The impact of the global financial crisis on working capital management in Swedish listed firms

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Abstract

This thesis studies the relationship between efficient working capital management and firm profitability, and if the global financial crisis has affected the relationship. Previous literature has presented inconsistent results regarding the impact of working capital management on firm profitability, finding both negative and positive effects. It has also been argued that the global financial crisis has increased the attention of and possibly changed the attitude towards working capital management as a strategy in order to increase firm profitability. In the study, the cash conversion cycle is used as a measure for working capital management, and return on assets as a measure for firm profitability.

The sample in this thesis consists of 1170 observations from 78 Swedish listed companies over the time-period 2003–2017. Both multiple regression analysis and an independent-sample t-test were conducted in order to examine the given relationship. The findings of this thesis indicate that firms can increase their profitability by implementing efficient working capital management. However, the global financial crisis has not brought a change in companies' working capital management.

Key words: cash conversion cycle, firm profitability, global financial crisis, ROA, working capital efficiency, working capital management
List of abbreviations:

CCC        Cash conversion cycle
DAP        Days of accounts payable
DAR        Days of accounts receivable
DEBT       Firm debt ratio
In.Size    Firm size
ROA        Return on assets
WC         Working capital
WCM        Working capital management
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1. Introduction

The success and survival of businesses are largely dependent on how well its finance function is managed (Padachi et al. 2006). Due to the competitive nature of the business environment, companies are required to adapt and adjust their strategies and need to implement sound financial policies not only in order to survive but also sustain growth (ibid). A carefully prepared financial strategy should guide companies in managing their capital, for instance, deciding how much to invest, where to invest, how they should finance the operations, and how much liquidity should be available. These decisions are important in order to avoid financial difficulties, such as insufficient ability to pay obligations or insolvency but also to gain profitable outcomes (Lauenstein, 1981). The company's financial policy consists of several financial management practices in which working capital management (WCM) is a key activity (Morden, 1984). WCM is the management of current assets and liabilities associated with the business operations within policy guidelines (Padachi et al., 2006), intending to allocate them in order to realize their optimal potential and also to minimize waste (Brealey, Myers & Allen, 2013). This procedure affects the strategies and operations of firms (Shin & Soenen, 1998) and in business research, it has been suggested to impact firm liquidity, and therefore also firm profitability (Wang, 2002; Eljelly, 2004).

The importance of efficient WCM is widely recognized (Filbeck and Krueger, 2005; Enqvist, Graham & Nikkinen, 2014), though there is a difference of opinion on what strategy to implement for a company to achieve optimal utilization of its working capital. These differences emanate from previous research, which finds that strategies with both shorter and longer cash conversion cycle (CCC) increase company profitability. The CCC measures how quickly the company manages to convert current resources to results, in other words, how many days capital is tied up in the business through accounts receivable, inventories and accounts payable (Deloof, 2003). Although the measure is commonly used in research as an expression for companies' working capital efficiency, the results are inconsistent. Studies have found that companies with shorter CCC have higher profitability (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Lazaridis & Tryfonidis, 2006; Ebben & Johnson, 2011). In contrast, Yazdanfar and Öhman (2014) point out studies with conflicting results, who finds that companies with longer CCC are more profitable (Gill et al., 2010; Sharma & Kumar, 2011; Abuzayed, 2012).

In addition to the discussion, if a shorter or longer CCC enhances firm profitability, there is a third view of what is seen as efficient WCM. Baños-Caballero, García-Teruel and Martínez-
Solano (2011) argue that the relationship between companies' investments in working capital and profitability is rather concave than linear. Efficient WCM could entail both shorter and longer CCCs, all depending on the economic environment and prerequisites of the company (Baños-Caballero et al., 2011; Enqvist et al., 2014). It is also suggested that firms' working capital is countercyclical (Einarsson & Marquis, 2001) and that economic downturns have a greater negative impact on firms with large investments in working capital (Braun & Larrain, 2005).

An emerging aspect in the literature is that all studies that find a positive relationship between CCC and firm profitability (Gill et al., 2010; Sharma & Kumar, 2011; Abuzayed, 2012), examines data of the years leading up to the global financial crisis of 2008–2009. Before the crisis, practicing and controlling for efficient working capital usage were not prioritized among companies (Kaiser & Young, 2009; Enqvist et al., 2014). It can be explained by the favorable economic condition which entailed a high availability of cash (Ivashina & Scharfstein, 2010), growth orientation in companies and subsequent working capital intense sales (Kaiser & Young, 2009). In line with this view, Enqvist et al. (2014) point out that investing in working capital is an activity which is quite common for companies that aim to grow in favorable economic conditions.

Moreover, the only research on the interrelationship of varying economic conditions, WCM and company profitability is Enqvist et al. (2014). The study does not only examine the impact of listed firm's CCC and its profitability like many prior studies, (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Lazaridis & Tryfonidis, 2006; Gill et al., 2010) but also the effects of varying economic conditions which makes the study and the result unique. Based on data from Finnish listed companies between 1990–2008, the study finds that the importance of the relationship between firm profitability and working capital efficiency varies with the economic conditions and that it rather significantly increases during economic downturns compared to economic booms (Enqvist et al., 2014). In order to maximize their profitability, companies can implement a certain optimal level of WCM efficiency (ibid). However, the determination of which level that is optimal is affected by the economic condition (ibid). Furthermore, Enqvist et al. (2014) mention that the attention on efficient WCM in operational business practices increased with the global financial crisis. It is somewhat supported by Scholleova (2012) who finds that companies that practiced WCM that lead to shorter CCC withstood the recent global financial crisis successfully. In addition, Kolay (1991) argues that in order for a company to survive or even come out stronger from a recession, efficient WCM is crucial.
Efficient management of working capital is of importance for companies in economic downturns, such as the global financial crisis. However, one could ask if the relevance of it has continued after the crisis and how it may have been affected by it. According to Singh and Kumar (2014), WCM practices have continued to be of interest for both managers and researches. In fact, in the two following years after the crisis, 73 research studies were published on the subject, compared to only eight research studies in the two years before the crisis (ibid). Kaiser and Young (2009) argue that managers' attention to WCM has increased with the global financial crisis. The harsh times have caused managers to adopt restrictive WCM practices freeing resources and reducing the strain on the bottom line (ibid). However, in the long run, establishing a value creating and sustainable WCM strategy is suggested by Kaiser and Young (2009) in order to avoid bad company performance related to inefficient WCM during economic downturns. Furthermore, to the best of our knowledge, there are no studies conducted on the period after the crisis that finds a positive relationship between WCM and firm profitability.

The majority of the body of literature on WCM investigates the impact of CCC on company profitability in large countries (Jose et al., 1996; Shin & Soenen, 1998). In contrast, by international standards, the Swedish economy is categorized as a small, export-focused (Swedish Central Bank, 2013). Given the difference in the business environment, as opposed to most previous studies, one could argue that research on the Swedish market is motivated. Yazdanfar and Öhman's (2014) study is the only one that examines the impact of CCC on companies profitability in Sweden. The study examines companies categorized as small and medium-sized enterprises, which leaves larger companies unexplored (ibid).

