The effect of the working capital level on firm profitability: Evidence from Dutch private small- to medium sized enterprises

Master Thesis

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Marlinde Josephine Berkel
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Abstract

This study investigates the relationship between working capital management (measured by the cash conversion cycle) and firm profitability among a previously unstudied sample of Dutch private small- to medium sized enterprises. Small private firms experience financial constraints which make them more dependent on short-term financing, and on working capital practices in particular. Moreover, supported by the finance gap theory, agency theory, and the pecking order theory, this study proposes an optimal working capital level exists that optimizes firm profitability, and that deviation from this optimal point decreases firm profitability. To find support for this so-called progressive WCM theory, a fixed effects panel regression and a pooled OLS-regression are performed. The results, however, indicate that a U-shaped relationship between the cash conversion cycle and firm profitability does not exist among the sample of unlisted SMEs from The Netherlands. Though, the days inventories outstanding, days sales outstanding, and the days payables outstanding (which are components of the cash conversion cycle) are negatively related to firm profitability.

Keywords: *working capital management (WCM), cash conversion cycle (CCC), days inventories outstanding (DIO), days sales outstanding (DSO), days payables outstanding (DPO), firm profitability, Dutch private SMEs, progressive WCM theory*

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1. Introduction

Small- to medium sized enterprises (SMEs) are the engine of the European economy. The fast majority of European firms are SMEs, where they represented nine out of every 10 European firms in 2018 (Clark, 2019). Despite their large share, private SMEs have limited access to external finance, especially when compared to large listed firms (Van der Bauwhede, De Meyere, & Van Cauwenberge, 2015). Stiglitz and Weiss (1981) explain that this stems from the imperfect capital market SMEs operate in. Therefore, SMEs increasingly focus on alternative financing methods to fund their growth (Casey & O'Toole, 2014). Considering the substantial role SMEs play in any economy in terms of economic output and job contribution (Dowling, O'Gorman, Puncheva, & Vanwalleghem, 2019; Psillaki & Daskalakis, 2009; Rahaman, 2011; Serrasqueiro & Nunes, 2008), understanding the link between SME finance and profitability of great importance.

1.1 Working capital management

Unlike financing for large listed firms, private SME finance is not that straightforward (Van der Bauwhede et al., 2015). As such, private SMEs find difficulties in accessing external finance because they suffer from credit constraints. Those constraints include credit rationing (i.e. denied financing), and costs of external financing being too high (Casey & O'Toole, 2014). Due to the credit constraints of private SMEs, such firms devote themselves to finding alternative financing methods to stimulate profitability (Afrifa & Padachi, 2016). Consequently, Baños-Caballero, García-Teruel, and Martínez-Solano (2010) point out that SMEs' limited access to external finance make them more dependent on short-term finance in general, and on trade credit in particular. In the same line, Deloof (2003) states that working capital management (WCM), which focusses on a company's short-term financial health, is a crucial component of small firm financial management which contributes to a firm's profitability and overall firm value.

Working capital is a measure of operating liquidity, and consists of a firm's current assets and current liabilities (Brealey, Myers, & Allen, 2020; Singhania & Mehta, 2017). This research deals with financial working capital by measuring a firm's cash conversion cycle. The cash conversion cycle is a widely used measure of WCM which calculates the amount of days between the expenditure for the purchase of raw material and the collection for the sale of the finished good (Eljelly, 2004; Singhania & Mehta, 2017; Vahid, Mohsen &

Mohammadreza, 2012). As such, to identify this time difference, the cash conversion cycle considers a firm's inventory, accounts receivable, and accounts payable. Furthermore, WCM, also referred to as liquidity management, involves balancing firm profit and liquidity by managing the components of the cash conversion cycle (i.e. the accounts payable, inventory, and accounts receivable) (Vahid et al., 2012; Yazdanfar & Öhman, 2014). Whereas profit is necessary for long-term survival, liquidity is required to pay current debts or other obligations to prevent insolvency and bankruptcy (Vahid et al., 2012; Wang, 2002). A conflict between profitability and liquidity arises when a firm pursues an aggressive approach to WCM, where a firm reduces its current assets and increases its current liabilities in order to improve profitability. However, reducing current assets harms a firm's liquidity which can result in insolvency (Altaf & Ahmad, 2019; Tauringana & Afrifa, 2013; Vahid et al., 2012). This trade-off between liquidity and profitability is also explained by Eljelly (2004), who states that efficient WCM involves eliminating the risk of the inability to meet short-term obligations, while having sufficient current assets to avoid stock-outs, which is achieved by planning and controlling current assets and current liabilities. Thus, efficient management of working capital affects firm profitability and risk, and consequently contributes to the overall corporate strategy of creating firm value (Baños-Caballero et al., 2010; Smith, 1980; Vahid et al., 2012; Yazdanfar & Öhman, 2014). Despite the essence of WCM, Eljelly (2004) points out that companies usually neglect improving liquidity management before reaching crisis conditions or becoming on the verge of bankruptcy, which is also proven by real-life bankruptcies. For example, HNA Group, one of China's largest conglomerates, declared bankruptcy in January 2021 due to a liquidity crisis (Global Times, 2021), as did Laurentian University's in Canada (Sambo, 2021). Also the Covid-19 pandemic increases the liquidity risk for firms. As such, many firms, including Virgin Atlantic, are required to undergo a financial restructuring program in order to prevent insolvency (British Broadcasting Corporation News, 2020). For these reasons WCM should be given the proper consideration.

Efficient WCM is particularly important for smaller firms (Baños-Caballero et al., 2010). To elaborate on this, Baños-Caballero et al. (2010) clarify that SMEs typically own more current assets than fixed assets, and that current liabilities are one of an SME's main source of external finance due to the difficulties they have in obtaining finance in the long-term capital markets. Therefore, WCM is crucial for the survival and growth of small companies. Additionally, Yazdanfar and Öhman (2014) state that short-term investments become increasingly important for SMEs due to growing competition. Besides, Eljelly (2004) explains that, compared to larger firms, small companies are usually not able to obtain large

quantities of stock to qualify for discounts. Also, unlike larger firms, small companies make efforts to pay within discount periods in order to benefit from cash discounts, and ensure to pay on time to avoid damaging their relations with their suppliers. These factors may force small companies to have higher liquidity levels and larger cash gaps (or a larger cash conversion cycle) (Eljelly, 2004). In short, SMEs are required to pay extra attention to efficient WCM due to their nature.

Since WCM is pivotal for the survival and growth of SMEs, it is required to understand its relationship with firm profitability. The relationship between WCM and firm profitability is investigated by multiple researchers (e.g. Afrifa & Padachi, 2016; Baños-Caballero, García-Teruel et al., 2012; Deloof, 2003; Wetzel & Hofmann, 2019). Notwithstanding this well researched topic, various theoretical arguments are proposed by the literature to understand the relation between working capital and firm performance. The first group of researchers find a negative relationship between WCM and firm profitability, also referred to as the traditional WCM theory (Baños-Caballero et al., 2012; Deloof, 2003; Wetzel & Hofmann, 2019). The second group of researchers find a positive relationship between WCM and firm profitability, which is referred to as the alternative WCM theory (Wetzel & Hofmann, 2019). Finally, the third group finds support for the progressive WCM theory, which proposes a concave relationship between working capital and profitability (Afrifa & Padachi, 2016; Baños-Caballero et al., 2012; Wetzel & Hofmann, 2019). Ultimately, either theory comes with cost and benefits which affect firm performance. Also, results on the relationship between WCM and profitability may vary due to the economic development of various countries (Singh, Kumar, & Colombage, 2017). To summarize, not one generalizable theory of WCM has been found in prior research.

1.2 Research question and contributions

Despite the consensus that WCM affects profitability, various researchers disagree on the way WCM affects firm profitability. Afrifa and Padachi (2016) acknowledge the existence of this debate in the existing literature as to whether high or low levels of working capital stimulate firm profitability. As a result, Altaf and Ahmed (2019) suggest for further research to seek to understand the relationship between working capital and firm performance across different countries. Besides, as identified by Baños-Caballero et al. (2012), most previous studies that examine the effect of WCM on firm profitability have focused on a sample of large (listed) firms, while WCM is especially important for small unlisted ventures given their credit

constraints and higher dependence on short-term finance. Notably, Afrifa and Padachi (2016) claim WCM is more important to SMEs than to larger firms. Because of these statements, the focus of this study is limited to unlisted SMEs operating in The Netherlands. Dutch firms are an interesting sample to study considering they operate in a civil law system, which is considered a weaker legal system than a common law system (Dowling et al., 2019; Engelen & Van Essen, 2010; Jalal & Khaksari, 2020), but also operate in a country with high economic development (Clark, 2020; Swagerman, 2020). A weak legal system is expected to have a negative impact on the efficiency of WCM, while a high economic development is expected to have a positive influence (Jalal & Khaksari, 2020). Besides, the European Payment Report 2020 by Intrum (2020) indicates that Dutch firms have a shorter payment term than the average European Union firm, and Dutch firms also do not value the relationship with the customer as much when payment is due. It is interesting to see how these conflicting features affect the relationship between WCM and firm profitability. Furthermore, prior research on the relationship between WCM and firm profitability have used a sample of Dutch listed firms to test the traditional WCM theory. However, using a sample of Dutch unlisted SMEs is, to the best of my knowledge, an unstudied sample in the research of WCM and firm profitability. Accordingly, I aim to find out what the effect of WCM is on firm profitability of unlisted SMEs operating in The Netherlands. This results into the following research question: what is the effect of working capital management on firm profitability among Dutch private SMEs?

This paper contributes to the existing empirical literature on corporate finance and working capital in multiple ways. First, within the finance literature, considerable attention is given to subjects such as capital budgeting, capital structure, and dividend policy, while WCM has received less attention (Chang, 2018; Singh et al., 2017). Despite WCM being a short-term financial management, it often becomes a genuine source of profitability, and thus should not be neglected (Chang, 2018, Singh et al., 2017). Therefore, this research adds to the corporate finance literature by researching the topic of managing working capital. Second, this study evaluates the traditional, alternative and progressive WCM theories in the literature review. Hereafter, based on theoretical argumentations, it is chosen to test one WCM theory: the progressive theory. This structure is unlike (most) WCM studies that start the research by stating one specific WCM theory to investigate. Thus, after evaluating all WCM theories, it is chosen to examine the existence of a concave relationship between WCM and firm profitability for unlisted SMEs operating in The Netherlands. Third, by explicitly focusing on a previously unstudied sample of Dutch private SMEs, I am able to fill a research gap in the

WCM literature as pointed out by Altaf and Ahmed (2019). The results of this study can be compared to findings of existing studies to understand the potential cause of institutional characteristics, financial systems, and any other (country-related) differences. In the same line, this research adds to scarce evidence on the relationship between WCM and firm profitability among unlisted firms compared to listed firms. Final contributions to the existing literature are made by performing additional robustness checks, where the influence of the individual components of the CCC on firm profitability are identified, and the sample is split by industry to analyse if the obtained results remain robust. Additionally, as for the practical contributions, this paper is of value for financial managers of private SMEs, because the results help them to set optimal financing and investment policies to keep the trade-off between liquidity and profitability stable. As such, Dutch private SMEs can set targets for the optimal inventory level, and create a trade credit policy that results in increased firm profitability. Finally, financially troubled SMEs can use the results and apply them in their asset restructuring policy to improve profitability, and thereby resolving financial distress.

1.3 Preview

The remainder of this thesis consists of six more chapters. The second chapter is the literature review which can be divided into four sections. First, the definition of Dutch private SMEs will be given including the differences between SMEs and large firms, differences between private and public firms, as well as characteristics of The Netherlands. The second section will focus on WCM. Therefore, the definition of WCM, theories on WCM, and empirical evidence on those theories will be given. Despite the fact that this study tests the existence of a concave relationship among Dutch private SMEs, providing information beyond the scope of this thesis will provide a deeper understanding of issues related to WCM. Furthermore, considering WCM is a form of short-term finance, the third section of the literature review will provide short-term financing theories, including the finance gap theory, the agency theory and the pecking order theory. Finally, the fourth section of the literature review will provide the hypothesis development in which the hypothesis will be created based on previously described theory and empirical evidence. In the methodology section, the third chapter of this thesis, I will explain the research design. The fourth chapter contains the data collection, in which the sampling process and the data collection method will be explained. Hereafter, the empirical results will be presented in chapter five. Chapter six is the conclusion in which I will summarize the key findings and give an answer to the research question. Finally, the

discussion is the seventh chapter of this thesis, in which I will provide both practical and theoretical recommendations based on the results, acknowledge limitations of this study, and provide avenues for further research.

2. Literature review

The literature review consists of four sections. The first one focusses on private SMEs, the second one focusses on WCM, the third section pays attention to other short-term financing theories, and the fourth section covers the hypothesis development. All theories on WCM and other short-term financing theories are provided in order to develop the theoretically supported hypothesis.

2.1 Dutch private SMEs

In line with prior studies that investigate the relationship between SME financing and firm performance in the European Union, the European Commission's definition of an SME is used. The European Commission's most recent definition of SMEs entered into force on 1 January 2005 and states that "the category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro" (European Commission, 2017, p. 3). More specifically, micro firms employ fewer than 10 persons and have an annual turnover or annual balance sheet total does not exceed two million euro; small firms employ fewer than 50 persons and have an annual turnover or annual balance sheet total does not exceed 10 million euro; and medium-sized firms employ fewer than 250 persons and either have an annual turnover that does not exceed 50 million euro, or an annual balance sheet not exceeding 43 million euro (European Commission, 2017). Furthermore, private firms are characterized by not having common shares or bonds traded in the public market, but by making private placements instead (Rahaman, 2011). Thus, private SMEs do not trade securities in the public market, employ fewer than 250 persons, and have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro.

2.1.1 SMEs vs. large firms

SMEs differ from large firms in various ways. The four most striking differences are the following. First, whereas the vast majority of SMEs are owner-managed (Berger & Udell, 1998; Vos et al., 2007; Yazdanfar & Öhman, 2015), ownership and management is typically separated in large firms. The shareholders of a large firm are the owners, and the board of directors (whom are elected by shareholders) have control rights, while management run the corporation (Claessens & Yurtoglu, 2012). A possible consequence of ownership separation is

the rise of agency problems when the interests of the principal (i.e. the owner) and the agent (i.e. the manager) conflict with each other. These agency issues allow managers to pursue their own interests at the expense of shareholders (Douma, George, & Kabir, 2006). SMEs do not experience those owner-manager conflicts since ownership and control is mostly concentrated to one person. Second, smaller firms have limited access to credit, because small firms have limited resources, and thus little to provide as collateral. Also, smaller firms are less transparent since they are less likely to have sufficient financial records that document their performance. This asymmetric information hinders SMEs' access to credit (Demirgüç-Kunt, Peria, & Tressel, 2020). Baños-Caballero et al. (2010) add that SMEs' main source of external finance are current liabilities, and not long term liabilities, because of their financial constraints. Large firms typically do not experience these difficulties in obtaining (long term) external finance (Demirgüç-Kunt et al., 2020). Third, larger firms are less likely to default a debt obligation and typically have higher survival rates than smaller firms, because large firms are less risky and more diversified (Baños-Caballero et al., 2010; Demirgüç-Kunt et al., 2020). Lastly, small firm financing is more costly than large firm financing because of the various fixed costs associated with financial transactions and because of contract enforcement (Demirgüç-Kunt et al., 2020). To conclude, SMEs are mostly owner-managed, suffer from information asymmetry, experience financial constraints, are more likely to default a debt obligation, and experience higher costs of external financing.

2.1.2 Private firms vs. public firms

Despite the focus of this research on the private market, some SMEs are publicly listed and therefore operate in the public market. Listed firms mainly distinguish themselves from unlisted ones in the following five ways. Firstly, compared to the private market, the public market is characterized by being uniform and transparent (Van der Bauwhede et al., 2015), which results in transparent and non-negotiable contracts (Berger & Udell, 1998). An advantage of transparent and non-negotiable contracts is that they make securities easily transferable, and thus more liquid (Brealey et al., 2020). The disadvantages of transparent and non-negotiable contracts, however, are that the terms of bonds and equities cannot be customized for individual investors, and that such standardized contracts are more difficult to renegotiate to personal preferences (Brealey et al., 2020). Secondly, listed firms, who are obliged to publicly publish financial records, enjoy easier access to capital market financing than unlisted firms, because they suffer less from information asymmetry (Demirgüç-Kunt et

al., 2020). Moreover, due to the presence of information asymmetry, unlisted firms' access to external finance is more likely to depend on specific banking relationships (Demirgüç-Kunt et al., 2020). Thirdly, listed firms are required to share confidential information with the market, which private firms are not required to do (Brealey et al., 2020). Unlisted firms may keep a competitive advantage by not having to disclose all information with their competitors. Fourthly, Brealey et al. (2020) point out that issuing securities in a public market reaches a large public, whereas selling securities in a private market does not reach such a wide range of potential investors. This could hinder SMEs' access to finance. Fifthly, a general cash offer (i.e. the sale of securities in a public market) is accompanied with a costly registration with the securities regulator. Unlisted firms that make private placements are not required to register with a securities regulator (Brealey et al., 2020). In short, the advantages of listed firms are that their securities are more liquid, they have easier access to capital market financing, and they reach a larger public when selling securities. Besides, the advantages of unlisted firms are that their contracts are customizable and negotiable, they are not required to share private information with the public, and they do not experience the costs of registering with a securities regulator.

2.1.3 Characteristics from The Netherlands

As previously stated, the characteristics of private SMEs negatively influence their access to external finance, and therefore make them more dependent on WCM. Another factor influencing a firm's access to external finance is a country's legal and economic environment (Beck, Demirgüç-Kunt, & Maksimovic, 2008; Krasniqi, 2010). Moreover, Jalal and Khaksari (2020) state that factors affecting the decisions and policies of companies regarding WCM differ across countries due to their legal and economic differences. Therefore, characteristics of The Netherlands that influence WCM and access to external finance are elaborated on below.

Firstly, a country's legal system can be either a common law system or a civil law system. A common law system is an uncodified law based on legal precedents established by the courts. Judicial authorities and public juries provide institutionalized opinions and interpretations in common law. Moreover, a civil law system is a codified law where all laws are written down. The Netherlands has a French origin civil law system, where the Dutch parliament together with the government are the primary law makers in the country. However, according to Engelen and Van Essen (2010), the civil law system is overall seen as a weaker

legal system, as common law countries tend to offer higher creditor protection rights, and typically have more developed financial markets. Dowling et al. (2019) agree to this, and state that firms operating in common law countries therefore have better access to finance. Besides, these country-level indicators of corporate governance is related to managerial efficiency, and thus the cash cycle (Jalal & Khaksari, 2020). As such, Jalal and Khaksari (2020) show that the management of working capital tends to be more efficient for common law countries that provide better investor protection. This finding is also supported by Mättö and Niskanen (2020). Thus, considering The Netherlands has a civil law legal system, firms experience difficulty in accessing finance, and overall manage their working capital less efficiently than firms operating in a common law country.

A second country characteristic influencing the efficiency of WCM is its economic condition. The economic condition of a country is measured by the growth of its gross domestic product (GDP), which is a monetary measure of a country's market value of all the final goods and services produced in a specific period of time (Baños-Caballero et al., 2010; Dowling et al., 2019; Martinez-Sola, García-Truel, & Martínez-Solano, 2014). According to Dowling et al. (2019), the GDP growth represents the economic conditions of a country which impact firm performance. Moreover, Jalal and Khaksari (2020) empirically show that a higher GDP is associated with a more efficient WCM (measured by the cash cycle), because firms operating in developed countries are better able to obtain raw materials on credit from suppliers and have superior skills in managing their inventories. The year-on-year percentage growth of the GDP of The Netherlands is 2.9% in 2017, 2.4% in 2018, 1.7% in 2019 and -4% in 2020 (Swagerman, 2020). Moreover, the GDP growth of the European Union (EU) in 2017, 2018, 2019 and 2020 is 2.7%, 2.1%, 1.5% and -7.4% respectively (Clark, 2020). Thus, the GDP growth of The Netherlands is above the EU's average (with a positive difference of .2% in 2017, .3% in 2018, .2% in 2019, and 3.4% in 2020). Therefore, it can be concluded that The Netherlands has better economic conditions when compared to the average EU firm, and are more likely to efficiently manage their working capital.

Finally, the average payment terms of firms impact the working capital level. Since working capital consists of current assets and current liabilities, and thus accounts receivable and accounts payable, the payment terms of firms influence the working capital level. Baños-Caballero et al. (2012) state that financially constraint firms are more dependent on trade credit, and thus grant less trade credit to their customers and simultaneously receive more credit from their suppliers. However, according to the European Payment Report 2020 by Intrum (2020), the payment terms of The Netherlands are smaller than the payment terms in

the EU. Whereas the average payment term of Dutch firms is 25 days, the average payment term of firms in the EU is 60 days in 2020. Jalal and Khaksari (2020) also show that the cash cycle of The Netherlands lies below the average of 79 countries incorporated in their study. Moreover, the European Payment Report by Intrum (2020) indicates that 34% of Dutch firms have accepted a longer payment term from their customers than initially demanded in order to preserve the relationship, while this percentage was, on average, 69% for all EU firms. Therefore, the European Payment Report 2020 states that Dutch firms are, on average, less keen to preserve their relationship with their customers when payment is overdue than EU firms. In short, the payment terms of Dutch firms are smaller than the average of all EU firms, and Dutch firms are less vigilant to maintain the relationship with customers, which result in lower working capital levels.

2.2 Working capital management

Working capital is a measure of operating liquidity. Moreover, working capital defines the short-term condition of a company, and consists of a firm's current assets and current liabilities (Brealey et al., 2020; Singhania & Mehta, 2017). Specifically, the current assets are cash and other assets that can be converted into cash within a year, such as inventories, accounts receivable, accrued income and marketable securities (Leach & Melicher, 2018; Singhania & Mehta, 2017). On the other hand, current liabilities are obligations that require payments within one year, such as accrued wages, accounts payable, and short-term loans (Leach & Melicher, 2018; Singhania & Mehta, 2017). Those current liabilities are indirect sources of external financing, and are especially important for smaller firms that may face problems in acquiring long-term financing (Singhania & Mehta, 2017). The net working capital is calculated by subtracting a firm's current liabilities from its current assets. Besides, the gross working capital consists of the total current assets (Singhania & Mehta, 2017). Finally, to ensure the correct balance between profitability and liquidity, the components of working capital have to be managed (Brealey et al., 2020).

2.2.1 Definition working capital management

The definition of WCM is consistent, as well as complementary. Singh et al. (2017) define WCM as the decision making process about the amount and composition of the current assets and current liabilities in a firm. Moreover, effective WCM can be achieved by constant monitoring of working capital components such as accounts receivable, inventory, and

accounts payable (Singh et al., 2017). Similarly, Singhania and Mehta (2017) state that WCM is defined as the management of short-term capital of a firm. Short-term capital refers to the funds that a firm requires to finance its daily operations, or in other words, the current assets and current liabilities. Moreover, the sources of cash to fund the current assets (i.e. the working capital requirement) include cash from shareholders, loans from financial institutions, and excess cash collected from accounts receivables over accounts payable. Ultimately, the firm transforms this cash into finished goods which eventually get converted to cash after sale (Singhania & Mehta, 2017). Thus, according to Singhania and Mehta (2017), the components of working capital must be managed to smoothly run a business, and to stimulate profitability. Sharma and Kumar (2011) agree that WCM involves managing short-term financing, and add that a crucial part of managing working capital is to maintain the liquidity in daily operations to ensure smooth running and meeting all obligations. Finally, Singhania, Sharma, and Rohit (2014) refer to WCM as managing a firm's short-term capital with the aim to maximize profits, while simultaneously striving to minimize the risk of loan defaults. Therefore, the efficacy of WCM rests on the balance between liquidity and profitability. To conclude, WCM can be defined as the management of short-term capital finance (i.e. current assets and current liabilities) by continuously monitoring the working capital components in order to create the perfect balance between liquidity and profitability. This definition of WCM is used in this study.

2.2.2 Cash conversion cycle

A widely used measure of WCM is the cash conversion cycle (CCC) (Afrifa & Padachi, 2016; Baños-Caballero et al., 2012; Boisjoly, Conine, & McDonald, 2020; Deloof, 2003; Eljelly, 2004; Signh et al., 2107; Singhania & Mehta, 2017; Singhania et al., 2014; Wang, 2002; Yazdanfar & Öhman, 2014). The CCC measures the length of days between of cash outflow for the purchase of raw materials and cash inflow through the sale of goods produced (Eljelly, 2004; Singhania & Mehta, 2017). In other words, the CCC shows the amount of days a firm relies on external financing (Afrifa & Padachi, 2016; Leach & Melicher, 2018). Another measure of WCM is a static method based on liquidity ratios, such as the current ratio and the quick ratio. Those ratios measure the liquidity of a firm at one point in time (Afrifa & Padachi, 2016). Considering the CCC is a dynamic method based on the operations of the firm which combines data of a firm's balance sheet and income statement, and thus measures liquidity with a time dimension, the CCC is the preferred measure of WCM (Afrifa &

Padachi, 2016; Wang, 2002). Additionally, the CCC is a key indicator of a firm's liquidity, hence it is used as a measure for working capital (Singhania & Mehta, 2017). Therefore, the CCC is used as a measure of WCM in this study.

