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Master Thesis

'Impact of Working Capital Management on the Profitability of Public Listed Firms in The Netherlands During the Financial Crisis'

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Colophon

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Abstract

This study investigates how public listed firms in The Netherlands manage their working capital. A sample of 37 firms is used, which are among the fifty largest companies in The Netherlands. The working capital policies during the non-crisis period of 2004-2006 and during the Financial Crisis of 2008 and 2009 are compared. This comparison investigates whether companies have to change their non-crisis working capital policies when the economy is into a recession. The results of this study indicate that, in crisis periods, firms don't need to change their working capital policy concerning accounts payables and inventory, if their goal is to enhance profit. For the working capital policy managing accounts receivables this is not the case. This is because during a crisis accounts receivables have a positive effect on a firm's profitability of the next year. These results are on short-term basis. On the long-term, benefits of aiding customers during crisis periods are likely to grow, because future sales will still be there. Also the risks taken by these aiding firms are relatively low and for large reputable firms it is also relatively cheap.

Key words: Working Capital Policies, Working Capital Management, Firm profitability, Financial constraints, Financial Crisis, Public Listed Firms, Amsterdam Stock Exchange.

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Enschede, February 2012

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Mathias Baveld

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"It isn't so much that hard times are coming; the change observed is mostly soft times going."

- Groucho Marx

I. INTRODUCTION

A. Introduction

This master thesis will provide a snapshot of how Dutch public listed firms manage their working capital during both a non-crisis period and a crisis period. This management of working capital needs to be evaluated, which is done with its effect on firm's profitability. In this regard, the better working capital is managed, the higher the profitability of a firm will be. Then on basis of this information the best way of managing working capital is assessed for both periods. Furthermore these periods are then compared and then determined, whether companies have to alter their management concerning their working capital management during times of a crisis.

B. Problem definition

Working capital management (WCM) is essential to survive because of its effects on a firm's profitability and risk, and consequently its value (Smith, 1980). WCM is the investment in current assets and current liabilities which are liquidated in a year or less and is very crucial for a firm's day-to-day operations (Kesimli and Gunay, 2011).

Firms can maximize their value by having an optimal level of working capital (Deloof, 2003). On the left hand of the balance sheet a firm has large inventory and generous trade credit policy which may lead to higher sales. Larger inventory reduces the risk of stock-outs. Accounts receivables, which is a part of trade credit, stimulates sales because it allows customers to assess product quality before paying (Long, Malitz and Ravid, 1993; and Deloof and Jegers, 1996). The negative side of granting trade credit and keeping inventories is that money is locked up in working capital (Deloof, 2003). Another component of working capital is accounts payable, which is in other words not extending trade credit but receiving it from a supplier. Receiving such a trade credit from a supplier allows a firm to assess the quality of the products bought, and can be an inexpensive and flexible source of financing for the firm (Deloof, 2003; and Raheman and Nasr, 2007). The flipside is that receiving such a trade credit can be expensive if a firm is offered a discount for the early payment. This is also the case with uncollected and extended trade credit, which can lead to cash inflow problems for the firm. (Gill et al., 2010).

Researchers have studied working capital management in many different ways. While some authors studied the impact of an optimal inventory management, other have studied the optimal way of managing accounts receivables that leads to profit maximization (Lazaridis and Tryfonidis, 2006; and Besley and Meyer, 1987). Other studies have focused on how reduction of working capital improves a firm's profitability (Jose et al., 1996; Shin and Soenen, 1998; Deloof, 2003; Padachi, 2006; Garcia-Teruel and Martinez-Solano, 2007; Raheman and Nasr, 2007; Samiloglu and Demirgunes, 2008; Zariyawati, 2009; Falope and Ajilore, 2009; Dong and Su, 2010; Sharma and Kumar, 2011; Karaduman et al., 2011).

