Argumenta Oeconomica
Year 2024, Vol. 53, No. 2
ISSN 2720-5088
journals.ue.wroc.pl/aoe

Determinants and speed of adjustment of financial liquidity: Evidence from Central and Eastern Europe

Leszek Czerwonka

Faculty of Economics, University of Gdańsk, Poland

e-mail: leszek.czerwonka@ug.edu.pl

ORCID: 0000-0002-8438-6443

Jacek Jaworski

WSB Merito University in Gdańsk, Poland

e-mail: jacek.jaworski@gdansk.merito.pl

ORCID: 0000-0002-6629-3497

Quote as: Czerwonka, L., & Jaworski, J. (2024). Determinants and speed of adjustment of financial liquidity: Evidence from Central and Eastern Europe. *Argumenta Oeconomica*, 2(53), 200-216.

DOI: 10.15611/aoe.2024.2.14

JEL: M20, G32, G20

Abstract: The article aims at (i) identifying the financial liquidity determinants at firm, industry and country level, (ii) examining whether firms follow the target liquidity level, and (iii) determining the average speed of adjustment to this level. Statistical analysis was used in an empirical study based on financial data of 13,513 firms operating in seven countries from Central and Eastern Europe in the research period 2012-2020. The study confirmed company-specific liquidity determinants (company size, growth, tangibility, leverage and cash flow). The average industry liquidity was found to be an industry-specific factor (positive relationship). The positive impact of unemployment and access to credit was detected at country level. The study also showed that country-specific determinants had twice as broad an influence on liquidity as industry-specific factors. It also provided evidence that companies tend to achieve the target liquidity level. The speed of adjustment was 88%.

Keywords: working capital management (WCM), liquidity determinants, target level of liquidity, speed of liquidity adjustment, Central and Eastern Europe

1. Introduction

It is widely accepted that the primary objectives of a company's short-term financial policy are to maintain a sufficient level of financial liquidity, and at the same time ensure maximum profitability. Ensuring liquidity reduces the risk of losing the ability to pay current liabilities and, consequently,

bankruptcy. By increasing a company's profitability, its value is built up. The domain of decisions concerning achieving these objectives is called working capital management (WCM).

WCM research began in the 1980s. Singh and Kumar (2014) analysing 92 articles published between 1980 and 2012, distinguished two main research directions: (i) diagnostics of the relationship between WCM and enterprise's profitability, and (ii) identification of the determinants of WCM. These directions were also emphasised by Prasad et al. (2019). The authors of this paper analysed all articles related to WCM with a Google Scholar citation count of more than 50. In most of the analysed studies, the cash conversion cycle (CCC) length was taken as a measure of WCM efficiency. This research is highly developed in both areas: (i) the relationship between profitability and CCC, and (ii) the determinants of CCC.

Prior research proved that CCC as a measure of WCM is very sensitive to changes in the general economic situation, and highly differentiated by the industry (Baños-Caballero et al., 2010; Cetenak et al., 2017; Moussa, 2019; Nastiti et al., 2019). This is because it depends on the length of the rest of the elements (periods) of the operating cycle (inventory turnover cycle, average collection and accounts payable periods). Thus, the length of CCC may not indicate the sufficient ability of an enterprise to pay off its liabilities (maintaining appropriate financial liquidity). The proportion between current assets and liabilities is more relevant and commonly applied in measuring this feature. However, as indicated by Pratap Singh and Kumar (2014) and Prasad et al. (2019), this measure of WCM is rarely used in research concerning the determinants of WCM. This was also studied by e.g. Kim et al. (1998), Drever and Hutchinson (2007), Wasiuzzaman (2018), Sabki et al. (2019), Dang (2020), Vu et al. (2020), Sardo and Serrasqueiro (2021), and Czerwonka and Jaworski (2023). Company-level factors (age and size, capital structure, cash flow, etc.) were the most commonly identified in these studies. The determinants arising from the specific characteristics of the industry, as well as those that characterise a particular economy, have been insufficiently recognised.

Thus, the first factor which motivated the authors to undertake this study was to check the determinants of liquidity measured by the current assets/liabilities coefficient and how they correspond with the determinants of WCM based on other measures. First of all, this concerns only the insufficiently recognised industry and country-specific factors.

The relationship between profitability and liquidity measured by current assets/liabilities was studied by, among others, Priya and Nimalathasan (2013), Reddy (2015), Rehman et al. (2015), Vintilă and Nenu (2016), Baser et al. (2017) and Raykov (2017). Most researchers detected a negative relationship, which shows the substitutability of the liquidity and the profitability for business performance. In turn, this means that there is a level of profitability beyond which declining liquidity can cause severe financial difficulties. This suggests the existence of an optimal (target) level of liquidity that ensures, high profitability and, at the same time, sufficient liquidity. Some studies support this hypothesis by showing the non-linear effect of liquidity on profitability (inverted U shape). At low levels of liquidity, its impact on profitability is positive, while at high levels, profitability starts to decline sharply (Baños-Caballero et al., 2012; Chukwunweike, 2014; Eljelly, 2004; Jaworski & Czerwonka, 2022; Mitra & Nandi, 2013). From this point of view, it is interesting to examine if there is any target financial liquidity level which enterprises follow. What is the speed of adjustment to this target liquidity level was the next question motivating this study.

The last research gap the authors wanted to fill is related to the small number of empirical studies on Central and Eastern European (CEE) countries (see Appendix 1), which concern only SMEs. Moreover, one is based on a very small research sample (160 enterprises and only listed companies). CEE countries have a low free-market tradition, but they are also members of the large common economy of the European Union. In this context, it was also worth studying how CEE companies deal with WCM compared to other countries.

Identifying the determinants at industry level and the strength of their impact on individual enterprises was also essential for verifying the theory of rational choice in liquidity decisions. This constituted the

first stage in examining whether companies in a given industry, guided by their own individual benefits and costs, will collectively produce common behaviour (Boudon, 2003). Finding the speed of liquidity adjustments to the target level was the second stage in confirming this concept in the field of WCM, whilst the third stage involved diagnosing macroeconomic country-specific determinants. In turn, institutional factors at country level may be the basis for developing legitimacy theory in WCM (Suchman, 1995) and finding whether enterprises' liquidity decisions follow the society's expectations, in this case, the rules imposed by the state.

Summing up, the objectives of the study were as follows: (i) to identify company, industry and country-specific determinants of liquidity, (ii) to test whether companies tend to achieve a target liquidity level, (iii) to determine the average speed of this adjustment. The relationship between current assets and liabilities was taken as a liquidity measure for 13,513 companies from seven CEE countries and EU members: Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia.

The study contributes to the literature in four areas. First, it confirmed the impact of company-specific liquidity determinants identified by other authors, and there are no significant differences between CEE and other countries in this regard. Second, the study showed that industry and country affiliations explain around 4% of the enterprises' liquidity variation. However, industry-specific factors have twice as broad an influence on liquidity as country-specific determinants. Third, it was found that access to bank loans is a country-specific factor positively influencing enterprises' liquidity. In this regard, a new macroeconomic determinant was revealed: the higher the unemployment level, the higher the financial liquidity of enterprises. Fourth, the study found that companies pursue similar short-term financial policies in specific industries and strive to find a target liquidity level. The speed of adjustment to this level is relatively fast (88% per year), which confirmed the short-term nature of the working capital management.