1.2 Aim of the study
As indicated by the previous literature, empirical results vary and differ concerning the relationship between CCC and firm profitability. The disagreement can be explained by the fact that these studies are based on different sample selections and economic conditions. After examining the existing literature, it is apparent that several studies present a positive relationship between WCM and profitability, meaning that a longer CCC period would increase the firm profitability. If this is a result of the companies being unaware of the presented potential of efficient WCM or the favourable economic condition which the studies were conducted in is however unclear. In addition, researchers have also argued that since the global financial crisis, the attention of WCM has increased and also that a shorter CCC increases the profitability during such crises. Thus, we find it interesting to investigate if the crisis has affected the view
on WCM as a strategy to increase the profitability of the firms, and therefore has been incorporated to a greater extent throughout the businesses of listed Swedish firms. Considering the literature, our main objective is to investigate if there has been a significant change in the CCC of firms, which would indicate if there has been implementation of WCM in a to a greater extent in the business operations. This leads us to the research question stated below:

1.3 Research question
Has the financial crisis changed the use of WCM as a strategy to increase firms' profitability?

2. Theory

2.1. Working capital and Working capital management
Working capital is defined as the difference between a company's current asset and its current liabilities (Pass & Pike, 1987; Filbeck & Krueger, 2005; Ding et al. 2013). Dewing (1941) regards it as one of the key elements of a company. Its importance is further attested by the fact that a requisite amount of working capital is needed for a company to fund its business operation (Mukhopadhyay, 2004; Preve & Sarria-Allende 2010; Zariyawati et al., 2010; Ding et al., 2012). Deloof (2003) finds that among companies, it is common to have a substantial amount of cash invested in working capital and according to Padachi et al. (2006) investments in working capital is a major item relative to the company's total assets.

Smith (1980) consider working capital to be a crucial aspect to consider since its output affect factors central to a company, such as the comprehensive firm value. Further, Filbeck and Krueger (2005) regard it as a vital part in both the survival and growth of the company and that working capital is utilized through various techniques across firms. These techniques are viewed to encompass a broad spectrum of managerial actions of a company's working capital (Kaur, 2010; Aravindan & Ramanathan, 2013). In which, allocation of capital related to current asset and current liabilities, for instance, managing the accounts receivable, cash, inventory, accounts payable and other short-term debts are primary actions of the concept of WCM (Kieschnick et al., 2013; Ding et al., 2013; Mauboussin & Callahan, 2014; Yazdanfar & Öhman, 2014). Further, WCM is well recognized to be the responsibility of the company's senior management (Fiador, 2016).

WCM is crucial for companies (Filbeck & Krueger, 2005), though the impact of WCM on firm performance varies among research studies. For instance, Opler, Pinkowitz, Sultz and
Williamson (1999) argue that WCM has a direct impact on the liquidity in companies. Kim, Mauer and Sherman (1998) also regard WCM to impact the liquidity and that it is practiced with the aim to reduce the company's requirement of costly external financing. Notably, unsatisfactory liquidity can cause unfavorable consequences such as bankruptcy (Dunn & Cheatham, 1993). Further, Bierman, Chopra and Thomas (1975) regard WCM to affect both the liquidity, in the form of attaining available cash equivalents to fund its operation and business opportunities, and the profitability in a company. In line with this finding, Ebben and Johnson (2011) argue that practice correct WCM may increase both the company's liquidity and profitability. In contrast, other studies find WCM to encompass a trade-off between liquidity and profitability (Shin & Shonen, 1998; Eljelly, 2004; Raheman & Nasr 2007). However, WCM is a significant factor for the company since it is practiced by the management to attain a satisfactory level of liquidity to run the operations successfully which in turn affects its profitability (Arunkumar & Radharamanan, 2011). A substantial amount of research studies finds efficient WCM practices to increase profitability of the company (Jose et al. 1996; Deloof, 2003; Garcia-Teruel & Martinez-Solano, 2007; Gill et al., 2010; Mathuva, 2010; Sharma & Kumar, 2011; Abuzayed, 2012 Enqvist et al. 2014; Yazdanfar & Öhman, 2014).

2.2 Cash Conversion Cycle

Introduced by Gitman in (1974) and further developed by Gitman and Sachdeva (1982), CCC is a comprehensive measure of a company's WCM (Deloof, 2003; Enqvist et al., 2014). The CCC measures the time-period between the moment the company pays for the input of resources and the moment of receiving payment of finished outputs from the transformed resources (Jose et al., 1996; Deloof, 2003; Kieschnick et al., 2013). To calculate this time cycle, the CCC consider the time length of the cycle of days of accounts receivable (DAR), days of inventories (DOI), days of accounts payable (DOP) (Deloof, 2003), which in detail is measured as follows: $\text{CCC} = \text{DAR} + \text{DOI} - \text{DAP}$ (Jose et al., 1996; Deloof, 2003). A longer CCC time-period entails a larger investment in the WC (Deloof, 2003). The CCC's dynamic characteristic of considering both income statement and balance sheet data allow for measuring the time dimension of the cycle-turn tempo, which is favorable to traditional static measures (Jose et al., 1996). Eljelly (2004) has a similar viewpoint that CCC is preferred over traditional measures. Though it should be noted that the measure has limitations since it does not take current liability items such as employee salaries, taxes, and interest in consideration (Cagle, Campbell & Jones, 2013). Even if the exclusion of these items may affect the company's liquidity, thus unfavorable to the CCC, the advantages of the time dimension and comparability features make it a robust measure (ibid). According to Kieschnick et al. (2013) and Singh and Kumar (2014), the CCC
is considered as the established measure of choice when measuring the efficiency in WCM. Further, extensive research in the field use the CCC to measure the working capital efficiency (Jose et al. 1996; Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Gill et al., 2010; Mathuva, 2010; Sharma & Kumar, 2011; Abuzayed, 2012; Enqvist et al. 2014; Yazdanfar & Öhman, 2014).

The previous research on the effect of WCM on firm performance varies in observed location and sample context, study period, impact of WCM, and results, (See Table 1). Several previous research studies find a negative relationship between efficient WCM and firm profitability, indicating that a shorter CCC will increase firm profitability. To examine the relationship between working capital efficiency and firm profitability, Shin and Soenen (1998) uses data from 58,985 companies in the US, which is a world leading economy, across seven industries for the period 1975–1994. With the CCC as a WCM measure, the authors find a negative relationship between CCC and profitability. Further, to decrease the WC level, it is preferred to be done by reducing the number of days in CCC instead of increasing liabilities (ibid). Based on a sample with 1009 companies in Belgium for the period 1992–1996, Deloof (2003) finds a significant negative relationship between the number of days accounts payable, inventory, and accounts receivable, respectively, and gross profit. Even though Deloof (2003) find significant results for each component of the measure, he does not find it for the CCC as a whole. Subsequently, Deloof (2003) conclude that there are several ways that shareholders' value can be enhanced by WCM. For instance, by reducing the number of days in accounts receivable and inventory to a reasonable level, thus opting for a shorter CCC, the companies profitability can increase. On the other hand, the profitability can also be increased by a longer CCC, which allows for higher gainful sales. Further, Mathuva (2010) analyses this relationship on data from 30 listed Kenyan firms, finding a consistent result, a negative relationship between CCC and profitability. Based on the result, Mathuva (2010) argue that WCM that leads to shorter CCC can create additional value for companies in emerging markets shareholder but also attain competitive advantages.
Table 1. Literature overview

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Context</th>
<th>Period</th>
<th>Significant result: WCM and profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enqvist et al. (2014)</td>
<td>Finland</td>
<td>Non-financial listed firms</td>
<td>1990–2008</td>
<td>CCC ↓</td>
</tr>
</tbody>
</table>

Table 1 presents an overview of previous literature, who the author/s are, which country it studied, what sample was used, which period and their result.

As shown in Table 1, there are also studies within the research area, which have found a positive relationship between CCC and firm profitability. Their results are contradictory to the previously mentioned studies, which in turn creates a debate on what efficient WCM is. Gill et al. (2010) studies a sample with data from 88 companies in the US during the period 2005–2007 and finds a positive relationship between CCC and firm profitability. The authors argue that companies profitability can be enhanced if they practice efficient WCM, which in this case is equivalent to lengthening the CCC (ibid). The study also shows a negative relationship between accounts receivable and firm profitability, meaning that if managers reduce the number of days
for accounts receivable, they can create value for their shareholders (ibid). Sharma and Kumar (2011) study the relationship on the Indian market, with observations from 263 listed companies over the period 2000-2008. They identify a positive relationship between CCC and profitability, and given their sample lengthening the CCC may increase company profitability in emerging markets (Sharma & Kumar, 2011). In line with this, Abuzayed (2012) study data from 52 listed companies in Jordan, also an emerging market, for the period 2000-2008. A positive relationship is observed for the independent variable, CCC on the dependent variable, company profitability (ibid). The result shows that longer CCC increases the profitability of companies in emerging markets, which according to Abuzayed (2012) is explained by the lack of motivation to conducting WCM in a greater extent among more profitable companies. He also emphasizes the dilemma of managers when trying to achieve a desirable trade-off between profitability and liquidity in order to maximize the firm value (ibid).