However, all the above mentioned authors have studied the impact of working capital management during non-crisis periods. According to my knowledge and searches within the databases of scientific articles which are available to me, there are no authors who studied the impact of working capital management on a firm's profitability during crisis periods. This study will try to provide an understanding of how firms can manage their working capital in an "optimal way" during a crisis. This optimal way is defined in this study as the most profitable way, so the most optimal way of managing working capital in this study is leading to the highest profitability of a firm. Before the objective of this study is further elaborated, it will be proper to discuss the financial crisis of 2008 and 2009 first, in more detail.

1. Introduction to the the financial crisis

The financial crisis of 2008-2009 is the biggest shock to the worldwide financial system since the 1930s (Cornett et al., 2011; and Foster and Magdoff, 2009). The crisis began in late summer 2007 with the collapse of two hedge funds, property of the American firm Bear Stearns. It all deteriorated over time, despite the attempts by governments to stop this process. A couple of months later, many of the so called sub-prime loans were unravelled and it became clear that these loans had a very high risk. It was very likely that these loans could never been paid back. This led to the collapse and bailing out of the British bank Northern Rock and the central bank intervention of AIG, Freddy Mac and Fenny Mea. A year later Lehmann Brothers in the US collapsed, which emitted a huge shockwave all over the world (Source: times.co.uk).

In the Netherlands, banks in particularly, were affected by the crisis. It started on 8 October 2008 with the collapse of Icesave, an Icelandic bank. Later the Dutch government injected money in several banks, such as ING, AEGON, SNS REAAL. ABN AMBRO was bought by the government and is at present still sole owner of this bank. All of these government interventions were needed because of the huge credit losses by these banks and they therefore needed liquidity from the government. Banks weren't the only ones affected by the crisis, also corporations. The Dutch economy was in a big recession, the gross national product had in the second trimester of 2008 a negative growth. Also unemployment rose, in 2009 to 5,25% and in 2010 to 8%. The total economy declined 4,75% (Centraal Plan Bureau). The unavailability of credit was the main problem for financially constrained firms, because they had to cut more investment, technology, marketing, and employment relative to financially unconstrained firms during the crisis (Campello et al., 2010).

Companies now have to find another way to gain funds, because without financial resources, companies can't survive in these turbulent times or even in normal circumstances. There is a source of funds which is often neglected by companies, which is working capital. To access this source of funds, companies have to use the credit terms

given by their suppliers. Various authors found that mainly large companies with high cash reserves increase their credit extensions to their customers (Meltzer, 1960; Swartz, 1974; Brechling and Lipsey, 1963; and Yang, 2011). In other words these firms can be seen as financial intermediaries and are an alternative of banks which scale back their lending to these customers.

The objective of this study is to understand, how companies can manage their working capital in the best way during a crisis period, in other words, which leads to the highest profitability. To determine which is the "best" way, this study will focus on the relation between these companies WCM and their profitability. This study will focus on large public listed firm, because of two reasons. First of all because of the vast amounts of data available on these firms, from both the periods before the crisis and during the crisis. Secondly because larger firms are seen as a source of financial funds for their customers during crisis periods (Meltzer, 1960; Swartz, 1974; Brechling and Lipsey, 1963; and Yang, 2011). This role as financial intermediary could alter the relation between the managing of working capital and a firm's profitability and therefore very relevant for this study. Since this study focusses on large public listed firm in The Netherlands, the main research question is:

- **'How do relatively large public listed firms in The Netherlands manage their working capital during the financial crisis, and which is the most profitable?'**

In this study not only the crisis period will be studied, but also a non-crisis period. There are two reasons for this. First of all, because according to my searches in databases available to me, there are no studies done on the relation between working capital management and a firm's profitability during non-crisis years within The Netherlands. The second reason is that it allows a comparison between these periods, which could indicate whether Dutch companies have to alter their working capital management when the economy is close to a recession. This will be studied by answering the following question:

- 'Are there differences between the managing of working capital during non-crisis period and crisis period?'