The paper is divided into four parts. The first is the theoretical background with a discussion of the results of previous empirical studies, and the research hypotheses were formulated. The second part of the article describes the research material and the research methods used. The results are presented in the third section and discussed in the fourth. The final part provides conclusions and recommendations.

2. Research hypotheses development

The essence of WCM is to maintain the ability of an enterprise to repay its liabilities while ensuring the efficiency of current assets/liabilities turnover (profitability of the operating activity). The flexible strategy of WCM ensures the minimisation of the liquidity risk; it is characterised by maintaining a relatively high level of current assets compared to sales revenue and a low proportion of current liabilities. High costs resulting from maintaining high levels of current assets and capital employed (equity + long-term debt) are the consequences of this strategy. The restrictive strategy of WCM is based on reducing current assets and increasing the share of current liabilities. This results in a decrease in the cost of current assets and the capital employed to finance them. However, at the same time, it increases liquidity risk. The characteristics of both WCM strategies indicate a negative relationship between profitability and corporate liquidity (Ding et al., 2013; Myers & Majluf, 1984; Smith, 1980).

The positive direction of the relationship between profitability and liquidity stems from an analysis of how companies operate in terms of low liquidity. Opler, Pinkowitz, Stulz, and Wiliamson (1999) noted that these firms invest any profit earned in the working capital. Deloof (2003), Raheman et al. (2010) demonstrated that a positive relationship can also exist under the influence of other factors. Higher levels of liquidity allow the company to increase sales, and negotiate higher discounts for cash payments on purchases. Consequently, it increases the achieved margin, improving its profitability.

There is a third concept in the literature that considers the existence of positive and negative directions of the relationship between profitability and liquidity. This non-linear relationship can be represented by a Gentry curve similar in shape to an inverted U (Figure 1).

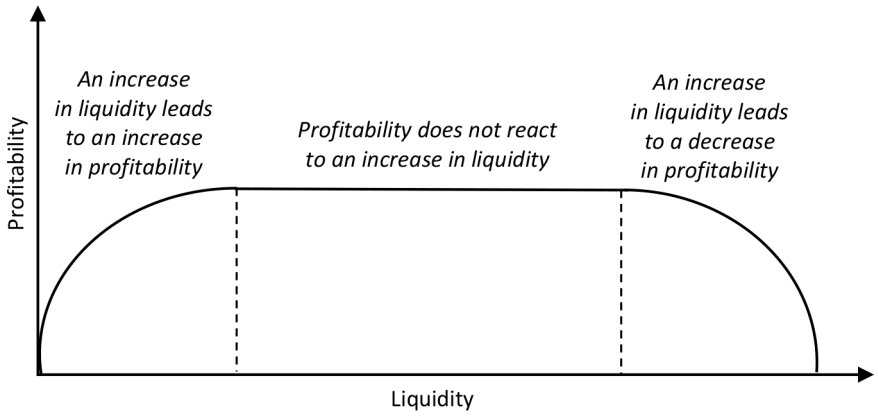

Fig. 1. Gentry's curve

Source: Gentry, 1976.

At low levels of liquidity, companies seek to invest the capital earned to increase their ability to pay off liabilities (positive relationship). Once a certain level of liquidity is exceeded (dependent on certain market conditions), the impact of liquidity on profitability becomes difficult to identify (no obvious relationship). Further investment in liquidity results in an increase in costs and a decrease (negative relationship) in profitability (Baños-Caballero et al., 2012; Jaworski & Czerwonka, 2018).

Taking the concept based on the negative relationship between profitability and liquidity into account, it can be concluded that there is a certain maximum level of profitability at which a company reaches a threshold level of liquidity. Further increases in profitability may result in a loss of liquidity. In the case of a non-linear relationship, there is a certain optimum level of liquidity for which profitability assumes a maximum value and does not change significantly. Therefore, following both concepts, it can be expected that companies will aim to achieve a target level of liquidity correlated with maximum profitability (trade-off theory of WCM). This is in line with the theoretical models of liquidity management proposed by Huberman (1984), Martin and Morgan (1988) and Kim et al. (1998). This phenomenon is confirmed by empirical findings on other WCM measures to some extent. Baños-Caballero et al. (2013) used a research sample of 60 non-financial companies listed on the Spanish stock exchange in 1997-2004, and the WCM measure studied was the cash conversion cycle (CCC). The results of this study indicated that the companies had a target CCC and adjusted its length gradually over time at a speed of 0.60. In a second study, based on data from 14,467 companies from 30 different countries operating between 1995 and 2013, the authors demonstrated a similar process for the level of net working capital (NWC) (Baños-Caballero et al., 2021). Cuong (2016), based on a sample of 112 firms from Vietnam and the period of 2005-2014, concluded that they had a target CCC and adjusted only 48% of working capital as compared to the target. Mathuva (2014), based on 33 Kenyan publicly traded companies in 1993-2008, also found that they maintained a target CCC and adjusted towards target at a speed of 0.44. Therefore, the following hypothesis can be formulated:

H1. There is a target level of financial liquidity that companies aim for with a certain speed of adjustment.

It is well known that the quality of WCM, and consequently the level of liquidity in a company, is affected by many factors classified into three groups (Baños-Caballero et al., 2010; Koralun-Bereźnicka, 2018; Moussa, 2019; Nazir & Afza, 2009):

1) company-specific determinants – expressing the characteristics and performance of a given company; these also include profitability,
2) industry-specific determinants – relating to the industry in which the company operates,
3) country-specific determinants – institutional and macroeconomic characteristics of a given economy.

Company-specific factors are the most studied group of determinants of liquidity measured as the relationship between current assets and liabilities (see Appendix 1). Their impact on liquidity is explained by theoretical concepts explaining WCM (Koralun-Bereźnicka, 2014; Nastiti et al., 2019), namely: (i) the CCC theory, (ii) the operating cycle theory as concepts relating to WCM directly, and (iii) the pecking order theory which mainly concerns capital structure of companies but also takes into account competitive investment in working capital or fixed assets.

According to the CCC theory, the cash conversion cycle starts when the company spends money on purchasing materials/goods. Consequently, the goods are sold, the receivables are collected, and the cash flow comes in (Richards & Laughlin, 1980). The shorter the cash conversion cycle, the more efficient the WCM and the higher the liquidity level (Abuzayed, 2012; Kieschnick et al., 2006; Petersen, 1997; Raheman & Nasr, 2007). In contrast, the operating cycle theory claims that companies loosening their credit policies towards customers increase accounts receivable and speed up inventory turnover, however this increases liquidity risk (Park & Gladson, 1963). In accordance with the pecking order theory, companies use sources of finance in a specific order: (i) internal financing, (ii) debt, and (iii) equity issuance (Myers & Majluf, 1984). In essence, WCM is closely connected to internal financing, thus meeting liquidity needs competes with investing in fixed assets.

In accordance with the described theories, WCM – and therefore liquidity – is influenced by the following factors (Baños-Caballero et al., 2010; Koralun-Bereźnicka, 2018; Moussa, 2019; Nazir & Afza, 2009): the company size (SIZE), the growth rate (GROW), the financial surplus (CF), the tangibility (TANG) and the debt level (DR).