The CCC is the sum of days sales outstanding (DSO), days inventories outstanding (DIO) and days payables outstanding (DPO). The calculation of the CCC can be found in equation 1 (Afrifa & Padachi, 2016; Baños-Caballero et al., 2012; Boisjoly et al., 2020; Leach & Melicher, 2018).

$$CCC = \frac{\text{Accounts receivable}}{\text{Sales}} \times 365 + \frac{\text{Inventories}}{\text{Costs of goods sold}} \times 365 - \frac{\text{Accounts payable}}{\text{Sales}} \times 365 \qquad (1)$$

The days inventories outstanding denotes the number of days it takes a firm to convert raw materials into finished good, which are then stored into warehouses until sold (Singhania et al., 2014). Brealey et al. (2020) explain that firms must decide whether to limit the costs of holding inventories or whether to have a buffer to meet unexpected demands. Also, Wang (2002) acknowledges that when the days inventories outstanding is reduced too far, the firm may risk losing sales because of stockouts. Moreover, the days sales outstanding refers to the number of days it takes for the customers to pay for goods bought on credit. The total number of days sales outstanding reflects the amount of control a firm has over its credit collections (Singhania et al., 2014). A firm may gain control over its credit collections by offering a cash discount for prompt settlement. For example, a '2/10, net 30' is a common offer indicating that full payments is required in 30 days, and that a cash discount of 2% is granted when customers pay the invoice within 10 days (Boisjoly et al., 2020; Brealey et al., 2020). Lastly, the days payable outstanding are the number of days it takes the firm to pay for goods bought on credit. It thus reflects settlement for raw materials bought from suppliers (Singhania et al., 2014). Increasing the days payable outstanding too much raises the risk of losing discounts for early payments or flexibility for future debt (Wang, 2002).

As seen in equation 1, the CCC involves the management of three components: inventory, accounts receivable, and accounts payable. The focus is on balancing the components of the CCC (Yazdanfar & Öhman, 2014). Zeidan and Shapir (2017) shed light on this trade-off by explaining that lengthening the CCC might improve margin and sales, while shortening it could result in higher costs and lost revenue. This trade-off is further explained in Chapter 2.2.3.

2.2.3 Working capital management theories

Studies that analyse the functional form of the relation between investment in working capital and firm performance can be grouped into the following three categories: the (i) traditional, (ii) alternative, and (iii) progressive WCM school of thought (Wetzel & Hofmann, 2019). Figure 1 illustrates these three theories.

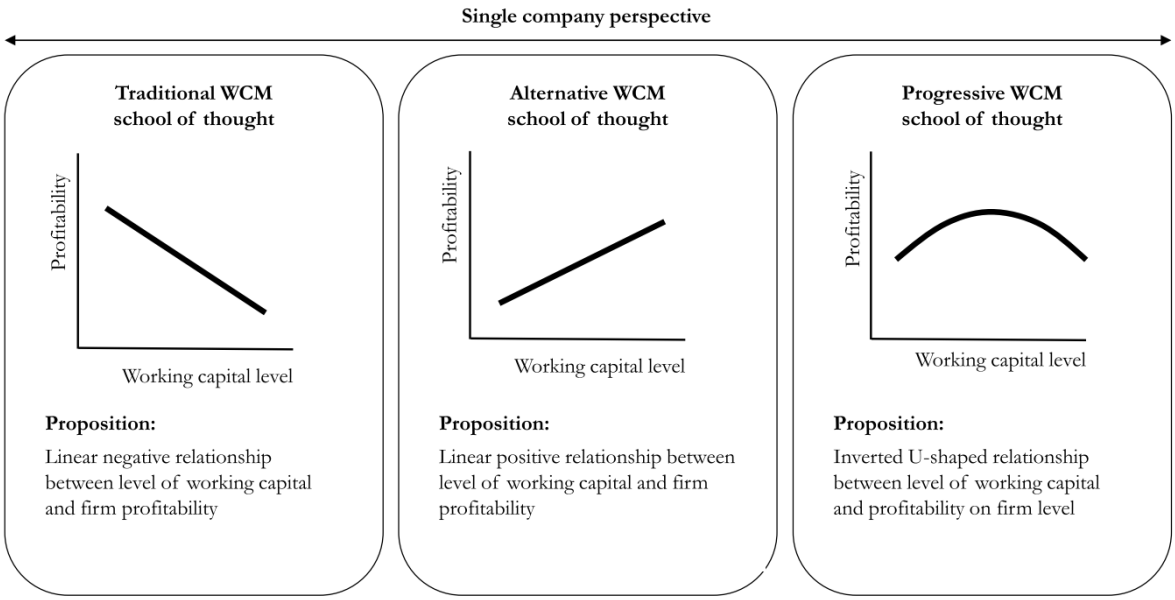

Figure 1. WCM theories explaining the relationship between investment in working capital assets and firm profitability (Wetzel & Hofmann, 2019, p. 366)

2.2.3.1 Traditional working capital management theory

The traditional WCM theory, as illustrated in the first box of Figure 1, proposes a linear negative relationship between the level of working capital and firm profitability (Wetzel & Hofmann, 2019). This relationship is caused by lower external financing and interest costs that emerge from lower capital levels, or the savings thereof (Deloof, 2003). Besides, having a lower level of external financing decreases the possibility of financial distress, and limits the associated financial distress costs (Aktas, Croci, & Petmezas, 2014; Altaf & Ahmad, 2019). Also, Wetzel and Hofmann (2019) explain that too much money tied up in working capital result in opportunity costs, as that money cannot be used for alternative positive net present value (NPV) projects. Therefore, the opportunity costs diminish with a lower level of working capital. Finally, holdings of relatively unprofitable assets such as cash and marketable securities can be minimized by having a low CCC (Wang, 2002). In short, the traditional WCM theory assumes that a lower level of working capital, achieved by reducing the

accounts receivable period, reducing the inventory and extending supplier credit terms, is associated with higher firm profitability.

2.2.3.2 Alternative working capital management theory

The second box in Figure 1 displays the alternative WCM theory, which predicts a positive linear relationship between the level of working capital and firm profitability. This relationship is based on several theoretical explanations. To begin with, larger inventories serve as a hedging instrument against price fluctuations, prevent interruptions in the production process (Aktas et al., 2014; Wetzel & Hofmann, 2019), and limit loss of business because of the scarcity of products (Chang, 2018). Secondly, granting trade credit to customers and suppliers may stimulate sales at a low demand period, or help the firm to strengthen its relationships with its customers (Aktas et al., 2014; Afrifa & Padachi, 2016; Baños-Caballero et al., 2012; Chang, 2018; Wetzel & Hofmann, 2019). Besides, Ng, Smith, and Smith (1999) explain that uncertainty in a relationship imposes transactions costs on the firm, which can be eliminated by extending trade credit. As such, extending more trade credit allows buyers to assess the quality of products and services prior payment which stimulates sales (Smith, 1987), and simultaneously reduce the asymmetric information between buyer and seller (Baños-Caballero et al., 2012). Finally, in terms of accounts payables, a firm may take advantage of crucial discounts for early payments (Chang, 2018; Wetzel & Hofmann, 2019). To conclude, the alternative WCM theory proposes that higher levels of working capital increase firm profitability. These higher levels of working capital are obtained by increasing the accounts receivable period, increasing the inventory and decreasing supplier credit terms.

2.2.3.3 Progressive working capital management theory

The progressive WCM theory finds a U-shaped relationship between the level of working capital and firm profitability as illustrated in the third box of Figure 1. Both high and low levels of working capital are found to be associated with a lower profitability due to the cost of overinvestment and underinvestment in working capital (Baños-Caballero et al., 2012; Wetzel & Hofmann, 2019). Costs of overinvestment in working capital include interest costs and agency costs associated with external finance that may turn into financial distress costs (Altaf & Ahmad, 2019), and opportunity costs (Wetzel & Hofmann, 2019). To elaborate on this, overinvestment in working capital means that no or little money is available to make

investments. Therefore, if a firm desires make such investments, it is required to attain external financing. External finance is firstly related to interest costs, and secondly to agency costs. Those agency costs arise due to conflicts of interests between the creditors and the owner of the firm. In order to minimize those agency problems, agency costs arise. Those agency costs consist of the monitoring expenditures (i.e. costs of supervision on the activities of the firm) by the creditors, and the bonding expenditures by the owner, which are the costs of sharing information to creditors to ensure the firm is acting in their best interest (Chittenden, Hall, & Hutchinson, 1996; Jensen & Meckling, 1976; Myers, 2001). Besides, costs of underinvestment in working capital are the risks of price fluctuations, out-of-stock situations, interruptions in the production process (Wetzel & Hofmann, 2019), and costs associated with asymmetric information between buyer and seller (Baños-Caballero et al., 2012). Consequently, firms are ought to strive to possess the optimal level of working capital to maximize profitability by balancing the costs and benefits of working capital (Baños-Caballero et al., 2012; Wetzel & Hofmann, 2019). The reasoning behind this theory is explained by Wetzel and Hofmann (2019), who state that investing in working capital allows a business to keep running, and that "every firm has to manage a trade-off between too much capital tied up (e.g. avoiding high inventory costs) and too little working capital available for its operational daily business (e.g. avoiding risk foregone sales)" (p.366-367). Baños-Caballero et al. (2012) add that linear relationships ignore the risk of loss of sales and interruptions in the production process related to low levels of working capital. In short, according to the progressive WCM theory, an optimal level of working capital exists that offsets the costs and benefits associated with working capital.

2.2.4 Empirical evidence on working capital management theories

Researchers have found empirical evidence for the traditional, alternative and progressive WCM theories. Some findings are elaborated on below. Besides, a summary of empirical evidence found on WCM theories is provided in Table 1.

2.2.4.1 Empirical evidence traditional working capital management theory

The traditional WCM theory is investigated by various researchers. First, Eljelly (2004) tests whether a negative relationship between WCM and firm profitability exists among both small and large Saudi joint stock companies in the period of 1996 to 2000. Both the CCC and the current ratio are used as proxies for WCM, and firm profitability is measured by a firm's net

operating income. Eljelly (2004) finds support for the traditional WCM theory, however, also mentions that the effect of the negative relationship depends on the level of liquidity and size of the CCC. To elaborate, Eljelly (2004) finds that holding excessive liquidity results in lost profits and the unnecessary costs. Second, Deloof (2003) tests the traditional WCM theory by obtaining data from 1,009 large Belgian firms, both listed and unlisted, from the period of 1992 to 1996. A significant negative relation between gross operating income and the number of days accounts receivable, inventories and accounts payable is found. Thus, less profitable firms wait longer to pay their bills, and profitability can be increased by reducing the number of days accounts receivable and inventories. However, the relationship between the CCC and firm profitability is insignificant (Deloof, 2003). Therefore, Deloof (2003) fails to support the traditional WCM theory. Third, Yazdanfar and Öhman (2014) investigate the impact of the CCC on firm performance (measured by return on assets), and predict a negative relationship between both variables. Data is obtained from 13,797 unlisted Swedish SMEs in the period of 2008 to 2011. Yazdanfar and Öhman (2014) find a significant negative relationship between CCC and profitability, and conclude that managers can increase firm profitability by reducing the firm's CCC, thereby creating additional firm value. Fourth, Singh et al. (2017) perform a meta-analysis by investigating 46 research articles that directly study the (negative) relationship between WCM and profitability. The findings confirm that WCM is negatively related with profitability. However, the relationship of a firm's CCC with profitability is not found to be statistically significant in all cases (Singh et al., 2017). Fifth, Chang (2018) tests the traditional WCM theory, and obtains data from 1994 to 2011 from 31,612 listed firms (both small and large) operating in 46 countries. Chang (2018) finds support for the traditional WCM theory. Furthermore, the significant negative relationship between CCC and return on assets (ROA), and between CCC and Tobin's Q, remains after splitting the sample in financially constraint firms (i.e. SMEs) and financially non-constraint firms (i.e. large firms). However, Chang (2018) mentions that the negative relationship reduces or reverses when firms exist at the lower CCC level. Sixth, Singhania et al. (2014) test the existence of a negative relationship between CCC and firm profitability (measured by ROA, net operating profit and gross operating profit), and desire to understand the dynamics of this relationship in the pre-recession, recession, and post-recession periods. Singhania et al. (2014) collect data from 82 listed Indian manufacturing firms, both small and large, from 2005 to 2012, and find a significantly negative relationship between CCC and profitability. Finally, Wang (2002) examines the relationship between liquidity management and operating performance for listed firms in Japan and Taiwan. Liquidity management is measured by the CCC, and firm

performance is measured by both ROA and return on equity (ROE). By collecting data from 1985 to 1996, Wang (2002) finds a significant negative relationship between WCM and firm performance. To conclude, most researchers find empirical support for the existence of a negative relationship between WCM and firm profitability. A summary of the empirical findings can be found in Table 1.

2.2.4.2 Empirical evidence alternative working capital management theory

Although not as frequently investigated as the traditional WCM theory, few researchers have examined the alternative WCM theory. To begin with, Sharma and Kumar (2011) identify whether a positive relationship exists between WCM and firm profitability among Indian firms listed at the Bombay Stock Exchange, and collect data from the period of 2000 to 2008. Sharma and Kumar (2011) find an insignificant relationship between CCC and ROA, and therefore fail to find support for the alternative WCM theory. Furthermore, Gill, Biger, and Mathur (2010) examine the alternative WCM theory for a sample of 88 American firms listed on New York Stock Exchange (NYSE). Data is obtained from 2005 to 2007. Gill et al. (2010) find a positive significant effect between a firm's CCC and its gross operating profit, and thus find support for the alternative WCM theory. Lastly, Tauringana and Afrifa (2013) test the alternative WCM theory by obtaining data from 133 SMEs listed on the Alternative Investment Market (AIM) from the period of 2005 to 2009. The results of the effect of CCC on ROA show that this variable is insignificant, and thus do not support the existence of a positive relationship between WCM and firm profitability. In short, some support is found for the alternative WCM theory. A summary of the empirical findings are shown in Table 1.

2.2.4.3 Empirical evidence progressive working capital management theory

Multiple researchers have investigated the existence of a concave relationship between WCM and firm profitability. Firstly, Afrifa and Padachi (2016) empirically test the existence of an optimal working capital level at which firms' profitability is maximised, and examine whether deviations from the optimal working capital level reduce firm profitability. Afrifa and Padachi (2016) use CCC as a proxy for WCM, and ROA, return on capital employed, and ROE as proxies for firm profitability. Furthermore, Afrifa and Padachi (2016) gather data from AIM listed SMEs from the period of 2005 to 2010, and find that working capital increases the profitability up to the breakpoint. Thus, the researchers find a non-linear relationship between working capital and firm profitability. Moreover, Afrifa and Padachi (2016) find that

deviation on either side of the optimal working capital level reduce firm profitability. Secondly, Baños-Caballero et al. (2012) investigate a possible quadratic relation between WCM and firm profitability by using a dataset of both listed and unlisted Spanish SMEs. Ultimately, by observing data from 2002 to 2007, Baños-Caballero et al. (2012) find support for the existence of a concave relationship between a firm's CCC and profitability (measured by a firm's gross operating income and net operating income). Thirdly, Aktas et al. (2015) test the existence of a concave relationship between WCM and firm profitability with a sample of US listed firms. By collecting data from the period of 1982 to 2011, Aktas et al. (2015) document the existence of an optimal level of working capital investment, and therefore find support for the progressive WCM theory. Thus, firms that converge to that optimal level, either by increasing or decreasing their CCC, improve their ROA over the following period. Fourthly, the progressive WCM theory is also tested by Altaf and Ahmad (2019). The authors examine the relationship between Indian listed companies' CCC, and ROA and Tobin's Q in the period of 2007 to 2016. Altaf and Ahmad (2019) confirm the existence of a U-shaped relationship between WCM and firm profitability. In addition, the authors find that the break-even point for financially unconstraint firms is higher, meaning they can finance a greater proportion of working capital using short-term debt. Finally, Singhania and Mehta (2017) test the existence of an optimal WCM level among a sample of listed firms from South East Asia, South Asia and East Asia in the period of 2004 to 2014. Singhania and Mehta (2017) find a significant concave relationship between a firm's CCC and ROA, confirming the progressive WCM-theory. In conclusion, empirical support is found for the existence of a U-shaped relationship between WCM and firm profitability. Besides, a summary of the empirical findings are presented in Table 1.

2.2.4.4 Empirical evidence influence external environment on working capital management

The external environment a firm operates in can possibly clarify why various researchers have found support for all three WCM theories across countries. However, prior research investigating the effect of the external environment on the WCM theories obtain varying results.

The effects of macroeconomic factors which represent the economic condition of a country, such as GDP and interest rates, are expected to affect trade credit and investment in inventories. To illustrate, Chang (2018) explains that recessions can be related to drastic inventory reductions. Also, it is expected that small businesses are affected more severely by changes in the macroeconomic environment, because of their high reliance on short-term

Table 1. A summary of existing studies investigating the link between WCM and firm profitability

Author(s) (year)	**Sample period**	**Geographic area**	**Size firm**	**Incorporation**	**Effect**
Eljelly (2004)	1996 – 2000	Saudi Arabia	Both	Listed	-
Deloof (2003)	1991 – 1996	Belgium	Large firms	Both	n.s.
Yazdanfar and Öhman (2014)	2008 – 2011	Sweden	SMEs	Unlisted	-
Chang (2018)	1994 – 2011	46 countries	Both	Listed	-
Singhania et al. (2014)	2005 – 2012	India	Both	Listed	-
Wang (2002)	1985 – 1996	Japan and Taiwan	Both	Listed	-
Sharma & Kumar (2011)	2000 – 2008	India	Both	Listed	n.s.
Gill et al. (2010)	2005 – 2007	United States	Both	Listed	+
Tauringana and Afrifa (2013)	2005 – 2009	United Kingdom	SMEs	Listed	n.s.
Afrifa and Padachi (2016)	2005 – 2010	United Kingdom	SMEs	Listed	Concave
Baños-Caballero et al. (2012)	2002 – 2007	Spain	SMEs	Both	Concave
Aktas et al. (2015)	1982 – 2011	United states	Both	Listed	Concave
Altaf and Ahmad (2019)	2007 – 2016	India	Both	Listed	Concave
Singhania and Mehta (2017)	2004 – 2014	South East Asia, South Asia and East Asia	Both	Listed	Concave

financing (Baños-Caballero et al., 2010; Chang, 2018). However, neither Chang (2018) nor Baños-Caballero et al. (2010) find that the interest rates and GDP growth affect WCM. Finally, Martínez-Sola et al. (2014) do not find a significant relationship between GDP growth and ROA. Thus, it seems that the WCM policy remains unchanged in various macroeconomic conditions.

Similarly, Chang (2018) explains that crisis conditions may influence the relationship between CCC and firm performance. To elaborate, Chang (2018) states that credit-constraint firms cut investment, technology, marketing, and employment at a higher rate than financially unconstrained firms during crisis periods. Also, in crisis periods, constrained firms use a large portion of their cash savings. However, after splitting the sample into a crisis period and a noncrisis period, Chang (2018) finds consistent results for both periods of time. Similarly, Afrifa and Padachi (2016) find that prevailing economic conditions do not influence the relationship between WCM and profitability. To elaborate, Afrifa and Padachi (2016) divide their sample into pre-recession and during the recession periods, and find that the support for the progressive WCM theory holds for both time periods. Gonçalves, Gaio, and Robles (2018) also find that the identified relationship between WCM on firm profitability remain unchanged in a crisis period and a noncrisis period. Thus, the uncertainty of the environment in crisis conditions does not seem to affect the WCM-profitability relationship.

Another aspect of the external environment which is ought to influence the working capital policy is a country's corporate governance. According to Chang (2018), corporate governance influences capital costs and a firm's cash management policy. Chang (2018) measures a country's corporate governance by the investor protection offered to shareholders. Firms that operate in a common law system tend to experience higher investor protection than firms who operate in a civil law system (Dowling et al., 2019; Engelen & Van Essen, 2010). Furthermore, stronger legal protection for investors is expected to be associated lower levels of working capital, because firms in countries with more efficient legal systems use less trade credit relative to bank financing (Chang, 2018; Mättö & Niskanen, 2020). Nonetheless, Chang (2018) finds that the WCM-profitability relationship remains unchanged after accounting for the corporate governance characteristics of a country. On the contrary, Mättö and Niskanen (2020) do find that countries with safer legal systems and better investor protection experience lower levels of working capital. On top of that, Mättö and Niskanen (2020) state that country-level legal instruments explain much of the cross-country differences in working capital, and that the trade credit practices can be expected to change if the financial system

changes. Thus, conflicting results are found on the impact of a country's corporate governance and WCM.

2.2.4.5 Concluding remarks empirical evidence on working capital management theories

Concluding remarks about the empirical evidence are provided below. These remarks aim to help understand the impact of firm size, firm incorporation and the country a firm operates in on the relationship between WCM and firm profitability.

2.2.4.5.1 SMEs vs. large firms

While most studies have focussed on both SMEs and large firms without making a distinction between both, some significant results were found specifically for SMEs. Firstly, Yazdanfar and Öhman (2014) find significant results for a negative relationship between WCM and firm profitability for SMEs. Also Chang (2018) finds support for the traditional WCM theory, and states that the relationship holds after splitting the sample in financially constraint firms (i.e. SMEs) and financially non-constraint firms (i.e. large firms). This would indicate that firm size has no influence on the results obtained. Although Chang (2018) finds empirical support for a negative relationship between WCM and firm profitability, the author also concludes that negative relationship reduces or reverses when firms exist at the lower CCC level, indicating that a possible quadratic relationship might exist. In addition, Afrifa and Padachi (2016) and Baños-Caballero et al. (2012) find statistically significant results that support the existence of a concave relationship between WCM and firm profitability for SMEs. Altaf and Ahmad (2019), who also find significant results for the progressive WCM theory, add that the optimal working capital level at which firms' profitability is maximized is higher for unconstraint firms (i.e. large firms). This means that large firms can finance a greater proportion of working capital using short-term debt. Although it seems as if the concave relationship between WCM and firm profitability more frequently holds for SMEs, still some support has been found for the traditional WCM theory. Therefore, not one WCM theory seems to be specifically related to firm size.

2.2.4.5.2 Private vs. public firms

Most researchers that investigate the relationship between WCM and firm profitability limit their sample to public firms. However, results found for public firms are conflicting. As such, support for listed firms is found for the traditional WCM theory (Eljelly, 2004; Chang, 2018;

Singhania et al., 2014; Wang, 2002), for the alternative WCM theory (Gill et al., 2010), and for the progressive WCM theory (Afrifa & Padachi, 2016; Aktas et al., 2015; Altaf & Ahmad, 2019; Singhania & Mehta, 2017). While the majority of researchers focus on a sample of listed firms, Yazdanfar and Öhman (2014) investigate the relationship between the working capital level and profitability for private firms. The authors find a statistically significant negative relationship between WCM and firm profitability. Besides, some researchers focus on both private and public firms, however, they do not make a separation in their results found. Therefore, it is unclear which WCM theory holds for private firms due to insufficient empirical evidence on this category of firms.

2.2.4.5.3 Country characteristics

When analysing the empirical results presented in Table 1, a trend can be observed among firms operating in Asia. To illustrate, a negative relationship between WCM and firm profitability is found for firms operating in Asian countries (including Saudi Arabia, India, Japan and Taiwan) in the earlier years (i.e. from 1985 onwards) (Eljelly, 2004; Singhania et al., 2014; Wang, 2002). Thereafter, in the years from 2004 to 2016, researchers find the existence of a concave relationship between WCM and firm profitability among Asian firms (Altaf & Ahmad, 2019; Singhania & Mehta, 2017). This change from a negative relationship towards a concave one can possibly be explained by the shift in the economic development of Asia, which has improved greatly from 2000 onwards (Tonby, Woetzel, Choi, Seong, & Wang, 2019). However, empirical evidence investigating the impact the economic condition of a country on the WCM-profitability relationship find insignificant results (Afrifa & Padachi, 2016; Baños-Caballero et al., 2010; Chang, 2018; Martínez-Sola et al., 2014). This indicates that the WCM policy remains unchanged in various macroeconomic conditions. Therefore, it is unclear if the shift in the relationship between the working capital level and firm profitability in Asia is caused by the shift in the economic development.

Additionally, some inconclusive findings have been found by other researchers analysing a sample of European, English and American firms. Firstly, the U.S. is characterized by having a high economic development, and by having a common law system with English origin. For American firms, however, both a positive (Gill et al., 2010) and a concave (Aktas et al., 2015) relationship between WCM and profitability is found. Moreover, Swedish firms operate in a high economically developed country which has a civil law system with Scandinavian origin (Mättö & Niskanen, 2020). Yazdanfar and Öhman (2014) find a negative relation between the working capital level and firm profitability for Swedish firms.

In addition, support for the progressive WCM theory is found for firms operating in the U.K. (Afrifa & Padachi, 2016). The U.K. has a high economic development and a common law system with English origin (Mättö & Niskanen, 2020). Finally, Baños-Caballero et al. (2012) also find support for the progressive WCM theory among Spanish firms, which operate in a country with high economic development and a civil law system with French origin (Mättö & Niskanen, 2020). While each country, the U.S., Sweden, the U.K. and Spain, has a high economic development, differences do exist among the legal system and its origin which might explain the difference in the relationships found between WCM and firm profitability. This is also supported by Mättö and Niskanen (2020) who find that country-level legal instruments explain much of the cross-country differences in working capital, and that the trade credit practices can be expected to change if the financial system changes. On the contrary, Chang (2018) does not find evidence that corporate governance of a country influence the WCM-profitability relationship. Also, the uncertainty of the environment in crisis conditions does not seem to explain any differences in the WCM-profitability relationship (Chang, 2018; Gonçalves et al., 2018). Thus, a country's corporate governance might explain the differences found in the WCM theories across the world, while uncertainty of the environment seems not to influence this relationship.

In short, not one generalizable WCM theory holds for all countries. Therefore, the country characteristics seem to impact the relationship between working capital and firm profitability. Although it seems as if the corporate governance of a country influences the results, it is unclear which concrete characteristics of the external environment affect the WCM-profitability relationship. Therefore, as also suggested by Altaf and Ahmed (2019), further research specifically focussing on one country should help understand why differences in the relationship between working capital and firm profitability emerge.