C. Acadamic and business relevance

The literature on working capital management is limited to non-crisis period. This study will shed light on the working capital management during crisis periods. This study will also contribute by studying the management of working capital within The Netherlands, which is not done before by a reputable author, according to the searches I made using the databases available for student of the University of Twente. This study will allow many large companies to determine their own working capital management in times of a crisis.

D. Structure of the thesis

The introduction, which is the first chapter, begins with the problem definition and introduces the financial crisis of 2008-2009. Afterwards the objectives of this study are discussed and the question that have to be answered to reach these objectives.

The second chapter Literature Review gives an extensive literature study on working capital and the managements of its different parts.

The third chapter discusses the hypotheses. It explains what relations and outcome are expected of each of the hypotheses.

The fourth chapter Methodology begins with the explanation of the research design and how each hypothesis is tested. Later, each variable is discussed and what variables are used by various authors and why and how they are operationalized. The chapter ends with the discussion of the sample and the data sources.

Chapter five Empirical Findings contains the various statistical analyses of this study. Part A discusses the descriptive statistics; part B addresses the correlation analyses. And part C discusses the regression analyses of this study.

The last chapter summarizes the analyses and explains the limitations of the study and the future research directions are given.

"A crisis is an opportunity riding the dangerous wind."

- Chinese Proverb

II. LITERATURE REVIEW

A. Introduction to working capital (management)

Working capital is an important tool for growth and profitability for corporations. If the levels of working capital are not enough, it could lead to shortages and problems with the day-to-day operations (Horne and Wachowicz, 2000). Working capital is also called net working capital and is defined as current assets less current liabilities (Hillier et al., 2010).

Net working capital = Current assets – current liabilities

Both components of the working capital formula above can be found on the balance sheet. Current assets can be found on the left side of the balance sheet and are those assets that generate cash within one year. Current assets are normally divided in cash and cash equivalents, short-term investments, trade and other receivables, prepaid expenses, inventories and work-in-progress. Current liabilities can be found on the right side of the balance sheet and are obligations which have to be met within one year. Current liabilities are divided in trade payables, short-term debt and accrued liabilities.