The operating cycle theory explains the negative impact of a company's size on liquidity. Larger companies typically conduct diversified activities, which in turn implies lower current asset levels in total amount than in companies with homogeneous activities. This means that assets are less saturated with liquid assets (lower liquidity level) in larger companies. The cash cycle and the pecking order theories identify a positive relationship. Larger companies have easier access to external financing and therefore, more capacity to meet their liquidity needs. A directionally ambiguous but statistically significant effect of company size on liquidity is also shown by empirical studies (see Appendix 1). Hence, it can be presumed that:

H2.1. The size of a company affects its liquidity.

The growth of a company (GROW) can also affect liquidity. An increase in sales causes an increase in the demand for inventories and receivables, i.e. the working capital level (WC). According to the operating cycle theory, this causes a longer operating cycle and decreases liquidity. A negative effect of GROW on liquidity was detected by Sardo and Serrasqueiro (2021). The opposite sign of this relationship follows from the CCC theory. The company growth implies better WC management, a shortening of the CCC and, consequently, an increase in liquidity. A positive relationship was observed by Wasiuzzaman (2018). Thus, GROW can be assumed as a significant liquidity determinant, but the sign of the relationship was not specified:

H2.2. Company growth significantly affects liquidity.

The pecking order theory claims that retained earnings are the primary source of financing for the enterprise. Simultaneously, net profit and depreciation are the components of the financial surplus proxy (see Table 1). Therefore, if CF increases, WC and, consequently, liquidity should also increase. A positive effect of CF on liquidity was detected by Sardo and Serrasqueiro (2021). However, this impact can also be the opposite as the CCC theory indicates. A larger CF creates an incentive for firms to repay short-term bank loans and, consequently, reduce liquidity:

H2.3. Liquidity depends on the financial surplus generated.

In accordance with WCM theories (the CCC, the operating cycle, and the pecking order theory), an increasing share of non-current assets in total assets (TANG) is a source of capital demand competing

with WC. Thus, increasing TANG may cause a decrease in the company's ability to repay current liabilities). A negative relationship between TANG and liquidity was observed by Wasiuzzaman (2018).

H2.4. An increasing share of non-current assets in total assets negatively affects liquidity.

According to the pecking order theory, an increase in debt occurs only after the retained earnings are used in financing the enterprise. This means that companies move into the area of a restrictive short-term financial strategy and reduce their liquidity (negative relationship between DR and liquidity). According to the pecking order and the cash cycle theories, an increasing long-term debt causes an increase in the WC level, which means that liquidity should increase (positive relationship). Similarly, short-term bank loans positively affect liquidity, while an increase in short-term trade credit has the opposite effect on liquidity (negative relationship). Both directions of the relationship between debt and liquidity were observed in prior research (see Appendix 1).

H2.5. A company's debt affects its liquidity.

In addition to company-specific determinants, it was evident in the literature that there are industry-level factors influencing liquidity (Baños-Caballero et al., 2010; Koralun-Bereźnicka, 2018; Moussa, 2019; Nazir & Afza, 2009). Differences in liquidity in industries were observed by Drever and Hutchinson (2007). Studying 3429 Australian small and medium-sized enterprises across 11 industries, they found that despite small differences between identified company-specific factors across industries, average levels of liquidity differed significantly. Sabki et al. (2019) also detected a similar relationship (see Appendix 1). Thus:

H3. Liquidity depends on the industry in which the company operates.

Industry-specific determinants of WCM were addressed by Filbeck and Krueger (2005) and Kieschnick et al. (2006), among others. These authors found that the cash conversion cycle varies across industries, while its variability is low in a particular sector. This indicates that companies in a specific industry try to copy their short-term financial policies and tend to achieve the average industry-specific WCM efficiency. A similar relationship can also be assumed for liquidity levels:

H3.1. Company's liquidity is positively related to its median in the industry.

Niskanen and Niskanen (2006) also showed that companies in particular industries maintain similar levels of current assets and trade credit. Both of these categories are related to liquidity measures, thus:

H3.2. The liquidity level of a company depends on average levels of current assets and trade liabilities in a particular industry.

The country-specific liquidity determinants were rarely examined. The theoretical basis for the existence of such factors was developed by Kim et al. (1998), who also provided empirical evidence of the dependence of liquidity on factors such as the cost of capital and GDP dynamics. Dang (2020) also identified the latter factor in recent years (see Appendix 1). In a broader context, the impact of country-specific determinants on WCM efficiency was studied by Koralun-Bereźnicka (2014), Cetenak et al. (2017), Oseifuah (2016), Nastiti et al. (2019), Moussa (2019) and Sarwar (2020). These authors detected several features of a given economy affecting the CCC's length or the WC's level. This means that the following hypothesis can be proposed:

H4. Liquidity is affected by the country (economy) where the company operates.

The most commonly identified macroeconomic determinants of WCM are GDP growth (GDP_GROW) and unemployment (UNEMPLOY), while access to bank credit (BANK_STREN) is the most often institutional factor studied.

According to the operating cycle theory, declining GDP growth results in a longer time of receivables collecting and a lower inventory turnover rate. This can result in a deterioration of liquidity due to

fewer opportunities to finance it (positive impact of GDP growth on the company's liquidity). The pecking order theory explains the negative relationship. The economic downturn results in an increased demand for financing liquidity with a financial surplus. A positive relationship between liquidity and GDP growth was found by Nastiti et al. (2019) and Sarwar (2020), while the negative was observed by Moussa (2019). This implies that:

H4.1. GDP growth exerts influence on companies' liquidity level.

The impact of unemployment on WCM investment is related to the research of Lin (2015). The author showed that higher labour costs associated with declining unemployment are often the reason for a reduction in WC investment and, consequently, declining liquidity levels. Conversely, higher unemployment causes lower labour costs, which should create incentives to increase liquidity:

H4.2. Increasing unemployment has a positive impact on liquidity.

Access to bank credit stands out among the institutional factors shaping WCM at country level. Its primary measure is the share of bank credit in the private sector (BANK_STREN). According to Cetenak et al. (2017), the higher BANK_STREN, the more willing companies are to invest in WC. This suggests that:

H4.3. A higher proportion of bank loans in financing the private sector causes an increase in companies' liquidity.

3. Research material and methodology

The ORBIS database[1] was the source of the research material. The sample included small, medium and large enterprises from seven CEE countries: Bulgaria (1963), Czech Republic (1093), Hungary (1721), Poland (2981), Romania (955), Slovakia (2013) and Slovenia (1234). In total, 13,513 companies were included, for which the necessary financial data were extracted from 2012 to 2020: fixed and current assets, receivables, inventories, short-term liabilities, depreciation, sales revenue, operating profit, net profit, debt, and equity. Only entities marked as 'corporate' in the Orbis database were included in the sample. NACE Rev. 2 classification (75 industries) was the basis of companies' classification into industries. The following industries were removed from the sample: Financial and Insurance Activities (K), Real Estate Activities (L), Public Administration and Defence, Compulsory Social Security (O), Education (P), and Other Service Activities (S) – due to the small size (one or two entities in some countries, none in others) or mismatch with the purpose of the study. The GROW definition (percentage growth of sales revenue) confined the research period to eight years. The World Bank and the International Money Fund databases were the sources for macroeconomic and institutional variables at country level.

The authors excluded from the analysis, data that might suggest an erroneous entry in the database, i.e. those that exceed the 0-1 range (e.g. debt proportion in all financing sources, the share of fixed assets in total assets) and reach values below zero (e.g. equity). To eliminate the impact of outlier observations, the research sample was restricted (truncated 1% in each tail), obtaining a total of 121,617 observations.