Although the existing literature finds that efficient WCM impacts firm profitability, there is a difference of opinion on how to maximize firm profitability through the management of the CCC. Both Gill et al. (2010) and Sharma and Kumar (2011) argues in line with Deloof (2003) that a longer CCC can increase profitability since it results in higher sales, partly due to a larger inventory which prevents stock-outs and production stops, thus efficient WCM can be achieved with longer CCCs. Abuzayed (2012) mentions as well that granting trade credit, extending the CCC, may boost the sales figures since it enables customers to access the product and evaluate its quality before paying. Though, the profitability can be adversely affected if the costs of additional investments in the working capital such as maintaining more inventory or allowing more generous trade credit policies, thus prolonging the CCC, is less then the benefits of a longer CCC (Deloof, 2003).

### 2.3 Working Capital Management and economic conditions

The different WCM activities are according to Mervill and Tavis (1973) in interrelationship with each other and are described best as a conjoined system that is affected by the existing economic condition. Hence, companies need to take economic conditions into account when forming and WCM policies and that efficient WCM practices differ in relation to economic conditions (ibid). Filbeck and Krueger (2005) examine how WCM differs over time and across industries in the US. The authors find differences in WCM practices over time, which they explain are due to shifts in interest rates and market competition as well as technological development. Moreover, the impact of varying economic conditions may also explain the
difference, which is different in firms depending on the industry, subsequently generating different approaches to WCM (ibid).

Einarsson and Marquis (2001) study how WCM policies in US companies is affected by different economic conditions. In particular, to what extent companies use financing from external parties to cover their working capital requirement over economic cycles, which the study finds countercyclical and more prevalent in economic downturns (ibid). Similar, based on a sample with over 57,000 observations in over 100 countries, Braun and Larrain (2005) examine the relationship between financing from external parties and growth in different economic conditions. The authors conclude that there is a strong link between a high level of working capital requirement and reliance on financing from external parties. Further, economic downturns are deemed to have a negative impact on companies, especially on those with a high external debt ratio (ibid). Consequently, Braun and Larrain (2005) regard it to be of importance to companies to take precautions and prepare for economic downturns such as securing capital for working capital reserves and defensive finance policies.

Enqvist et al. (2014) further evolve the research on WCM by study the simultaneous effects of working capital and profitability in shifting economic conditions. The study's result, which is suggested to be representative for the Nordic, proves that companies can enhance their profitability by practicing efficient WCM and that economic conditions affect the view and subsequently the role of working capital. Enqvist et al. (2014) point out that in times of economic growth is WCM, not prioritized, and companies instead focus on increasing sales with lenient approaches of working capital to suit customers. Though, when the economic condition inevitably shifts and start to deteriorate, the absence of sound WCM practices are exposed. For instance, weak sales figures due to unfavorable economic conditions, especially prominent during the global financial crisis, entail an influx reduction in resources to fund the working capital, but also an increase in inventory cost and days of accounts receivable, which exhausts companies' working capital. Subsequently, companies increase their efforts to utilize their working capital efficiently by focusing on achieving a shorter CCC (ibid). Lastly, profitability is a key objective to companies regardless of the existing economic condition, and in order to achieve this, incorporating efficient WCM practices in the day-to-day operations is essential (ibid).
2.4 Hypotheses formulation
In view of prior research, efficient WCM is a well established method to conduct with the aim to boost firm profitability (Jose et al. 1996; Deloof, 2003; Garcia-Teruel & Martinez-Solano, 2007; Gill et al., 2010; Mathuva, 2010; Sharma & Kumar, 2011; Abuzayed, 2012; Enqvist et al. 2014; Yazdanfar & Öhman, 2014). The efficiency of the WCM is mostly measured through the CCC, which captures the time it takes for companies to convert the input of resources to payments of finished outputs (Deloof, 2003). However, there is no best practice regarding which CCC strategy to implement in order to increase firm profitability. Managers can either strive to shorten or lengthen the CCC (Deloof, 2003), dependent on the economic conditions or firm-specific characteristics in order to increase firm profitability (Enqvist et al., 2014). This is further attested by the fact that studies find inconsistent result on the direction of the relationship between CCC and profitability, either a negative relationship (Jose et al., 1996; Shin & Soenen,1998; Mathuva, 2010) or positive relationship (Gill et al., 2010; Sharma & Kumar, 2011; Abuzayed, 2012). WCM practices are argued to depend on economic conditions (Mervill & Tavis, 1973; Filbeck & Krueger, 2005). Though Enqvist et al. (2014) find that WCM is less pronounced in economic booms compared to economic downturns, they also conclude that practicing WCM in the business operation is essential for managers with the aim to increase their company's profitability, regardless of economic condition. Hence, we will examine the relationship between CCC and firm profitability during a time-period, including both economic downturns and economic booms.

Hypothesis 1: There is a positive relationship between CCC and firm profitability

According to Einarsson and Marquis (2001) and Braun and Larrain (2005), CCC is affected by varying economic conditions. Furthermore, it is argued that in order for a company to both survive and possibly come out stronger from a recession, efficient WCM is crucial (Kolay, 1991). Enqvist et al. (2014) find that the attention of efficient WCM in business practices increased with the global financial crisis, and it is shown that companies that practiced WCM, entailing shorter CCC, withstood the recent financial crisis successfully (Scholleova, 2012). Singh and Kumar (2014) point out that WCM has continued to be of interest to researchers and managers after the global financial crisis. Kaiser and Young (2009) argue that companies should establish sustainable WCM strategies in order to avoid bad company performance related to inefficient WCM. Though research on the relationship between WCM and firm profitability for the period after the global financial crisis, the impact of it on the incorporation
of WCM into companies' business operations are both scarce and unclear. Therefore we will examine whether the global financial crisis has brought a change in the way companies operationalize this method.

Hypothesis 2: There is a difference in companies' CCC before and after the global financial crisis

3. Methodology

3.1 Approach

The purpose of the thesis was to study and objectively present the relationship between working capital efficiency and firm profitability, and how the relationship has been affected by varying economic conditions. Hence, a deductive research study approach was preferred, which means that the researcher assumes an already established theory to derive hypotheses, which, thereafter, are tested (Bryman & Bell, 2013). The framework of this study was built on established theory regarding the correlation between a company's working capital and its profitability. Financial data were analyzed in order to demonstrate the correlation between these factors on the Swedish market, and thereafter, the results were interpreted in order to determine whether the theories were applicable.

The overall focus also defines research in terms of research implementation and data processing (Bryman & Bell, 2013). In quantitative research, the emphasis is placed on quantification regarding the collection and analysis of a large data sample at the same time as the approach is deductive with the objective to test established theories. The researcher uses scientific principles and methods for trying to describe social reality in an objective manner (ibid). The emphasis in the thesis is not to understand social constructs or examine people's perceptions of the impact of working capital on a company's financial performance in the selected context. Therefore, a quantitative research strategy is best suited to achieve the purpose of the thesis.

