>sector_{bm}</i>	1 for basic materials (<i>bm</i>); 0 for remain	n/a	n/a
<i>dcncind</i> – dummy <i>sector_{cnc,ind}</i>	1 for consumer non-cyclicals (<i>cnc</i>) and industrials (<i>ind</i>); 0 for remain	n/a	n/a
<i>roadc</i> – dummy <i>roa</i> covid-19	<i>roa * dc</i>	n/a	n/a
<i>cresrecdc</i> – dummy <i>cresrec</i>	<i>cresrec * dc</i>	n/a	n/a
<i>alavdc</i> – dummy <i>alav</i> covid-19	<i>alav * dc</i>	n/a	n/a
<i>atfdc</i> – dummy <i>atf</i> covid-19	<i>atf * dc</i>	n/a	n/a
<i>atpibdc</i> – dummy <i>atpib</i> covid-19	<i>atpib * dc</i>	n/a	n/a
<i>ebitdalcdc</i> – dummy <i>ebitdalc</i> covid-19	<i>ebitdalc * dc</i>	n/a	n/a
<i>dbmdc</i> – dummy <i>sector_{bm}</i> , covid-19	<i>dbm * dc</i>	n/a	n/a
<i>dcncinddc</i> – dummy <i>sector_{cnc,ind}</i> , covid-19	<i>dcncind * dc</i>	n/a	n/a

Obs. a) Baños-Caballero, García-Teruel, Martínez-Solano (2010); b) Jaworski & Czerwonka (2022); c) Wasiuzzaman (2018); d) Moussa (2019)

After specifying the model, the multicollinearity test was performed using the Variance Inflation Factor (VIF) and Tolerance statistics. A maximum VIF value of 5.44 (*dc*) was observed, with a mean VIF 2.10, and VIF-1 0.934783. Therefore, there is no evidence of the presence of multicollinearity (Fávero et al., 2014).

The Durbin-Watson test showed autocorrelation of the residues (Table 3), corrected with the inclusion in the model of the 1st order AR autoregressive component, a variable of lagged residues (*resdef*), according to the new regression equation that follows (Greene, 2008; Fávero et al., 2014).

So, the new regression equation to be used comes:

$$\begin{aligned}
ccc_{it} = & \beta_0 + \beta_1 roa + \beta_2 dc + \beta_3 cresrec + \beta_4 alav + \beta_5 atf + \beta_6 atpib \\
& + \beta_7 ebitdalc + \beta_8 lnrec + \beta_9 dbm + \beta_{10} dcncind + \beta_{11} roadc \\
& + \beta_{12} cresrecdc + \beta_{13} alavdc + \beta_{14} atfdc + \beta_{15} atpibdc \\
& + \beta_{16} ebitdalc + \beta_{17} dbmdc + \beta_{18} dcncinddc + \beta_{19} resdef \\
& + \mu_{it}
\end{aligned} \tag{2}$$

Table 3. Autocorrelation statistics for equation (1) and equation (2)

Analysis	Test	Regression (1)	Regression (2)
Autocorrelation	Durbin-Watson	.5502734	2.108775

The Breusch-Pagan and White and Jarque-Bera tests were statistically significant at 1% and thus indicate a problem of heteroscedasticity and normality of the residues, respectively, corrected with the technique of White's robust standard errors (Greene, 2008; Fávero et al., 2014), as shown in Table 4.

Table 4. Heteroskedasticity and normality tests for equation (2)

Analysis	Test	χ^2	Probability
Heteroskedasticity	Breusch-Pagan	1585.23	.000
Heteroskedasticity	White	742.1201	8.0e-98
Normality	Jarque-Bera	6.0e+04	.000

4. Results analysis

Table 5 shows an overview of the dispersion of the values of the variables used in the OLS and Quantile regression models.

Table 5. Descriptive statistics¹

Variable	Mean	Median	SD	Min	Max	Skew.	Kurt.
<i>ccc</i>	79.4412	65.34965	86.86098	-360.846	996.2987	2.352029	16.60987
<i>roa</i>	.0583096	.045148	.1119702	-.797016	.9286506	-.155738	11.66249
<i>cresrec</i>	.0510612	.0172063	.2799951	-.871589	4.642854	4.939081	60.6658
<i>alav</i>	.1653313	.1043159	.1826553	-6.81e-06	.9247555	1.109356	3.668645
<i>atf</i>	.2644948	.2046821	.2174032	-3.10e-15	.9624095	.9246404	3.135838
<i>atpib</i>	.0000305	.0000134	.0000745	2.96e-07	.0013243	8.214875	93.75627
<i>ebitdalc</i>	1140.272	623.6055	4248.254	-87515.5	104172.7	4.075755	130.4906
<i>lnrec</i>	9.755739	9.762422	.3744133	7.388839	12.44693	.0671431	7.30715
<i>cccdc</i>	82.7116	67.47276	89.05666	-360.846	836.8036	1.678876	10.51176
<i>roadc</i>	.0567157	.0447271	.1183614	-.762341	.657824	-.439453	9.599546
<i>cresrecdc</i>	.0565666	.0430355	.2924547	-.780589	4.550289	4.084682	54.45936