Table 1 presents definitions of the variables included in the study. The current liquidity ratio CR was used as the response variable. Items 2 to 6 are explanatory variables related to company-specific liquidity determinants. Items 7 to 9 correspond to industry-specific liquidity factors, while 10 to 12 are country-specific.

[1] The Orbis database covers more than 400 million companies and entities across the world; 40 million of these have detailed financial information (https://www.bvdinfo.com).

Table 1. Variables used in the study

No.	Variable	Abbreviation	Measure
1	Current ratio	CR	$\frac{current\ assets}{short\ term\ liabilities}$
2	Size of the enterprise	SIZE	$\ln(total\ assets)$
3	Growth opportunities	GROW	$\frac{\Delta sales\ revenue}{sales\ revenue}$
4	Cash flow proxy	CF	$\frac{net\ profit + depreciation\ and\ amortization}{total\ assets}$
5	Assets structure (tangibility)	TANG	$\frac{fixed\ assets}{total\ assets}$
6	Capital structure (total debt ratio)	DR	$\frac{total\ debt}{total\ assets}$
7	Median of CR	IND_CR	median of current ratio in a particular industry/country
8	Median of current assets	IND_CUR_ASSET	median of current assets in a particular country/industry
9	Median of trade payables	IND_PAYABL	median of trade payables in a particular country/industry
10	Annual growth of GDP	GDP_GROW	$\frac{GDP\ growth\ (annual\ \%)}{100}$
11	Rate of unemployment	UNEMPLOY	$\frac{unemployment\ rate\ (\%)}{100}$
12	The strength of the banking sector	BANK_STREN	$\frac{domestic\ credit\ from\ the\ banking\ sector\ (\%\ of\ GDP)}{100}$

Source: own elaboration.

Table 2 shows the descriptive statistics of the distribution of the variables used in the study.

Table 2. Descriptive statistics of the research sample

No.	Variable	Mean	Median	Std. dev.	Min.	Max.
1	CR	2.640	1.578	3.289	0.145	30.239
2	SIZE	8.933	8.652	1.340	6.454	13.411
3	GROW	0.034	0.007	0.189	-0.568	1.070
4	CF	0.108	0.087	0.433	-7.421	143.800
5	TANG	0.399	0.378	0.267	0.000	1.000
6	DR	0.494	0.502	0.250	0.000	1.000
7	IND_CR	1.702	1.602	0.746	0.159	29.345
8	IND_CUR_ASSET	0.600	0.626	0.212	0.013	1.000
9	IND_PAYABL	37.222	35.781	15.237	0.461	290.890
10	GDP_GROW	0.022	0.029	0.030	-0.080	0.079
11	UNEMPLOY	0.078	0.068	0.037	0.020	0.173
12	BANK_STREN	0.509	0.513	0.106	0.248	0.793

Source: own elaboration.

For CR, the arithmetic mean was 2.64, while the median was 1.58. This shows that liquidity was relatively high in the countries studied. Regarding the other variables, the median and arithmetic mean values were similar for the indicators DR, SIZE, TANG, UNEMPLOY, BANK_STREN, IND_CUR_ASSET, IND_CR, IND_PAYABL. For these variables, the range of observation values was the smallest, and the standard deviation was significantly lower than the arithmetic mean value. There were noticeable differences between the arithmetic means and the medians for the remaining variables. For the variables CF, GROW, and GDP_GROW, the minimum values were negative. The negative value of CF was due to negative net profits. The negative value of the GROW variables indicates a decrease in the companies' sales revenue, while GDP_GROW indicates a decrease in the country's GDP growth.

Appendix 2 contains a matrix of Pearson correlation coefficients for all pairs of explanatory variables, which does not show any strong correlations (<0.5). The calculated VIFs were significantly lower than 10, which means that there was no strong collinearity among the explanatory variables.

The study was divided into three stages. The first examined whether the variability of CR is determined by the industry and economy in which the analysed companies operate. Analysis of variance (ANOVA) was used to detect differences between the average values in several populations (Lynch, 2013).

The second stage consisted of (i) diagnosing the relationship between the variables corresponding to the possible liquidity determinants (company, industry and country-specific factors) and the value of the CR variable and (ii) searching for target liquidity level as an industry feature. For this purpose, static panel models were applied (OLS, fixed and random effects models):

$$\begin{aligned} CR_{it} \quad = \quad & \beta_0 + \beta_1 SIZE_{it} + \beta_2 GROW_{it} + \beta_3 CF_{it} + \beta_4 TANG_{it} + \beta_5 DR_{it} + \beta_6 IND\_CR_{it} + \\ & + \beta_7 IND\_CUR\_ASSET_{it} + \beta_8 IND\_PAYABL_{it} + \beta_6 GDP\_GROW_{it} + \\ & + \beta_7 UNEMPLOY_{it} + \beta_8 BANK\_STREN_{it} + \varepsilon_{it} | \mu_{it} | \varepsilon_{it} + \mu_{it}. \end{aligned} \tag{1}$$

The Ordinary Least Squares method (OLS) can be used for homogeneous samples, while the Breusch-Pagan test was used to find individual effects. The Hausman test was applied to identify fixed or random characteristics of these effects (Greene, 2003).

According to hypothesis H1, companies are expected to aim for a target CR, ensuring the maximisation of profitability. Thus, the third and final stage of the study estimated the speed of adjustment of company liquidity to the target level. This process can be represented by the model (Baños-Caballero et al., 2013, 2021):

$$CR_{it} - CR_{it-1} = \lambda (CR_{it}^{*} - CR_{it-1}) \tag{2}$$

where CR_{it}^{*}– target CR, λ – speed of adjustment.

The target CR value is unobservable, which means that a variable based on the determinants of liquidity needs to be introduced:

$$CR_{it}^{*} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 GROW_{it} + \beta_3 CF_{it} + \beta_4 TANG_{it} + \beta_5 DR_{it} + \mu_{it}. \tag{3}$$

Substituting the above expression into equation (2) gives:

$$\begin{aligned} CR_{it} \quad = \quad & \lambda\beta_0 + \lambda\beta_1 SIZE_{it} + \lambda\beta_2 GROW_{it} + \lambda\beta_3 CF_{it} + \\ & + \lambda\beta_4 TANG_{it} + \lambda\beta_5 DR_{it} + \lambda\mu_{it} - \lambda CR_{it-1} + CR_{it-1}, \end{aligned} \tag{4}$$

and next:

$$\begin{aligned} CR_{it} \quad = \quad & (1-\lambda) CR_{it-1} + \lambda\beta_0 + \lambda\beta_1 SIZE_{it} + \lambda\beta_2 GROW_{it} + \\ & + \lambda\beta_3 CF_{it} + \lambda\beta_4 TANG_{it} + \lambda\beta_5 DR_{it} + \gamma\mu_{it}. \end{aligned} \tag{5}$$

This model implicitly incorporates the CR target based on data available in the financial statements. It is a dynamic model incorporating the lagged variable CR_{it-1}. The authors applied the generalised method of moments (GMM) to estimate its parameters. The instrumental variables replace the explanatory variables in this model. The Sargan test was applied to test the correlation between the

instrumental variables and the random component (Gujarati & Porter, 2009). The study tested for the presence of the random component's first and second-order autocorrelation (AR1 and AR2) using Arellano-Bond tests (Labra & Torrecillas, 2018).