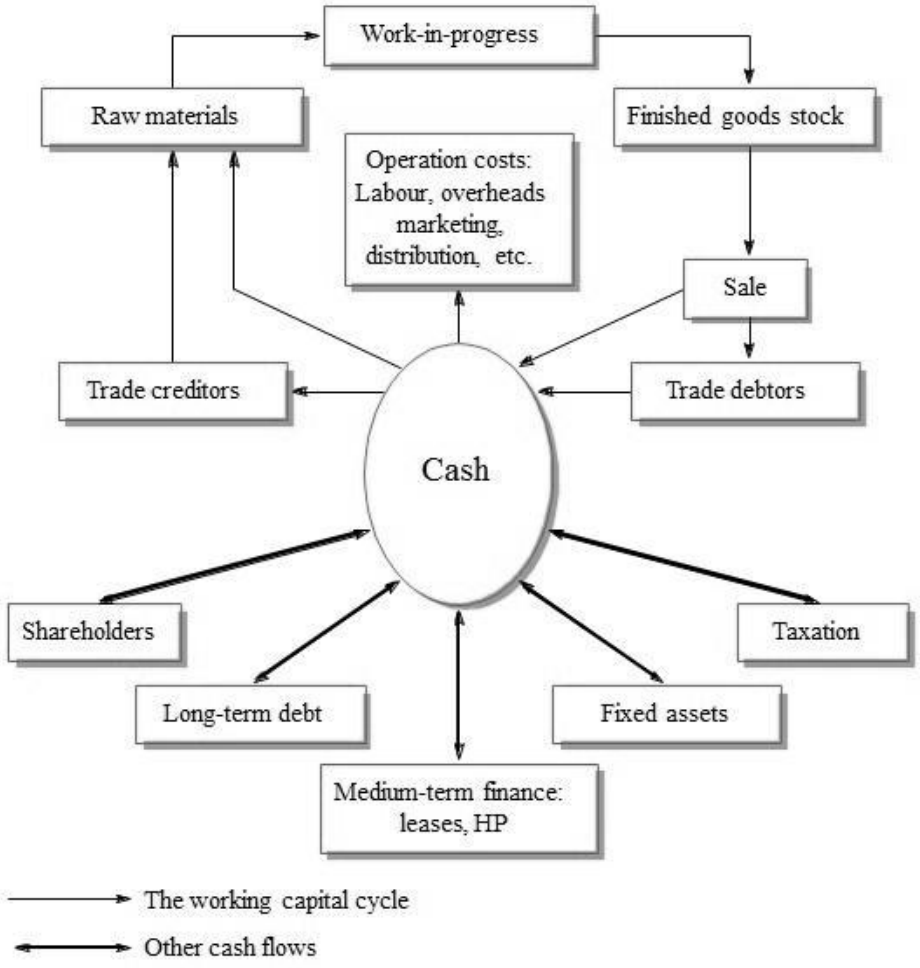

Figure 1.1 A typical working capital cycle (Source: Arnold, 2008:530)

To illustrate the working capital of a firm, the working capital cycle will now be discussed and can be seen in figure 1.1 on the previous page. The cycle begins with the purchase of raw materials which can be found in the inventory. Later on, these raw materials are transformed in finished goods. These goods are stocked in the inventory until they are sold to a customer. The sale can be purchased by cash or by trade credit. This trade credit provides a delay until the cash is received. With every step of the cycle there are associated costs, which are direct costs and opportunity costs.
The direct costs are the cost of capital invested in each part of the cycle, for example interest on the debt finance to sustain trade creditors. The opportunity costs are represented by the possible returns forgone by investing in working capital instead of some alternative investment opportunity (Berry and Jarvis, 2006).

The above discussed working capital and the cycle that it forms is managed by what is called Working Capital Management (WCM). WCM is part of the financial management of a firm, other parts are e.g. capital budgeting and capital structuring. The first two are mainly focussed on the managing of long-term investments and returns. While WCM focuses mainly on the short-term financing and short-term investment decisions of firms (Sharma and Kumar, 2011). Working capital management is vital for a firm, especially for manufacturing, trading and distribution firms, because in these firms WCM directly affect the profitability and liquidity. This is because for these firms it accounts for over half their total assets (Raheman and Nasr, 2007). It is possible that inefficient WCM can lead to bankruptcy, even if the profitability of a firm is constantly positive (Kargar and Bluementhal, 1994). A reason for this could be that excessive levels of current assets can easily lead to a below average return on investment for a firm (Raheman and Nasr, 2007). An efficient WCM has to manage working capital in such a way that it eliminates risks of default on payment of short-term obligations on one side and minimalizes the change of excessive levels of working capital on the other side (Eljelly, 2004).

In the 1980's and prior to that period, working capital management was compartmentalized (Sartoris and Hill, 1983). WCM was divided in cash, account payables and account receivables. In most firms, these compartments were managed by different managers on various different organizational layers (Sartoris and Hill, 1983). But Sartoris and Hill (1983) argued that there was a need for an integrated approach, where all the three compartments are combined. This led to the integration of the management of inventories, account payables and account receivables, called Working Capital Management (WCM), these parts will now be discussed individually.

Accounts receivables can be seen as short-term loans to customers given by the supplying firm. Giving these credit terms to customers are an important way of securing sales (Berry and Jarvis, 2006). Although the total amount of receivables on a balance sheet of a firm could be constant over time, its components are continually shifting and therefore careful monitoring is needed (Firth, 1976). When the accounts receivables keep growing, funds

are unavailable and therefore can be seen as opportunity costs. According to Berry and Jarvis (2006) a firm setting up a policy for determining the optimal amount of account receivables have to take in account the following:

- The trade-off between the securing of sales and profits and the amount of opportunity cost and administrative costs of the increasing account receivables.
- The level of risk the firm is prepared to take when extending credit to a customer, because this customer could default when payment is due.
- The investment in debt collection management.