3.2 Research design

Research design encompasses the structure that determines the execution of the method and the processing of the produced data (Bryman & Bell, 2013). In this study, a longitudinal design was used, which means that the financial development for the companies was analyzed in time over several measuring points (ibid).
3.3 Data
The data used in this thesis is secondary data and was retrieved through the database Thomson Reuters Datastream. The use of secondary data was suitable in order to construct our data sample, but there are some problems that needed to be identified in order for our analysis to be done correctly (Bryman & Bell, 2015 p. 328-329). The use of Thomson Reuters Datastream may have led to survival bias since it contains data from active firms, and therefore, does not include firms that no longer are publicly traded on the Stockholm Stock Exchange, firms that have merged with or been acquired by other firms or no longer exists. This might have entailed the effect of the sample being biased toward high performing firms. This effect was mitigated since we only included companies with complete data for the full observation period. Furthermore, the regression models took this problem into consideration by controlling for year and firm-effects and thus limited the potential impact of it. Notably, our secondary data was not necessarily standardized and the development of accounting rules during the observed period has led to different definitions and accounting techniques which in turn have led to discrepancies in the observed financial data. This lack of standardization could result in an unavoidable degree of errors in the data. Thus, the sample was screened, and companies with incomplete data were either excluded or when possible, data was manually added from the database Retriever Business in order to decrease the loss of observations (see Table 2).

3.3.1 Observed time-period
This thesis examined the 15 years of 2003–2017 with three separate regression analyses. The time-period of 2003–2017 (Period 1) includes both economic booms and downturns, which enabled us to investigate whether there is a relationship between WCM and firm profitability for a period with varying economic conditions. We used 2003 as the starting point of our study because it is the first year free of the effects of the dot-com crash. The choice of 2017 as the most recent year in the study was because of the large amount of lacking data from 2018, and therefore, it was decided to not include 2018 in the sample. Further, the time-periods 2003-2006 (Period 2) and 2014-2017 (Period 3) were tested separately in order for us to compare the periods before and after the global financial crisis and therefore determine if the impact of the crisis had changed the relationship between WCM and firm profitability. These specific periods have been chosen due to their proximity to the global financial crisis of 2008-2009 and that they had the characteristic of economic booms. The fact that the global financial crisis separates these periods should, according to us, result in changes in the relationship between CCC and firm profitability. To enable us to examine if there is a difference, we excluded the years closest to the crisis, both prior and following, in order to avoid possible contaminating effects.
connected to it. As a result of the negative GDP in 2012, there is a larger time difference between the crisis and 2014-2017 than 2003-2006 and the crisis (Statistics Sweden, 2017). Considering the GDP-growth of the years included in our observed time period, we have categorized all years with a negative GDP-growth as economic downturns and all years with a positive GDP-growth as economic booms, which is in line with Enqvist et al. (2014).

![Figure 1: Sweden’s GDP-growth presented in percent for the period 2003–2017](image)

Source: Statistiska Centralbyrån (SCB); Ekonomifakta. * = Preliminary GDP-growth.

### 3.3.2 Population and sample
Since the aim of this thesis was to examine the relationship between working capital management and firm profitability in Sweden, our target population was listed Swedish firms, more specifically firms listed on Nasdaq Stockholm OMX's lists: Small-, Mid- or Large Cap. We chose to study listed firms in Sweden since prior research have studied the relationship between WCM and firm profitability of listed companies in different markets, though not in the Swedish market (e.g. See Shin & Soenen, 1998; Wang, 2002; Lazaridis & Tryfonidis, 2006; Mathuva, 2010; Gill et al., 2010; Enqvist et al., 2014). Firms listed on the Nasdaq Stockholm OMX lists', Small-, Mid- or Large Cap represent a large part of Swedish listed firms since the market value of these firms amount to 98 percent of the market value of all listed firms in Sweden (Swedish Central Bank, 2016). The financial data on the firms were collected from databases, primarily from the database Thomson Reuters Datastream.
The extracted data sample initially consisted of a total of 5475 observations from 365 firms. The data was screened and cleaned of missing and extreme values since these might distort the results and if not removed, would complicate a proper statistical analysis (Tabachnick & Fidell, 2013). In line with Shin and Soenen (1998), Deloof (2003), Lazaridis and Tryfonidis (2006) and Enqvist et al. (2014), financial firms such as insurance companies and banks were excluded due to the nature of their operations. After adjusting for missing and extreme values, the sample consisted of 1170 observations from 78 firms, as shown in Table 2 below:

Table 2: Data selection

<table>
<thead>
<tr>
<th></th>
<th>No. of companies</th>
<th>Total observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original sample</td>
<td>365</td>
<td>5475</td>
</tr>
<tr>
<td>No. of trimmed observations</td>
<td>287</td>
<td>4305</td>
</tr>
<tr>
<td>No. of manually added observations</td>
<td>9</td>
<td>54</td>
</tr>
<tr>
<td>Final sample</td>
<td>78</td>
<td>1170</td>
</tr>
</tbody>
</table>

Table 2 shows the process of our selection of data, including original sample, number of trimmed observation, number of manually added observations and final sample.

3.4 Variable selection

3.4.1 Dependent variable

Firm profitability is the dependent variable in this thesis and is measured as Return on Assets (ROA). ROA is an overall indicator of firm profitability (Padachi, 2006) and is the most frequently used measure of firm profitability in previous literature of WCM (Wang, 2002; Garcia-Teruel & Martinez-Solano, 2007; Enqvist et al., 2014). ROA was used since it does not consider the asset formation of firms and thus is not affected by differences in the capital structure (Enqvist et al., 2014). Following Padachi (2006), Garcia-Teruel and Martinez-Solano (2007) and Enqvist et al. (2014), ROA was calculated as the ratio between net income and total assets. The calculation of ROA is presented in Equation 1 below:

Equation 1. Return on Asset

\[
ROA = \frac{Net \, Income}{Total \, Assets}
\]
3.4.2 Independent variable
In order to measure WCM in this thesis we used CCC as the independent variable since WCM efficiency is operationalized as CCC. CCC was introduced by Gitman (1974) as a measure for WCM and it measures the time period between the moment the company pays for an input of resources and the moment of receiving payment of finished outputs from the transformed resources (Jose et al., 1996; Deloof, 2003; Kieschnick et al., 2013). It is a measurement which combines data from both income statement and balance sheet with a time dimension since it consists of the components DAP, DIO, and DAR (Jose et al., 1996). The calculations of CCC, DAP, DIO, and DAR is presented in Equation 2–5 below:

Equation 2. Cash Conversion Cycle

\[ CCC = \left( \frac{\text{Cost of Goods Sold}}{\text{Sales}} \right) \times 365 \]

Equation 3. Number of Days Account Payable

\[ \text{No. of Days Account Payable} = \left( \frac{\text{Accounts Receivables}}{\text{Cost of Goods Sold}} \right) \times 365 \]

Equation 4. Number of Days Account Receivable

\[ \text{No. of Days Account Payable} = \left( \frac{\text{Invoices Payable}}{\text{Cost of Goods Sold}} \right) \times 365 \]

3.4.3 Control variables
Control variables were included in the regression models in order to control that the variation in the dependent variable does not depend on other factors than the independent variable (XX). In line with previous studies, we used the control variables In.Size and DEBT (Shin & Soenen, 1998; Deloof, 2003; Enqvist et al. 2014).