4. Research results

The results of the ANOVA analysis conducted for the two differentiation criteria (industry and country) are presented in Table 3.

Table 3. ANOVA results of country and industry effects on the variability of CR

Effect	One-dimensional significance tests for CR Parameterisation with sigma-restrictions Decomposition of effective hypotheses				
	Sum of squares	df	Mean squares	F	p-value
CR					
Constant	190582	1	190581.9	18380.06	0.00
Country	31110 **(2.42%)**	7	4444.3	428.61	0.00
Industry	18129 **(1.41%)**	13	1394.5	134.49	0.00
Error	1235429 (96.17%)	119147	10.4		

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

Source: own elaboration.

Country affiliation explained 2.42% of the variation in CR, while for the industry, this was 1.41%.

Table 4 contains the estimated parameters of the static panel models applied in the study and the tests determining the whole model's significance and indicating the model version's choice. The estimates were repeated for models containing only statistically significant variables (models 3 and 5), confirming the stability of the relationships pointed out by models 1, 2 and 4.

Table 4. Results of static panel model estimations

Model	1	2	3	4	5
Dependent variable	CR	CR	CR	CR	CR
Model	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects
Constant	4.962*** (0.304)	4.648*** (0.316)	4.645*** (0.304)	3.901*** (0.377)	3.857*** (0.364)
SIZE	0.280*** (0.034)	0.198*** (0.034)	0.198*** (0.034)	0.267*** (0.037)	0.266*** (0.037)
GROW	-0.342*** (0.032)	-0.310*** (0.032)	-0.310*** (0.032)	-0.310*** (0.033)	-0.311*** (0.032)
CF	-0.793*** (0.098)	-0.795*** (0.097)	-0.794*** (0.096)	-0.817*** (0.097)	-0.811*** (0.096)
TANG	-3.894*** (0.129)	-3.802*** (0.129)	-3.803*** (0.129)	-3.817*** (0.129)	-3.814*** (0.129)
DR	-6.426*** (0.117)	-6.166*** (0.119)	-6.169*** (0.119)	-6.266*** (0.121)	-6.273*** (0.122)
IND_CR		0.514*** (0.056)	0.516*** (0.054)	0.532*** (0.057)	0.538*** (0.055)
IND_CUR_ASSET		0.032 (0.040)		0.031 (0.040)	

IND_PAYABL		0.000 (0.001)		-0.002 (0.001)	
GDP_GROW				-0.010 (0.218)	
UNEMPLOY				1.408*** (0.348)	1.317*** (0.346)
BANK_STREN				0.202 (0.130)	0.199* (0.121)
No. of observations	114457	114457	114457	114.457	114.457
Joint test on given regressors	F(5, 13327) = 767.08 p < 0.001	F(8, 13327) = 503.26 p < 0.001	F(6, 13327) = 664.82 p < 0.001	F(11, 13327) = 369.18 p < 0.001	F(8, 13327) = 501.66 p < 0.001
Breusch-Pagan test	120177 p < 0.001	116463 p < 0.001	117284 p < 0.001	115743 p < 0.001	116680 p < 0.001
Hausman test	327.22 p < 0.001	326.86 p < 0.001	272.30 p < 0.001	389.05 p < 0.001	319.31 p < 0.001

Note: * dependence is significant at the level of 0.1; ** dependence is significant at the level of 0.05; *** dependence is significant at the level of 0.01 (standard errors in parentheses)

Source: own elaboration.

As the Breusch-Pagan and Hausman tests indicated, a fixed effect model was the most relevant for the collected data in all the variants of models.

The most numerous dependencies occurred at the level of company-specific factors. Their statistical significance was indicated in all the models estimated. For GROW, CF, DR and TANG variables, this relationship was always negative, while for SIZE, it was positive.

For country level, two significant CR determinants were observed; GDP_GROW proved to be statistically insignificant in all the models. The UNEMPLOY variable showed a statistically significant positive effect on CR (two models). A weak positive relationship of CR with BANK_STREN was observed in only one model.

For the industry variables, the weakest correlations were identified. For IND_CUR_ASSET and IND_PAYABL, a statistically significant effect on CR was not confirmed. The only statistically significant and positive relationship was observed between CR and IND_CR. This means that the liquidity of an individual company followed the average liquidity in its industry. Thus, changes in industry average liquidity showed the direction of the individual company's liquidity adjustments to its target value. A dynamic approach was used to estimate the speed of this adjustment (Table 5).

Table 5. Parameters of GMM model estimations

Variable	Parameter	Standard error	Z-value
CR_{t-1}	0.125***	0.027	4.65
SIZE	0.312***	0.053	5.86
GROW	-0.175***	0.032	-5.54
CF	-0.608***	0.104	-5.86
TANG	-3.672***	0.137	-26.74
DR	-7.835***	0.165	-47.41
No. of observations	86 500		
Sargan test			6.644
AR(1)			-14.027***
AR(2)			1.163

Note: * dependence is significant at the level of 0.1; ** dependence is significant at the level of 0.05; *** dependence is significant at the level of 0.01 (standard errors in parentheses)

Source: own elaboration.

The study based on the dynamic model (GMM) confirmed the statistical significance and the directions of the relationship of CR with all assumed company-specific determinants diagnosed by static models. In addition, a statistically significant positive relationship between current-year (CR_t) and past-year (CR_{t-1}) liquidity levels was detected. Based on equation (4), it can be derived that the parameter λ describing the annual speed of change of CR was equal to:

$$(1-\lambda) = 0.125 \Rightarrow \lambda = 1 - 0.125 = 0.875. \quad (6)$$

5. Robustness check

A robustness check was performed for the tested relationships. The Kruskal-Wallis test (also called one-way non-parametric ANOVA) was conducted to test the results obtained by ANOVA. The results confirmed that country and industry differentiate average CR ratio.

A robustness check was also conducted for panel models. Testing the stability of detected relationships can be carried out by removing or adding variables (Lu & White, 2014). Table 4 includes the parameters of five models in different configurations of the explanatory variables. All the relevant coefficients estimated had the same signs, which confirmed stability in the direction and statistical significance of the relationships detected.

The SIZE variable is based on assets in the basic model, while the GROW variable is based on sales revenue. However, there are studies in which these variables relate only to assets or only to sales revenue, or in the opposite configuration to the current study. Therefore, all four possible combinations were tested for both the static and dynamic versions of the models. The tests showed that the coefficient of the SIZE variable changed its sign when its definition was based on sales revenue. For the coefficient estimated for GROW, the sign did not change in any configurations; in one case, it became insignificant. This is consistent with the findings of Dang et al. (2018), who stated that a change in the definition of SIZE may cause a change in its sign or other independent variables. In the case of the presented study, changes in the definition of SIZE and GROW did not affect the signs of the parameter estimates of the other variables.

6. Discussion

The study provided strong evidence that liquidity depends on company-specific factors (support of H2.1 to H2.4 hypotheses). The size of an enterprise positively affects the level of liquidity, which was also diagnosed by Wasiuzzaman (2018), Youssef et al. (2022) and Czerwonka and Jaworski (2023). This result did not confirm the findings of Sardo and Serrasqueiro (2021). Negative relationships concern growth opportunities, cash flow, tangibility and indebtedness. These observations are similar to the research results of Wasiuzzaman (2018), Vu et al. (2020), Sardo and Serrasqueiro (2021) and Czerwonka and Jaworski (2023). They are also comparable to WCM determinants identified for other measures (working capital level or cash conversion cycle) by Cetenak et al. (2017), Drever & Hutchinson (2007), Koralun-Bereźnicka (2014) and Moussa (2019).