<i>alavdc</i>	.1636401	.1008225	.1833533	-6.81e-06	.9247555	1.130864	3.780877
<i>atfdc</i>	.2630887	.2052964	.2178603	0	.9624095	.9500883	3.216448
<i>ebitdalcdc</i>	1016.229	656.8349	4055.331	-45530.8	68061.42	2.202072	72.74123
<i>atpibdc</i>	.0000312	.0000141	.0000725	8.47e-07	.0011662	7.71457	81.31207

¹ 7,707 total observations

As noted, the behavior of skewness and kurtosis indicates that the time series of the variables in the models are not normal - a result confirmed by the Jarque-Bera test, except for the *atf* and *atfdc* variables, which can, in the regressions, confirm a similar result between WCM levels and different in the Covid-19 period.

It is found that the *ccc* in the Covid-19 period has a higher mean, median and standard deviation. In the whole period, a large standard deviation and amplitude and median smaller than the average of the *ccc* are also observed, which, a priori, indicates different results, possibly, in the extreme quantiles of the WCM.

Regarding the WCM variables/determinants, original and interacting with the Covid-19 period, some show variations that may signal different behaviors in the regression estimation parameters, such as: (i) standard deviation and/or amplitude different in the variables *ebitda/ebitdadc* and *roa/roadc*; (ii) all dispersion measures of the *alav*, *atf* and *atpib* variable are equal and/or very close; (iii) different mean and median in the variables *cresrec/cresrecdc* and very similar in the others of the firm's group as well as the variables of macroeconomic conditions *atpib/atpibdc*.

In summary, the dispersion of the data allows inferring that the determinants (firm, country and sector) may present different results in the parameters of the regressions both in terms of quality levels and/or strategies of the WCM and in the period of the Covid-19 crisis.

Table 6. OLS and Quantile (Q) regressions coefficients

Variables	OLS	Q10	Q25	Q50	Q75	Q90
<i>roa</i>	-14.0913c (8.0142)	15.0434 (13.4998)	4.39679 (6.1035)	-4.3357 (3.8081)	-19.8484a (6.4336)	-64.8054a (16.0189)
<i>dc</i>	6.1909c (3.6015)	9.6607 (6.0347)	4.2962 (2.7284)	3.6399b (1.7023)	3.4419 (2.8760)	2.0957 (7.1608)
<i>cresrec</i>	-20.2327a (5.3205)	1.7671 (5.0811)	-2.9028 (2.2973)	-7.6598a (1.4333)	-13.5103a (2.4215)	-19.2362a (6.0293)
<i>alav</i>	81.0405a (6.3777)	82.0535a (8.2114)	73.1357a (3.7125)	74.5318a (2.3163)	75.2654a (3.9133)	63.0597a (9.7438)
<i>atf</i>	-82.9985a (4.8651)	-64.3697a (7.0010)	-70.3031a (3.1652)	-74.6607a (1.9748)	-85.4393a (3.3365)	-111.497a (8.3074)
<i>atpib</i>	228030.44a (29136.38)	-3853.95 (20089.96)	150108.76a (9083.03)	229175.79a (5667.11)	342329.2a (9574.35)	516546.81a (23838.88)
<i>ebitdalc</i>	-.0013a	-.0006b	-.0011a	-.0014a	-.0010a	.0004