2.3 Other short-term financing theories

As previously mentioned, the characteristics of private SMEs make them more dependent on short-term finance, and on trade credit in particular. Besides the WCM theories, various other short-term financing theories help explain why WCM is of relevance for SMEs. These theories are the finance gap theory, agency theory, and the pecking order theory. The short-term financing theories mostly stem from market imperfections, such as taxes, transactions costs and asymmetric information. A perfect capital market is one where a firm's financing choice does not affect its capital cost, value, or performance (Modigliani & Miller, 1958). In

reality, however, solely companies with good financial statements, a positive credit history and a good reputation can easily obtain money directly through capital markets (Rupeika-Apoga & Saksonova, 2018). The imperfect market is especially applicable for private SMEs as its market mechanism fails to adequately address information asymmetries present in the market, and the financing needs of small businesses (Stiglitz & Weiss, 1981). Those market imperfections make efficient management of working capital crucial for the growth and survival of private SMEs.

2.3.1 Finance gap theory

The finance gap theory points out that private SMEs are financially constraint, which make such firms dependent on short-term finance. The theory is related to the following subjects: information asymmetries, moral hazard problems, adverse selection, and credit constraints. Firstly, the private SME market is characterized by information asymmetries (Berger & Udell, 1998; Van der Bauwhede et al., 2015). Information asymmetries refer to inequalities in access to information, whereby the firm has information that creditors do not have (Myers & Majluf, 1984; Stiglitz & Weiss, 1981). The firm's main advantage is that the entrepreneur knows what the information means for the well-being and performance of the firm (Myers & Majluf, 1984). This information asymmetry results in difficulties for creditors to assess firm value (Dowling et al., 2019), and in uncertainties about the future behaviour of borrowers in terms of repaying the loan (Krasniqi, 2010). In other words, creditors experience difficulties in distinguishing between 'good' and 'bad' investment projects (Myers & Majluf, 1984). A simple solution might be to transmit the necessary information from one party to another, however, this is not easily feasible. As such, Myers and Majluf (1984) explain that the firm has to provide verifiable and detailed information to prove what the firm is saying is true. However, the costs of supplying, absorbing and verifying this information is substantial, and making information public comes with the risk of sharing private information with the firm's competitors. Also, small firms may have difficulty building reputations to signal high quality to overcome informational opacity (Berger & Udell, 1998). To summarize, private SMEs have more information about their firm compared to creditors, also referred to as information asymmetries. Those asymmetries result in difficulties for creditors to distinguish between 'good' and 'bad' SMEs in terms of their ability to repay a loan.

Subsequently, the risk associated with the presence of asymmetric information can translate into adverse selection and moral hazard problems. Adverse selection is associated

with financial institutions, such as banks, assessing the creditworthiness of firms. Krasniqi (2010) explains that banks require collateral to secure a loan. Since larger firms are more likely to provide collateral and to meet the bank's requirements, they are more likely to have access to debt finance. Moreover, small firms typically do not meet the level of production necessary to have considerable tangible assets on their balance sheet that can be pledged as collateral, such as accounts receivable, equipment and inventory (Berger & Udell, 1998). This results in adverse selection, where banks only select large firms, and reject small firm credit applications (Krasniqi, 2010). In addition, Krasniqi (2010) found evidence reflecting a self-selection of firms towards good performers, where well-performing firms are the ones who seek access to external finance. Stiglitz and Weiss (1981) elaborate on this 'self-selection' from another viewpoint, and argue that the interest rate a bank charges may itself affect the riskiness of the pool of loans by classifying potential borrowers. The interest rate that a bank charges depends on the probability of repayment. Therefore, the interest rate a firm is willing to pay may act as a screening device, where riskier firms who perceive their probability of repayment to be low, are, on average, willing to pay higher interest rates. As the interest rate increases, so does the riskiness of the pool of loans. Thus, increasing interest rates or increasing collateral requirements could increase the riskiness of the bank's loan portfolio by discouraging safer investors (Stiglitz & Weiss, 1981). In short, adverse selection comprises that financial institutions mainly select larger firms who can provide more collateral, or attract riskier firms while discouraging safer investors by increasing the interest rate. Finally, moral hazard problems relate to misbehaviour of borrowing firms. Moral hazard problems arise when a borrowing firm acts riskier and has little incentive to be diligent, because the borrowing firm is aware that entrepreneurial effort is unsupervised and loan repayment is only possible if a project succeeds. Since poor borrowers have little to lose if a project fails, their behaviour increases the likelihood of project failure and default (Demirgüc-Kunt & Levine, 2009; Krasniqi, 2010). Thus, moral hazard problems relate to misbehaviour of the borrowing firms, because the firm knows that the finance provider will bear the risk if the project fails and defaults.

In order to overcome the information asymmetries and reduce moral hazard problems, banks tighten the requirements of credit supply. Krasniqi (2010) explains that banks are encouraged to increase the interest rate and collateral requirements to safeguard themselves from opportunistic behaviour of untruthful borrowers. Thus, creditors reduce the amount of credit granted and/or increase its cost (Serrasqueiro & Nunes, 2008), which drives away bank financing for SMEs (Allen et al., 2019). In short, the credit constraints include credit rationing

(i.e. denied financing) and costs being too high (Casey & O'Toole, 2014). Finally, such credit constraints result in a 'finance gap' for SMEs, which is driven by market failures, and results in SMEs looking beyond the scope of bank financing to finance their operations (Allen et al., 2019; Krasniqi, 2010). Thus, the finance gap theory explains that SMEs face financial constraints that stem from information asymmetries in the private SME market which limit their access to bank financing. Baños-Caballero et al. (2010) elaborate on the finance gap theory, and explain that most of an SME's assets are in the form of current assets, while current liabilities are one of their main sources of external finance because of the financial constraints they face. Since WCM can be used as an alternative way to finance operations, or it can be used to increase firm profitability and help overcome financial constraints, the finance gap theory highlights the necessity of WCM for private SMEs.

2.3.2 Agency theory

The basics of the agency theory are explained by Jensen and Meckling (1976), who define an agency relationship as a contract under which one party (the principal) delegates some decision making authorities to another party (the agent). Since both parties have incentives to maximize their results, the agent will most likely not always act in the best interests of the principal (Jensen & Meckling, 1976). Put differently, the agency theory includes the basic agency structure of a principal and an agent who are work cooperatively, but have conflicting goals and conflicting attitudes towards risk (Eisenhardt, 1989). Mostly, the principal refers to the firm-owner (i.e. the shareholder), and the agent refers to the manager. However, the agency conflict can also arise between different parties, such as a conflict of interest between the owner-manager and creditors, or between the owner-manager and customers (Chittenden et al., 1996). Thus, the agency theory explains that the interests between the principal and the agent conflict due to differing goals and attitudes towards risk.

The agency theory provides valuable insights into small firm finance (Chitterden et al., 1996). As such, agency conflicts between the creditors (i.e. the principle) and the owner-manager (i.e. the agent) result in agency costs which influence the preferred financial structure of firms. First of all, the agency conflicts arise, because small firm owner-managers tend to diminish wealth from creditors by investing in risky projects (Chittenden et al., 1996). Associated with these agency problems between small firms and external providers of capital are information asymmetries, moral hazard problems and adverse selection (Chittenden et al., 1996). These agency problems typically cannot be solved at zero cost. Therefore, 'agency

costs' occur in order to minimize the agency problems, and consist of the monitoring expenditures by the principal and the bonding expenditures by the agent (Chittenden et al., 1996; Jensen & Meckling, 1976; Myers, 2001). Moreover, Chittenden et al. (1996) explain that the monitoring costs of the principal are particularly high for small firms because they are not required to disclose much, if any, information. As a result, managers of small firms make financial policy trade-offs to control agency costs in an efficient manner (Chittenden et al., 1996). For example, small firms may minimize leverage as the agency costs of increased outside debt may transcend the agency costs of outside equity due to an increase in the expected costs of financial distress, bankruptcy, or liquidation (Berger & Bonaccorsi di Patti, 2006; Hamilton & Fox, 1998). Thus, further increases in leverage result in higher total agency costs. In short, the agency costs related to external finance withhold private SMEs from fully depending on financing sources that include a formal financial intermediary. As a result, private SMEs find alternative ways to finance their operations, where efficient WCM could be a solution.

Agency conflicts between owner-managers of small firms and customers also help explain the importance of WCM. Bellouma (2014) explains that the agency conflicts between owner-managers and customers arise due to difficulty to assess the creditworthiness of the seller by the buyer, or in other words, due to information asymmetry. Those ex-ante asymmetric information problems imply that buyers do not correctly know the quality of the acquired product or service, and the trustworthiness of the firm (Bellouma, 2014; Smith, 1987). This issue is less likely to arise among large firms considering they have typically established a reputation of their product quality. Small firms on the other hand are typically not as well-known, are therefore required to allow customers to assess their creditworthiness (Bellouma, 2014). In order to eliminate this informational problem, the firm may communicate information about the characteristics and quality of the products sold before payment, and gain customers' trust by granting trade credit (Bellouma, 2014). In this way, buyers are able to assess the quality of products and services prior payment, and thus not restrained to buy a product or service. Therefore, granting trade created reduces information asymmetry between buyer and seller, and results in increased sales (Baños-Caballero et al., 2012; Smith, 1987). In short, granting trade credit allows customers to reduce asymmetric information resulting from the difficulty to assess the quality of the product or service sold and the creditworthiness of the firm.

2.3.3 Pecking order theory

Short-term finance also relates to the pecking order theory. The pecking order theory is initiated by Donaldson (1961), and elaborated on by Myers (1984) and Myers and Majluf (1984). It entails that firms tend to rely on internal sources of funds. If external financing is required, firms prefer debt over equity. The reason why firms prefer internal financing over external financing is because of the relative costs of the various sources of finance. Myers (1984) explains that the pecking order occurs if the costs and benefits of dividends and debt are exceeded by the costs of issuing new securities. Other costs that arise due to the pecking order behaviour include information asymmetry costs, where management possess information about the value of the firm's risky securities and its prospects that creditors do not have (Myers, 1984). Internal financing is the most cost-friendly source of financing, and the preferred one, because this does not require to solve any informational issues with external parties (Brealey et al., 2020). Following up on this, Brealey et al. (2020) point out that debt financing requires the firm to share little information with creditors. Information required by debt providers involve information that shows a firm is able to fulfil its liabilities. Finally, equity finance requires the firm to share much information. The providers of equity demand information that indicates a project is profitable enough, and thus requires the firm to share as much information as possible, including information about plans, prospects, technology, product design and marketing ideas. Besides the fact that sharing information is costly, it is also time consuming and may result in sharing confidential information with competitors (Brealey et al., 2020). Because of these costs, and to avoid informational asymmetry problems, firms prefer to finance new investments first with retained earnings, then with the safest security of debt, continued with hybrid securities, and finally, with equity, where internal equity is preferred over external equity (Myers, 1984; Myers & Majluf, 1984). Furthermore, Chittenden et al. (1996) explain that the pecking order theory is particularly relevant to small firms, because they suffer from higher information asymmetry problems, and thus suffer from higher external financing costs compared to large firms. This is also referred to as the small firm effect (Chittenden et al., 1996). In conclusion, the pecking order theory clarifies that private SMEs tend to follow a hierarchy in raising capital, preferring internal funds over external funds to avoid the high costs associated with debt and equity finance. Ultimately, WCM is related to the pecking order theory, as the management of working capital is one of the determinants of the amount of internal cash available.

2.4 Hypothesis development

Both the traditional and the alternative WCM theories have advantages and disadvantages for private SMEs. The advantage of the traditional WCM theory, which proposes a negative relationship between WCM and profitability, is that lower levels of working capital increase the cash flow available to the firm. More cash flow is available, because money is not tied up in inventories or accounts receivable. Moreover, the additional cash flow can be used to finance the day-to-day operations and for investments, and means that less external finance is needed (Afrifa & Padachi, 2016; Wetzel & Hofmann, 2019). This advantage of the traditional WCM theory is supported by the finance gap theory, which points out the difficulty for private SMEs to attract external financing due to the constraints they face (Myers & Majluf, 1984; Stiglitz & Weiss, 1981), and the pecking order theory by which firms prefer to use internal financing above external financing (Myers, 1984; Myers & Majluf, 1984). Besides, considering less external financing is associated with less agency costs that arise from conflicts of interest between creditors and owner-managers, the traditional WCM theory is also supported by the agency theory (Chittenden et al., 1996). Thus, the traditional WCM theory is supported by the finance gap theory, the pecking order theory, and the agency theory as it increases internal finance and diminishes the need for external finance.

On the other hand, the traditional WCM theory does not take into account the downsides of having a low level of working capital, such as bearing the risk of distortions in the production process and loss of sales (Baños-Caballero et al., 2012). Consequently, the alternative WCM theory suggests that a higher level or working capital positively influences firm profitability, as a larger inventory limits the risks of price fluctuations, out-of-stock situations and interruptions in the production process (Wetzel & Hofmann, 2019). Another advantage of a higher working capital level is that granting trade credit strengthens a firm's long-term relationships with customers and suppliers, and allows buyers to assess products and services quality prior to payment which reduces asymmetric information and stimulates sales (Baños-Caballero et al., 2012; Smith, 1987). This advantage of the alternative WCM theory is supported by the agency theory. The agency theory, which is based upon conflicts of interest between two parties (Chittenden et al., 1996; Jensen & Meckling, 1976), points out the issue of information asymmetries between a firm and its customers, where customers cannot verify the quality of a product or service before payment (Bellouma, 2014). Thus, a larger working capital level (by granting trade credit) ensures the creditworthiness of a firm can be assessed, and thus limits the agency conflict between both parties. This advantage is

particularly relevant for private SMEs whose reputation is typically not as well established as large firms. In short, the alternative WCM theory is supported by the agency theory.

Considering the divergence in theoretical and empirical support (see Table 1) for both the traditional and the alternative WCM theories, this study predicts the existence of a non-linear relationship between the investment in working capital and firm profitability for Dutch private SMEs. The progressive WCM theory strives to find the optimal level of working capital to maximize profitability, and therefore benefits from the advantages of both the traditional and the alternative WCM theories (Baños-Caballero et al., 2012; Wetzel & Hofmann, 2019). Moreover, a concave relationship between WCM and firm profitability is most likely to exist among private SMEs, because these firms are typically financially constraint (Casey & O'Toole, 2014; Demirgüç-Kunt et al., 2020), and have a lower reputation than larger firms (Bellouma, 2014). Being financially constraint results in SMEs desiring a lower WCM level, as this leads to a higher cash flow and less need for external financing. However, having a lower reputation results in small firms desiring a higher WCM level, as granting trade credit allows customers to assess the creditworthiness of such firms, and thereby having the opportunity to gain a good reputation. Thus, theoretical support is found for the traditional and the alternative WCM theories. Since it is of importance for small private firms to limit the need for external financing and to establish creditworthiness, a concave relationship is most likely to exists among such firms. Also, various researchers have found empirical support for the existence of a concave relationship between WCM and firm profitability for SMEs (e.g. Afrifa & Padachi, 2016; Baños-Caballero et al., 2012), and both SMEs and large firms (e.g. Aktas et al., 2015; Altaf & Ahmad, 2019; Singhania & Mehta, 2017). In short, this study estimates the optimal working capital level as the equilibrium between the costs and benefits of working capital levels (Afrifa & Padachi, 2016), and thus tests the progressive WCM theory. Therefore, the following hypothesis is tested:

Hypothesis 1 (H1). There is a concave relationship between WCM and firm profitability.

The existence of a concave relationship between WCM and firm profitability among Dutch private SMEs is tested in two phases. The first phase tests if an optimal working capital level exists, and the second phase tests if deviation from the optimal working capital level negatively affects firm profitability. Therefore the hypothesis is separated in two:

Phase 1: ***Hypothesis 1a (H1a).*** An optimal working capital level exists that maximizes firm profitability.

Phase 2: ***Hypothesis 1b (H1b).*** Deviation from the optimal working capital level reduces firm profitability.

Firstly, an optimal working capital level at which firms' profitability is maximized (H1a) most likely exists, because this point is the correct trade-off between the costs and benefits of low and high levels of the CCC. Besides, deviation from the optimal working capital level is expected to have a negative impact on firm profitability, because a high working capital level comes with higher costs of external financing, while a low working capital level is associated with difficulty for customers to assess a firm's creditworthiness, the risk of price fluctuations, out-of-stock situations and interruptions in the production process which have a negative effect on firm profitability. Evidence must be found for both hypothesis 1a and 1b in order to accept hypothesis 1 (i.e. to accept the existence of a concave relationship between WCM and firm profitability among Dutch private SMEs).

2.4.1 Theoretical framework

The corresponding theoretical framework is depicted in Figure 2 which shows the expected effect of a Dutch private SME's working capital level (measured by the CCC) on firm profitability. The slope's highest point (i.e. the optimal CCC level) is marked with the middle vertical red line. This CCC level is expected to result in the highest firm profitability (H1a). Moreover, deviation from the optimal point (as displayed with the red arrows) is expected to negatively influence firm profitability. As such, the slope moves downwards at deviations from the optimal point towards both high and low CCC levels (H1b).

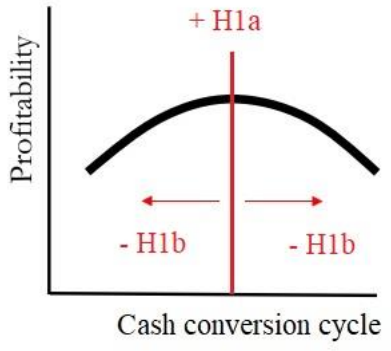

Figure 2. Theoretical framework depicting the expected relationship between the CCC and firm profitability

3. Methodology

To test the existence of a concave relationship between WCM and firm profitability of Dutch unlisted SMEs, a univariate, bivariate and multivariate analysis is conducted.

3.1 Univariate and bivariate analysis

A univariate analysis does not deal with (causal) relationships, but describes individual variables. Thus, the central tendency (mean and median) and the distribution (standard deviation, minimum, maximum) of each variable incorporated in the study is analysed (Field, 2005). The univariate analysis is also utilized to identify outliers, and remove them if necessary. There are two ways to deal with outliers, including winsorisation or data removal (Afrifa & Padachi, 2016). This study makes use of winsorisation.

A bivariate analysis, the Pearson correlation analysis, is used to identify the correlation between the independent variables to account for possible multicollinearity problems (Eljelly, 2004). Multicollinearity occurs when two or more independent variables are moderately or highly correlated in a regression model, and can be identified by assessing the correlation coefficient and by calculating the variance inflation factor (VIF). Multicollinearity becomes a problem when the correlation coefficient exceeds the threshold of 0.80 (Field, 2005). Moreover, the threshold for the VIF value of the independent variables is that it should be less than 10, and preferably below 5 (Field, 2005).

3.2 Multivariate analysis

The objective of a regression analysis is to predict changes in the dependent variable in response to changes in the independent variable(s), and thus to explore dependence relationships (Field, 2005). A regression analysis is a frequently applied method to model firm profitability (Eljelly, 2004). In order to analyse the relationship between WCM and firm profitability of Dutch unlisted SMEs, while controlling for control variables, this study makes use of a multiple regression analysis. Upon deciding which multiple regression method to use in this study, methods used in equivalent prior studies are analysed.

3.2.1 Prior studies

Various multivariate research methods are used in prior studies that examine the relationship between WCM and firm profitability. None of those prior research methods include a probit

or a logistic regression, because these are non-linear regressions used when the dependent variable is dichotomous (Field, 2005). Since the dependent variable firm profitability is a metric variable, probit and logistic regressions are not suitable methods to use. The three most frequently applied methods to analyse the relationship between WCM and firm profitability are: a panel regression, an OLS-regression, and a generalized method of moments (GMM) model.

3.2.1.1 Prior studies performing a panel regression

A panel dataset, also called a longitudinal one, is created by following a sample of individuals over time. Thus, the dataset consists of multiple observations on each individual in the sample (Hsiao, 2014). A panel regression is a regression analysis which uses panel data, and is suitable when the measurement level of the dependent variable is metric (i.e. interval or ratio). Moreover, a panel dataset possesses numerous advantages over cross-sectional or time series datasets. First of all, a panel dataset results in more accurate inference of model parameters than cross-sectional or time series data sets, because the large number of data points increases the degrees of freedom, and reduces the collinearity among the independent variables. Therefore, the efficiency of the estimates are improved (Afrifa & Padachi, 2016; Altaf & Ahmad, 2019; Hsiao, 2014; Singhania & Mehta, 2017). Secondly, panel data allows a researcher to construct more realistic behavioural hypotheses which cannot be addresses by using cross-sectional or time series data (Hsiao, 2014). Another advantage of using panel data is its ability to control for the impact of omitted variables, including individual and/ or time heterogeneity, which correlate with explanatory variables (Afrifa & Padachi, 2016; Altaf & Ahmad, 2019; Hsiao, 2014). A final advantage of a panel dataset is that it creates more accurate predictions for individual outcomes, meaning that a more precise description of an individual's behaviour is obtained by supplementing observations of the individual in question with data on other individuals (Hsiao, 2014).

A distinction can be made between a fixed effect (FE) panel regression and a random effect (RE) panel regression. These variable intercept regressions are used to account for the unobserved heterogeneity across individuals and/or through time. The individual specific effects include omitted variables which are time invariant, but vary across cross-sectional units. Moreover, the time specific effects are omitted variables that are individual-invariant, but differ through time. Finally, both individual and time specific effects account for unobserved heterogeneity among variables that vary across cross-sectional units at a given point in time and also differ through time (Hsiao, 2014). Furthermore, a fixed effect panel

regression is characterized by having individual or time specific effects which are treated as fixed constants, and which are dependent on the explanatory variables. Thus, a fixed effects model considers the individuality of each firm by allowing the intercept to vary across companies, while the coefficients of the slope are hold constant across companies (Hsiao, 2014). The standard model of a fixed effect panel regression is the following $Y_{i,t} = (\alpha + \mu_i) + \beta' X_{i,t} + \varepsilon_{i,t}$, where i represents the unit of observations, t represents the period of time, Y is the dependent variable, $(\alpha + \mu_i)$, or α_i, represents the fixed constant (the unobservable individual specific effects) which differs between firms, β represents the slope of the regressor, X represents the independent variables, and ε represents the error term which includes the remaining disturbance (Hsiao, 2014). A random effect panel regression, on the other hand, assumes a single common intercept term and assumes that the intercepts for individual firms vary from this common intercept in a random manner. The omitted variables (the individual or time specific effects) are independent of the explanatory variables, and are independently identically distributed (Deloof, 2003; Hsiao, 2014; Tauringana & Afrifa, 2013). The standard model of a random effect panel regression is the following $Y_{i,t} = \alpha + \beta' X_{i,t} + (\mu_i + \varepsilon_{i,t})$, where i represents the unit of observations, t represents the period of time, Y is the dependent variable, α represents the single common constant which is a random variable and independent on the explanatory variables, β represents the slope of the regressor, X represents the independent variables, μ_i represents the unobservable heterogeneity which is specific for each firm, which, together with ε, represent the error term (Hsiao, 2014).

The relationship between WCM and firm profitability is most frequently tested using a panel regression. In order to test the progressive WCM theory, Afrifa and Padachi (2016) perform a random effects panel regression model. More specifically, the authors test if an optimal working capital level at which SMEs' profitability is maximised exists, and if deviations from the optimal working capital level reduce firm profitability using β_0 as their intercept term, μ_i to account for unobservable heterogeneity which is specific for each firm, and $\varepsilon_{i,t}$ as the error term. Similarly, Baños-Caballero et al. (2012) use a dynamic panel regression model to test the progressive WCM theory. The authors investigate a possible quadratic relation between WCM and firm profitability by using β_0 as the intercept term, λ_t as a time dummy variable, η_i for unobserved individual specific effects, and $\varepsilon_{i,t}$ is included for the random disturbance. Furthermore, Aktas et al. (2015) test the existence of a concave relationship between WCM and firm profitability by using a fixed effects panel regression. Aktas et al. (2015) use α_t and η_i as the intercept which represent the year and firm fixed

effects, respectively. Moreover, $\varepsilon_{i,t}$ is included as the error term. In order to test the traditional WCM theory, Deloof (2003) performs a fixed effects panel regression where the intercept captures the effects of variables that are particular to each firm and that are constant over time. Similarity, Singhania et al. (2014) test the existence of a negative relationship between WCM and firm profitability by performing a fixed effects panel regression using β_0 as their intercept term and $\varepsilon_{i,t}$ as the error term. Finally, to test the alternative WCM theory, Tauringana and Afrifa (2013) perform a random effect panel regression using β_0 as their intercept term and $\varepsilon_{i,t}$ as the error term.

3.2.1.2 Prior studies performing an OLS-regression

An ordinary least squares (OLS)-regression is a linear regression that models a relationship between variables by calculating the best-fitting line for the observed data, and so minimizes the sum of squares of the vertical deviations from each data point to the line. An OLS-regression thus results in a linear line with the least squared residuals (Field, 2005). Moreover, an OLS-regression is used when the measurement level of the dependent variable is metric, and is the most common and simplest type of linear regressions. The intercept (β_0 or α) denotes the starting point of the dependent variable when all independent variables have a value of 0. Furthermore, β_k is the regression coefficient, and reflects the change in the dependent variable when the independent variable changes with 1 unit. Finally, the error term (ε) reflects the difference between the predicted and the actual value of the dependent variable (Field, 2005).

A pooled OLS-regression is considered the simplest model to use when data is longitudinal. Unlike panel regression, pooled OLS-regression treats each observation as separate, meaning observations over time are not linked to the same unit of observation. Moreover, within a pooled OLS-regression, both the slope and intercept coefficients are the same, and therefore less reliable than a panel regression according to Hsiao (2014). Ultimately, the standard model of a pooled OLS-regression is the following $Y_{i,t} = \alpha + \beta' X_{i,t} + \varepsilon_{i,t}$, where i represents the unit of observations, t represents the period of time, Y is the dependent variable, α represents the constant (or intercept term) which the same for all firms, β represents the slope of the regressor, X represents the independent variables, and ε represents the error term (Hsiao, 2014).