The results of this study confirmed the dependence of liquidity on the industry and country-specific factors signalled by Sabki et al. (2019) and Dang (2020) thus supporting H3 and H4. They are also consistent with the research results based on the other WCM measures (Cetenak et al., 2017; Filbeck & Krueger, 2005; Kieschnick et al., 2006; Koralun-Bereźnicka, 2014; Moussa, 2019; Nastiti et al., 2019; Oseifuah, 2016; Sarwar, 2020). In this regard, these authors extended previous observations with the fact that about 2.5% of liquidity variation was explained by the industry-specific factors, and 1.5% by determinants at country level.

Taking country-specific liquidity determinants into account, two significant factors were found. Supporting hypothesis H4.2, the study empirically confirmed the statement of Lin (2015) that the growth of unemployment by reducing the costs of work may increase in WCM investment (liquidity growth). Access to bank loans was the second important country-specific factor (confirmation of H4.3). In this case, the authors detected relatively weak dependence; the easier access to bank loans, the higher the liquidity of companies. This confirms the findings of Sabki et al. (2019) and is consistent with Cetenak et al. (2017). The H4.1 hypothesis was not confirmed. GDP growth does not exert an influence on companies' liquidity. This contradicts the previous observations (Dang, 2020; Moussa, 2019; Nastiti et al., 2019; Sarwar, 2020), and might be a special feature of CEE countries, but would require in-depth research.

This study was yet to confirm H3.2 hypothesis that liquidity depends on the industry's current assets and liabilities. This means that the r study could not support the thesis of Niskanen and Niskanen (2006), however it was found that the liquidity of the particular enterprise follows the average industry liquidity level (supporting H3.1). This finding is consistent with Kieschnick et al. (2006), Filbeck and Krueger (2005) and Czerwonka and Jaworski (2023), at the same time supporting the thesis that companies seek a target level of financial liquidity and try to adjust to it. The confirmation of H1 is consistent with the research by Baños-Caballero et al. (2013, 2021), Mathuva (2014), and Cuong (2016). The authors also found that the liquidity adjustment speed to this target level equals about 88% per year. In the case of Spanish-listed companies and net working capital as a WCM measure, this speed was at ca. 60% (Baños-Caballero et al., 2013). For a more diversified sample from 30 countries, the average level of this speed was lower and amounted to 50% (Baños-Caballero et al., 2021), Kenyan (Mathuva, 2014) and Vietnamese (Cuong, 2016) companies showed the lowest speed of 44-48%.

7. Conclusions

The study results provide four main groups of conclusions:

1. There is solid evidence to support previously diagnosed firm-specific determinants of liquidity. In this regard, no significant differences between CEE and other countries were found.
2. As newly found determinants at industry and country level explained about 4% of the companies' liquidity, variation may be indicated. The country-specific factors exert twice as wide an impact on the liquidity as industry-specific determinants.
3. Access to bank loans and unemployment levels were revealed as the most significant country-specific liquidity determinants. Both of them exerted a positive influence on the liquidity level, while GDP turned out to be an insignificant factor.
4. The median of companies' liquidity is the most important industry-specific factor. The authors found that enterprises follow industry liquidity, which points to the target level of this liquidity. The speed of adjustment of the liquidity was relatively fast, confirming the short-term nature of working capital management and the idea that current assets and liabilities were changed quite easily because they were almost always firmly controlled and prone to manipulation.

The fourth conclusion is especially important. Baños-Caballero et al. (2013, 2021), Mathuva (2014) and Cuong (2016) arrived at a similar conclusion but concerning another measure of WCM. In their studies, the adjustment speed was slightly lower (44-60%).

The results of this study also constitute the basis for further research:

1. The majority of detected relationships for company-specific liquidity determinants suggests that the cash conversion cycle theory best explains the working capital management of enterprises studied. However, this claim requires more in-depth research.
2. The detected debt and tangibility dependencies indicate a relationship between long-term decisions (investment and capital structure policies) and short-term management. This confirms the observations, among others, of Denis (2011) and simultaneously creates room to examine whether there are features which connect these management areas.

3. The revealed liquidity adjustment to the target justifies the research question: How is this property related to the relationship between profitability and WCM measures? The answer to this question may become the basis of a new theoretical concept based on a dynamic approach to liquidity-profitability trade-off.
4. Regarding country and industry-specific factors, it could be interesting to find out why the former has a greater impact on liquidity than the latter. At the same time, the unconfirmed relationship between liquidity and GDP may be a feature specific to CEE economies, which is worth studying through in-depth research.

By identifying industry-specific factors and determining the existence of a target level of liquidity and the speed of its adjustments by individual enterprises, the study proved that common modes of behaviour in the field of WCM can be identified. This provides grounds for further examination of the adequacy of the rational choice theory in this area. However, the small number of institutional country-specific factors used in the study, combined with their insignificant impact on the diagnosed companies' behaviour, do not allow the conclusion that the legitimacy theory can explain the liquidity decisions of enterprises.

The study also indicates several practical implications. Firstly, the negative impact of CF and TANG on liquidity means that the investment in fixed assets is firmly competitive with the investment in liquidity, hence managers should consider that investing cash flow generated in fixed assets may result in difficulties in working capital management. Secondly, the target level of liquidity is changing very quickly, which forces managers to change the liquidity of their enterprise at the same very fast pace, may be a source of difficulty in maintaining liquidity at a sufficient level. Thirdly, the study results are also important for policymakers, who have to take into account that regulations at country level affect company liquidity half as much as industry conditions, and that access to bank loans and unemployment level are the most important country-specific factors.

The main limitations of the study include the following: (i) the research sample covered only seven countries from Central and Eastern Europe, (ii) the relatively small number of liquidity determinants was taken into account, (iii) only one measure of the enterprise financial liquidity was assumed.

References

Abuzayed, B. (2012). Working capital management and firms' performance in emerging markets: The case of Jordan. *International Journal of Managerial Finance*, *8*(2), 155-179. https://doi.org/10.1108/17439131211216620

Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2010). Working capital management in SMEs. *Accounting and Finance*, *50*(3), 511-527. https://doi.org/10.1111/j.1467-629X.2009.00331.x

Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2012). How does working capital management affect the profitability of Spanish SMEs? *Small Business Economics*, *39*(2), 517-529. https://doi.org/10.1007/s11187-011-9317-8

Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2013). The speed of adjustment in working capital requirement. *European Journal of Finance*, *19*(10), 978-992. https://doi.org/10.1080/1351847X.2012.691889

Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2021). The speed of adjustment in net operating working capital: an international study. *Spanish Journal of Finance and Accounting / Revista Española de Financiación y Contabilidad*, *50*(4), 423-440. https://doi.org/10.1080/02102412.2020.1864176

Baser, F., Gokten, S., Kucukkocaoglu, G., & Ture, H. (2017). Liquidity-profitability tradeoff existence in Turkey: An empirical investigation under structural equation modeling. *Copernican Journal of Finance & Accounting*, *5*(2), 27-44. https://doi.org/10.12775/cjfa.2016.013

Boudon, R. (2003). Beyond rational choice theory. *Annual Review of Sociology*, *29*(1), 1-21. https://doi.org/10.1146/annurev.soc.29.010202.100213

Cetenak, E. H., Vural, G., & Sokmen, G. (2017). Determinants of working capital in emerging markets: do economic developments matter? In Ü. Hacioğlu, H. Dinçer, & N. Alayoğlu (Eds.), *Global Business Strategies in Crisis. Strategic Thinking and Development* (pp. 385-397). Springer Nature. http://link.springer.com/10.1007/978-3-319-44591-5

Chukwunweike, V. (2014). The impact of liquidity on profitability of some selected companies: the financial statement analysis (FSA) approach. *Research Journal of Finance and Accounting*, *5*(5), 81-90. www.iiste.org/Journals/index.php/RJFA/article/view/11414/11746

Cuong, N. T. (2016). The determinants of working capital requirement and speed of adjustment : evidence from Vietnam's seafood processing enterprises. *International Research Journal of Finance and Economics*, *147*, 88-98.