	(.0003)	(.0003)	(.0001)	(.00009)	(.0001)	(.0004)
<i>lnrec</i>	-23.8647a (2.5878)	-5.1515 (3.2289)	-13.9679a (1.4598)	-21.1515a (.9108)	-28.2594a (1.5388)	-41.4859a (3.8315)
<i>dbm</i>	22.7282a (2.3529)	25.5968a (4.1887)	24.3863a (1.8938)	22.9005a (1.1815)	21.2133a (1.9962)	15.6595a (4.9704)
<i>dcncind</i>	10.8897a (1.8869)	8.9832a (3.1036)	8.1796a (1.4031)	9.8719a (.8754)	11.6857a (1.4791)	14.4444a (3.6827)
<i>roadc</i>	-14.5205 (15.0578)	9.5740 (24.6569)	-2.731 (11.1478)	-9.2175 (6.9554)	-24.0365b (11.7508)	-48.8543c (29.2581)
<i>cresrecdc</i>	3.2383 (10.1203)	-5.1246 (9.1833)	-7.022c (4.1519)	-3.8662 (2.5904)	-.9096 (4.3765)	9.2124 (10.8970)
<i>alavdc</i>	-6.0831 (9.6520)	-11.4213 (15.2982)	-2.1040 (6.9166)	-2.8449 (4.3154)	-2.4620 (7.2907)	4.7012 (18.1530)
<i>atfdc</i>	-.17895 (7.3206)	.0860 (13.0549)	1.8100 (5.9023)	3.1336 (3.6826)	5.2425 (6.2216)	5.0164 (15.4911)
<i>atpibdc</i>	-54841.044 (43289.15)	67950.90c (37225.1)	-48747.31a (16830.14)	-61424.48a (10500.71)	-95232.8a (17740.5)	-113432.4b (44171.5)
<i>ebitdalcdc</i>	.0015a (.0005)	.0004 (.0006)	.0008a (.0003)	.0010a (.00019)	.0010a (.0003)	-.0001 (.0008)
<i>dbmcdc</i>	-1.0599 (3.7347)	-5.1073 (7.8620)	-.9549 (3.5545)	-.1920 (2.2177)	1.2208 (3.7468)	7.4341 (9.3291)
<i>dcncinddc</i>	-.1860 (3.034)	-1.4221 (5.8109)	.2793 (2.6272)	-.0483 (1.6392)	-1.2293 (2.7693)	.3055 (6.8953)
<i>resdef</i>	.7293a (.0187)	.5153a (.0140)	.7508a (.0063)	.8703a (.0039)	.8943a (.0067)	.8711a (.0167)
β_0	306.9166a (25.6218)	71.2487b (31.7309)	189.7065a (14.3461)	277.4153a (8.9508)	364.4626a (15.1221)	527.8122a (37.6521)

Standard error in brackets | Significance level: a – 1%; b – 5%; c – 10%

N. Obs. 7,704 | F-test 116.33a | R-squared .5672

Regarding the WCM determinants, firm level, considering the entire period of the research, it is observed that they are significant both in the OLS model and in the quantiles. The *cresrec* presents a negative and statistically significant relationship at 1% - a finding confirmed by previous studies (Baños-Caballero, García-Teruel & Martínez-Solano, 2010; Wasiuzzaman, 2018 and Moussa, 2019). Furthermore, this result can be explained by the motivation of the transaction (Keynes, 1985) - lower level of activity and greater investment in working capital according to significant impact from Q50 and progressive up to Q90 - thus, the conservative strategy is the option, supported by the pecking order theory (Myers & Majluf, 1984), consistent with indebtedness. The leverage (*alav*) has a positive and significant relationship, a result confirmed by Moussa (2019) - signals the search for an ideal level of indebtedness - debt cost-benefit trade-off (Myers, 1984) through WCM strategies: greater impact on the lowest levels of *ccc* and progressively regressing up to Q90.

On the other hand, *atf* and *ebitdalc* have a negative relationship and statistical significance at 1% – findings confirmed by Baños-Caballero, García-Teruel & Martínez-Solano (2010), Wasiuzzaman (2018), Jaworski & Czerwonka (2022) and by Moussa (2019), respectively. Thus, the SBE's of the euro zone, a priori, seek to increase investment in working capital, precaution, and conservative strategy, to generate operational resources with lower cost in light of the trade-off and pecking order theory.

The *roa* was significant and with a negative relation in the OLS, possibly due to the significance in the Q75, Q90 quantiles. Thus, there is a trade-off - the influence of WCM's conservative strategy with lower profitability.

This finding allows us to infer that there is a WCM limit - conservative versus aggressive strategy, which foresees, a priori, a balance between risk and marginal return and, after this limit, profitability tends to decrease (Deloof, 2003).

Regarding the enterprise size represented by *lnrec*, a positive and significant relationship was found, a result confirmed by Wasiuzzaman (2018), Baños-Caballero, García-Teruel, Martínez-Solano (2010) and Jaworski & Czerwonka (2022) justified by the lower cost of financing working capital in larger companies.