Multiple researchers test the relationship between WCM and firm profitability by performing an OLS-regression. First of all, Chang (2018) performs a pooled OLS-regression to test the traditional WCM theory. The regression model of Chang (2018) denotes the

intercept term as β_0, and includes an error term in the regression model ($\varepsilon_{i,t}$). Secondly, Deloof (2003) performs an OLS-regression alongside a panel regression to verify the robustness of the results. Thus, Deloof (2003) performs an OLS-regression to test if a negative relationship exists between a firm's net operating income and CCC. Third, Sharma and Kumar (2011) perform a pooled OLS-regression to identify whether a positive relationship exists between WCM and firm profitability by using β_0 as the intercept term, and $\varepsilon_{i,t}$ as the error term. Finally, Eljelly (2004) performs a pooled OLS-regression to empirically test the existence of a negative relationship between the net operating income and the cash gap (or CCC) of large firms. The intercept is denoted as β_0, and the error term as ε.

3.2.1.3 Prior studies performing other regression analyses

Although a panel regression and an OLS-regression are most frequently used to test the relationship between the CCC and firm profitability, various other multivariate regression analyses are used, such as: the GMM-model (Altaf & Ahmad, 2019; Chang, 2018; Singhania & Mehta, 2017), a seemingly unrelated regression (SUR) model (Yazdanfar & Öhman (2014), a weighted least squares (WLS) model, and a general least squares (GLS) model (Gill et al., 2010). Out of all remaining multivariate regression models, the GMM-model is most frequently used.

The GMM-model is a commonly applied model in economics and finance. A GMM-model can model a linear or a non-linear relationship, and does not require full knowledge of the distribution of the data. Instead, only specified moments derived from an underlying model are required for GMM estimation (Wooldridge, 2001). The notion of a moment is essential for describing features of a population. Since information on an entire population can rarely be obtained, a sample from the population is used to estimate population moments (Wooldridge, 2001). Moreover, Hsiao (2014) explains that the unknown parameter vector must be solved to obtain the standard method of moments estimator. The values of the parameters are determined by the parameters that give the best as possible fit based on the sample and the distribution of variables. Put differently, the unknown parameters are estimated by setting the sample averages of the moment functions as close to zero as possible (Hsiao, 2014). Furthermore, the main advantage of using a GMM-model is its ability to avoid the problem of endogeneity (Altaf & Ahmad, 2019; Chang, 2018). Besides, a GMM-model helps to improve the efficiency of the estimator, and controls for time-invariant characteristics, multicollinearity, possible omission of independent variables, and unobserved heteroskedasticity (Wooldridge, 2001). Finally, a GMM-model is preferred over an OLS-

regression or a panel regression when the assumptions of multivariate regression are not met (Wooldridge, 2001).

Few researchers test the relationship between WCM and firm profitability using a GMM-model. To begin with, Altaf and Ahmad (2019) test the progressive WCM theory by using a two-step GMM estimator. This estimator is used to estimate dynamic models of panel data (i.e. is used when the dependent variable is lagged), and is considered to be more efficient, and more robust to heteroscedasticity and autocorrelation than a one-step model. As previously mentioned, the unknown parameters of a GMM model are estimated by setting the sample averages of the moment functions as close to zero as possible. Within a two-step GMM model, an initial estimate is used to estimate the optimal linear combination of the moment functions. This initial estimate is computed by the use of an optimal weighting matrix (Imbens, 1997). The two-step GMM model used by Altaf and Ahmad (2019) tests whether a concave relationship exists between a firm's ROA and working capital financing, and includes β_0 as the intercept term, γ_t as a time dummy variable, δ_i as the firm's unobservable individual effects, and $\varepsilon_{i,t}$ as the random disturbance. Singhania and Mehta (2017) also test the existence of an optimal WCM level by using a two-step GMM-model. The empirical model tests the existence of a concave relationship between a firm's ROA and CCC, and includes β_0 as the intercept term, $\gamma_{i,t}$ as a time dummy variable, $\eta_{i,t}$ as the firm's unobservable individual effects, and $\varepsilon_{i,t}$ as the error term.

3.2.2 Method applied in this study

To analyse the relationship between firm profitability and the CCC, this study makes use of two multivariate regression analyses: a panel regression and a pooled OLS-regression. The panel regression model (with fixed or random effects) is the main model, and the pooled OLS-regression model is added to verify the robustness of the results.

3.2.2.1 Panel regression

Panel regression is the main model in this study. Firstly, because the dependent variable of this study, firm profitability, is a metric variable, and because this study makes use of panel data. Moreover, a panel regression is most frequently used method by prior studies that test the (concave) relationship between WCM and firm profitability. This ensures easier comparison of results found in this study with results found by prior studies. Another reason for performing a panel regression analysis as the main model in this study is its advantages.

As previously mentioned, a panel regression has the advantage of being more efficient, migrating multicollinearity, controlling for heterogeneity, being informative, giving greater variability, and giving consistent estimators in the presence of omitted variables. Ultimately, the Hausman test will be performed to decide whether to use the fixed effects (FE) or random effect (RE) model (Afrifa & Padachi, 2016). Thus, the main model of this study is a panel regression, either using the fixed effects or the random effects depending on the results of the Hausman test.

3.2.2.2 Pooled OLS-regression

In line with Deloof (2003), a pooled OLS-regression is the second model of this study, and is added to ensure the robustness of the results. Since a pooled OLS-regression is less reliable than a panel regression, it is not the main model used in this study. However, in order to verify the robustness of the results, a pooled OLS-regression is suitable considering it is the most common and simplest type of linear regressions. This ensures the results are effortlessly interpretable. In short, a pooled OLS-regression is performed alongside a panel regression to identify the relationship between WCM and firm profitability.

3.2.3 Reversed causality

Since regression models identify causal relationships, they are subject to endogeneity problems. Endogeneity, also referred to as reversed causality, is a common issue in the study of corporate finance. It entails that dependence relationships can be determined in both directions. As such, this study aims to identify the effect of WCM on firm profitability. However, it could also be the case that a firm's profitability influences its WCM (Aktas et al., 2015; Chang, 2018). To rule out such endogeneity, similar to Aktas et al. (2015), this study makes use of leading variables. Thus, the dependent variable (i.e. firm profitability) is a leading variable measured in year t + 1, while the independent variables and control variables are measured in year t.

3.3 Research models

A panel regression and a pooled OLS-regression are performed to test the hypothesis. As stated in the hypothesis development, the existence of a concave relationship between WCM and firm profitability is tested in two phases. Each phase consists of a, or several, research model(s). These research models are elaborated on in this section. Besides, considering the

Hausman test is performed in a later stadium of this research, both the fixed effects (FE) and random effect (RE) panel regression models are provided. Ultimately, depending on the results of the Hausman test, only one of these panel regression models is used in this research.

3.3.1 Research model for hypothesis 1a

The research models shown in equations 2.1, 2.2, and 2.3 test whether an optimal working capital level exists that maximizes firms' profitability (i.e. tests hypothesis 1a), and thus determines the optimal breakpoint of the profitability-working capital relationship. In order to confirm hypothesis 1a, β_1 and β_2 must be significantly positive and negative, respectively (Afrifa & Padachi, 2016). This means that WCM increases the profitability of Dutch private SMEs up to the breakpoint, after which increases in the working capital reduces profitability.

Fixed effect panel regression model

$$PROF_{i,t+1} = \alpha_i + \beta_1 CCC_{i,t} + \beta_2 CCC^2_{i,t} + \beta_3 AGE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 TAN_{i,t} + \beta_7 OWN1_{i,t} + \beta_8 OWN2_{i,t} + \beta_9 IND_i + \beta_{10} YEAR_i + \varepsilon_{i,t+1} \quad (2.1)$$

Where i represents each of the companies, t represents the period of time, α_i represents the constant (the unobservable individual specific effects) which differs between firms, $\beta_{1\text{-}8}$ represent the slopes of the regressors, and ε represents the error term which includes the remaining disturbance. It is assumed that the error term is not autocorrelated. The definition of the dependent variable, independent variables and control variables are provided in Chapter 3.4 and in Table 2. Moreover, within the fixed effect panel regression model, the constant (α_i) is correlated with the explanatory variables, and represents unobservable firm specific effects.

Random effect panel regression model

$$PROF_{i,t+1} = \alpha + \beta_1 CCC_{i,t} + \beta_2 CCC^2_{i,t} + \beta_3 AGE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 TAN_{i,t} + \beta_7 OWN1_{i,t} + \beta_8 OWN2_{i,t} + \beta_9 IND_i + \beta_{10} YEAR_i + \mu_i + \varepsilon_{i,t+1} \quad (2.2)$$

Where i represents each of the companies, t represents the period of time, α represents the constant, $\beta_{1\text{-}8}$ represent the slopes of the regressors, and $\mu_i + \varepsilon_{i,t}$ represent the error term where μ_i is represents the unobservable heterogeneity which is specific for each firm, and ε represents the remaining disturbance. It is assumed that the error term is not autocorrelated. The definition of the dependent and independent variables are provided in Chapter 3.4 and in

Table 2. Moreover, within the random effect panel regression model, the constant (α) is a random variable which is not fixed for a firm and uncorrelated with all explanatory variables.

Pooled OLS-regression model

$$PROF_{i,t+1} = \alpha + \beta_1 CCC_{i,t} + \beta_2 CCC^2_{i,t} + \beta_3 AGE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 TAN_{i,t} + \beta_7 OWN1_{i,t} + \beta_8 OWN2_{i,t} + \beta_9 IND_i + \beta_{10} YEAR_i + \varepsilon_{i,t+1} \quad (2.3)$$

Where i represents each of the companies, t represents the period of time, α represents the constant, $\beta_{1\text{-}8}$ are the slopes of the regressors, and $\varepsilon_{i,t}$ represents the error term. The constant of a pooled OLS-regression is the same for all firms and is time invariant.

3.3.2 Research models for hypothesis 1b

A two-stage methodology is used to verify hypothesis 1b (i.e. whether deviation from the optimal working capital point significantly reduces firm profitability). In the first stage deviations from optimal CCC are obtained, and in the second stage firm profitability is regressed against those deviations to identify the effect of deviation from the optimal working capital level (Afrifa & Padachi, 2016; Baños-Caballero et al., 2012; Martinez-Sola et al., 2014).

3.3.2.1 Stage one

Equations 3.1, 3.2, and 3.3 represent the first stage of testing hypothesis 1b, and represent the benchmark regression for the determinants of the length of a firm's CCC. This equation is identified by multiple researchers to be the benchmark specification that measures the antecedents of CCC (Afrifa & Padachi, 2016; Baños-Caballero et al., 2012).

Fixed effect panel regression model

$$CCC_{i,t} = \alpha_i + \beta_1 AGE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 TAN_{i,t} + \beta_5 ROA_{i,t} + \beta_6 IND_i + \beta_7 YEAR_i + \varepsilon_{i,t} \quad (3.1)$$

Random effect panel regression model

$$CCC_{i,t} = \alpha + \beta_1 AGE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 TAN_{i,t} + \beta_5 ROA_{i,t} + \beta_6 IND_i + \beta_7 YEAR_i + \mu_i + \varepsilon_{i,t} \quad (3.2)$$

Pooled OLS-regression model

$$CCC_{i,t} = \alpha + \beta_1 AGE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 TAN_{i,t} + \beta_5 ROA_{i,t} + \beta_6 IND_i + \beta_7 YEAR_i + \varepsilon_{i,t} \quad (3.3)$$

Where $CCC_{i,t}$ represents the optimal CCC of firm i at time t, and ROA represents the return on assets of firm i, measured at time t.

3.3.2.2 Stage two

In the second stage of testing hypothesis 1b, the residuals of equations 3.1, 3.2, and 3.3 are used in equations 4.1, 4.2, and 4.3 to determine the effect of a deviation from the optimal working capital level. The residuals of the optimal CCC are used, because firms' current CCC might not always equal their optimum. Thus, the residuals are used as a proxy for the deviations from the optimal CCC (Baños-Caballero et al., 2012). Ultimately, the objective is for equation 4 to determine if positive and negative deviations from the optimal working capital level influence firms' profitability.

Fixed effect panel regression model

$$PROF_{t+1} = \alpha_i + \beta_1 (Positive\_DEV)_{i,t} + \beta_2 (Negative\_DEV)_{i,t} + \beta_3 OWN1_{i,t} + \beta_4 OWN2_{i,t} + \varepsilon_{i,t+1} \quad (4.1)$$

Random effect panel regression model

$$PROF_{t+1} = \alpha + \beta_1 (Positive\_DEV)_{i,t} + \beta_2 (Negative\_DEV)_{i,t} + \beta_3 OWN1_{i,t} + \beta_4 OWN2_{i,t} + \mu_i + \varepsilon_{i,t+1} \quad (4.2)$$

Pooled OLS-regression model

$$PROF_{t+1} = \alpha + \beta_1 (Positive\_DEV)_{i,t} + \beta_2 (Negative\_DEV)_{i,t} + \beta_3 OWN1_{i,t} + \beta_4 OWN2_{i,t} + \varepsilon_{i,t+1} \quad (4.3)$$

Different to Afrifa and Padachi (2016), who solely analyse the effect of the absolute and the positive deviation from the optimal CCC on firm profitability, this study analyses the effects of negative and positive deviations from the optimal CCC on profitability. DEVIATION itself represents the absolute value for the residuals from equation 3 (the residuals can be either positive or negative). Following up on this, the interaction terms Positive_DEV and Negative_DEV are created. The Positive_DEV is defined as above-optimal*DEVIATION.

The above-optimal is a dummy variable that takes 1 for positive residuals and 0 otherwise. Similarly, Negative_DEV is defined as below-optimal*DEVIATION. The below-optimal is a dummy variable that takes 1 for negative residuals and 0 otherwise. Finally, to confirm hypothesis 1b, both β_1 and β_2 should be significantly negative. This implies that profitability significantly reduces as firms move away from to optimal working capital point in both directions (Afrifa & Padachi, 2016; Martinez-Sola et al., 2014).

3.4 Variables

A description including the measurement of the dependent variable, independent variables and the control variables are elaborated on below. Besides, a summary of all variables incorporated in this research is provided in Table 2.

3.4.1 Dependent variable

The dependent variable, firm profitability, is measured by two different ratios in order to ensure the robustness of the results (Afrifa & Padachi, 2016). Considering the sample consists of unlisted firms, market based measures of firm profitability such as Tobin's Q cannot be used in this study. Therefore, the two measures of firm profitability used are accounting measures based on the book values of a firm. The two measures are return on assets (ROA) and return on equity (ROE), where ROA is the main dependent variable.

According to Afrifa and Padachi (2016), ROA has been used extensively to measure firm profitability in the extant literature. ROA is measured by dividing earnings before interest and taxes (EBIT) by the book value of total assets (Afrifa & Padachi, 2016; Aktas et al., 2015; Altaf & Ahmad, 2019; Chang, 2018; Dary & James, 2019; Sharma & Kumar, 2011; Singhania et al., 2014; Vahid et al., 2012; Wang, 2002; Wetzel & Hofmann, 2019; Yazdanfar & Öhman, 2014). Thus, the ROA measures how efficiently a firm uses its assets to generate earnings (Singhania & Mehta, 2017; Wetzel & Hofmann, 2019). The higher the ratio, the more profitable the firm is. ROA is the main profitability measure in this study, because it is most frequently used by prior studies, and thus makes comparison of the results easier. Also, Sharma and Kumar (2011) explain that ROA is a preferred measure for firm profitability, because it relates the profitability of the company to the asset base, which allows to identify how efficiently a firm is managing its assets to generate profits (Singhania & Mehta, 2017). In addition, the other performance measure ROE is added for robustness. ROE is calculated by

dividing profit by shareholders equity (Afrifa & Padachi, 2016; Wang, 2002). In short, ROA and ROE are incorporated in this study as proxies for firm profitability.

3.4.2 Independent variables

The independent variables are CCC and its square (CCC^2). As stated in Chapter 2.2.2, the CCC is the preferred measure of a firm's working capital level given the criticism of static measures such as the current ratio and the quick ratio (Baños-Caballero et al., 2012). More specifically, the CCC measures the difference in time of cash outflow for procurement of raw materials and cash inflow from the sale of goods produced (Singhania & Mehta, 2017). As shown in equation 1, the CCC is the sum of days sales outstanding (DSO), days inventories outstanding (DIO) and days payables outstanding (DPO).

A shorter CCC infers that a firm relies less days on external financing, and therefore is ought to have a positive effect on firm profitability according to the traditional WCM theory (Chang, 2018; Deloof, 2003; Singhania & Mehta, 2017). On the other hand, a longer CCC means that a firm relies more days on external financing, but also has the benefit of limiting the risks of price fluctuations, out-of-stock situations and interruptions in the production process (Wetzel & Hofmann, 2019). Besides, a longer CCC can strengthen the long-term relationships of a firm with customers and suppliers (Afrifa & Padachi, 2016; Baños-Caballero et al., 2012; Wetzel & Hofmann, 2019), and allows them to assess the quality of products and services prior to payment (Smith, 1987). Therefore, a longer CCC is expected to have a positive effect on firm profitability according to the alternative WCM theory.

Including both the CCC and its square allows to test the effect of costs and benefits of both high and low working capital levels, and therefore the existence of a concave (U-shaped) relationship between WCM and firm profitability (Afrifa & Padachi, 2016). Thus, to validate the existence of an optimal WCM level, firm's profitability is regressed against CCC and its square.

3.4.3 Control variables

Finally, control variables are included to control for unobserved factors which may influence private SME's profitability. The control variables are grouped into firm characteristics (firm age, firm size, leverage, tangibility), corporate governance characteristics (ownership concentration), industry, and time.

3.4.3.1 Firm age

Firm age is a firm characteristics which is measured by the number of years between incorporation and the calendar year end of each firm (Afrifa & Padachi, 2016; Aktas et al., 2015; Altaf & Ahmad, 2019; Yazdanfar & Öhman, 2014).

Firm age is expected to be positively related to firm profitability, because older firms are less financially constraint and have better access to external financing (Berger & Udell, 1998; Yazdanfar & Öhman, 2014). Moreover, older firms are expected to have higher profitability because of their easier access to resources due to established contacts with customers, and because of their experience (Afrifa & Padachi, 2016). Ultimately, Afrifa and Padachi (2016) find a positive significant effect of age on ROA.

3.4.3.2 Firm size

Two measurements of firm size are incorporated in this study for robustness. The first measure for firm size is total sales (in €) at the end of the financial year (Afrifa & Padachi, 2016; Altaf & Ahmad, 2019; Baños-Caballero et al., 2012; Deloof, 2003; Eljelly, 2004; Singhania et al., 2014; Singhania & Mehta, 2017; Yazdanfar & Öhman, 2014), and the second measure is total assets (in €) at the end of the financial year (Eljelly, 2004; Sharma & Kumar, 2011).

Firm size is expected to be positively related to firm profitability. Firstly, larger firms have higher survival rates, are less risky and their financial records are more transparent (Demirgüç-Kunt et al., 2020). Besides, Baker and Kilincarslan (2019) explain that larger firms are generally more mature and have a steady earnings pattern. Consequently, larger firms suffer less from information asymmetry and are less financially constraint compared to smaller firms, meaning they can make desired investments to ensure profitability and firm growth. Moreover, according to Eljelly (2004), larger firms are able to buy inventory in large quantities and receive quantity discounts, whereas smaller firms are usually not able to obtain as much inventory to qualify for these discounts. Finally, larger firms are more likely to get longer credit periods from their suppliers (Eljelly, 2004). Chang (2018) and Yazdanfar and Öhman (2014) find a positive significant effect from firm size on profitability.

3.4.3.3 Leverage

Leverage is measured by dividing total debt by total assets at the end of the financial year (Afrifa & Padachi, 2016; Aktas et al., 2015; Altaf & Ahmad, 2019; Baños-Caballero et al., 2012; Chang, 2018; Deloof, 2003; Sharma & Kumar, 2011; Singhania et al., 2014).

A negative relationship between leverage and firm profitability is expected. According to the trade-off theory, an optimal point of debt exists that just offsets the costs of financial distress and the savings of taxes (Brealey et al., 2020). Smaller firms typically experience lower target ratios and higher borrowing costs because of their information asymmetries and higher likelihood of being financially distressed (Baños-Caballero et al., 2012; Berger & Udell, 1998). Thus, a higher leverage ratio may harm firm profitability because of the increasing chances of financial distress and the increasing agency costs of debt (Afrifa & Padachi, 2016). A negative relationship between leverage and firm profitability is found by Aktas et al. (2015), Baños-Caballero et al. (2012), Chang (2018) and Singhania et al. (2014).

3.4.3.4 Tangibility

A firm's tangibility is measured by dividing the fixed assets by total assets at the end of the financial year (Afrifa & Padachi, 2016; Altaf & Ahmad, 2019; Baños-Caballero et al., 2010); Deloof, 2003). It measures what proportion of a firm's total assets is fixed. A higher tangibility ratio means that a firm has many tangible assets relative to its total assets.

Afrifa and Padachi (2016) expect a negative relationship between tangibility and firm profitability. Since products and services are becoming more knowledge intensive, the amount of intangible assets in the form of human capital and R&D are expected to maximise firm profitability (Afrifa & Padachi, 2016). However, Baños-Caballero et al. (2010) argue that fixed assets generate less asymmetric information than intangible assets. Therefore, firms with more fixed assets might experience lower financing costs which has a positive effect on firm performance. In short, the expected relationship between firm profitability and investments in fixed assets is unclear.

3.4.3.5 Ownership structure

The ownership structure of a firm may also influence firm profitability. Firm ownership is an internal (firm-oriented) corporate governance mechanism which can be analysed from two viewpoints: size and identity (Douma et al., 2006).

3.4.3.5.1 Ownership size

Ownership size refers to the magnitude of ownership, which diverges from being dispersed (i.e. having many shareholders) to being concentrated (i.e. having few shareholders) (Douma et al., 2006). In this study, ownership size is measured by the number of shareholders of a firm.

The expected relationship between ownership size and firm profitability is diverse. While concentrated owners have more power, a stronger motive, and a larger ability to monitor, they also have larger private benefits of control. Therefore, a downside of ownership concentration is that dominant shareholders may pursue their own interests at the expense of other shareholders. This is also referred to as tunnelling which ultimately has a negative effect on firm performance (Douma et al., 2006). Dispersed ownership, however, may result in free-riding. Free-riding occurs when many small passive investors all believe someone else will take control. Since the monitoring abilities of many small passive investors is not optimal, agency problems may arise between shareholders and managers, which has a negative effect on firm profitability (Douma et al., 2006). In short, both high and low ownership concentrations seem to have a negative effect on firm profitability.

3.4.3.5.2 Ownership identity

Ownership identity relates to the relationship a shareholder has with the firm. An inside relationship means that the shareholder is personally connected to the firm, whereas an outside relationship means that the shareholder has no connection with the firm. According to Douma et al. (2006), outside ownership should be separated into (foreign/domestic) institutional ownership and (foreign/domestic) corporate ownership, because the underlying dynamics governing the investments by institutions and corporations differ. Therefore, this study measures ownership identity as a dummy variable indicating how the largest owner is connected to the firm: internal ownership, external domestic corporate ownership, external foreign corporate ownership, external domestic institutional ownership, and external foreign institutional ownership. Corporate shareholders refer to companies having shares of other firms. Moreover, institutional shareholders are institutions, such as banks and pension funds, owning shares of firms.

According to Douma et al. (2006), various owners may have different goals which may result in different effects on firm profitability. To begin with, inside owners such as family owners are involved in the firm, have long-term goals, and bring higher levels of trust. However, such owners are also typically controlling ones that participate in management.

This may result in tunnelling, which has a negative effect on firm performance (Douma et al., 2006). On the contrary, Anderson and Reeb (2003) find that family firms perform better than nonfamily firms, indicating that inside ownership has a positive effect on firm performance. Brisley, Cai, and Nguyen (2021) also investigate the effect of inside ownership on firm performance. More specifically, Brisley et al. (2021) find that firms who adopted executive stock ownership requirements, where CEOs receive stocks as incentive payment to align managerial interest with that of the shareholders, experience a deterioration in firm performance. This indicates that internal ownership may have a negative effect on firm performance. Moreover, foreign outside ownership usually has a positive effect on firm performance, because such owners have higher commitment and longer-term involvement. Foreign outside corporate owners in particular have superior monitoring abilities, access to resources and skills to optimally use the institutional environment (Douma et al., 2006). Domestic corporate ownership also has a positive effect on firm performance, although the magnitude of this relationship is not as high as for foreign corporations (Douma et al., 2006). Finally, Douma et al. (2006) state that outside institutional owners are powerful as they can threat to exit when management makes decisions that conflict with their interests. Besides, institutional owners are typically financially motivated, and therefore unwilling to commit to a long-term relationship with the firm. Therefore, institutional ownership, both foreign and domestic, typically has a moderate to negative effect on firm profitability. Daryaei and Fattahi (2020) add that institutional ownership has a positive effect on a firm's ROA when the level of institutional ownership remains below 28.5%. To conclude, the various incentives of owners result in various effects on firm profitability.

3.4.3.6 Industry

Consistent with prior studies investigating the relationship between WCM and firm profitability (e.g. Afrifa & Padachi, 2016; Aktas et al., 2015; Chang, 2018; Deloof, 2003; Eljelly, 2004), this study controls for industry effects by introducing industry dummies. Consequently, a firm takes the value 1 if it operates in a specific industry, and 0 otherwise. The industry classification used in this study is the NACE Rev. 2 classification developed by the European Commission (Deloof, 2003). Controlling for industry matters, because working capital needs and practices differ between industries (Aktas et al., 2015; Eljelly, 2004). As such, capital intensive industries require lower levels of working capital, whereas their labour-intensive counterparts require higher levels of working capital (Eljelly, 2004). The industry classification process is further explained in Chapter 4.3.