Czerwonka, L., & Jaworski, J. (2023). Determinants of working capital management in small and medium enterprises: evidence from Central and Eastern Europe. *Journal of International Studies*, *16*(2), 162-180. https://doi.org/10.14254/2071-8330.2023/16-2/11

Dang, C., Li, Z., & Yang, C. (2018). Measuring firm size in empirical corporate finance. *Journal of Banking & Finance*, *86*, 159-176.

Dang, H. T. (2020). Determinants of liquidity of listed enterprises: evidence from Vietnam. *Journal of Asian Finance, Economics and Business*, *7*(11), 67-73. https://doi.org/10.13106/jafeb.2020.vol7.no11.067

Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? *Journal of Business Finance and Accounting*. *30*(3-4), 573-588. https://doi.org/10.1111/1468-5957.00008

Denis, D. J. (2011). Financial flexibility and corporate liquidity. *Journal of Corporate Finance*, *17*(3), 667-674. https://doi.org/10.1016/j.jcorpfin.2011.03.006

Ding, S., Guariglia, A., & Knight, J. (2013). Investment and financing constraints in China: Does working capital management make a difference? *Journal of Banking and Finance*, *37*(5), 1490-1507. https://doi.org/10.1016/j.jbankfin.2012.03.025

Drever, M., & Hutchinson, P. (2007). Industry differences in the determinants of the liquidity of Australian small and medium sized enterprises. *Small Enterprise Research*, *15*(1), 60-76. https://doi.org/10.1080/13215906.2007.11005832

Eljelly, A. M. A. (2004). Liquidity-profitability tradeoff: an empirical investigation in an emerging market. *International Journal of Commerce and Management*, *14*(2), 48-61. https://doi.org/10.1108/10569210480000179

Filbeck, G., & Krueger, T. M. (2005). An analysis of working capital management results across industries. *Mid-American Journal of Business*, *20*(2), 11-18.

Gentry, J. (1976). *Management perceptions of the working capital process*, Faculty Working Papers, No. 352. College of Commerce and Business Administration, University of Illinois at Urbana-Champaign.

Greene, W. H. (2003). *Econometric Analysis*. Prentice Hall, Upper Saddle River.

Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics* (5th ed.). McGraw-Hill/Irwin.

Huberman, G. (1984). External financing and liquidity. *The Journal of Finance*, *39*(3), 895-908. https://doi.org/10.1111/j.1540-6261.1984.tb03684.x

Jaworski, J., & Czerwonka, L. (2018). Relationship between profitability and liquidity of enterprises listed on Warsaw Stock Exchange. *35th International Scientific Conference on Economic and Social Development – "Sustainability from an Economic and Social Perspective" – Lisbon, 15-16 November 2018, Book of Proceedings*, 326-334. https://www.esd-conference.com/upload/book_of_proceedings/Book_of_Proceedings_esdLisbon2018_Online.pdf

Jaworski, J., & Czerwonka, L. (2022). Profitability and working capital management: Evidence from the Warsaw Stock Exchange. *Journal of Business Economics and Management*, *23*(1), 180-198. https://doi.org/10.3846/jbem.2022.15087

Kieschnick, R., Moussawi, R., & LaPlante, M. (2006). Corporate working capital management: determinants and consequences. *International Journal of Managerial Finance*, *3*(2), 164-177.

Kim, C.-S., Mauer, D. C., & Sherman, A. E. (1998). The determinants of corporate liquidity: Theory and evidence. *The Journal of Financial and Quantitative Analysis*, *33*(3), 335-359. https://doi.org/10.2307/2331099

Koralun-Bereźnicka, J. (2014). On the relative importance of corporate working capital determinants: findings from the EU countries. *Contemporary Economics*, *8*(4), 415-434. https://doi.org/10.5709/ce.1897-9254.154

Koralun-Bereźnicka, J. (2018). Determinants of capital structure across European countries. In K. Jajuga, H. Locarek-Junge, & L. T. Orlowski (Eds.), *Contemporary Trends and Challenges in Finance* (pp. 199-209). Springer International Publishing AG Switzerland. https://doi.org/10.1007/978-3-319-76228-9

Labra, R., & Torrecillas, C. (2018). Estimating dynamic panel data. A practical approach to perform long panels. *Revista Colombiana de Estadística*, *41*(1), 31-52. http://www.scielo.org.co/pdf/rce/v41n1/0120-1751-rce-41-01-00031.pdf

Lin, T.-T. T. (2015). Working capital requirement and the unemployment volatility puzzle. *Journal of Macroeconomics*, *46*(December), 201-217. https://doi.org/10.1016/j.jmacro.2015.05.006

Lu, X., & White, H. (2014). Robustness checks and robustness tests in applied economics. *Journal of Econometrics*, *178*, 194-206.

Lynch, S. M. (2013). Comparing means across multiple groups: Analysis of variance (ANOVA). In *Using Statistics in Social Research: A Concise Approach*. Springer.

Martin, J. D., & Morgan, G. E. (1988). Financial planning where the firm's demand for funds is nonstationary and stochastic. *Management Science*, *34*(9), 1054-1066. https://doi.org/10.1287/mnsc.34.9.1054

Mathuva, D. M. (2014). An empirical analysis of the determinants of the cash conversion cycle in Kenyan listed non-financial firms. *Journal of Accounting in Emerging Economies*, *4*(2), 175-196. https://doi.org/10.1108/JAEE-10-2011-0045

Mitra, S., & Nandi, K. C. (2013). Linkage between liquidity, risk and profitability: A study with reference to Eastern Coalfields Ltd. *Journal of Institute of Public Enterprise*, *36*(3/4), 29-48.

Moussa, A. A. (2019). Determinants of working capital behavior: Evidence from Egypt. *International Journal of Managerial Finance*, *15*(1), 39-61. https://doi.org/10.1108/IJMF-09-2017-0219

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187-221. https://doi.org/10.1016/0304-405X(84)90023-0

Nastiti, P. K. Y., Atahau, A. D. R., & Supramono, S. (2019). The determinant of working capital management: The contextual role of enterprise size and age. *Business, Management and Education*, *17*(2), 94-110. https://doi.org/10.3846/bme.2019.10409

Nazir, M. S., & Afza, T. (2009). Working capital requirements and the determining factors in Pakistan. *The Icfai Journal of Applied Finance, 15*(4), 28-38. https://lahore.comsats.edu.pk/Papers/Abstracts/146-8588087907446883308.pdf

Niskanen, J., & Niskanen, M. (2006). The determinants of corporate trade credit policies in a bank-dominated financial environment: The case of Finnish small firms. *European Financial Management*, *12*(1), 81-102. https://doi.org/10.1111/j.1354-7798.2006.00311.x

Opler, T., Pinkowitz, L., Stulz, R., & Wiliamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, *52*(1), 3-46. https://doi.org/10.1016/S0304-405X(99)00003-3

Oseifuah, E. (2016). Determinants of working capital requirements: Evidence from selected non-financial firms listed on the Johannesburg Securities Exchange. *The Journal of Accounting and Management*, *6*(1), 19-29.