Firms size
Previous studies of WCM has used sales or revenues as a measurement for In.Size and in order to make it comparable, they have used the natural logarithm of sales (Jose et al., 1996; Deloof, 2003; Enqvist et al., 2014). Thus, this thesis measured the natural logarithm of net sales in thousands of SEK as In.Size. According to Jose et al. (1996), larger companies tend to be more
profitable, thus positively affecting the relationship between firm size and profitability. The calculation of $\ln\text{Size}$ is presented in Equation 6 below:

**Equation 6. Firm size**

$$SIZE = \ln(Sales)$$

**Firm debt ratio**

The financing of firms has been suggested to both be impacted by and have an impact on WCM (Filbeck & Krueger, 2005), and it has also been argued that firm profitability is affected by how firms are financed (Braun & Larrain, 2005). The relationship between the firm's external financing and its total assets is measured by DEBT (Deloof, 2003; Lazaridis & Tryfonidis, 2006; Enqvist et al., 2014). The calculation of DEBT is presented in Equation 7 below:

**Equation 7. Firm debt ratio**

$$DEBT = \frac{Short\ term\ Loans + Long\ term\ Loans}{Total\ Assets}$$

**3.4.4 Dummy variable**

Wang (2002) finds that different industries have a difference in the CCC. Therefore this thesis controls for potential effects of industry differences by applying industry dummy variables (IND_dummy). The companies are categorized and divided into eight industries: technology (D1), services (D2), industrials (D3), telecom, (D4), oil & gas (D5), consumer goods (D6), basic materials (D7) and healthcare (D8). These classifications are in accordance with the classifications from Thomson Reuters Datastream since the data is retrieved from the same source. In addition, we included 15-year dummies (YEAR_dummy) in order to control for year-specific effects (Deloof, 2003).
3.5 Regression analysis
Since we investigated the relationship between a dependent variable (ROA), an independent variable (CCC) and control variables (ln.Size and DEBT) both a univariate method, linear regression analysis, and a multivariate method, multiple regression analysis, was applied (Tabachnick & Fidell, 2013). This method examines to which degree our independent and control variables can explain the variance in the outcome of the dependent variable, and thus predict the outcome of it (ibid). When determining if our results support our hypotheses or not, we analyzed the results on a 1 %, 5 % and 10 % level of significance (ibid). Our chosen method is in line with previous literature on the subject (Abuzayed, 2012; Enqvist et al., 2014).

3.5.1 Regression models
The regression models, presented in Model 1-2 below, was constructed and used on three different combinations of samples. Model 1 included our dependent and independent variables as well as dummy variables. In Model 2, the control variables for firm size and debt ratio were added. Firstly, we used the models on the whole sample period 2003-2017 (Period 1) in order to investigate the relationship between the dependent variable ROA and the independent variable CCC while controlling for firm size and debt ratio. Secondly, we used the models on the periods 2003-2006 (Period 2) and 2014-2017 (Period 3) separately, which enabled us to analyze the different results and compare any eventual differences.

3.5.2 Normality, skewness and kurtosis
When conducting a multivariate analysis with continuous variables, it is crucial to investigate the degree of normality in the data (Tabachnick & Fidell, 2013). Although multiple regression analysis is quite robust, a normally distributed dataset is preferable and therefore, it is necessary to test the level of normality (ibid). Two components of normality are skewness and kurtosis, where skewness indicates to which degree the data is symmetric and kurtosis examines how peaked it is (ibid).

In order to determine the level of normality, skewness, and kurtosis in our dataset, descriptive statistical tests in SPSS were conducted, which presented the results in histograms, boxplots, and scatterplots. In addition, SPSS produced descriptive statistics for each variable's level of skewness and kurtosis. The results showed that we had problems with skewness and kurtosis with ROA and CCC and we concluded that the variables deviated from normality due in part to outliers. There is a certain level of deviation which is acceptable, but in our case, the data sample deviated to an unacceptable level, and therefore we were required to transform it in
order to achieve acceptable levels of skewness and kurtosis (Tabachnick & Fidell, 2013). We
Winsorized our dataset in order to trim the most extreme values, which is a method used when
outliers skew the dataset (Kokin & Bell, 1994). When winsorizing data, you replace the values
that exceed a certain percentile, in our case, on a five percent level (ibid). After completing this
process, the data had acceptable levels of skewness and kurtosis. This method was necessary
for the progress and completion of our study, although we are aware that this might impact the
results.

3.5.4 Multicollinearity
We conducted a Variance Inflation Factor-test (VIF) in order to investigate whether our
variables were correlated. This was made previous to running the regressions with the purpose
of examining if there was multicollinearity amongst our independent variables or the control
variables. There was no multicollinearity amongst our variables since none of them exceeded a
value of five in the VIF-test, although the dummy variable Industrials showed relatively high
values, exceeding a value of three, in all three tests. (Tabachnick & Fidell, 2013)

3.5.5 Homoscedasticity and linearity
We investigated the variability among our dependent and the independent variables and
conducted scatterplots in order to detect potential homoscedasticity. This is related to the
normality of the dataset, and previous to the trimming and transformation of the data, the
assumptions of homoscedasticity seemed violated. When investigating the homoscedasticity
after the trimming and transformation of the data was done, the results were acceptable for the
chosen research method. Further, we examined the linearity between our independent and
dependent variable through probability plots before we conducted our regression analysis. The
results showed that the linear relationship had an acceptable level after the transformation of
the sample. (Tabachnick & Fidell, 2013)
4. Results

4.1 Descriptives statistics and correlations

In the following section, the results from our study and our analysis of the relationship between CCC and firm profitability will be presented. First, the descriptive statistics and the correlation amongst our variables are presented. Second, the results of the regression analysis are presented and compared. Third, we present the results of our T-test, which were conducted after the results of the regression analysis, were analyzed. Finally, the results of our tested hypotheses are presented and whether they are supported or rejected.

We have summarized the descriptive statistics of the variables for the full time-period, 2003-2017, in Table 3 below. It shows that for Swedish listed firms, the average CCC is approximately 91 days. The interval among the variables is relatively large, with a minimum value of 4,386 and a maximum value of 202,354. The standard deviation is 52,6 days, which indicates that the CCC varies among the firms in our sample. ROA has a mean value of 0,050 (5 %), and a interval spanning from the minimum value of -0,163 (-16,3%) and a maximum value of 0,187 (18,7%). The standard deviation is 0,078 (7,8%), which indicates that the ROA varies among the firms in our sample. The mean DEBT is 0,226, which shows that the average firm debt ratio is 22,6 percent of the firms' total assets, and the standard deviation is 0,155 (15,5%).

Table 3: Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
<th>StD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>1170</td>
<td>0,0503</td>
<td>-0,1627</td>
<td>0,1874</td>
<td>0,0778</td>
</tr>
<tr>
<td>CCC</td>
<td>1170</td>
<td>91,0290</td>
<td>4,3863</td>
<td>202,3539</td>
<td>52,6141</td>
</tr>
<tr>
<td>ln.Size</td>
<td>1170</td>
<td>15,4058</td>
<td>10,1327</td>
<td>19,6289</td>
<td>2,0789</td>
</tr>
<tr>
<td>DEBT</td>
<td>1170</td>
<td>0,2264</td>
<td>0,0001</td>
<td>1,0108</td>
<td>0,1549</td>
</tr>
</tbody>
</table>

Table 3 presents the descriptive statistics for all variables used in our regression models. The statistics presented is mean value (Mean), minimum value (Min), maximum value (Max) and average standard deviation (StD). ROA is presented in percent.

The following results from the correlation matrix below present the correlations between the model's variables and thus enabling us to compare the correlations separately between the independent variable and the independent variables and separately between the independent variables (Tabachnick & Fidell, 2013). Further, the correlation results offer an additional explanation of the results from the regression analysis presented further below in the result.
The models' dummy variables were excluded from the correlation matrix. The cause and effect of/between the variables are not displayed/explained in the correlation matrix, and it shows no more than the relationship between the model's variables (Deloof, 2003). The correlation coefficients can only hold values between +1 and -1 (Tabachnick & Fidell, 2013). A correlation value of +1 demonstrates a perfect positive correlation, indicating that the independent variable move in the same direction as the dependent variable (ibid). The different correlation values, -1, demonstrates a perfect negative correlation indicating that the independent variable move in the opposite direction as the dependent variable (ibid). A correlation value of zero suggests that the independent variable does not have a relationship with the dependent variable (ibid). Lastly, none of the variables have a high correlation value. The strongest correlation is found between In.Size and ROA for period 2, indicating that there is no problem with multicollinearity among our variables. This is confirmed by the VIF-test.

Table 4 presents the correlations of our variables. The variables presented are: return of assets (ROA), cash conversion cycle (CCC), firm size (ln.Size) and firm debt ratio (DEBT). The statistical significance are presented in the following order: ** = significance at the 1 percent level and * = significance at the 5 percent level.