Table 2. Summary of variables and calculations

Variable	Abbr.	Measurement	Source(s)
Dependent variable			
Return on assets	ROA	EBIT / total assets x 100%	Aktas et al., (2015); Altaf and Ahmad (2019); Chang (2018); Singhania et al. (2014); Vahid et al. (2012); Wang (2002); Wetzel and Hofmann (2019); Yazdanfar and Öhman (2014)
Return on equity	ROE	Net income / total equity x 100%	Afrifa and Padachi (2016); Wang (2002)
Independent variables			
Cash conversion cycle	CCC	DSO + DIO – DPO, or (accounts receivable/ sales) × 365 + (inventory/costs of goods sold) ×365 – (accounts payable/sales) × 365	Afrifa and Padachi (2016); Baños-Caballero et al. (2012); Eljelly (2004); Singhania and Mehta (2017); Sharma and Kumar (2011)
Square of cash conversion cycle	CCC^2	$(DSO + DIO – DPO)^2$, or ((accounts receivable/ sales) × 365 + (inventory/costs of goods sold) ×365 – (accounts payable/sales) × 365)^2	Afrifa and Padachi (2016); Baños-Caballero et al. (2012); Singhania and Mehta (2017)
Control variables			
Company age	AGE	Number of years since incorporation	Afrifa and Padachi (2016); Aktas et al., (2015); Altaf and Ahmad (2019)
Company size	SIZE1	Total sales (in €)	Afrifa and Padachi (2016); Altaf and Ahmad (2019); Baños-Caballero et al. (2012); Deloof (2003); Eljelly (2004); Singhania et al. (2014); Singhania and Mehta (2017); Yazdanfar and Öhman (2014)
Company size	SIZE2	Total assets (in €)	Eljelly (2004); Sharma and Kumar (2011)

Table 2 continued

Variable	Abbr.	Measurement	Source(s)
Financial leverage	LEV	Total debt / total assets x 100%	Afrifa and Padachi (2016); Aktas et al., (2015); Altaf and Ahmad (2019); Baños-Caballero et al. (2012); Chang (2018); Deloof (2003); Sharma and Kumar (2011); Singhania et al. (2014)
Tangibility	TAN	Fixed assets / total assets x 100%	Afrifa and Padachi (2016); Altaf and Ahmad (2019); Baños-Caballero et al. (2010); Deloof (2003)
Ownership size	OWN 1	Number of shareholders of a firm	Douma et al. (2006)
Ownership identity	OWN 2	Nominal variable indicating how the largest owner is related to the firm: internal, external institutional domestic, external institutional foreign, external corporate domestic, external corporate foreign	Douma et al. (2006)
Industry dummy	IND	Nominal variable indicating to what industry a firm belongs (based on Nace Rev. 2 classification)	Afrifa and Padachi (2016); Baños-Caballero et al. (2012); Deloof (2003)
Year dummy	YEAR	Variable indicating what year the observations are obtained in	Baños-Caballero et al. (2012); Chang (2018); Deloof (2003)

Note: All values are book values

3.4.3.7 Year

This study makes use of panel data, meaning that data is collected over multiple years. To ensure observations are not related to time specific events, year dummies are included. Those year dummies control for changes in the economic and financial environment over the years (Baños-Caballero et al., 2012; Chang, 2018; Deloof, 2003).

3.5 Overview robustness tests

Five robustness tests are performed to ensure the consistency of the obtained results, and hereby ensure the structural validity of this study. The first robustness test is using several proxies for variables. As such, two proxies for the dependent variable firm performance and two proxies for the control variable size are used. A second robustness test is using two research models to test the relationship between WCM and firm profitability, namely: a panel regression and a pooled OLS-regression. If the results of both models are similar, then the results are not driven by unobserved firm-level heterogeneity. The third robustness tests are similar to Baños-Caballero et al. (2012), who also re-estimate the quadratic model by taking sub-samples by industry to verify if the results hold. Fourthly, it is identified if a linear relationship between the CCC and firm profitability may exist. Finally, a robustness check is to performed by excluding the CCC, and including the separate components of the CCC (DSO, DPO and DIO) to see what their individual effect is on firm profitability. This is similar to Deloof (2003), who does not find a significant relationship between CCC and profitability among Belgian firms, but does find significant negative relationships between separate components and firm. Also Eljelly (2004) performs separate analysis, and finds a significant relationship between both CCC and firm profitability, and the components of CCC and profitability.

4. Sample and data

Before conducting the empirical research, the sample must be selected and the data gathered. As such, the sample selection, industry classification, data collection and multiple imputation process are described in this chapter.

4.1 Sample

Four sampling criteria are applied to select the final sample. Also, the industry is reclassified into larger categories to obtain valid results.

4.1.1 Sample selection

Four selection criteria are applied to select the final sample, the first three of whom are consistent with the research question. First, solely firms from The Netherlands are selected. Second, all publicly listed firms are eliminated. Third, the firm must meet the criteria of an SME as indicated in section 2.1. Thus, a firm is characterized as an SME when firms employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro (European Commission, 2017). Finally, in line with Afrifa and Padachi (2016), Baños-Caballero et al. (2012) and Deloof (2003), financial firms such as banks and insurance firms are excluded from the sample because they have a different asset structure, different accounting requirements and are regulated by the government. Also, consistent with Chang (2018) and Deloof (2003), firms operating in the energy and water industries are excluded from the sample because of their tight regulations. This prevents the results being influenced by a financial policy which is governed by a regulatory environment. Applying these four criteria in the Orbis database results in a final sample of 113 firms, and 339 firm year observations (see Table 3).

4.1.2 Industry classification

This study controls for unobserved effects from the industry a firm operates in. Each industry, measured as a dummy variable, is classified by the NACE Rev. 2 classification as developed by the European Commission. The NACE Rev. 2 classification consists of 21 industry categories. In this research substantial sample sizes in every industry category should exist to acquire valid results. Therefore, some industries are grouped together (i.e. reclassified) so the sample size per category it is sufficiently large. Afrifa and Padachi (2016) follow the same

Table 3. Sample selection Orbis

Initial sample size	**Criteria**	**Number of excluded firms**
2,629,362	Dutch firms	2,592,056
37,264	Unlisted firms	7,271
29,993	SME criteria: maximum of 249 employees, maximum yearly turnover of €50,000,000 and/ or a maximum yearly assets on balance sheet of €43,000,000	29,423
570	Exclude financial firms, and firms operating in the energy and water industry	457
113	Final sample size	

process, and explain that amalgamating similar sectors is justified because most sectors are closely related and have similar characteristics.

As explained in Chapter 4.2, financial firms and firms operating in the energy and water industries are excluded from the sample. Thus, firms with the NACE Rev. 2 code K (Financial and Insurance Activities), D (Electricity, Gas, Steam and Air Conditioning Supply), and E (Water Supply) are excluded from the sample. Besides, no firm in the dataset belongs to the Mining and Quarrying (code B), Public Administration and Defence, and Compulsory Social Security (code O), Education (code P), Activities of Households as Employers, and Undifferentiate Goods and Services Producing Activities of Households for Own Use (Code T), and Activities of Extraterritorial Organisations and Bodies (Code U) industries. Therefore, these industries are also not incorporated in this study. Furthermore, the industries that are present in this study are reclassified based on similar operations and industry characteristics. As a result, similar to Afrifa and Padachi (2016), the following industry categories are created: (1) Manufacturing, (2) Wholesale and retail, (3) Administration, software and communication, and (4) Other. Table 4 provides an overview of the reclassification process. As shown in Table 4, the Wholesale and retail industry is the largest category consisting of 56 out of the 113 firms. The Administration, software and communication, on the contrary, is the smallest category consisting of 11 firms.

Table 4. NACE Rev. 2 classifications

NACE Rev. 2 Code	NACE Rev. 2 Economic Area	No. of firms pre re-classification	Reclassification	No. of firms after re-classification
C	Manufacturing	33	Manufacturing	33
G	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	56	Wholesale and retail	56
J	Information and Communication	4	Administration, software and communication	11
M	Professional, Scientific and Technical Activities	6		
N	Administrative and Support Service Activities	1		
A	Agriculture, Forestry and Fishing	3	Other	13
F	Construction	1		
H	Transportation and Storage	1		
I	Accommodation and Food Service Activities	3		
L	Real estate activities	1		
R	Arts, Entertainment and Recreation	2		
S	Other Service Activities	2		
	Total	113		113

4.2 Data

Data are collected from the Orbis database. However, because the preliminary dataset consists of many missing values, a multiple imputation is ran to create the final dataset.

4.2.1 Data collection

This study examines the effect of WCM on firm profitability for Dutch private SMEs. To answer the research question, data are collected from the Orbis database. Orbis is a database from Bureau van Dijk, and includes numerical and factual data about company reports and

financial information of both private and public companies worldwide. Among others, it features information about the firm performance and the financial leverage which is needed for this research. Besides, LexisNexis is used as a back-up source to account for the missingness in the dataset.

Consistent with Yazdanfar and Öhman (2014), data is collected within a time period of four years, namely 2014 – 2017. Since the dependent variable is a leading variable (measured in year t+1), data is ultimately presented as a three year period. Moreover, years 2014-2017 have been chosen to ensure the results are unaffected by the global financial crisis of 2007-2008 and its aftermath. Besides, preliminary, an unbalanced dataset is downloaded from Orbis, meaning a firm is not required to have three consecutive years of data. The reason why a preliminary unbalanced dataset is used, is because it avoids attrition bias and survivorship bias. Firstly, attrition bias comprises firms that drop out because they stop reporting data, even if still operating (Demirgüç-Kunt et al., 2020). Moreover, survivorship bias refers to firms that drop out because they die or are acquired by another firm (Demirgüç-Kunt et al., 2020; Renneboog, Ter Horst, & Zhang, 2008). Thus, an unbalanced dataset ensures no selection bias that emerges from systematic differences between firms that drop out and firms that do not.

4.2.2 Multiple imputation

As presented in Table 3, the sample consist of 113 firms, and with 3 years of observations, the total firm year observations are 339. However, because of the unbalanced dataset, most variables contain missing values, of which the independent variable (CCC) contains the majority of missing values at 48.1% resulting in 176 firm year observations (see Appendix I, table i). The reason why the CCC contains most missing data, is because it relies on three parts: the DSO, DPO, and DIO. If one of the elements are missing, then the CCC cannot be calculated.

Missing data, also referred to as missingness, may cause bias and will always cause a reduction in efficiency when more than approximately 5% of the data are missing (Graham, 2009; Madley-Dowd, Hughesa, Tillinga, & Heron, 2019). According to Madley-Dowd et al. (2019), there are two common ways to deal with missingness. The first solution is to run a complete case analysis (also known as listwise deletion) which restricts the analysis to individuals with complete data. The second solution is to run multiple imputation which "creates *m* copies of the dataset, replacing the missing values in each dataset with independent

random draws from the predictive distribution of the missing values under a specific model (the imputation model)" (Madley-Dowd et al., 2019, p. 63). Thus, the imputed dataset replaces each missing item with *m* acceptable values, resulting in additional error variance to each imputation, and thereby representing a distribution of possibilities. Next, a model is fit to each dataset, and the imputations are combined into one inference. Ultimately, the pooled inference can be used for further analysis. In short, there are various methods to overcome missingness.

Furthermore, Madley-Dowd et al. (2019) empirically show that, regardless of the proportion of missing data, multiple imputation provides unbiased estimates and improves efficiency. On the contrary, a complete case analysis is always biased because the model does not include all variables related to missingness. Similarly, Graham (2009) acknowledges that multiple imputation methods are always at least as good as the old procedures such as listwise deletion or pairwise deletion, and often much better. Besides, multiple imputation is preferred above single imputation techniques. Single imputation techniques such as mean imputation or regression imputation impute a single value for each missing data point, and therefore contain no error and do not represent uncertainty associated with the missing value (Graham, 2009). For example, the regression imputations all lie directly on the regression line, indicating a deterministic relationship, while in reality most often a probabilistic relationship exists where there is some error variance that causes the data points to deviate from the regression line. Therefore, in order to reduce biased results and to improve the efficiency, a decision is made to run multiple imputation in this study.

Two conditions must be met to run multiple imputation. The first condition of running multiple imputation is that the imputation model must include all variables that are included in the analysis model, and all variables related to missingness. The second condition is that data must be missing at random or missing completely at random (Graham, 2009; Madley-Dowd et al., 2019). Firstly, all variables incorporated in this study are included in the multiple imputation model plus the values of the DSO, DPO and DIO. Also, one variable (firm age) does not contain any missing values, and is therefore included as a predictor variable. Since the variables of the analysis model and the variables related to missingness are included in the model, the first condition of multiple imputation is met. To test the second condition of multiple imputation, it is analysed whether missing values are missing completely at random (MCAR), missing at random (MAR), or missing not at random (MNAR). First, to identify whether data is MCAR, meaning that missing values do not depend on observed nor on unobserved data, the Little's test is performed (Graham, 2009). The Little's test shows a

significant result (Chi-square = 161,278, df = 102, p-value = .000) which infers that the null-hypothesis, stating that data is MCAR, is rejected. Thus, the data is not MCAR. Next, it is identified whether the data is missing at random (MAR), or missing not at random (MNAR). When data is MAR, then the missingness depends on observed data, not on unobserved data. On the contrary, when data is MNAR, the missingness does depend on unobserved data, and is often the consequence of respondents purposely not providing information (Graham, 2009). There is no statistical test to identify if data is MAR or MNAR, however, a researcher can try to obtain some of the missing values by additional research (e.g. by following up on non-respondents by phone, or by analysing public reports) to distinguish between MNAR and MAR. Data are most likely MAR when data of non-respondents are similar to the results of the respondents. In case data of non-respondents are extreme values when compared to data of the respondents, then data are most likely MNAR (Graham, 2009). Considering private firms do not publish public reports, other sites such as LexisNexis and the company's own website are used to retrieve some of the missing values. Analysing missing values shows that many of the missing values are similar to the non-missing values. For example, data regarding ownership identity is missing from the dataset for C&D Foods Netherlands BV, while further investigation shows that the firm is owned by an Irish incorporation. Thus, the ownership identity of C&D Foods Netherlands BV is 'external corporate foreign ownership', which is also the case for 43.4% other firms included in the dataset. Moreover, The Cookware Company BV has a missing value for the total turnover in 2016. However, further analysis shows that their turnover of 2016 was 16.6 million euros. The Cookware Company BV's annual turnover of 2014 was 17.2 million euros, meaning the previously missing value for 2016 fits the data well. Similarity, the total turnover of 2015 of Starbucks coffee Netherlands BV is 12.58 million euros, while data for 2016 is missing. Further analysis shows that their annual turnover of 2016 is 12.60 million euros which is in line with their turnover of 2015. Since the values of the non-respondents are similar to the results of the respondents, it is assumed that the data of this study is MAR. Therefore, the second condition of multiple imputation is also met.

Before running multiple imputation, it must be decided how many imputations to run. An old rule of thumb is that 3 to 5 imputations are suffice to make good inferences with the imputed dataset (Graham, 2009; Von Hippel, 2018). However, Von Hippel (2018) explains that few imputations result in replicability of point estimates, but not in replicability of the standard error (SE) estimates. Moreover, if the SE estimate is not replicable, related quantities such as confidence intervals, t-statistics, and p-values will not be replicable, either. Therefore,

Von Hippel (2018) suggests to use a two-step procedure to identify the amount of imputations needed. Firstly, a pilot multiple imputation analysis should be performed to estimate the fraction of missing information (FMI). The FMI is a parameter-specific measure that quantifies information loss due to missingness, while simultaneously accounting for the amount of information retained by other variables within a dataset (Madley-Dowd et al., 2019). The second step is to calculate the required number of imputations using the formula in equation 5. The CV(SE) represents the approximate percentage the SE estimate is allowed to change when data is imputed. Von Hippel (2018) recommends to only allow the SE estimate to change by 5%, which is why this percentage is maintained in this study.

$$m = 1 + \frac{1}{2}\left(\frac{FMI}{CV(SE)}\right)^2 \quad (5)$$

Running a test pilot shows that the FMI of the dataset is 0.6636. Furthermore, with an FMI of 66.36% and by allowing the SE estimate to change by 5%, the required number of imputations is 89. Thus, 89 imputations are ran to end up with the final imputed dataset. This dataset is used in any further analyses of this study. However, a limitation of using multiple imputation estimates is that data can be nonreplicable, because the reported estimates from a sample of m-imputed datasets can differ from the estimates of another re-imputed dataset. As a consequence, the non-replicability reduces the openness and transparency of scientific research, and harms the reliability (Von Hippel, 2018). Thus, although using multiple imputation reduces the bias and improves the efficiency, it must be acknowledged that running multiple imputation is a limitation of this study.

5. Results

This chapter presents the descriptive statistics, the correlation analysis, and the results of the regression analyses. Moreover, robustness tests are performed to analyse the consistency of the obtained results.

5.1 Descriptive statistics

Table 5 presents the descriptive statistics of the variables incorporated in this study, excluding the industry- and year variables since they have already been discussed in Chapter 4. Also, for transparency, the descriptive statistics before multiple imputation are presented in Appendix I, Table ii. Furthermore, the descriptive statistics are presented after winsorizing outliers from the dataset. Winsorization involves reducing any extreme value to the next highest or lowest value to mitigate the influence of extreme values on the results (Afrifa & Padachi, 2016; Aktas et al., 2015). Data winsorization is a frequently applied method to deal with outliers. As such, Afrifa and Padachi (2016) winsorize outliers at the 5^{th} and 95^{th} percentiles (i.e. at the 10% level), while other researchers winsorize outliers at the 1% or 5% level (e.g. Aktas et al., 2015; Hill et al., 2010). This study winsorizes the outliers at the 5% level, meaning that extreme values are set to the 2.5^{th} or the 97.5^{th} percentile of the variable concerned. The 5% winsorization level is chosen, because the 1% winsorization would not have eliminated all extreme outliers from the dataset, while a 10% winsorization would modify the data too much. To illustrate the winsorization process, extreme outliers are first identified by plotting a boxplot of each quantitative variable included in this study, and by analysing scatterplots of the dependent variable and each quantitative independent variable (results not reported). Any value in a boxplot denoted with an asterisk (*) is considered an extreme outlier, because the value is greater than three times the interquartile range. Moreover, any value in a scatterplot moving in the opposite direction from any other observations is considered an extreme outlier. Subsequently, the extreme outliers are winsorized to the 5% level. For example, a CCC value of 423 days is considered an extreme outlier, which is therefore winsorized to 302 days (i.e. the 97.5^{th} percentile). Ultimately, the variables ROA, ROE, CCC, and CCC^2 contained extreme outliers which are winsorized at the 5% level. Additionally, data are analysed for any misspecifications. Those outliers are also winsorized to the 5% level. For instance, a tangibility value of 117% in the dataset is considered incorrect, because the tangibility cannot exceed 100% (fixed asses cannot exceed total assets). Therefore, this outlier is winsorized to

the 97.5th percentile value of 83.3%. In short, extreme outliers as identified by boxplots and scatterplots, and misspecifications are winsorized at the 5% level.

As can be observed form Table 5, the mean ROA of the Dutch private SMEs in the sample is 9.9%. ROA values obtained by previous studies that investigate the relationship between WCM and firm profitability among SMEs are diverse. To illustrate, Yazdanfar and Öhman (2017) find a mean ROA of 11% for the period 2008-2011 among Swedish SMEs, while Afrifa and Padachi (2016) find a value for UK listed SMEs of -13.96% over the period 2005-2010. So, despite the similarity in the time period, still diverse average ROA values are obtained for those European SMEs. Moreover, other studies focussing on large firms also obtain inconsistent results. As such, Aktas et al. (2015) find a mean ROA of 5.01%, Altaf and Ahmad (2019) a value of 16.1%, Singhania et al. (2014) a mean of 8.7%, and Wetzel and Hofmann (2019) an average ROA of 4.17%. Overall, since previous studies find different average ROA values, it cannot be concluded whether the average value of 9.9% obtained in this study fits previous studies. However, the 9.9% does lie within the range of -13.96% and 16.1% as found by previous studies. Furthermore, Table 5 shows that the mean ROE is 19.8%. Consistent with previous studies who use multiple profitability measures, both profitability means are in the same direction (either both positive or both negative). For example, Afrifa and Padachi (2016) find a mean ROA of -13.96, and a mean ROE of -31.84%. Also, the performance measures of Altaf and Ahmad (2019) are both positive with an average ROA of 16.1%, and a mean Tobin's Q of 24.2%. Additionally, it should be noted that the minimum ROA and ROE are -24%, and -63% respectively, indicating that firms in the sample have a negative operating income or net income resulting a negative ROA and ROE.

The mean CCC is nearly 137 days, meaning that it takes Dutch private SMEs roughly 137 days on average to convert the cash outflow for the purchase of raw materials to the cash inflow through the sale of goods produced. Or in other words, Dutch private SMEs, on average, rely approximately 137 days on external financing. On average, this is longer than CCC values obtained prior research. Most previous studies find a mean CCC below 100 days. To begin with, Deloof (2003) finds a mean CCC of 44.48 days among large Belgian firms. Yazdanfar and Öhman (2017) find a similar mean CCC of 45.49 days for a sample of Swedish SMEs. Also, Baños-Caballero et al. (2012) find that their sample of Spanish SMEs have a mean CCC of 75.97 days. Besides, while most studies find a negative CCC value in their sample, this study does not. To illustrate, the 10th percentile of Baños-Caballero et al. (2012) has a value of -25.12 days, while the minimum CCC in this study is 0 days. In short,

Table 5. Descriptive statistics

Variables	N	Mean	Median	St. dev.	Minimum	Maximum
Dependent variable (t+1)						
ROA (%)	339	.099	.089	.123	-.240	.403
ROE (%)	339	.198	.151	.289	-.630	.991
(In)dependent variables (t)						
CCC (days)	339	136.720	131.190	61.851	.000	302.000
CCC^2	339	22,483.530	17,211.080	19,809.192	703.000	89,900.000
DSO (days)	339	89.420	78.000	63.229	1.000	256.000
DIO (days)	339	71.920	66.090	48.990	.000	193.000
DPO (days)	339	23.430	15.000	25.902	.000	99.000
Control variables (t)						
Age (years)	339	31.270	24.000	24.700	.000	114.000
Size1 (total sales EUR x mln)	339	26.836	25.855	10.715	.023	49.821
Size2 (total assets EUR x mln)	339	15.849	14.746	8.753	.010	42.059
Lev (%)	339	.543	.549	.227	.052	.997
Tan (%)	339	.206	.102	.222	.000	.833
Own1	339	1.440	1.000	.548	1.000	3.000
Own2_internal	339	.018	.000	.132	.000	1.000
Own2_instdomestic	339	.062	.000	.241	.000	1.000
Own2_instforeign	339	.027	.000	.161	.000	1.000
Own2_corpdomestic	339	.451	.000	.498	.000	1.000
Own2_corpforeign	339	.442	.000	.497	.000	1.000
ROA (%)	339	.010	.087	.118	-.240	.403

Notes*: This table reports the descriptive statistics for each variable included in this study. The variable definitions can be found in table 2. In equation 2, CCC is used as the independent variable, and in equation 3 CCC is used as a dependent variable, both measured at time t. Also, in equation 2 and 4, ROA and ROE are used as the dependent variable measured in time t+1, while in equation 3 ROA is used as a control variable measured at time t. Data of the dependent variables (t+1) are based on 2017, 2016, and 2015. Data of the independent and control variables (t) are based on the years 2016, 2015, and 2014. Outliers are winsorized at the 97.5 and 2.5. percentile.*

this study finds an average CCC value above 100 days, while not having any negative CCC values unlike most studies. Based on this it can be concluded that Dutch private SMEs, on average, settle their outstanding bills promptly, allow more days for customers to pay for goods bought on credit, and do not sell their finished goods immediately. This is supported when analysing the mean DSO, DIO, and DPO values of 89.420, 71.920, and 23.430 days respectively. Finally, since the CCC^2 is the square of the CCC, it contains numerous extreme values. To exclude the influence of those extreme values, the CCC^2 is transformed into a natural logarithm when performing the robustness checks. The CCC^2 is used in the main analysis to allow easier comparison between the slope coefficients of the CCC and CCC^2.

The average private SME in the sample is approximately 31 years old as shown in Table 5. The average age is higher than the typical average age of an SME as identified by prior research. The private SMEs in the sample of Yazdanfar and Öhman (2017), for example, are, on average, 20 years old. Also, the average age of SMEs in the sample of Afrifa and Padachi (2016) is 13 years, and the median age is approximately 8 years. On a different note, larger firms are commonly older. This is also shown by the mean age of both large and small firms in the sample of Altaf and Ahmad (2019), which is 37 years. Thus, contradictory to Berger and Udell (1998), who state that small firms are typically younger, the private SMEs in this study are on average older than other studies on SMEs. Finally, to reduce the influence of extreme values when running regression analyses, age is transformed into a natural logarithm.

Furthermore, firm size is measured by two proxies: total sales, and total assets in euros. Size1 is measured as the total sales, and is €26.836 million on average. Thus, the average firm in the sample is medium sized according to the criteria of the European Commission. Also, Size1 its maximum value of €49.821 million proves the dataset meets the criteria of an SME according to the European Commission, whose total sales may be €50 million at most. Furthermore, the median total sales of €25.855 million indicates a normal distribution of the data. Additionally, Size2, measured by total assets, is €15.849 million on average. Moreover, the median is €14.746 million. The mean and median values are similar, which indicates a normal distribution. Moreover, the maximum value of Size2 is €42.059 million, and therefore meets the criteria of an SME (whose total assets may be €43 million maximum). Finally, similar to most studies (e.g. Altaf & Ahmad, 2019; Baños-Caballero et al., 2012; Singhania & Mehta, 2017; Yazdanfar & Öhman, 2014), size is transformed into a natural logarithm to minimize the influence of extreme values on the regression results.