Park, C., & Gladson, J. W. (1963). *Working Capital*. Collier Macmillan Ltd.

Petersen, M. A. (1997). Trade credit: theories and evidence. *The Review of Financial Studies*, *10*(3), 661-691.

Prasad, P., Narayanasamy, S., Paul, S., Chattopadhyay, S., & Saravanan, P. (2019). Review of literature on working capital management and future research agenda. *Journal of Economic Surveys*, *33*(3), 827-861. https://doi.org/10.1111/joes.12299

Priya, K., & Nimalathasan, B. (2013). Liquidity management and profitability: A case study of listed manufacturing companies in Sri Lanka. *International Journal of Technological Exploration and Learning*, *2*(4), 161-165.

Raheman, A, Afza, T., Qayyum, A., & Bodla, M. (2010). Working capital management and corporate performance of manufacturing sector in Pakistan. *International Research Journal of Finance and Economics*, *47*, 151-163.

Raheman, A. & Nasr, M. (2007). Working capital management and profitability – case of Pakistani firms. *International Review of Business Research Papers*, *3*, 279-300.

Raykov, E. (2017). The liquidity-profitability trade-off in Bulgaria in terms of the changed financial management during crisis. *Management*, *22*(1), 135-156.

Reddy, B. M. (2015). Tradeoff between liquidity and profitability: A study on TATA Steel Ltd. *International Journal of Commerce, Business and Management*, *4*(2), 1096-1100.

Rehman, M. Z., Khan, M. N., & Khokhar, I. (2015). Investigating liquidity-profitability relationship: Evidence from companies listed in Saudi Stock Exchange (Tadawul). *Journal of Applied Finance & Banking*, *5*(3), 159-173.

Richards, V. D., & Laughlin, E. J. (1980). A cash conversion cycle approach to liquidity analysis. *Financial Management*, *9*(1), 32-38.

Sabki, S., Wong, W. C., & Regupathi, A. (2019). SME liquidity and its determinants. *International Journal of Business and Society*, *20*(1), 111-124.

Sardo, F., & Serrasqueiro, Z. (2021). Determinants of working capital: Empirical evidence on manufacturing SMEs. *Journal of Economic Studies*, *49*(3), 506-521. https://doi.org/10.1108/JES-10-2020-0513

Sarwar, A. (2020). The determinants of working capital management in Pakistan: The case of manufacturing sector. *Competitive Social Science Research Journal*, *1*(2), 31-53.

Singh, H. P., & Kumar, S. (2014). Working capital management: A literature review and research agenda. *Qualitative Research in Financial Markets*, *6*(2), 173-197. https://doi.org/10.1108/QRFM-04-2013-0010

Smith, K. (1980). Profitability versus liquidity tradeoffs in working capital management. In K. Smith (Ed.), *Readings on the management of working capital* (pp. 549-562). West Publishing Company.

Suchman, M. C. (1995). Managing legitimacy: strategic and institutional approaches. *The Academy of Management Review*, *20*(3), 571-610. https://doi.org/10.2307/258788

Vintilă, G., & Nenu, E. A. (2016). Liquidity and profitability analysis of the Romanian listed companies. *Journal of Eastern Europe Research in Business and Economics*, 1-8. https://doi.org/10.5171/2016.161707

Vu, T. M. T., Truong, T. Van, & Dinh, D. T. (2020). Determinants of liquidity in manufacturing firms. *Journal of Asian Finance, Economics and Business*, *7*(12), 11-19. https://doi.org/10.13106/JAFEB.2020.VOL7.NO12.011

Wasiuzzaman, S. (2018). Determinants of liquidity in Malaysian SMEs: a quantile regression approach. *International Journal of Productivity and Performance Management*, *67*(9), 1566-1584. https://doi.org/10.1108/IJPPM-12-2017-0354

Youssef, I. S., Al Alam, A. F., & Salloum, C. (2022). Determinants of firm liquidity in Central and Eastern Europe SMEs. *International Journal of Globalisation and Small Business*, *13*(2), 127-146. https://doi.org/10.1504/IJGSB.2022.127220

Received: October 2023, revised: February 2024

Appendix 1. Empirical studies on liquidity determinants

Author	Research sample and period	Positive determinants	Negative determinants	Other determinants
Wasiuzzaman, 2018	986 Malaysian SMEs with data for 2011-2014	Profitability, Growth, Size, Age	Tangibility	–
Sabki et al., 2019	250 Malaysian SMEs for 2005-2013 and 2011-2014	–	Cash holdings	Access to bank loan industry
H. T. Dang, 2020	6700 observations from companies listed on Vietnam's stock exchange in 2008-2019	Capital adequacy, ROE, Leverage	ROA	GDP
Vu et al., 2020	139 firms listed on Ho Chi Minh City Stock Exchange in 2015-2019	ROA	Leverage	Structure of directors' board
Sardo & Serrasqueiro, 2021	3994 Iberian manufacturing SMEs in 2011-2017	Age, Cash flow, Long term debt	Size, Growth	–
Youssef et al., 2022	160 listed SMEs from Central and Eastern Europe in 2011-2019	Profitability, Leverage, Size	–	–
Czerwonka & Jaworski, 2023	8516 SMEs from six CEE countries for the period 2012-2020	Size	Growth, Cash flow, Tangibility, Leverage	Industry liquidity, Country-level institutional environment

Source: own elaboration.

Appendix 2. Pearson correlation matrix for all variables

CR	SIZE	GROW	CF	TANG	DR	IND_CR	IND_CUR_ ASSET	IND_PAYA BL	GDP_ GROW	UNEMPLOY	BANK_ STREN	
1.00	-0.08	-0.04	0.02	-0.14	-0.54	0.27	0.01	-0.08	-0.01	-0.04	0.03	CR
	1.00	0.03	-0.08	0.20	0.02	-0.06	-0.16	-0.01	0.07	-0.13	-0.22	SIZE
		1.00	0.09	-0.05	0.06	-0.02	0.04	0.01	0.19	0.00	-0.04	GROW
			1.00	-0.03	-0.16	0.01	0.01	-0.01	0.00	0.00	0.00	CF
				1.00	-0.11	-0.06	-0.52	0.02	-0.01	0.03	0.05	TANG
					1.00	-0.21	0.10	0.10	0.00	0.11	0.02	DR
						1.00	0.10	-0.17	-0.04	-0.15	0.01	IND_CR
							1.00	-0.01	0.00	-0.01	-0.05	IND_CUR_ASSET
								1.00	-0.06	0.20	0.14	IND_PAYABL
									1.00	-0.14	-0.31	GDP_GROW
										1.00	0.50	UNEMPLOY
											1.00	BANK_STREN
VIF	1.13	1.06	1.07	1.43	1.13	1.12	1.40	1.08	1.16	1.41	1.53	

Source: own elaboration.