Table 4: Correlations matrix

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>CCC</th>
<th>ln.Size</th>
<th>DEBT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>1</td>
<td>0,072*</td>
<td>0,301**</td>
<td>-0,168**</td>
</tr>
<tr>
<td>CCC</td>
<td>0,072*</td>
<td>1</td>
<td>0,063*</td>
<td>-0,019</td>
</tr>
<tr>
<td>ln.Size</td>
<td>0,301**</td>
<td>0,063*</td>
<td>1</td>
<td>0,005</td>
</tr>
<tr>
<td>DEBT</td>
<td>-0,168**</td>
<td>-0,019</td>
<td>0,005</td>
<td>1</td>
</tr>
<tr>
<td>Period 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>1</td>
<td>0,011</td>
<td>0,442**</td>
<td>-0,132*</td>
</tr>
<tr>
<td>CCC</td>
<td>0,011</td>
<td>1</td>
<td>-0,032</td>
<td>-0,029</td>
</tr>
<tr>
<td>ln.Size</td>
<td>0,442**</td>
<td>-0,032</td>
<td>1</td>
<td>0,052</td>
</tr>
<tr>
<td>DEBT</td>
<td>-0,132*</td>
<td>-0,029</td>
<td>0,052</td>
<td>1</td>
</tr>
<tr>
<td>Period 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>1</td>
<td>0,141*</td>
<td>0,146**</td>
<td>-0,269**</td>
</tr>
<tr>
<td>CCC</td>
<td>0,141*</td>
<td>1</td>
<td>0,155**</td>
<td>0,020</td>
</tr>
<tr>
<td>ln.Size</td>
<td>0,146*</td>
<td>0,155**</td>
<td>1</td>
<td>-0,025</td>
</tr>
<tr>
<td>Debt</td>
<td>-0,269*</td>
<td>0,020</td>
<td>-0,025</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4 presents the correlation matrix of the variables for the time-periods 2003–2017 (Period 1), 2003–2006 (Period 2), and 2014–2017 (Period 3). For Period 1, CCC has a significant positive correlation with both ROA (0,072) and ln.Size (0,063) at the 5 percent level. For Period 2, CCC has no significant correlations. For Period 3, CCC has a significant positive correlation at the 5 percent level with ROA (0,141) and at the 1 percent level with ln.Size (0,155). There are no significant correlations between CCC and DEBT for any of the periods.
Further, the result shows that for Period 1 ln.Size has a significant positive correlation at the 1 percent level with ROA (0,301) and at the 5 percent level with CCC (0,063). For Period 2, ln.Size has a significant positive correlation at the 1 percent level with ROA (0,442). For Period 3 ln.Size has a significant positive correlation at the 1 percent level with ROA (0,146) and CCC (0,155). Notably, ln.Size has a significant correlation with ROA for all three periods, and that the correlation between CCC and ROA varies between the periods.

Regarding period 1, DEBT is only significantly correlated with ROA, and it is a negative correlation at the 1 percent level (-0,168). For Period 2, DEBT has a significant negative correlation at the 5 percent level with ROA (-0,132) and for Period 3 DEBT has a significant negative correlation at the 5 percent level with ROA (-0,269). Overall, the results show that DEBT only has a significant correlation with ROA for all three periods.

### 4.2 Regression analysis

Table 5. Regression analysis for Period 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCC</td>
<td>0,102*** (0,001)</td>
<td>0,066** (0,030)</td>
</tr>
<tr>
<td>ln.Size</td>
<td>3,198</td>
<td>2,175</td>
</tr>
<tr>
<td>DEBT</td>
<td>-0,177*** (0,000)</td>
<td>-6,145 (0,000)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixed yearly effects</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed industry effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0,049</td>
<td>0,151</td>
</tr>
<tr>
<td>P-value</td>
<td>0,000</td>
<td>0,000</td>
</tr>
<tr>
<td>F-value</td>
<td>3,743</td>
<td>9,664</td>
</tr>
<tr>
<td>N</td>
<td>1170</td>
<td>1170</td>
</tr>
</tbody>
</table>

Table 5 presents the results of the estimated regression models for the whole observed period 2003–2017 (Period 1) where ROA is the measure for firm profitability(%). CCC is Cash Conversion Cycle; ln.Size is the natural logarithm of sales; DEBT is firm debt ratio. Year and industry ID have been controlled. *** = statistical significance at the 1% level; ** = statistical significance at the 5% level and * = statistical significance at the 10% level. The values presented for each variable are in order: Beta-value; (t)-p-value and lastly t-value.

In Table 5, the results of the regression for Period 1 are presented. Model 1 excludes the control variables, while Model 2 includes them. In Model 1, the statistical significance for CCC is at the 1 percent level, with a positive beta of 0,102, and a t-value of 3,198. The adjusted R2 is
0.049 for Model 1. In Model 2, the control variables are included, and CCC had a statistical significance on the 5 percent level with a positive beta of 0.066 and a t-value of 2.175. Both control variables, ln.size, and DEBT had a statistical significance at the 1 percent level. ln. Size have a positive beta of 0.288 and a t-value of 9.078. DEBT has a negative beta of -0.177 and a t-value of -6.145. Model 1 has an adjusted R2 of 4.9 percent and Model 2 of 15.1 percent.

The full regression model, including control variables (Model 2) shows that CCC has a positive impact on ROA, which indicates that larger investments in CCC lead to higher firm profitability. ln. Size has a significant positive impact on ROA, indicating that larger firms tend to be more profitable. DEBT has a significant negative impact on ROA, meaning that lower firm debt ratio tends to increase firm profitability.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Period 2</th>
<th>Period 2</th>
<th>Period 3</th>
<th>Period 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td>CCC</td>
<td>0.033</td>
<td>0.042</td>
<td>0.166***</td>
<td>0.130**</td>
</tr>
<tr>
<td></td>
<td>(0.590)</td>
<td>(0.547)</td>
<td>(0.007)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>ln.Size</td>
<td>0.540</td>
<td>0.744</td>
<td>2.737</td>
<td>2.152</td>
</tr>
<tr>
<td>DEBT</td>
<td>-0.146***</td>
<td>-0.232***</td>
<td>-0.007</td>
<td>-3.839</td>
</tr>
<tr>
<td>Fixed yearly effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed industry effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.122</td>
<td>0.239</td>
<td>0.063</td>
<td>0.126</td>
</tr>
<tr>
<td>P-value</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td>F-value</td>
<td>4.573</td>
<td>10.763</td>
<td>2.897</td>
<td>5.468</td>
</tr>
<tr>
<td>N</td>
<td>312</td>
<td>312</td>
<td>312</td>
<td>312</td>
</tr>
</tbody>
</table>

Table 6 present the results of the estimated regression models for two observed periods: 2003–2006 (Period 2) and 2014–2017 (Period 3), where ROA is the measure for firm profitability (%), CCC is Cash Conversion Cycle; ln. Size is the natural logarithm of sales; DEBT is firm debt ratio. Year and industry ID have been controlled. *** = statistical significance at the 1% level, ** = statistical significance at the 5% level and * = statistical significance at the 10% level. The values presented for each variable are in order: Beta-value; ()-p-value and lastly t-value.

In Table 6, results for Period 2 and Period 3 are presented. Both periods are tested through both Model 1 and Model 2. Period 2 shows non-significant relationships between CCC and ROA in both Model 1 and Model 2. In Model 2 ln. Size have a statistical significance at the 1 percent level with a positive beta of 0.374 and a t-value of 6.346. DEBT has a statistical significance at
the 1 percent level as well, with a negative beta of -0.146 and a t-value of -2.714. When Period 2 is tested in Model 2, it has an adjusted R2 of 23.9 percent.

Testing Model 1 for Period 1, CCC has a statistical significance at the 1 percent level with a positive beta of 0.166 and a t-value of 2.737. The adjusted R2 for the model is 6.3 percent. When it is tested with Model 2, CCC has a statistical significance at the 5 percent level with a positive beta of 0.130 and a t-value of 2.152. ln.Size has a statistical significance at the 10 percent level with a positive beta of 0.120 and a t-value of 1.930. DEBT has a statistical significance at the 1 percent level with a negative beta of -0.232 and a t-value of -3.839. The model shows an adjusted R2 of 12.6 percent.