The average firm in the sample has 54.3% debt compared to total assets. The maximum leverage is 99.7%, meaning that the corresponding firm has 99.7% total debt and .03% equity. Moreover, it is evident that leverage is normally distributed, considering the median of 54.9% is a similar value to the mean. Furthermore, the average leverage of this study is exceeds the average leverage of other studies investigating the WCM-profitability relationship. To begin with, Belgian firms in the sample of Deloof (2003) have an average leverage of 25.4%, which is similar to the 32% found by Gill et al. (2010) among US firms, and the 23.66% among US found by Aktas et al. (2015). The difference in average leverage found between this study and other studies might be explained by differences in firm size and being listed or not. To elaborate, the previously mentioned studies have a sample of either large, or both large and small firms, and are all listed on a stock exchange. According to the pecking order theory, such firms are able to rely more on internal financing and therefore require less debt (Brealey et al., 2020).

The mean tangibility is 20.6%, indicating that the average firm in the sample possesses 20.6% fixed assets, and 79.4% of current assets. Baños-Caballero et al. (2010) find a similar percentage of 23.6% among their sample of Spanish SMEs, and explain this low percentage demonstrates the importance of efficient management of current assets. Moreover, Afrifa and Padachi (2016) find a slightly higher average tangibility of 36.89% among listed SMEs from the U.K. On the contrary, Altaf and Ahmad (2019), whose sample of both large and small listed firms, have an average tangibility of 79.7%. Also, Baños-Caballero et al. (2010) find that the average investment in fixed assets for a sample of listed Spanish firms is 52.63%. A possible explanation for the low tangibility found in this study and other studies focussing on SMEs, is that SMEs typically own more current assets than fixed assets, and are therefore more dependent on short term financing (Baños-Caballero et al., 2010). Moreover, the pattern also fits the theoretical reasoning of Demirgüç-Kunt et al. (2020), who state that smaller firms have little to provide as collateral, and are therefore more financially constraint than large firms. However, it is evident that some firms in the sample do not experience those constraints, as the maximum tangibility value is 83.3%.

When analysing Own1, which represents the number of shareholders, it can be observed that the maximum amount of shareholders of the Dutch private SMEs in the sample is 3, and that firms, on overage, have 1 to 2 shareholders (mean value is 1.440). This fits the expected values for small private firms who are typically owner-managed (Berger & Udell, 1998; Vos et al., 2007; Yazdanfar & Öhman, 2015), and typically sell securities to a small public (Brealey et al., 2020). However, because only three values exist for Own1, it is decided

to transform Own1 into a dummy variable. Since the majority of the firms in the sample have 1 owner (i.e. 200 observations out of the 339), Own1 will take the value 1 if the firm has 1 owner, and Own1 will take the value 0 otherwise. This allows to control for the influence of ownership concentration on firm profitability.

Furthermore, Own2 is a measure of ownership identity. Table 5 shows that 2 firms of the sample have internal ownership (.018 * 339 / 3 years = 2 firms), 7 firms have institutional domestic ownership, 3 firms have institutional foreign ownership, 51 firms have corporate domestic ownership, and 50 firms have corporate foreign ownership. However, as mentioned, private firms are typically owner-managed. So, the conclusion that most private SMEs are owned by another corporation is against the expectations. Therefore, additional research is performed to verify the results presented in Table 5. Indeed, further research confirms that the results of Own2 are (mostly) unreliable, because most firms classified as having external corporate ownership should have been classified as having internal ownership. To illustrate, Elcee BV is classified in Orbis as having 'external corporate domestic ownership', while further research shows that the owner of the firm is also the CEO. Therefore, the ownership is actually internal. Similarly, the owners of KWS Benelux BV are also active in the management team as Managing Director. Therefore, KWS Benelux BV does not have external corporate domestic ownership, as identified by Orbis. Instead, the ownership of KWS Benelux BV should be classified as internal ownership. The reason why the results of Orbis show different results is most likely because of the legal structure of Dutch firms, where owners found a so called 'besloten vennootschap, or BV' which in turn owns the SME concerned. Orbis recognizes this as 'external corporate domestic ownership', while in most cases the owner of the BV also has a management position in the firm, making ownership internal. Since the results of Own2 presented in Table 5 are unreliable, the variable Own2 is not used in any further analysis.

5.2 Assumptions and conditions

Prior to performing a Pearson's R correlation analysis and a multivariate regression, it must be identified if data meets various assumptions and conditions. The assumptions of a multivariate regression are: (1) the linearity assumption, (2) the independence assumption, (3) the equal variance assumption (i.e. homogeneity of variance), and (4) the normality assumption (De Veaux et al., 2016). The first assumption, the linearity assumption, must be

met to perform a Pearson's R correlation analysis. Furthermore, for the sake of brevity, the assumption and condition plots are not reported.

5.2.1 Linearity assumption

To begin with, the linearity assumption consists of the following three conditions: (1) the quantitative variables condition, (2) the straight enough condition, and (3) the no outliers condition. Firstly, the quantitative variables condition requires all variables to be metric or dichotomous (De Veaux et al., 2016). So, to fulfil the quantitative variables condition, the nominal variables Industry, Ownership, and Year are transformed into dummy variables (including reference categories). Secondly, the straight enough condition demands there to be a linear relationship between the variables (De Veaux et al., 2016). However, De Veaux et al. (2016) clarify that the scatterplot does not need to show a strong or any slope, but at least should have no bend or other non-linear pattern. After assessing the scatterplots between each dependent variable and the independent variables, a (modest) linear relationship is observed between all variables. Therefore, the straight enough condition is met. Thirdly, the no outliers condition requires absence of outliers that may influence the correlation. Since Pearson's R is a non-resistant measure, and thus sensible to outliers, one outlier can make a small correlation large, and vice versa (De Veaux et al., 2016). Also, outliers may influence the outcomes of a regression analysis. Because the outliers are removed by winsorizing extreme values and any misspecifications at the 5% level before presenting the descriptive statistics in Chapter 5.1, the no outlier condition is met. This is supported when analysing boxplots of individual variables and scatterplots of dependent and independent variables. In short, the linearity assumption is met, and a Pearson's R correlation analysis can be performed.

5.2.2 Independence assumption

The second assumption of multivariate analysis is the independence assumption. De Veaux et al. (2016) explain that the errors in the regression model must be independent of each other. By using a simple random sample, which is the case of this study, it is assumed that the errors in the regression model are independent of each other.

5.2.3 Equal variance assumption

The third assumption is the equal variance assumption, also referred to as the homogeneity of variance. This assumption requires equal distribution of the residuals, and thus the absence of

heteroskedasticity (De Veaux et al., 2016). When analysing the standardized residual plot, with the predicted scores on the x-axis and the residuals on the y-axis, the spread of the residuals around zero should be nearly consistent or uniform, and should not show any patterns or clumps. The standardized residual plot is assessed for three models: one where ROA t+1 is the dependent variable, one where ROE t+1 is the dependent variable, and one where CCC is the dependent variable. The residual plots of the first two models show that the shape of the data is roughly rectangular with a concentration of scores along the centre, indicating that the assumption of homoscedasticity is met. However, when assessing the standardized residual plot of the third model, where CCC is the dependent variable, two cases make the shape of the residual plot fan out. Those two cases belong to the same company (Alron BV). Therefore, to ensure the data is not heteroskedastic, it is chosen to remove Alron BV, who belongs to the Wholesale and retail industry, from the dataset. Thus, the first dataset used to test hypothesis 1a consists of 113 firms, while the second dataset used to test hypothesis 1b consists of 112 firms. Ultimately, the data of all models are homoscedastic, and the equal variance assumption is met.

5.2.4 Normality assumption

The fourth assumption of multivariate analysis is the normality assumption, which entails that the errors around each value for a predictor should follow a normal model (De Veaux et al., 2016). Two methods are used in this study to assess the normality assumption. The first method is to analyse the histogram of the residuals. The histogram shows a normal distribution which indicates the normality assumption is met. To verify this indication, a second method is performed where the normal probability plot of the residuals is analysed. Since the normal probability plot shows a fairly straight line, it is concluded that the normality assumption is met.

5.3 Correlation analysis

A correlation analysis is a bivariate analysis which measures the correlation or association between two variables. Besides, the multicollinearity between independent variables must be assessed in order to proceed with a multivariate regression analysis.

5.3.1 Pearson's R

The Pearson's R coefficient is calculated, which is a correlation coefficient that measures the strength and direction of a linear relationship between two quantitative variables (De Veaux et al., 2016). Moreover, correlation coefficients range between -1 and +1, where -1 implies a perfectly negative correlation, +1 a perfectly positive correlation, and 0 implies no correlation. Any significant correlation confirms the existence of a positive or negative relationship between variables, which is why only significant relationships are discussed. Besides, it must be acknowledged that a shortcoming of a bivariate analysis is that it does not identify causes from consequences (Deloof, 2003).

The correlation analysis is presented in Table 6. To begin with, as seen in Table 6, most variables are significantly related to the profitability measures. The first correlation is between ROA and ROE. A correlation of .781 significant at the 1% level indicates a strong positive relationship between both profitability measures. This means that if one profitability measure increases, the other profitability measure increases also. Moreover, a negative correlation exists between both profitability measures and the CCC. The correlation coefficients of both ROA (-.173) and ROE (-.208) with the CCC are statistically significant at the 1% level. A negative relationship would imply support is found for the traditional WCM theory, where firms can improve profitability by reducing the CCC. However, the relationship could also be reversed, because a bivariate analysis does not consider a dependent and independent variable. Besides, Baños-Caballero et al. (2012) also find a negative significant correlation of -.217 between profitability and CCC, while their multivariate analysis finds

Table 6. Pearson's correlation matrix

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**VIF**
1	ROA	1									
2	ROE	.781**	1								
3	CCC	-.173**	-.208**	1							1.702
4	ln_Age	-.090	-.164**	.102	1						1.038
5	ln_Size1	-.056	-.020	.063	.067	1					2.324
6	ln_Size2	-.232**	-.269**	.360**	.077	.668**	1				2.817
7	LEV	-.021	.344**	-.290**	-.126*	.127*	-.091	1			1.210
8	TAN	-.230**	-.250**	-.314**	-.027	-.091	.133*	-.040	1		1.445

Notes: *This table represents the Pearson correlation coefficients with their statistical significance, and the VIF values for the independent and control variables. Variable definitions as described in Table 2. ** Correlation is significant at the .01 level. * Correlation is significant at the .05 level.*

support for the progressive WCM theory. A similar pattern is observed for Afrifa and Padachi (2016). Thus, a multivariate analysis should confirm the existence the identified relationships. Other notable correlations exist between the profitably measures and firm size, and the profitability measures and firm age. To illustrate, ROE is negatively related to firm age, and both ROA and ROE are negatively related to Size2, whereas firm age and size were expected to be positively correlated with firm profitability. A positive relationship was expected, because older and larger firms typically suffer less from information asymmetry, are less financially constraint, and thus have better access to financial means to make (profitable) investments (Berger & Udell, 1998; Yazdanfar & Öhman, 2014). In the same line, most previous research identify a positive significant relationship between profitability and firm age, and profitability and firm size (e.g. Afrifa & Padachi, 2016). On the contrary, this study indicates that smaller, and younger firms are more profitable. Additionally, a positive moderate correlation of .344 between leverage and ROE exists, which is opposite from the expectations and prior research. A negative relationship was expected, because a high amount of debt may harm profitability by the increasing chances of financial distress. This negative correlation between leverage and profitability is also identified by prior researchers (e.g. Altaf & Ahmad, 2019; Baños-Caballero et al., 2012). However, the correlation is not robust, as no significant relationship between leverage and ROA is found. Furthermore, a negative correlation of -.230 between ROA and tangibility, and a negative correlation of -.250 between ROE and tangibility is found, both significant at the 1% level. This relationship is consistent with the correlation found by Afrifa and Padachi (2016), who explain that mostly intangible assets in the form of human capital and R&D are expected to maximise firm profitability, whilst fixed assets are not.

Besides the correlation between the CCC and the profitability measures, CCC is also significantly correlated with three control variables: Size2, leverage, and tangibility. Firstly, firm size measured by total assets is positively related to the CCC with a correlation coefficient of .360 significant at the 1% level. Baños-Caballero et al. (2012) and Afrifa and Padachi (2016) also find a positive correlation between both variables. However, Wetzel and Hofmann (2019), Yazdanfar and Öhman (2014), and Sharma and Kumar (2014) find a negative significant correlation of -.155, -.1915, and -.129 respectively between firm size and the CCC. Despite various results found by prior research, the positive relationship identified in this research can possibly be explained by the fact that larger firms, who are less financially constraint, have higher optimal working capital levels than smaller firms (Wetzel & Hofmann, 2019). Secondly, leverage and the CCC are negatively correlated (-.290), as higher accounts

payable (and thus higher leverage) decreases the CCC. Similarity, the third correlation between tangibility and CCC is negative (-.314), because as the ratio of fixed assets increase, the ratio of current assets including accounts receivable and inventory decrease. Moreover, a lower accounts receivable and inventory is related to a lower CCC. These patterns can also be observed among prior research. For example, Baños-Caballero et al. (2012) also find a negative relationship between the CCC and leverage (-.0896), and Afrifa and Padachi (2016) find a negative relation between the CCC and tangibility (-.066).

Furthermore, some significant correlations are found among the control variables. A first non-surprising correlation is identified among both measures of firm size. Size1 (measured by total sales), and Size2 (measured by total assets) are strongly positively correlated with a correlation coefficient of .668. Thus, as firm size measured by total sales increases, the firm size measured by total assets increases also, and vice versa. Moreover, size measured by total sales is positively related to leverage, significant at the 5% level. The positive relationship between firm size and leverage can be explained by the trade-off theory, as larger firms with safe, tangible assets and plenty of taxable income to shield ought to have higher leverage target ratios (Brealey et al., 2020). On the contrary, a negative relationship between firm size and leverage could be explained by the pecking order theory, where larger firms consciously decide to use less debt, because they can rely on internal financing (Brealey et al., 2020). This divergence in support for both theories is also identified in the literature, and no one theory is found to be better than the other (Brealey et al., 2020). Also empirical findings on the correlation between firm size and leverage differ. For example, Baños-Caballero et al. (2012) find a positive correlation (.1707), while Altaf and Ahmad (2019) find a negative correlation (-.08). Finally, size measured by total assets is positively related to tangibility (.138). Altaf and Ahmad (2019) also find a positive correlation between size measured by total assets and tangibility (.04), because as fixed assets increase, total assets increases also.

5.3.2 Multicollinearity

Besides the assumptions and conditions of multivariate regression, Field (2005) mentions to assess the multicollinearity among the predictor variables before conducting a multivariate analysis. Multicollinearity arises when two or more predictor variables are highly linearly related and are therefore less able to explain the dependent variable. According to Field (2005), multicollinearity can be assessed by analysing the VIF scores. A commonly applied

threshold for the VIF value of the independent variables is that it should be less than 10, and preferably below 5 (Field, 2005). As shown in the last column of Table 6, the largest VIF value is 2.817. Thus, since all VIF values are below the threshold of 5, multicollinearity is not an issue in this study. However, it should be noted that when CCC^2 is included in the model also, then multicollinearity issues between CCC and CCC^2 arise. This is to be expected, because CCC^2 is the square of CCC. Also, similar to other studies that test a non-linear relationship (e.g. Afrifa & Padachi, 2016; Aktas et al., 2015; Altaf & Ahmad, 2019; Baños-Caballero et al., 2012; Singhania & Mehta, 2017; Wetzel & Hofmann, 2019), CCC and CCC^2 must be added simultaneously to test the existence of a u-shaped relationship. Thus, the analysis is continued. Finally, when the CCC is swapped with its individual components DSO, DIO, and DPO, still no multicollinearity issues arise, because all VIF values remain below 5 (results not reported).

5.4 Hausman test

A Hausman test determines whether to use a FE or RE panel regression by identifying if there is a correlation between the unobservable heterogeneity (μ_i) of each firm and the independent variables in the model. The null-hypothesis states that the unobserved heterogeneity is uncorrelated with the regressors, and therefore the RE model should be used. However, rejecting the null-hypothesis (by finding significance at the 5% level) infers that the unobserved heterogeneity is correlated with the regressors. This means that the RE model is significantly different from the FE model, and therefore the FE model should be used (Afrifa & Padachi, 2016). The results of the Hausman test (reported in Appendix II) show that the p-values of the models are smaller than .05. Therefore, the null-hypothesis that the unobserved heterogeneity is uncorrelated with the regressors is rejected. Thus, the unobserved heterogeneity is correlated with the regressors, and the fixed effects model is used for testing both hypothesis 1a and 1b.

5.5 Results regression analysis

The results of the FE panel regression and the pooled OLS-regression are used to examine whether a concave relationship between the working capital level and firm profitability exists among Dutch private SMEs. As described in Chapter 2.4, the hypothesis is tested in two phases. Therefore, the results of the regression analyses are also presented in two parts. The first part tests whether an optimal working capital level exists that maximizes firm

profitability (i.e. tests H1a), and the second part identifies if deviation from the optimal working capital level reduces firm profitability (i.e. tests H1b). If both hypothesis 1a and 1b are confirmed, then the progressive WCM theory is supported for Dutch private SMEs. Besides, robustness checks are performed to identify if the obtained results are consistent.

5.5.1 Results hypothesis 1a

Table 7 shows the results of the fixed effects regression model used to test if an optimal working capital level exists that maximizes firm profitability. The dependent variable ROA is measured in time t+1, and the independent and control variables are measured in time t. Besides, for robustness, three additional regression analyses are ran: one for ROA and CCC using a pooled OLS-regression model (Table vi), one for ROE and CCC using a fixed effects panel regression model (Table vii), and one for ROE and CCC using a pooled OLS-regression model (Table viii). Those tables are added to Appendix III. When analysing the results of Table 7 is firstly noted at the F-statistic of all models are significant at the 1% level, which represents that the models itself are meaningful (i.e. the slope coefficients are not 0). Moreover, the adjusted R-squared of the pooled OLS-regression model gives an indication how much of the variation in the dependent variable can be explained by the independent variables. Furthermore, the 'R-squared within' of the fixed effects model explains how much of the variation in the dependent variable within each firm can be explained by the independent variables, and thus controls for differences between groups. The 'R-squared between' of the fixed effects model explains how much of the variation in the dependent variable can be explained between firms, and thus exploits differences between groups.

Various combinations of control variables are presented in Table 7, and Tables vi, vii, and viii (Appendix III) to verify the robustness of the relationships found. As such, all tables consist of 10 models, all whom control for the influence of the different years (and industries in the pooled OLS-regression). Model 1 shows the relationship between CCC and CCC^2, and ROA after controlling for year and industry. Moreover, Models 2 to 7 add one control variable at the time, while controlling for CCC, CCC^2, year, and industry. Besides, it should be noted that the influence of the control variables are also investigated without controlling for any other variables, but the results remain the same, and are therefore not reported. Model 8 is added to ensure the results remain robust while excluding CCC and firm size, which are highly correlated with other control variables (see Table 6). Finally, models 9 and 10 are the full regression models, where model 9 controls for size measured by total sales, and model 10

controls for firm size measured by total assets. Furthermore, the adjusted R-squared of the full models (model 9 and/ or 10) are the highest, and thus best able to explain firm profitability. To elaborate, model 9 of Table 7 illustrates that 6.33% of the variation in ROA can be explained by the model after controlling for differences between firms, and that 11.43% of the variation in ROA can be explained by the differences between firms. On the contrary, Table 7 also shows that 2.32% of the variation in ROA within firms is explained by model 1, and that 4.7% of the variation in ROA can be explained by differences across firms. Similarly, Table vi (Appendix III) shows that 4.1% of the variation in ROA can be explained by CCC, CCC^2, year and industry, while 15.2% and 15.5% of the variation in ROA can be explained by the full model (including Size1, and Size2, respectively).

In order to confirm hypothesis 1a, the slope of the CCC and the slope of the CCC^2 must be significantly positive and negative, respectively. Table 7 shows that the CCC and the CCC^2 are insignificantly related to ROA after allowing for the other independent variables in all models but model 8. This result is robust, as the CCC is not significantly positively related to ROA, and CCC^2 is not significantly negatively related to ROA when changing the regression model to a pooled OLS-regression model, and when changing the dependent variable to ROE (see Appendix III). Therefore, no support is found for the progressive WCM theory, and it is concluded that no optimal working capital level exists for Dutch private SMEs. Ultimately, hypothesis 1a is rejected.

As for the control variables, to begin with, ln_Age is insignificantly related to ROA as shown in models 2, 8, 9 and 10 of Table 7. This insignificant relationship remains robust when observing Tables vi, and vii in Appendix III. Moreover, despite Age showing a significant negative relationship to ROE in models 2 and 8 in Table viii (Appendix III), the significance disappears in the full models, even though age is not correlated with firm size. Therefore, it is concluded that age does not contribute to explaining firm profitability, after allowing for the other predictors.

In addition, models 3, 4, 9, and 10 of Table 7 show that the natural logarithm firm size is significantly negatively related to ROA. This is significant negative relationship between firm size and ROA also remains without the logarithmic transformation (results not reported). Moreover, this negative relationship remains partly robust when analysing the full models of Tables vi, vii, and viii in Appendix III. Although the full models of Table vi shows a negative but insignificant relationship between Size1 and Size2, and ROA, Table vii shows a negative relationship between firm size and ROE significant at the 5% level, and Table viii shows a significant negative relationship between Size2 and ROE. Therefore, it is concluded that firm

size, both measured by total sales and by total assets, is negatively related to firm profitability after allowing for the other predictors. Thus, the findings indicate that the smaller firms in the sample have a higher profitability than larger firms. The negative relationship between firm size and profitability is against the expectations since larger firms are typically found to be more profitable. This positive relationship is expected, because larger firms suffer less from information asymmetry and are less financially constraint compared to smaller firms, meaning they are more likely to make desired positive NPV-investments (Demirgüç-Kunt et al., 2020). However, despite the conventional wisdom that larger firms are typically more profitable, various prior studies also find a negative relationship between firm size and ROA (e.g. Afrifa & Padachi, 2016; Aktas et al., 2015; Altaf & Ahmad, 2019; Sharma & Kumar, 2011; Wetzel & Hofmann, 2019), which may be an indication that small firms manage their assets more efficiently.

Furthermore, leverage is significantly positively related to ROA in Table 7. This positive relationship remains through various combinations of variables, which reflects the robustness its relationship with ROA. Specifically, after allowing for the other predictors in model 9, a 1% increase in the leverage of a firm results in an increase in ROA of 14.8%. Similarly, after allowing for the other predictors in model 10, a 1% increase in the leverage of a firm results in an increase in ROA of 15.3%. A positive relationship between leverage and ROE is also observed in Tables vii (significant at the 5% level), and viii (significant at the 1% level). On the contrary, a negative relationship between leverage and ROA can be observed in the full models of Table vi (Appendix III). This relationship is, however, just about significant at the 10% level with t-statistics of -1.672, and -1.702. Also, leverage is insignificantly related to ROA in models 5 and 8 in Table vi, which indicates that the significant negative relationship in the full models may be caused by a correlation among predictor variables. Since the negative relationship between leverage and ROA in Table vi is not robust, it is concluded that leverage is, overall, positively related to firm profitability among the sample of Dutch private SMEs. The positive relationship between leverage and profitability is against the expectations. To elaborate, high amounts of debt increase the chances of financial distress (i.e. when cash flow is insufficient to meet debt obligations). Being in financial distress is costly, which is why leverage typically has a negative influence on firm profitability. As such, most prior researchers find a negative relationship between leverage and profitability (e.g. Afrifa & Padachi, 2016; Aktas et al., 2015; Baños-Caballero et al., 2012; Chang, 2018; Deloof, 2003). A possible explanation for the positive relationship identified in this research may be that actually a u-shaped relationship between leverage and profitability exists.

Table 7. FE panel regression results hypothesis 1a

ROA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Independent variables										
CCC	-.020	-.021	-.021	-.020	-.023	-.035	-.023		-.045	-.420
	(-.505)	(-.524)	(-.528)	(-.507)	(-.582)	(-.833)	(-.566)		(-1.075)	(-.987)
CCC^2	5.631E-5	5.903E-5	5.055E-5	6.472E-5	7.471E-5	8.483E-5	6.336E-5		.000	.000
	(.458)	(.477)	(.416)	(.529)	(.615)	(.677)	(.512)		(.913)	(.987)
Control variables										
ln_Age		1.029						.071	.534	.777
		(.239)						(.017)	(.126)	(.182)
ln_Size1			-2.631**						-2.659**	
			(-2.381)						(-2.432)	
ln_Size2				-1.579*						-1.605**
				(-1.928)						(-1.969)
Lev					.139***			.145***	.148***	.153***
					(2.585)			(2.680)	(2.743)	(2.810)
Tan						-.067		-.055	-.079	-.065
						(-1.147)		(-1.037)	(-1.363)	(-1.111)
Own1_dummy							-3.229	-3.662	-3.857	-3.941
							(-.512)	(-.588)	(-.621)	(-.632)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-7.630	-11.350	35.888*	17.107	-14.942**	-5.860	-7.376	-17.160	29.024	8.725
	(-1.377)	(-.686)	(1.881)	(1.225)	(-2.425)	(-1.019)	(-1.323)	(-1.059)	(1.192)	(.430)
R-squared within	.0232	.0233	.0502	.0402	.0232	.0322	.0249	.0408	.0633	.0497
R-squared between	.0470	.0530	.0284	.0006	.0496	.1725	.0359	.0077	.1143	.0906
F-statistic	6.600***	6.517***	6.730***	6.656***	6.768***	6.564***	6.524***	6.728***	6.739***	6.661***
N	339	339	339	339	339	339	339	339	339	339

***Notes**: This table represents the fixed effects panel regression results identifying if a concave relationship between the working capital level and ROA exists. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Moreover, Table 7 shows that the negative relationship between tangibility and ROA is not significant. An insignificant negative relationship between both variables is also observed in Table vii (Appendix III). However, this negative relationship becomes significant at the 1% level in Tables vi, and viii (Appendix III) after allowing for the other predictors. This is consistent with the view that intangible assets in the form of human capital and R&D are expected to maximise firm profitability, whilst fixed assets are not (Afrifa & Padachi, 2016). Nonetheless, since Table 7 shows insignificant results, the negative relationship between tangibility and firm profitability is not confirmed.