Regarding the behavior of the business level determinants, it can be concluded that the changes in WCM policies during the Covid-19 period were punctual. There is statistical and negative significance for the *roadc* variable in the Q75 and Q90 quantiles but with lesser significance, 5% and 10%, respectively. Still, it is noticed that there is a greater impact on Q75 and a smaller one on Q90 and this may signal a tendency towards an aggressive approach by WCM. Result confirmed by Baños-Caballero, García-Teruel & Martínez-Solano (2010), Wasiuzzaman (2018). It can be inferred that lower performance stimulates the raising of operational resources - financing decision guided by pecking order (Myers and Majluf, 1984).

In the Covid-19 crisis, it is observed that the SBE's of the euro zone the *resrecdc* were significant and with a negative relationship only in Q25 and indebtedness (*alavdc*) was not significant. With these findings, it can be inferred that WCM was guided by an aggressive or less conservative strategy and suggests cash generation to, a priori, reduce indebtedness and/or mitigate the effect of the crisis. This WCM strategy suggests mitigating bankruptcy costs and conflicts of interest – trade-off and pecking order, respectively (Myers & Majluf, 1984 and Jensen & Meckling, 1976).

During the Covid-19 crisis, *ebitdalc* remained significant but nevertheless positive in the OLS and in the Q25, Q50 and Q75, a result confirmed by Baños-Caballero, García-Teruel & Martínez-Solano (2010) and Jaworski & Czerwonka (2022). Thus, the aim is to generate internal resources at lower costs. On the other

hand, throughout the period *ebitdalc*, it is significant and with a negative relation in the OLS and in the quantiles: Q10, Q25, Q50 and Q75 - for Moussa (2019) it indicates lower demand for working capital. With this, it is possible to infer a less conservative strategy tendency pursuing ideal limit of trade-off and pecking order according to Myers & Majluf (1984) and Jensen & Meckling (1976), respectively.

In summary, throughout the period and according to the OLS model, all determinants are statistically significant, namely: *roa*, *cresrec*, *atf*, *ebitdalc* and *lnrec* with a negative relationship; *alav* and *atpib* with positive relationship. However, in the quantile regression results, predominance of the highest WCM levels is observed, a conservative strategy. At lower *ccc* levels, only leverage (*alav*) and cash flow (*ebitdalc*) are significant. The *alav* with a positive relationship and the *ebitdalc* with a negative relationship and both with a greater impact on lower levels of *ccc*. Thus, it can be deduced that the conservative WCM strategy is the option, but with reflections on performance (Deloof, 2003, Assaf Neto, 2012) according to the *roa* result. On the other hand, in the Covid-19 period, there is evidence of a shift towards the aggressive or less conservative strategy, according to the results of the following determinants: (i) lower value of *roadc* in relation in the *roa* in Q90; (ii) negative and significant relationship of growth only in the Q25 quantile; (iii) positive *atpibdc* result in the Q10 quantile and negative in the others, but with much lower values in Q25 and Q50 than in Q75 and Q90; (iv) positive *ebitdalc* in the intermediate quantiles, Q25, Q50 and Q75; (v) indebtedness, *alav*, was not a determinant of the *ccc*; (vi) cash generation at intermediate *ccc* levels. Thus, it can be concluded that in the financial crisis of Covid-19, the SBE's in the euro zone adopted aggressive WCM strategies seeking to generate internal resources by mitigating variations in indebtedness. For Moussa (2019) in periods of financial crisis, there is less expansion with greater working capital, however, as found in the present research, depending on the level of WCM.

Regarding the economic condition variables tested, the following stand out: (i) the financial crisis of Covid-19, *dc*, influenced the WCM only in the OLS model and in the Q50 quantile; (ii) in relation to the determinant reflection of the country's economic growth on the company's investment given by *atpib*, there is a positive and statistically significant relationship at the 1% level in the OLS model and in all quantiles, except Q10. During the Covid-19 period, the *atpibdc* variable was significant and negative in all quantiles, except in Q10 (positive relationship). In general, the value of the *atpib* variable is lower during the period of the Covid-19 crisis (see table 5), that is, the capital of companies in the Euro Zone decreased more than GDP and, thus, the country's condition explains/impacts the WCM with

a negative relation (result of the variable *atpidc* and with more intensity in the highest levels of WCM.

Industry determinants, sector of economic activity, in the period of the Covid-19 crisis did not influence the WCM (*dbmdc/dcncinddc*). However, throughout the research period, they show positive significance at 1% in the OLS model and in all quantiles both for the basic materials sector (*dbm*) and for non-cyclical and industrial consumer goods (*dcncind*). However, it is observed that in the basic materials sector there is greater influence at the lower levels of the WCM (Q10, Q25 and Q50) while that in the industry sector (goods and non-cyclical and industrial consumption) the greater influence is perceived at the highest levels, Q75 and Q90. In summary, the influence on WCM in the *dbm* sector more than doubles in relation to that of *dcncind*, 22.7282 and 10.8897, respectively.