For Period 2, CCC shows positive non-significant results in both models. However, CCC shows a positive statistically significant impact on ROA for Period 3, similar to the regression for Period 1. ln.Size has a positive impact on ROA in both models, indicating that larger firms tend to be more profitable. DEBT also shows significant results for both periods, although a negative one, which means that a lower firm debt ratio tends to increase firm profitability.

4.1 T-test
Considering the results of the regression analysis, we decided to examine the CCC of our sample further. We conducted a t-test in order to compare the mean score of our continuous variable (CCC) for two different time-periods and examine whether there is a significant difference or not (Tabachnick & Fidell, 2013). The variables we tested were Period 2 and Period 3 in order to find out if there, in fact, has been a change in the CCC of the firms in our data sample. The test is an independent-samples t-test, and the results are presented in Table 7 below:

<table>
<thead>
<tr>
<th>Period</th>
<th>Mean</th>
<th>StD</th>
<th>Sig.</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period 2</td>
<td>88.2190</td>
<td>50.0475</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period 3</td>
<td>93.3007</td>
<td>55.1045</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>0.020**</td>
<td>0.228</td>
</tr>
</tbody>
</table>

Table 7 presents the result of the t-test of the mean variance of CCC between Period 2 and Period 3. The statistics presented is mean value (Mean), standard deviation (StD), significance (Sig.) and 2-tailed significance (Sig. 2-tailed). Significance levels are presented in the following order: *** = 1 percent level, ** = 5 percent level and * = 1 percent level.

The result of the t-test shows that the variance of scores for the two groups, Period 2 and Period 3, are not the same. This was tested through Levene's test for equality of variances, generating a significant result (0.002) and therefore, equal variances were not assumed. Subsequently,
when assessing the differences between the two groups, we could conclude that the result was larger than the cut-off value of 0.05 (0.228). Thus, there is no statistically significant difference in the mean CCC-length between Period 2 and Period 3. (Tabachnick & Fidell, 2013)

### 4.2 Hypothesis testing

Table 8. Hypotheses testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>Significant</th>
<th>Supported/Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CCC</td>
<td>ROA</td>
<td>Yes</td>
<td>Supported</td>
</tr>
<tr>
<td>2</td>
<td>CCC</td>
<td>ROA</td>
<td>No</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

Table 8 presents each tested hypothesis, if the result is significant and if it is supported or rejected. In Table 8, the results of our hypotheses are presented. It shows that hypothesis 1a is rejected and hypothesis 1b is supported, due to the positive statistically significant relationship between CCC and ROA when tested for Period 1 in Model 2. Hypothesis 2 is rejected since our t-test showed that there is not a statistically significant difference in the mean CCC-length between Period 2 and Period 3. We do however see in Table 6 that the relationship between CCC and ROA in Period 2 is non-significant, but in Period 3 it is significant at the 1 percent level in Model 1 and at the 5 percent level in Model 2.

### 5. Analysis

Our study provides some insight regarding the question of whether the global financial crisis has changed the use of WCM as a strategy in order to increase firms' profitability, and can be concluded in some key results.

First off, our results from the regressions for Period 1 showed that there is a significant positive relationship between CCC and ROA, as shown in Table 5. This is in line with Gill et al. (2010), Sharma and Kumar (2011) and Abuzayed (2012) who also found a positive relationship between CCC and firm profitability in times of economic growth. The positive relationship for Period 1 between CCC and ROA suggests that longer CCC leads to higher firm profitability. It may be explained by longer CCC encompassing larger inventory, which may improve sales and in turn, increase firm profitability (Deloof, 2003; Gill et al. 2010; Sharma and Kumar, 2011). Another possible explanation is granting more generous trade credit, which Abuzayed (2012) argues may boost firm sales and subsequently their profitability.
Notably, Gill et al. (2010), Sharma and Kumar (2011) and Abuzayed (2012) studies markets that are different from the Swedish market, both geographically and characteristically. Sharma and Kumar (2011), and Abuzayed (2012) examines firms in the emerging markets of India and Jordan, while Gill et al. (2010) examine firms in the US market which can be regarded as a world leading economy. Our result indicates that there is a positive relationship between CCC and firm profitability, not only in emerging markets or a world-leading economy but also in a small, developed, and export-oriented market such as the Swedish. Unlike Gill et al. (2010), Sharma and Kumar (2011), and Abuzayed (2012), our data sample include not just the time-period with economic growth before the global financial crisis but also the crisis and appurtenant economic downturns as well as the period afterward with repeated economic growth. Hence, our result may be valid in a context with varying economic conditions.

Furthermore, in contrast to the positive relationship in our study, Enqvist et al. (2014) finds that the relationship between WCM and firm profitability is negative on the Finnish market, which together with the rest of the result is argued by the authors to be representative for the Nordic region. The contradictory results may be because Enqvist et al. (2014) use a more balanced sample with periods of economic growth and downturn. Another possible difference between our studies, which may affect the result, is the use of different time-periods. Enqvist et al. (2014) examine the time-period 1990–2008 compared to our time-period of 2003–2017. According to their study and their sample, a shorter CCC entails efficient WCM while our indicates that firms should lengthen their CCC in order to achieve efficient WCM.

Period 1 was tested in two different regression models: Model 1 and Model 2. In Model 1, the relationship between CCC and ROA was statistically significant at the 1 percent level (0,001) and in Model 2 at the 5 percent level (0,030). The difference between the models is that the control variables ln.Size and DEBT are included in Model 2, which explains the change in the p-value. ln.Size and DEBT do explain some of the variations in ROA, and therefore, the relationship between CCC and ROA is weaker in Model 2 than in Model 1. Both control variables are significant on the 1 percent level, and the fact that the p-value of the model increases when they are included shows that they are relevant for our study. Furthermore, ln.Size has a positive relationship with ROA, which is in line with Jose et al. (1996), and DEBT a negative. This indicates that larger firms are more profitable, which is in contradiction to Enqvist et al. (2014), who find the opposite result. The result also indicates that firms with a low debt ratio are more profitable, for our sample and observed time-period. Although we find...
significant results, our model has a adjusted R2 of 4.9 percent, meaning that it explains 4.9 percent of the variation in ROA, which is considerably lower than Abuzayed (2012) who presents an adjusted R2 of 21.7 percent and Enqvist et al. (2014) who presents an adjusted R2 of 23 percent. This shows that our model fails to fully explain the variation on ROA, and thus, our results should be interpreted with caution. Notably, the adjusted R2 for Period 2 and Period 3 are higher than Period 1, 23.9 percent, and 12.6 percent, respectively. This indicates that during our shorter time-periods, the variables explain the variation in ROA to a higher degree and do not have to be interpreted as cautiously.

The fact that our study include the years following the global financial crisis separates it from the previous literature (Jose et al., 1996; Shin & Soenen, 1998; Deloof, 2003; Gill et al., 2010; Mathuva, 2010; Ebben & Johnson, 2011; Sharma & Kumar, 2011; Abuzayed, 2012; Enqvist et al., 2014). Our time-period includes both periods of economic growth and an economic downturn, which enables us to examine whether varying economic conditions impact the relationship between WCM and firm profitability. We focused on examining whether the global financial crisis has changed the use of WCM as a strategy in order to increase firm profitability and if so, how. We tested two separate time-periods, 2003–2006 (Period 2) and 2014–2017 (Period 3), in order to investigate if there is a significant relationship between WCM and firm profitability for those separately. As presented in Table 6, Period 2 showed a statistically non-significant positive relationship, and Period 3, a statistically significant positive relationship between CCC and ROA. Since the global financial crisis occurred in the interval between these periods, and that the relationship had changed from non-significant to significant indicated that it might have had some impact on firms' use of WCM in their business operations. However, our results from the regression analysis do not explain if this is the case. The results of the regression analysis of Period 2 shows that ln.Size and DEBT have statistically significant relationships with ROA. ln.Size has a positive relationship and DEBT a negative relationship. The negative beta-value of DEBT decreased from Period 2 (-0.146) to Period 3 (-0.232), indicating that decreasing the debt ratio of firms yields higher relative firm profitability after the crisis compared to before.