Finally, ownership concentration (measured by the variable Own1) is inconsistently related to the profitability measures. Table 7 shows a negative, but insignificant relationship between the dummy variable of having one owner, and ROA. On the contrary, a significant positive relationship between ownership concentration and ROE can be observed from Table viii (Appendix III). This would indicate that the power, strong motive, and large ability to monitor that comes with ownership concentration positively affects profitability, and that private SMEs do not experience tunnelling, where dominant shareholders may pursue their own interests at the expense of others (Douma et al., 2006). However, this relationship is not robust, because insignificant relationships between ownership concentration and profitability are obtained in Table 7, and Tables vi and vii (Appendix III). Therefore, no conclusions about the relationship between ownership concentration and profitability can be drawn based on the results.

Ultimately, to rule out that multiple imputation modifies the results, an additional robustness check is performed that replicates Table 7 using the dataset before multiple imputation. This table is added to Appendix III, Table ix, and shows that both CCC and CCC^2 are insignificantly related to ROA. This confirms that hypothesis 1a is not supported, and that an optimal working capital level does not exist.

5.5.2 Results hypothesis 1b

According to the empirical evidence presented above, hypothesis 1a is not supported, and Dutch private SMEs do not have an optimal working capital level. Therefore, it is difficult to identify the effect of deviation from an optimal working capital point that does not exist. Nonetheless, the additional analysis can confirm if a concave profitability-WCM relationship is non-existent. Finding insignificant results would indicate that the progressive WCM theory does not hold for Dutch private SMEs. Besides, as explained under the equal variance assumption in Chapter 5.2.3, one firm is removed from the dataset to avoid heteroscedasticity

Table 8. FE panel regression results hypothesis 1b (phase 2)

ROA	**1**	**2**	**3**	**4**	**5**
Independent variables					
Pos_deviation	-.174		.221	.236	
	(-.203)		(.180)	(.192)	
Neg_deviation		-.439	-.614	-.634	
		(-.462)	(-.451)	(-.464)	
Absolute_deviation					-.171
					(-.351)
Control variables					
ln_Age				-.801	
				(-.226)	
Own1_dummy				-2.515	
				(-.401)	
Intercept	-20.693***	-20.858***	-20.965***	-14.980	-20.740***
	(-4.975)	(-5.015)	(-4.980)	(-.862)	(-4.995)
R-squared within	.0002	.0010	.0011	.0020	.0006
R-squared between	.0012	.0012	.0012	.0003	.0000
F-statistic	6.773***	6.779***	6.691***	6.523***	6.776***
N	336	336	336	336	336

Notes*: This table represents the fixed effects panel regression results identifying if deviations from the optimal working capital level affect firm profitability, measured by ROA. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

problems. Thus, a dataset containing 112 firms and 336 firm year observations is used to test hypothesis 1b.

A two-stage methodology is applied to verify hypothesis 1b (i.e. to verify whether deviation from the optimal working capital point significantly reduces firm profitability). Deviations from optimal CCC are obtained in the first stage, and in the second stage firm profitability is regressed against those deviations to identify the effect of deviation from the optimal working capital level on profitability. Appendix IV, Table x and xi, present the results of the first stage. Table x shows the results of the fixed effects panel regression, and Table xi of the pooled OLS-regression. The variables size, leverage, tangibility, and ROA significantly help explain the optimal CCC as shown in model 7 of Table x and xi. Therefore, model 7 is used to estimate the optimal CCC, and its standardized residuals are saved to continue with phase 2 of testing hypothesis 1b. Ultimately, Table 8 shows the effects of deviation from the

(supposedly) optimal CCC level on firm profitability, and Tables xii, xiii, and xiv in Appendix V contain the robustness checks of testing hypothesis 1b phase 2.

Table 8 shows the effect of deviation from the optimal working capital level (where deviation is determined by the saved standardized residuals from phase 1) on firm profitability. The F-statistics of all models are statistically significant, which indicates that the models are meaningful. Furthermore, the R-squared statistics are relatively low, meaning that the deviation from the optimal CCC is unable to explain the variation in ROA well. Since model 4 also controls for age and ownership concentration, it shows the highest R-squared statistics. To elaborate, model 4 of Table 8 shows that a .2% of the variation in ROA can be explained by the model after controlling for firm fixed effects. Besides, .03% of the variation in ROA can be explained by the differences between firms according to model 4 of Table 8.

As for the interpretation of the individual regression coefficients, Table 8 shows that positive deviation, negative deviation, and absolute deviation from the optimal CCC are insignificantly related to ROA, keeping the other predictors constant. Furthermore, the robustness checks performed as presented in Appendix V show varying results. To begin with, the F-statistic in all models of Table xii are insignificant. Also, all models but model 4 of Table xiv are insignificant. Since the insignificant models are not meaningful, they are not interpreted. Furthermore, model 4 of Table xiv shows similar results to Table 8, because both positive deviation from the optimal CCC and negative deviation from the CCC are insignificantly related to ROA. Table xiii (Appendix V), on the other hand, shows a robust positive significant relationship between positive deviation from the optimal CCC and ROE. Moreover, negative deviation from the optimal CCC shows a positive significant relationship to ROE in model 2, however, this relationship is not robust as it does not hold in models 3 and 4. Ultimately, the results of Table xiii (Appendix V) indicate that firms can increase their ROE by increasing the their CCC. Despite this significant relationship found, no conclusions are drawn based on Table xiii (Appendix V), because Table 8 fails to identify the existence of a relationship between deviation from the optimal CCC and firm profitability. Thus, since the results are not robust, it is concluded that neither positive nor negative deviation from an optimal working capital level has an effect on firm profitability. Therefore, hypothesis 1b stating that deviation from the optimal working capital point significantly reduces firm profitability, is rejected.

Once again, to verify the robustness of the results obtained in Table 8, the same analysis is performed using the dataset before multiple imputation. As shown in Appendix V, Table xv, positive, negative, and absolute deviation from the optimal CCC level are

insignificantly related to firm profitability. This suggests that the obtained results are robust, and verifies that hypothesis 1b is not supported.

5.5.3 Robustness checks

The following three additional robustness checks are performed: 1) identifying if the results remain robust by industry, 2) identifying if a linear relationship exists between CCC and firm profitability, and 3) identifying the relationship between the components of the CCC and ROA.

5.5.3.1 Robustness check by industry

A first robustness check is performed where the results are compared between industries. Although no support is found for the existence of an optimal working capital level, it may be so that the relationship changes when separating the sample by industry. As explained by Eljelly (2004), results may differ between industries as capital intensive industries require lower levels of working capital, whereas their labour-intensive counterparts require higher levels of working capital which have different effects on profitability. The panel regression results of the robustness check by industry are presented in Table 9. Depending on the outcomes of the Hausman tests, a fixed effects panel regression or a random effects panel regression is ran. The results of the Hausman tests are presented in the notes of Table 9. Finally, the results of the pooled OLS-regression are presented in Table xvi of Appendix VI. Table 9 and Table xvi (Appendix VI) replicate equation 2 by industry (i.e. test hypothesis 1a), and thus identify if an optimal CCC level exists that optimizes firm profitability across different industries. The F-statistics of the FE models (and the Wald-chi-squared statistic for the RE models) show all models are statistically significant, meaning all variables make a meaningful contribution in explaining ROA. However, it should be noted that the Wald-chi-squared statistic of 10.800 of model 3, the Administration, software & communication industry, is just about significant at the 10% level. Model 3 is therefore considered to be less meaningful in explaining ROA than the other models. This is also observed when analysing the R-squared within values, which is lowest in model 3 with .59% of the variation in ROA within firms being explained by the predictors, compared to the 22.74% in model 2. A same pattern is observed in Table xvi (Appendix VI). Furthermore, consistent to the findings of Table 7, the combination of the CCC and the CCC^2 are insignificantly related to ROA as presented in Table 9. This finding remains robust when performing a pooled OLS-regression by industry as presented in Table xvi (Appendix VI). The insignificant relationships indicate

that an optimal working capital level that maximizes firm profitability does not exist across different industries. However, the sample of the manufacturing industry presented in model 2 of Table 9 shows one exception as the CCC^2 is negatively related to ROA, significant at the 10% level. If the positive relationship between the CCC and ROA of model 2 in Table 9 would have been statistically significant also, then the progressive WCM theory would have been supported for the manufacturing industry. However, with a t-statistic of 1.292, CCC is insignificantly related to ROA, meaning no such support is found. Instead, a single significant negative relationship between CCC^2 and ROA indicates that extreme CCC values lower profitability of firms operating in the manufacturing industry. In short, splitting the sample by industry confirms that a U-shaped relationship between the working capital level and firm profitability does not exist for Dutch private SMEs.

Table 9. Robustness check: panel regression results by industry

	Wholesale & retail industry	**Manufacturing industry**	**Administration, software & communication industry**	**Other industry**
ROA	**1**	**2**	**3**	**4**
CCC	.002	.065	-.388	.093
	(.036)	(1.292)	(-1.270)	(.830)
ln_CCC²	-1.367	-6.141*	13.137	-1.608
	(-.393)	(-1.732)	(1.010)	(-.310)
Control variables	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Intercept	85.921	45.942	108.841	121.008
	(1.271)	(1.197)	(.620)	(1.120)
R-squared within	.1093	.2274	.0059	.2233
R-squared between	.0001	.0198	.7477	.5811
F-statistic	5.601***	6.808***		
Wald-chi² statistic			10.800*	17.590***
N	168	99	33	39

Notes*: This table represents the panel regression results identifying the existence of a concave relationship between WCM and firm profitability across different industries. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variables are measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Hausman test Wholesale industry: chi squared = 20.68, p = .002. Hausman test Manufacturing industry: chi squared = 13.90, p = .031. Hausman test Administration industry: chi squared = 3.44, p = .179. Hausman test Other industry: chi squared = 12.29, p = .056. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

5.5.3.2 Robustness check linear relationship CCC and ROA

Despite the theoretical support, a concave relationship between WCM and firm profitability does not exist among small private Dutch firms according to the empirical evidence presented above. The nonexistence of a U-shaped relationship between WCM and firm profitability remains robust when splitting the sample by industry. Therefore, an additional robustness check is performed to analyse if a linear relationship exists instead. The results of the fixed effects panel regression analysing the relationship between CCC and ROA are presented in Appendix VII, Table xvii, and the results of the pooled OLS-regression are presented in Appendix VII, Table xviii.

The F-tests in both Table xvii and Table xviii (Appendix VII) show significance at the 1% level indicating that the models are useful in explaining firm profitability. Besides, the full models (model 9 and 10) indicate that approximately 15.5% of the variation in ROA can be explained by CCC, age, firm size, leverage, tangibility, and ownership concentration (see Table xviii, Appendix VII), which is similar to the 22% found by the full model of Deloof (2003), and the 16.3% found by Eljelly (2004). In addition, Table xvii shows that the CCC is negatively related to ROA in all models. However, the relationship between the CCC and ROA does not show statistical significance. On the contrary, the pooled OLS-regression as presented in Table xviii (Appendix VII) does show a significant negative relationship between the CCC and ROA where statistical significance ranges from the 5% level in models 2, 3, 4, 6, and 8, to the 1% level in models 1, 7, 9, and 10. Thus, the pooled OLS-regression finds support for the traditional WCM theory where firms can increase their profitability by lowering their CCC, while the FE panel regression fails to support this. Considering the obtained results are not robust (i.e. the existence of a negative relationship between the CCC and ROA is not fully supported), no conclusive statements can be made based on Tables xvii and xviii.

Although the results are not reported for the sake of brevity, similar findings between the CCC and ROA are obtained when running a panel regression and pooled OLS-regression while splitting the sample by industry. Similar to the results presented in Tables xvii and xviii of Appendix VII, the panel regression results show a negative, but insignificant relationship between the CCC and ROA across different industries, while the pooled-OLS regression results presented does show statistical significance. To elaborate, a significant negative relationship exists between the CCC and ROA among SMEs operating in the Wholesale and retail industry, where a one day increase of the CCC decreases ROA by 5.7% (significant at the 1% level). A possible explanation for only finding significance for the Wholesale and

retail industry may be due to the smaller statistical power of the other industries because of their smaller sample sizes. To illustrate, the Wholesale and retail industry consists of 56 firms, while the Manufacturing industry, Administration, software & communication industry, and Other industry consist of 33, 11, and 13 firms, respectively. To conclude, when splitting the sample by industry, the regression models fail to find robust results about the existence of a negative linear relationship between WCM and firm profitability.

5.5.3.3 Robustness check relationship components CCC and ROA

A final robustness check is performed where the relationship between the components of the CCC (i.e. DSO, DIO, and DPO) and firm profitability are analysed. To elaborate, the aforementioned results fail to identify a relationship between the CCC and firm profitability. In other words, the existence of a concave or linear relationship between WCM and firm profitability is not supported. Therefore, in order to fully understand the relationship between the CCC and ROA, the relationships between the DSO, DIO and DPO, and firm profitability are analysed. Before performing the regression analyses, the DSO, DIO, and DPO are transformed into natural logarithms to minimize the influence of extreme values on the results. Finally, the fixed effects panel regression results of the relationship between the components of the CCC and ROA are presented in Table 10, and the pooled OLS-regression results in Table xix of Appendix VIII.

To begin with, taking into account the other predictors, the DSO is negatively related to ROA, significant at the 1% level, in all models of Table 10. This suggest that Dutch private firms may increase their profitability by allowing their customers less time to settle their invoices. Moreover, partial support for a negative relationship between the DSO and ROA is found in Table xix (Appendix VIII). To elaborate, the DSO shows a significant negative relationship to ROA in models 2 and 9 of Table xix. However, the significant relationship disappears when no control variables are added to the regression model. Therefore, it may be that the significant negative relationship between the DSO and ROA in Table xix is caused by a correlation between the DSO and one of the control variables. The highest correlation exists between the DSO and Tangibility (with a correlation coefficient of .337 significant at the 1% level). Furthermore, the negative relationship between DSO and ROA can be explained by the higher external financing and interest costs that emerge from higher capital levels caused by a lengthy DSO (Deloof, 2003). As money is tied up in accounts receivable, firms have less cash available to make payments or investments, requiring them to attract external financing (Aktas et al., 2014; Altaf & Ahmad, 2019).

Secondly, the DIO shows a negative relationship to firm profitability. To illustrate, the DIO shows a negative relationship to ROA significant at the 1% level in all models of Table xix (Appendix VIII). Besides, the DIO also shows a significant negative relationship to firm profitability in models 7, 8, and 9 of Table 10. Thus, taking into account the other predictors, the longer the DIO, the lower firm profitability. Dutch private SMEs can therefore increase their profitability by lowering the number of days it takes to convert raw materials into finished good, which are then stored into warehouses until sold. An explanation for the negative relationship between DIO and profitability is that the inventory holding costs, such as warehouse storage and insurance costs, cut profitability (Tauringana & Afrifa, 2013). Also, an increased working capital level where money is tied up in inventories results in less money available for day-to-day operations and to make investments. To finance these items, firms require external financing which is associated with interest costs and agency costs that negatively influence profitability (Aktas et al., 2014; Altaf & Ahmad, 2019; Deloof, 2003).

Finally, the DPO seems to be negatively related to firm profitability. To elaborate, Table 10 shows a negative relationship between the DPO and ROA in models 5 and 6. However, the significance disappears after allowing for the other components of the CCC in models 7, 8, and 9. Table xix, on the other hand, shows a robust negative significant relationship between the DPO and ROA in all models. Therefore, partial support is found for the existence of a negative relationship between the length of the DPO and firm profitability. In short, Dutch private SMEs can most likely increase their profitability by lowering number of days it takes the firm to pay for goods bought on credit. This negative relationship may be explained by the discounts for early payments that firms take advantage of which have a positively affects profitability (Chang, 2018; Wetzel & Hofmann, 2019).

In conclusion, all components of the CCC are negatively related to firm profitability, of which the negative relationship between the DSO and firm profitability is strongest and most robust. Moreover, the negative relationship between all components of the CCC and profitability help explain why previous results fail to identify a relationship between the CCC and firm profitability. To elaborate, DSO and DIO increase the CCC, while DPO decreases the CCC. Finding a negative relationship between all components of the CCC and firm profitability is therefore contradictory. Deloof (2003) obtains a similar finding among large Belgian firms where all components (i.e. DSO, DIO, and DPO) are negatively related to firm profitability, while CCC is not significantly related to profitability. Deloof (2003) explains

Table 10. Robustness check: FE panel regression relationship components CCC and ROA

ROA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Independent variables									
ln_DSO	-2.372***	-2.758***					-2.780***	-2.745***	-3.394***
	(-3.190)	(-3.727)					(-3.487)	(-3.418)	(-4.255)
ln_DIO			-.757	-.920			-1.372**	-1.419**	-1.903***
			(-1.202)	(-1.466)			(-2.148)	(-2.210)	(-2.977)
ln_DPO					-.711*	-.881**	-.293	-.305	-.453
					(-1.747)	(-2.160)	(-.708)	(-.732)	(-1.115)
Control variables	No	Yes	No	Yes	No	Yes	No	No	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Intercept	1.007	35.298	-5.985	30.109	-7.761*	29.983	-4.550	9.849	47.308**
	(.192)	(1.501)	(-1.177)	(1.245)	(-1.822)	(1.253)	(-.761)	(1.508)	(2.024)
R-squared within	.0487	.0760	.0110	.0403	.0186	.0451	.0686	.0729	.1024
R-squared between	.0000	.0108	.0751	.0068	.0294	.0056	.0213	.0236	.0000
F-statistic	7.071***	7.325***	6.600***	6.749***	6.796***	6.961***	7.126***	6.982***	7.469***
N	339	339	339	339	339	339	339	339	339

Notes*: This table represents the fixed effects panel regression results identifying the relationship between the components of the CCC (i.e. DSO, DIO, and DPO) and profitability. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Hausman test: chi squared = 39.85, p = .0000. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

that the insignificant relationship between CCC and profitability is not a surprise, because profitability declines with the number of days inventories, but also with the number of days accounts payable, which is subtracted to calculate the CCC. Also, identifying the relationship between the components of the CCC and firm profitability provides insight in the negative relationship between the CCC and firm profitability found in Table xviii (Appendix VII). As such, a negative relationship between the CCC and firm profitability suggests that the DIO and DSO are negatively related to ROA, and that the DPO is positively related to the ROA. However, as shown in Table xix (Appendix VIII), both the DIO and DPO show a robust negative relationship to ROA. Therefore, the previously identified negative relationship between the CCC and ROA of Table xviii (Appendix VII) seems to be caused by the highly significant negative relationship between the DIO and ROA, as shown in Table xix. In short, the DSO, DIO, and DPO are negatively related to firm profitability, which is inconsistent with any of the WCM theories.

6. Conclusion

This study offers evidence on the relationship between WCM and firm profitability among Dutch private SMEs by answering the following research question: what is the effect of working capital management on firm profitability among Dutch private SMEs? Prior research have investigated that a relationship between WCM and profitability exists, however, the direction of this relationship is, up to this day, debatable. Besides, it is argued that private SMEs are more dependent on WCM because of the financial constraints they face, and therefore a relationship between WCM and profitability most likely exists among this group of firms. Furthermore, given the competing arguments for the existence of a positive or negative WCM-profitability relationship, this study proposes an optimal working capital level (measured by the CCC) exists that maximizes profitability. Theoretical support for the existence of a concave relationship between WCM and profitability is found in the finance gap theory, agency theory, and pecking order theory.

To investigate if a concave relationship between the CCC and profitability exists, this study collects data of 113 Dutch private SMEs over the period of 2014 – 2017 from the Orbis database. The results of the panel regression and pooled-OLS regression show that the CCC and its square do not affect firm profitability, while sperate components of the CCC do. Thus, to answer the research question, it is concluded that working capital management (measured by the CCC) has no effect on the profitability of Dutch private SMEs. However, the DSO, DIO and the DPO are overall negatively related to firm profitability. This infers that unlisted SMEs from The Netherlands can improve profitability by allowing customers less time to pay for goods bought on credit, decreasing the amount of days it takes to create and sell a product or service, and by promptly settling outstanding bills. In short, WCM measured by the CCC does not have an effect on firm profitability among Dutch private SMEs, and thus an optimal working capital level does not exist. However, the DSO, DIO and DPO (which are components of the CCC) do have an effect on firm profitability. As such, Dutch private SMEs can increase their profitability by lowering the DSO, DIO, and DPO.

7. Discussion

This final chapter provides the theoretical and practical contributions based on the results. Furthermore, the limitations of this study are acknowledged, and some avenues for future research are highlighted.

7.1 Theoretical and practical contributions

Multiple theoretical contributions are made with this study. The fist most prominent contribution is made by analysing the WCM-profitability relationship among a previously unstudied sample of firms, namely Dutch unlisted SMEs. Therefore, a research gap is filled as pointed out by Altaf and Ahmad (2019), who emphasise the need to analyse the influence of the CCC on firm profitability across as many countries as possible to understand why evidence supports the existence of a positive, negative, and a concave relationship. Hereby, also a second contribution is made by adding to the scarce evidence on the relationship between WCM and firm profitability among unlisted firms. This study confirms that data on private firms is difficult to obtain, and often comes with much missing data which cannot be recovered by analysing public reports. This might be why little evidence on the WCM-profitability relationship exists on private firms despite some crucial differences between public and private firms, as indicated in this research. The third contribution to the existing literature is made by confirming no 'one size fits all' theory exists when it comes to WCM, and that firm characteristics (e.g. being listed or not), and country characteristics influence the WCM-profitability relationship. A final theoretical implication is made by not only analysing the influence of the CCC and its square on firm profitability, but also trying to understand why a certain relationship has (not) been found. This is achieved by examining the relationship between the components of the CCC and firm profitability.

Besides the theoretical implications, also some practical implications can be made based on this results of this study. To begin with, the results indicate Dutch private SMEs should not strive towards an optimal CCC, a low CCC, or a high CCC. Instead, financial managers of those firms should manage the components of the CCC separately to enjoy from its benefits. To illustrate, the average Dutch private SME should try to obtain a low DIO, because this has a positive effect on profitability. One way a firm can achieve this, is by incorporating a just-in-time production. A just-in-time production is a manufacturing program that aligns raw-material orders from suppliers directly with production schedules, and is aimed primarily at increasing efficiency and decreasing all forms of waste (Cua, McKone, & Schroeder, 2001). Ultimately, a just-in-time production reduces inventory costs. Thus, by

incorporating a just-in-time production, the amount of days between creating and selling a product or service (i.e. the DIO) decreases, which has a positive effect on firm profitability. Nonetheless, a downside of a just in time production is that firms do not have a buffer to meet unexpected demands (Brealey et al., 2020; Wang, 2002). Therefore, employees should be trained to perform multiple tasks and to forecast demand accurately to prevent losing sales because of stockouts (Cua et al., 2001). Another practical implication for the Dutch private SME is to lower its DPO. To elaborate, SMEs should pay their outstanding bills promptly to enjoy from early-payment discounts, and herewith improve profitability. This especially counts for small firms, because they are more dependent on those small savings that ultimately make a difference in profitability, and are also more dependent on their relationship with suppliers which can be improved by paying on time (Eljelly, 2004). Small firms should therefore amend their trade credit policy to ensure they are able to swiftly settle their bills. A final practical implication for Dutch private SMEs is to lower their DSO by gaining more control over their credit collections. A firm may gain control over its credit collections by offering a small cash discount for prompt settlement. For example, a '2/10, net 30' is a common offer indicating that full payments is required in 30 days, and that a cash discount of 2% is granted when customers pay the invoice within 10 days (Boisjoly et al., 2020; Brealey et al., 2020). Hereby, a firm may stimulate its customers to promptly pay for goods bought on credit. Thus, besides amending the trade credit policy to ensure firms are able to swiftly settle their bills, Dutch private SMEs should also amend their trade credit policy to ensure prompt settlement of outstanding invoices to increase their profitability.

7.2 Limitations and further research

Similar to most studies, this study deals with some limitations. First of all, a limitation is the large amount of missing data. For example, 48.1% of the data is missing for the main independent variable: the CCC. As acknowledged by Graham (2009), missing data results in biased results and reduce the efficiency. Moreover, because of the private firms in the sample, missing data cannot be recovered by analysing public reports. In order to overcome this first limitation, a multiple imputation is ran. However, this causes the second limitation of this research, because multiple imputation results in nonreplicable estimates which reduce the openness and transparency of scientific research, and thereby harm the reliability of the results (Von Hippel, 2018). Von Hippel (2018) also explains that this limitation can be reduced by exceeding the amount of imputations beyond the old rule of thumb (i.e. beyond 5-10 imputations). This research satisfies this notation by running 89 imputations, but, still it

cannot be ruled out that the multiple imputation makes the results of this study slightly less reliable. A third limitation of this study is excluding the control variable 'ownership identity' because its results are unreliable. Despite the fact that this study still controls for ownership concentration, excluding ownership identify from this study means that this study is less able to control for corporate governance characteristics. A final limitation is that the results are not generalizable beyond the sample of Dutch private SMEs, meaning that the results are very specific to unlisted SMEs from The Netherlands. Although it is the aim to add country-specific knowledge about the WCM-profitability relationship to the existing literature, it does harm the external validity of the research.