5. Conclusions

This research investigates the determinants of WCM in the period of the Covid-19 financial crisis. The sample consists of 1,101 non-financial companies from 9 countries in the euro zone and 6 sectors of economic activity, totaling 7,707 observations in the period from 2015 to 2021. The data collected from the Refinitiv Reuters Eikon database were estimated using the OLS method, Robust and Quantile Pooled Regression.

The WCM determinants were defined in three groups: (i) of the firm: return on assets, growth opportunity, financial leverage, fixed assets and operating cash flow – *roa, cresrec, alav, atf, ebitda*, respectively; (ii) macroeconomic conditions: dummy for the Covid-19 period (*dc*) and investment weighted by the country's annual GDP (*atpib*); (iii) industry: dummy basic materials (*dbm*) and dummy consumer-non-cyclicals and industrial (*dcncind*), the consumer cyclicals, energy and utilities sectors are the reference. All determinants, except enterprise size (*lnrec*), were also analyzed during the Covid-19 crisis.

As a result, the determinants of macroeconomic conditions positively influence WCM. However, while the Covid-19 financial crisis (*dc*) impacts the WCM in the OLS model and only the Q50 quantile, the country condition (*atpib*) impacts positively and progressively until Q90. However, the country's macroeconomic condition (*atpidc*) in the period of the Covid-19 crisis, influenced the WCM in Q10 with a positive relation and in the others with a negative and progressive relation until Q90. This finding indicates that firm growth associated with country growth mitigates the increase in WCM and, thus, improves its efficiency (less conservative strategy). In short, macroeconomic conditions suggest an aggressive WCM strategy – motivated by transaction and/or precaution (Keynes, 1985) and resulting

from the Covid-19 contingency (Lawrence & Lorsch, 1967). On the other hand, the increase in the representativeness of firm-GDP-country suggests caution (conservative strategy) with the probable increase in the level of activity (Keynes, 1985). Even so, these findings are based on the theory of trade-off and pecking order - more internal resources for financing and, therefore, lower bankruptcy and agency costs (Myers & Majluf, 1984 and Jensen & Meckling, 1976).

Regarding the industry determinants in the WCM, the influence is significant for both the basic materials sector and the consumer sector - non-cyclical and industrial but different - progressively greater at the lowest and highest levels of *ccc*, respectively. This finding suggests greater influence of the aggressive strategy in the basic materials sector and conservative in the non-cyclical and industrial consumer sector. However, in the Covid-19 crisis, both determinants did not influence the WCM. Thus, it can be stated that the SBE's in the euro zone, regardless of the economic scenario, tend to have specific WCM strategies that can be explained by agency theory, trade-off and pecking order.

Regarding the firm-related determinants, *atpib* and *alav* indicate a positive relationship and, therefore, lower efficiency/quality of WCM, at the highest and lowest levels of *ccc*, respectively. In relation to the Covid-19 period, indebtedness is not relevant and the ratio between companies' capital and the country's GDP is lower and with a negative and progressive impact up to the Q90 quantile, that is, companies adopted the conservative WCM strategy were the most affected. This finding is consistent with the results of the firm's variables (*roadc*, *cresrecdc*, *ebitdalcdc*) in the Covid-19 crisis, which indicate that SBEs in the euro zone chose to take more risks with a less conservative WCM strategy.

Thus, it can be inferred that in the period of the Covid-19 financial crisis, the SBE's in the euro zone with lower levels of *ccc* showed lower growth but sought, with the aggressive strategy, to generate internal resources with lower costs, consequently, for the purposes of financing - WCM based on the theory of trade-off and pecking order.

This research is relevant for providing empirical results on the influence of firm determinants, macroeconomic and industry conditions on WCM and, thus, presents adequate bases for the continuity and development of SBE's, especially in adverse conditions such as the Covid crisis -19.

However, when carrying out the research, it was noticed that collecting data from small business enterprises (SBE's) requires more zeal and validation conferences because the information, being voluntary, could contain flaws. In addition, several filters were used (see methodology) to avoid implications and better validate the results. The research results, in addition to being robust and relevant, point to new investigations, including other variables exogenous to

companies, specific to each country, focusing on sectors of economic activity, as well as considering other economic, geographic, and temporal scenarios.

6. References

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