As our result shows, there is a positive relationship between CCC and firm profitability for our entire observed time-period. This indicates that firms' can lengthen their CCC in order to achieve efficient WCM and subsequently increase their profitability. When testing the relationship for the time-period after the global financial crisis, we also find a positive relationship. Kolay (1991) argues that in order to endure financial crises and reduce the possible
decline of the firm, WCM efficiency is an important aspect both before and during times of economic downturn. Scholleova (2012) finds that companies that practiced efficient WCM, which is equal to shorter CCC in the study, were able to withstand the crisis successfully. Enqvist et al. (2014) argue that during a crisis, firms have to shorten their CCC in order to achieve efficient WCM and thus stay profitable during the harsh conditions of the crisis. One line of thought, based on these arguments, is that the firms in our sample did shorten their CCC to a level where they could stay profitable. However, in the aftermath of the crisis when the economy was recovering, they needed to lengthen their CCC and increase their investments in their WC in order to reach the optimal level and achieve efficient WCM. It could explain the positive relationship for our sample, and also explain why our results differ from Enqvist et al. (2014), which did not include the period after the crisis in their study. Another aspect that could serve as an argument for this is that our sample only consists of companies that were active during the whole observed period of 2003-2017, and if the previous arguments of shortening the CCC during crisis being crucial are correct. One could assume that the companies in our sample, in fact, did shorten their CCC and thus did not go bankrupt during this period. This would have had an impact on our result, making the relationship positive between CCC and firm profitability due to the shortening of CCC during the crisis.

Notably, there are some parts of the results that could be interpreted as signs that there may have been a change in the use of WCM as a strategy in order to increase firm profitability. For the entire time-period, there was a significant relationship between CCC and ROA. However, when examining the periods before and after the crisis, there are different results. The relationship between CCC and ROA in the sample previous to the crisis is not statistically significant, while the period after the crisis, the relationship between the variables is significantly positive. Although we do not find any results that prove this, it could indicate that there may have been a change in companies' views of WCM as a strategy in their business operations. This aligns with Singh and Kumar (2014) who argue that managers attention of WCM has grown with the effects of the global financial crisis, which would have brought a change in the use of WCM between the periods.

Another interesting result is that the adjusted R2 of the regression models has changed from 23.9 percent in the period before the crisis, to 12.6 percent in the period after the crisis. We do not find any results which can prove our speculations here either, but the change in the strength of the model brings some questions of what might have brought this change. Since the adjusted R2 has decreased, one could imagine that the crisis has forced the companies of our sample to
look for new strategies and opportunities in order to increase their profitability and that these could explain some of the variations in ROA. As mentioned earlier, we do not have any results that prove this reasoning, and these are merely speculations.

To further study whether there is a difference in the CCC between the two periods, we conducted an independent-samples t-test. The test yielded insignificant results, which means that we can not prove that there is a difference in the mean CCC-length between Period 2 and Period 3. This implies that companies' WCM is in contradiction to Kaiser and Young (2009) proposed strategy to change companies' WCM activities and general attitude towards WCM strategies which given their arguments would have resulted in a change the mean CCC-length between the two periods, prior and after the global financial crisis. However, this result indicates that the crisis has not changed the use of WCM as a strategy in order to increase firm profitability.

6. Conclusion

This thesis has examined the relationship between working capital efficiency and firm profitability among listed Swedish firms and how the financial crisis of 2008-2009 has impacted this relationship. It has shown that among Swedish firms for the entire observed time-period of our study and the period following the crisis, there is a statistically significant positive relationship and that firms can enhance their profitability by increasing the length of their CCC. The tests of this sample also show that larger firms tend more profitable and that firms with a lower debt ratio tend to be more profitable. It shows that the period leading up to a financial crisis, working capital efficiency has no significant impact on firm profitability and firms during that period, indicating that they could not have increased their profitability by shortening or lengthening their CCC.

The positive relationship for the whole observed time-period between CCC and firm profitability is in line with previous studies by Gill et al. (2010), Sharma & Kumar (2011) and Abuzayed (2012), who all find similar results but for different markets. However, our result contradicts the findings of Enqvist et al. (2014), who studies the Finnish market.

We do not find any result that supports that the global financial crisis has changed the use of WCM as a strategy in order to increase firm profitability. We compared the results from regression analyzes on two time-periods which were separated by the crisis, and we tested if
there was a variance of the mean CCC-length between those periods. Our results showed no statistically significant differences, and therefore we cannot prove if there, in fact, has been a change.

The results in this study are based on our sample which includes the years 2003-2017 and is limited to 78 Swedish companies listed on the Nasdaq Stockholm OMX, and thus does not necessarily provide an accurate representation for other markets, firms, countries or time-periods.

7. Future research

Our thesis offers a number of insights on the relationship between WCM and firm profitability and if the global financial crisis has affected the relationship. Though some aspects are not considered in our thesis, which can further add to the existing knowledge on the effects of WCM on firm profitability. Primarily, the impact of the individual components of CCC is not taken into account in this study, investigating the individual components interrelations and effects on the WCM would bring deeper knowledge on the subject. The use of different measures for firm profitability, and comparing the differences are another aspect that would give some new understanding of the relationship between WCM and firm profitability. We do not include non-listed firms in our sample, and thus these could be included future studies in order to gain a more extensive explanation on how Swedish firms use WCM as a strategy in order to increase firm profitability. We have not seen any comparative studies between different markets regarding the given relationship. Although we understand that it would require a vast amount of data, it would also be interesting to examine a larger population such as Europe, Asia, or Africa.

8. Limitations of this thesis

Considering our choice of literature and method, we assess the reliability of our thesis to be acceptable. Primarily, we applied renowned scientific articles to support our theoretical framework and to motivate the delimitations of our study. Further, the model used in our study is based on articles published well-reputed scientific journals, which also are some of the most
cited articles in this field of research. Hence, with regard to studying the purpose of our thesis, we consider the study's structure to be reliable.

Regression analysis is a generally accepted research method, although it has some limitations. The method only shows the relationship between variables and not the causality, which is a limitation to a certain degree. When examining a phenomenon, regression models can not derive the full explanation of it. The result of the model is also dependent on which variables the researchers choose to include, and there might be some variable/variables that are left out of the model which explains the variation in the dependent variable to a higher degree. Another possible problem is that the regression analysis is sensitive to correlated independent variables. (Tabachnick & Fidell, 2013)

Concerning our data sample, there are some limitations. Our sample is based on secondary data, which could distort the results. Even though the firms in our sample adhere to the same laws and regulations, there could be some differences in the accounting practices between the firms resulting in different definitions of some of the data. Since the data retrieved from Thomson Reuters Datastream excludes firms that have been acquired by other firms, have merged with other firms and firms that no longer exist, the sample may have been affected by possible survival bias. There was also a certain degree of missing data in our database, resulting in a potential loss of observations. These problems were controlled for in several ways, as previously described.

Another limitation of the study is that it only included Swedish companies listed on Nasdaq Stockholm OMX lists', Small-, Mid- or Large Cap, excluding financial and insurance companies. This is in line with the research question, however, a larger sample might generate a more generalizable result. Furthermore, a more extensive observed time-period, which includes more than one crisis could enable comparisons between the growth periods and the crises in order to examine whether there has been a change in the behaviour of firms. Other or more variables could be included in the regression analysis models, which could yield more extensive results. Therefore, our study's result ought to only be applied in analyses concerning companies that are in accordance with our sample.
References