Based on the conclusion, contributions, and limitations of this study, some avenues for future research arise. The first recommendations are based on the finding that there is not one generalizable WCM theory that holds for all firms. As such, future research investigating the WCM-profitability relationship should acknowledge this, and focus on the effects of the external environment to try to understand why there is no single theory that holds for all firms in different countries. This can be achieved by analysing the moderating effect of the external environment and the CCC on firm profitability. In the same line, another avenue for further research is to perform a meta-analysis by collecting the results found by prior research, and comparing them to find out how the results differ by the different sample characteristics. Singh et al. (2017) have performed a meta-analysis by investigating 46 research articles that directly study relationship between WCM and profitability. However, Singh et al. (2017) aim to find the most frequently confirmed relationship by prior research. A next stage is not to try to find the most commonly accepted WCM theory, but to perform a meta-analysis to understand *why* there is no 'one size fits all' WCM theory by focussing on the differences between samples and countries. Moreover, although previous studies differentiate between firm size in analysing the WCM-profitability relationship, prior studies differentiate little between public and private firms, and mostly limit their sample to public firms. This makes it unclear what impact a firm's incorporation has on the relationship between WCM and firm profitability. Therefore, a final recommendation for future research is to investigate the WCM theory whilst specifically focussing on private firms to add to the scarcity of research on such firms.

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Appendices

Appendix I Descriptive statistics before multiple imputation

Table i. Missing values

Variables	**N**	**Missing (%)**
ROA	314	7.4
ROE	313	7.7
CCC	176	48.1
CCC2	176	48.1
Age	339	0.0
Size1	277	18.3
Size2	323	4.7
LEV	323	4.7
TAN	311	8.3
OWN1	330	2.7
OWN2	330	2.7
ROA_control_t	311	8.3
DSO	277	18.3
DPO	194	42.8
DIO	251	26.0
Accounts receivable	323	4.7
Accounts payable	208	38.6
Inventory	321	5.3
Costs of goods sold	253	25.4
Sales	277	18.3

Table ii. Descriptive statistics before multiple imputation

Variables	N	Mean	Median	St. dev.	Minimum	Maximum
Dependent variable (t+1)						
ROA (%)	314	.098	.084	.126	-.240	.403
ROE (%)	313	.194	.145	.297	-.630	.991
(In)dependent variables (t)						
CCC (days)	176	138.510	128.500	77.021	.000	302.000
CCC^2	176	29,741.700	16,512.500	24,668.130	703.000	89,900.000
DSO (days)	277	97.200	77.360	78.495	8.000	406.000
DIO (days)	251	74.500	63.530	59.179	.000	245.000
DPO (days)	194	22.070	15.250	22.983	.000	117.000
Control variables (t)						
Age (years)	339	31.270	24.000	24.700	.000	114.000
Size1 (total sales EUR x mln)	277	27.237	26.267	11.207	.023	49.821
Size2 (total assets EUR x mln)	323	15.884	14.553	8.960	.010	42.059
Lev (%)	323	.541	.548	.230	.052	.997
Tan (%)	311	.213	.099	.228	.000	.833
Own1	330	1.430	1.000	.548	1.000	3.000
ROA (%)	311	.096	.081	.120	-.213	.403

Notes*: This table reports the descriptive statistics for each variable included in this study before multiple imputation is ran. The variable definitions can be found in table 2. In equation 2, CCC is used as the independent variable, and in equation 3 CCC is used as a dependent variable, both measured at time t. Also, in equation 2, ROA is used as the dependent variable measured in time t+1, and in equation 3 ROA is used as a control variable measured at time t. Data of the dependent variables (t+1) are based on 2017, 2016, and 2015. Data of the independent and control variables (t) are based on the years 2016, 2015, and 2014. Outliers are winsorized at the 97.5 and 2.5. percentile.*

Appendix II Hausman test

Table iii. Hausman test (ROA as dependent variable) N = 339

	(b) fe	**(B) re**	**(b-B) difference**	**S.E.**
CCC	.0258303	.0062389	.0195914	.0124116
ln_CCC²	.6132815	-.7912453	1.404527	.7124345
ln_Age	.7172192	-1.070713	1.787933	3.363816
ln_Size1	-2.878665	-2.023395	-.8552708	.4508456
Lev	-.0136872	-.0264865	.0127993	.0396195
Tan	.0936629	-.0781104	.1717733	.0436084
Chi square	38.13			
P-value	.0000			

Table iv. Hausman test (ROE as dependent variable) N = 339

	(b) fe	**(B) re**	**(b-B) difference**	**S.E.**
CCC	.066866	.0310848	.0357812	.0288876
ln_CCC²	.3550273	-2.962456	3.317483	1.661299
ln_Age	13.68606	-2.539044	16.22511	7.321164
ln_Size1	1.993209	1.756528	.2366803	1.043244
Lev	.2839277	.3461493	-.0622216	.087675
Tan	-.0370125	-.2836206	.2466081	.0963812
Chi square	30.25			
P-value	.0000			

Table v. Hausman test (CCC as dependent variable) N = 336

	(b) fe	**(B) re**	**(b-B) difference**	**S.E.**
ln_Age	-15.02532	1.373502	-16.39882	16.67517
ln_Size2	.1253306	11.98709	-11.86176	1.866703
Lev	-.2631073	-.6794516	.4163443	.2096719
Tan	-1.435568	-1.090534	-.3450338	.2059752
ROA_control_t	.1015204	-.4808946	.582415	.1858191
Chi square	54.34			
P-value	.0000			

Appendix III Robustness check hypothesis 1a

Table vi. Robustness check: pooled OLS-regression results hypothesis 1a (ROA as dependent variable)

ROA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Independent variables										
CCC	-.052	-.046	-.052	-.045	-.054	-.086**	-.051		-.083**	-.078*
	(-1.262)	(-1.086)	(-1.261)	(-1.109)	(-1.321)	(-2.214)	(-1.244)		(-2.051)	(-1.930)
CCC^2	8.740E-5	7.032E-5	8.760E-5	.000	8.158E-5	.000	8.969E-5		.000	.000
	(.693)	(.538)	(.694)	(.806)	(.646)	(1.162)	(.689)		(.869)	(.884)
Control variables										
ln_Age		-.364						-.657	-.418	-.492
		(-.512)						(-.978)	(-.706)	(-.724)
ln_Size1			-.437						-.533	
			(-.382)						(-.492)	
ln_Size2				-2.566***						-1.010
				(-2.929)						(-1.164)
Lev					-.033			-.013	-.051*	-.051*
					(-1.083)			(-.454)	(-1.672)	(-1.702)
Tan						-.212***		-.177***	-.215***	-.203***
						(-6.711)		(-5.583)	(-6.689)	(-6.090)
Own1_dummy							1.220	.567	.400	.379
							(.910)	(.419)	(.302)	(.287)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	13.711***	14.505***	21.110	54.829***	15.879***	23.503***	12.993***	16.547***	36.789**	42.466***
	(4.187)	(4.000)	(1.074)	(3.806)	(4.138)	(6.903)	(3.856)	(5.107)	(1.977)	(3.091)
Adjusted R-squared	.041	.039	.039	.063	.042	.154	.041	.111	.153	.156
F-statistic	3.089***	2.730***	2.714***	3.838***	2.851***	8.693***	2.805***	5.712***	6.081***	6.195***
N	339	339	339	339	339	339	339	339	339	339

***Notes**: This table represents the pooled OLS-regression results identifying if a concave relationship between the working capital level and profitability exists. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table vii. Robustness check: FE panel regression results hypothesis 1a (ROE as dependent variable)

ROE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Independent variables										
CCC	.115	.108	.113	.115	.109	.110	.116		.091	.100
	(1.313)	(1.233)	(1.308)	(1.329)	(1.264)	(1.200)	(1.314)		(.993)	(1.095)
CCC^2	.000	.000	.000	.000	-9.768E-5	.000	.000		-7.084E-5	-4.829E-5
	(-.498)	(-.422)	(-.544)	(-.417)	(-.372)	(-.457)	(-.507)		(-.262)	(-.179)
Control variables										
ln_Age		7.363						7.260	5.839	6.468
		(.795)						(.778)	(.632)	(.703)
ln_Size1			-5.029**						-5.066**	
			(-2.109)						(-2.130)	
ln_Size2				-4.207**						-4.470**
				(-2.399)						(-2.542)
Lev					.258**			.239**	.256**	.269**
					(2.213)			(2.010)	(2.180)	(2.299)
Tan						-.019		-.160	-.052	-.016
						(-.154)		(-1.364)	(-.414)	(-.127)
Own1_dummy							1.574	-2.029	-.223	-.068
							(.116)	(-.149)	(-.017)	(-.005)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-30.485**	-57.096	52.684	35.426	-44.008***	-29.974**	-30.609**	-52.626	20.148	2.465
	(-2.556)	(-1.606)	(1.280)	(1.185)	(-3.307)	(-2.416)	(-2.551)	(-1.509)	(.380)	(.056)
R-squared within	.0369	.0436	.0386	.0498	.0577	.0370	.0379	.0409	.0703	.0801
R-squared between	.1058	.0732	.0948	.1370	.0166	.0801	.1546	.0002	.0138	.0298
F-statistic	7.443***	7.372***	7.532***	7.586***	7.551***	7.347***	7.347***	7.228***	7.387***	7.457***
N	339	339	339	339	339	339	339	339	339	339

***Notes**: This table represents the fixed effects panel regression results identifying if a concave relationship between the working capital level and profitability exists. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table viii. Robustness check: pooled OLS-regression results hypothesis 1a (ROE as dependent variable)

ROE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Independent variables										
CCC	-.167*	-.120	-.167*	-.150*	-.138	-.242***	-.161*		-.173**	-.156*
	(-1.823)	(-1.273)	(-1.820)	(-1.656)	(-1.580)	(-2.773)	(-1.785)		(-2.017)	(-1.810)
CCC^2	.000	.000	.000	.000	.000	.000	.000		.000	.000
	(.914)	(.396)	(.912)	(1.051)	(1.207)	(1.380)	(.916)		(1.179)	(1.209)
Control variables										
ln_Age		-3.038*						-2.699*	-2.178	-2.223
		(-1.922)						(-1.906)	(-1.500)	(-1.541)
ln_Size1			.256						-2.132	
			(.100)						(-.922)	
ln_Size2				-6.657***						-3.887**
				(-3.416)						(-2.109)
Lev					.385***			.378***	.326***	.324***
					(5.859)			(6.139)	(5.021)	(5.053)
Tan						-.461***		-.352***	-.416***	-.372***
						(-6.511)		(-5.273)	(-6.069)	(-5.236)
Own1_dummy							10.468***	5.343*	5.020*	4.936*
							(3.556)	(1.873)	(1.779)	(1.759)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	30.112***	36.736***	25.777	136.770***	5.123	51.417***	23.950***	10.691	66.100*	90.479***
	(4.115)	(4.557)	(.587)	(4.268)	(.627)	(6.734)	(3.237)	(1.564)	(1.666)	(3.029)
Adjusted R-squared	.059	.067	.056	.089	.145	.164	.091	.223	.243	.251
F-statistic	4.041***	4.026***	3.526***	5.108***	8.183***	9.278***	5.241***	11.756***	10.052***	10.462***
N	339	339	339	339	339	339	339	339	339	339

***Notes**: This table represents the pooled OLS-regression results identifying if a concave relationship between the working capital level and profitability exists. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table ix. Robustness check: FE panel regression results hypothesis 1a using the dataset before multiple imputation (ROA as dependent variable)

ROA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Independent variables										
CCC	.152	.126	.152	.103	.113	.122	.154		.006	-.007
	(1.075)	(.885)	(1.064)	(.726)	(.773)	(.798)	(1.083)		(.033)	(-.042)
CCC^2	.000	.000	.000	.000	.000	.000	.000		.000	.000
	(-1.138)	(-.865)	(-1.129)	(-1.086)	(-.892)	(-.961)	(-1.151)		(-.267)	(-.399)
Control variables										
ln_Age		-14.391						4.158	-10.001	-7.498
		(-1.120)						(.648)	(-.627)	(-.480)
ln_Size1			.101						.201	
			(.011)						(.020)	
ln_Size2				-13.473*						12.880
				(-1.669)						(1.475)
Lev					.140			.120	.201	.140
					(1.054)			(1.520)	(1.334)	(.917)
Tan						-.167		-.141	-.426	-.361
						(-.521)		(1.423)	(-1.108)	(-.997)
Own1_dummy							-42.435***	-17.195	-56.344**	-61.371***
							(-3.521)	(-1.583)	(-2.290)	(-2.704)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-18.878	35.543	-20.561	-225.391*	-22.006	-14.912	-19.020	-26.084	20.996	-182.716
	(-1.213)	(.697)	(-.139)	(-1.808)	(-1.390)	(-.854)	(-1.214)	(-1.074)	(.111)	(-1.193)
Adjusted R-squared	.308	.311	.297	.327	.309	.269	.308	.442	.260	.288
F-statistic	1.708**	1.710**	1.665**	1.766***	1.705**	1.583**	1.702**	3.069***	1.538**	1.620**
N	171	171	171	171	171	171	171	171	171	171

***Notes**: This table represents the FE panel regression results identifying if a concave relationship between the working capital level and profitability exists using the dataset before multiple imputation. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Appendix IV Regression results hypothesis 1b (phase 1)

Table x. FE panel regression results hypothesis 1b (phase 1)

CCC	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Independent variables							
ln_Age	4.917					10.583	
	(.225)					(.526)	
ln_Size2		6.640				7.325*	7.370*
		(1.594)				(1.905)	(1.921)
Lev			-.359			-.439*	-.430*
			(-1.296)			(-1.667)	(-1.638)
Tan				-1.484***		-1.509***	-1.501***
				(-5.836)		(6.011)	(-5.999)
ROA_control_t					-.738**	-.867***	-.878***
					(-2.187)	(-2.686)	(-2.729)
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	156.304*	69.252	192.992***	175.770***	169.533***	37.778	75.481
	(1.876)	(.999)	(7.521)	(8.837)	(7.976)	(.391)	(1.165)
R-squared within	.0096	.0037	.0143	.1399	.0051	.0868	.0862
R-squared between	.0135	.2155	.1167	.0959	.0394	.3800	.3813
F-statistic	6.481***	6.576***	6.543***	7.776***	6.661***	7.934***	8.026***
N	336	336	336	336	336	336	336

***Notes**: This table represents the fixed effects panel regression results identifying the determinants of the optimal CCC. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. Variable definitions as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table xi. Pooled OLS-regression results hypothesis 1b (phase 1)

CCC	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Independent variables							
ln_Age	2.756					-.935	
	(.818)					(-.332)	
ln_Size2		23.863***				24.363***	24.366***
		(6.070)				(6.906)	(6.916)
Lev			-.883***			-.802***	-.797***
			(-6.525)			(-6.646)	(-6.665)
Tan				-.730***		-1.041***	-1.040***
				(-4.724)		(-7.513)	(-7.516)
ROA_control					-.716***	-1.035***	-1.029***
					(-2.576)	(-4.269)	(-4.262)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	123.110***	-261.192***	177.141***	153.815***	137.659***	-185.919***	-189.321***
	(9.276)	(-4.009)	(17.934)	(17.895)	(17.799)	(-3.094)	(-3.201)
Adjusted R-squared	.097	.186	.199	.152	.113	.382	.384
F-statistic	6.984***	13.768***	14.843***	11.044***	8.103***	21.701***	24.166
N	336	336	336	336	336	336	336

***Notes**: This table represents the pooled OLS-regression results identifying the determinants of the optimal CCC. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. Variable definitions as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Appendix V Robustness check hypothesis 1b (phase 2)

Table xii. Pooled OLS-regression results hypothesis 1b (phase 2)

ROA	**1**	**2**	**3**	**4**	**5**
Independent variables					
Pos_deviation	-.632		-.386	-.621	
	(.545)		(-.341)	(-.549)	
Neg_deviation		-.949	-.770	-.474	
		(-.757)	(-.567)	(-.349)	
Absolute_deviation					-.553
					(-.810)
Control variables					
ln_Age				-1.246*	
				(-1.819)	
Own1_dummy				1.994	
				(1.460)	
Intercept	10.295***	9.718***	9.924***	12.780***	10.065***
	(13.329)	(11.956)	(9.796)	(5.156)	(14.977)
Adjusted R-squared	-.002	-.001	-.004	.005	-.001
F-statistic	.368	.574	.344	1.438	.656
N	336	336	336	336	336

Notes*: This table represents the pooled OLS-regression results identifying if deviations from the optimal working capital level affect firm profitability, measured by ROA. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table xiii. FE panel regression results hypothesis 1b (phase 2)

ROE	**1**	**2**	**3**	**4**	**5**
Independent variables					
Pos_deviation	5.615***		5.664**	5.669**	
	(3.060)		(2.159)	(2.150)	
Neg_deviation		4.409**	-.075	-.077	
		(2.141)	(-.026)	(-.026)	
Absolute_deviation					2.970***
					(2.838)
Control variables					
ln_Age				-.688	
				(-.090)	
Own1_dummy				-.257	
				(-.019)	
Intercept	-42.420***	-39.724***	-42.454***	-39.212	-40.910***
	(-4.763)	(-4.412)	(-4.707)	(-1.052)	(-4.587)
R-squared within	.0000	.0000	.0000	.0148	.0000
R-squared between	.0059	.0059	.0058	.0464	.0001
F-statistic	7.752***	7.552***	7.649***	7.448***	7.697***
N	336	336	336	336	336

***Notes**: This table represents the fixed effects panel regression results identifying if deviations from the optimal working capital level affect firm profitability, measured by ROE. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table xiv. Pooled OLS-regression results hypothesis 1b (phase 2)

ROE	**1**	**2**	**3**	**4**	**5**
Independent variables					
Pos_deviation	.424		-.038	-1.111	
	(.180)		(-.015)	(-.450)	
Neg_deviation		1.429	1.446	2.899	
		(.505)	(.471)	(.978)	
Absolute_deviation					.606
					(.393)
Control variables					
ln_Age				-5.298***	
				(-3.547)	
Own1_dummy				13.174***	
				(4.425)	
Intercept	19.035***	19.711***	19.732***	29.215***	19.190***
	(10.909)	(10.735)	(8.621)	(5.406)	(12.637)
Adjusted R-squared	-.003	-.002	-.005	.072	-.003
F-statistic	.033	.255	.127	7.542***	.154
N	336	336	336	336	336

***Notes**: This table represents the pooled OLS-regression results identifying if deviations from the optimal working capital level affect firm profitability, measured by ROE. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variables are measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table xv. FE panel regression results hypothesis 1b using the dataset before multiple imputation (phase 2)

ROA	**1**	**2**	**3**	**4**	**5**
Independent variables					
Pos_deviation	-1.546		3.041	3.665	
	(-.626)		(.562)	(.661)	
Neg_deviation		-2.581	-5.431	-6.536	
		(-.997)	(-.953)	(-1.104)	
Absolute_deviation					-1.078
					(-.830)
Control variables					
ln_Age				2.474	
				(.209)	
Own1_dummy				-62.765***	
				(-3.272)	
Intercept	-18.535***	-19.960***	-21.994***	29.429	-19.069***
	(-3.082)	(-3.330)	(-3.129)	(.754)	(-3.210)
Adjusted R-squared	.283	.290	.282	.273	.286
F-statistic	1.652**	1.673**	1.642**	1.603**	1.662**
N	171	171	171	171	171

Notes*: This table represents the fixed effects panel regression results identifying if deviations from the optimal working capital level affect firm profitability, measured by ROA using the dataset before multiple imputation. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Appendix VI Robustness check: results by industry

Table xvi. Robustness check: pooled OLS-regression results by industry

	Wholesale & retail industry	**Manufacturing industry**	**Administration, software & communication industry**	**Other industry**
ROA	**1**	**2**	**3**	**4**
CCC	-.068	.081	-.317	-.064
	(-1.543)	(1.331)	(-1.111)	(-.508)
ln_CCC2	.820	-5.794	10.959	-.314
	(.268)	(-1.584)	(.877)	(-.054)
Control variables	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Intercept	52.938	81.080**	176.686	92.402
	(1.347)	(2.225)	(1.224)	(.864)
Adjusted R-squared	.092	.189	.262	.489
F-statistic	2.885***	3.546***	2.259*	5.033***
N	168	99	33	39

Notes*: This table represents the pooled OLS-regression results identifying the existence of a concave relationship between WCM and firm profitability across different industries. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variables are measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Appendix VII Robustness check: relationship CCC and ROA

Table xvii. Robustness check: FE panel regression relationship CCC and ROA

ROA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Independent variables										
CCC	-.004	-.003	-.003	-.005	.000	-1.611E-5	-.008	-.003	-.009	-.002
	(-.319)	(-.222)	(-.223)	(-.413)	(-.016)	(-.001)	(-.581)	(-.251)	(-.647)	(-.168)
Control variables										
ln_Age			.840						.133	.340
			(.195)						(.031)	(.080)
ln_Size1				-2.664**					-2.685**	
				(-2.398)					(-2.439)	
ln_Size2					-1.578*					-1.594*
					(-1.918)					(-1.941)
Lev						.138**			.144***	.149***
						(2.544)			(2.660)	(2.724)
Tan							-.059		-.068	-.053
							(-1.029)		(-1.199)	(-.928)
Own1_dummy								-2.873	-3.293	-3.339
								(-.457)	(-.531)	(-.535)
Year dummy	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-20.284***	-8.919*	-12.009	35.260*	15.597	-16.557***	-7.938	-8.842*	28.361	7.346
	(-4.638)	(-1.871)	(-.726)	(1.853)	(1.143)	(-2.956)	(-1.626)	(-1.842)	(1.158)	(.361)
R-squared within	.0176	.0232	.0233	.0502	.0402	.0232	.0319	.0249	.0627	.0492
R-squared between	.0473	.0473	.0532	.0283	.0005	.0498	.1670	.0358	.1126	.0888
F-statistic	6.815***	6.680***	6.554***	6.773***	6.694***	6.801***	6.593***	6.560***	6.750***	6.666***
N	339	339	339	339	339	339	339	339	339	339

***Notes**: This table represents the fixed effects panel regression results identifying if a linear relationship between the working capital level and profitability exists. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Hausman test: chi squared = 38.10, p = .0000. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively.*

Table xviii. Robustness check: pooled OLS-regression relationship CCC and ROA

ROA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Independent variables										
CCC	-.034***	-.024**	-.024**	-.024**	-.014	-.029**	-.043***	-.024**	-.049***	-.044***
	(-3.215)	(-2.177)	(-2.143)	(-2.171)	(-1.168)	(-2.425)	(-3.916)	(-2.121)	(-4.231)	(-3.529)
Control variables										
ln_Age			-.462						-.639	-.652
			(-.673)						(-.975)	(-.997)
ln_Size1				-.433					-.510	
				(-.379)					(-.471)	
ln_Size2					-2.541***					-.993
					(-2.904)					(-1.145)
Lev						-.034			-.053*	-.054*
						(-1.112)			(-1.753)	(-1.783)
Tan							-.210***		-.213***	-.202***
							(-6.647)		(-6.647)	(-6.051)
Own1_dummy								1.224	.469	.449
								(.913)	(.355)	(.341)
Industry dummy	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	14.672***	11.984***	13.419***	19.323	52.433***	14.325***	20.680***	11.272***	34.807*	41.587***
	(9.176)	(5.648)	(4.457)	(.993)	(3.722)	(4.794)	(8.665)	(4.986)	(1.885)	(2.993)
Adjusted R-squared	.027	.043	.041	.041	.064	.044	.153	.043	.153	.156
F-statistic	10.336***	3.530***	3.085***	3.038***	4.298***	3.204***	9.731***	3.143***	6.571***	6.691***
N	339	339	339	339	339	339	339	339	339	339

***Notes**: This table represents the pooled OLS- regression results identifying if a linear relationship between the working capital level and profitability exists. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively*

Appendix VIII Robustness check: relationship components CCC and ROA

Table xix. Robustness check: pooled OLS-regression relationship components CCC and ROA

ROA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Independent variables									
ln_DSO	.023	-1.320**					-.740	-.163	-1.664**
	(.036)	(-1.980)					(-1.061)	(-.222)	(-2.216)
ln_DIO			-1.862***	-1.728***			-2.307***	-1.850***	-2.155***
			(-3.087)	(-2.973)			(-3.904)	(-2.859)	(-3.487)
ln_DPO					-1.008**	-1.336***	-.938*	-.963*	-.894*
					(-2.138)	(-2.912)	(-1.855)	(-1.895)	(-1.817)
Control variables	No	Yes	No	Yes	No	Yes	No	No	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Intercept	8.665***	29.134	16.625***	37.586**	11.585***	30.153	24.183***	19.963***	42.361**
	(2.788)	(1.551)	(5.652)	(1.987)	(5.752)	(1.615)	(6.151)	(4.236)	(2.271)
Adjusted R-squared	.029	.118	.055	.129	.043	.130	.058	.063	.159
F-statistic	2.701**	5.099***	4.248***	5.528***	3.501***	5.579***	7.940***	3.800***	5.885***
N	339	339	339	339	339	339	339	339	339

Notes*: This table represents the pooled OLS-regression results identifying the relationship between the components of the CCC (i.e. DSO, DIO, and DPO) and profitability. The unstandardized beta coefficients are presented, and the t-statistics are in parentheses. The dependent variable is measured in time t+1, and the independent and control variables are measured in time t. Further variable definitions are as described in Table 2. Significance at the 1, 5, and 10 per cent level are represented by ***, **, and * respectively*