Account payables are the opposite of account receivables, instead of giving a credit on a sale, a firm receives a credit. Hampton and Wagner (1989) explain account payables as follows: 'When a firm makes a purchase on credit, it incurs an obligation to pay for the goods according to the terms given by the seller. Until the cash is paid for the goods the obligation to pay is recorded in accounts payables'. Account payables can be seen as a short term loan, or in other words, a source of funding. The typical account payable policy is "2 in 10, net 30". This means that if a firm pays within 10 days it receives a discount of 2 percent, if not, the total bill has to be paid in thirty days. This means that a firm has to pay 2 percent for only 20 days, which is in fact a very expensive loan. To make this clearer the 2 percent can be transformed in an annual rate of 43 percent, which is enormous compared to normal annual rates. It is also possible that the policy is net 30, which means that the due date is within thirty days, without any discount. (Leach and Melicher, 2009: 504)

Instead of a source of funding, account payables or in other words using the trade credit term of a supplier can also be used to assess product quality (Deloof, 2003; Ng et al., 1999; Lee and Stowe, 1993; Long, Malitz and Ravid, 1993 and Smith, 1987). This assessment has to be done during the credit term and if the quality of the product is not satisfying, it can be sent back without paying the bill. The trade-off of accepting account payables or not is illustrated in figure 1.2.

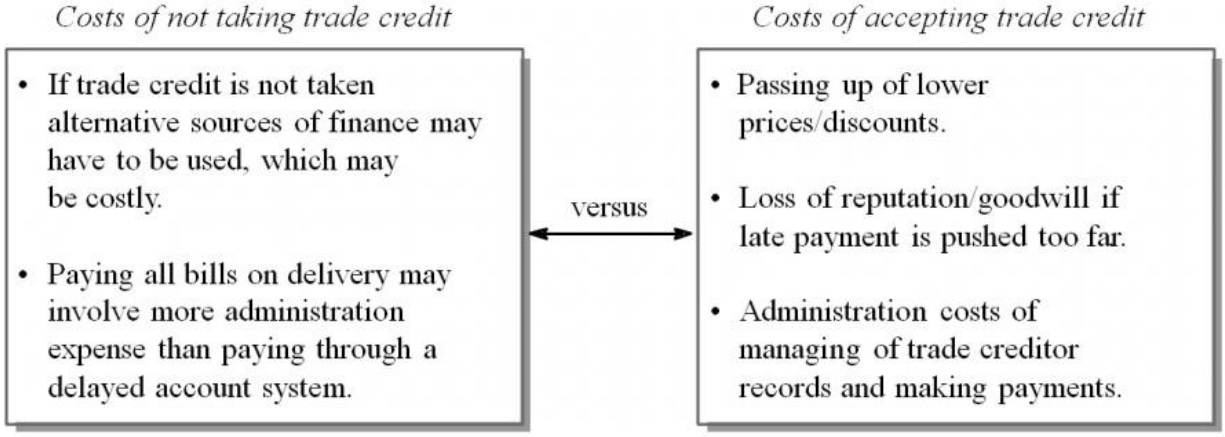

Figure 1.2 The Credit Trade-off (Source: Arnold, 2008: 549)

Inventory represents a large part of the total assets of many firms and an effective management is needed for normal production and selling operations of the firm and for keeping the costs of holding inventory at a minimum (Firth, 1976). The goal of inventory management is to minimize the costs of storing and financing goods while maintaining a level of inventories that satisfies the amounts of sales of a firm (Hampton and Wagner, 1989). Deloof (2003) argues that with inventory management there is a trade-off between sales and costs. If a firm keeps more stock it could result in more sales, but it will also be more costly. A firm needs to determine an optimal level of the amount of stocks. In figure 1.3 the different trade-offs a firm faces, are illustrated.

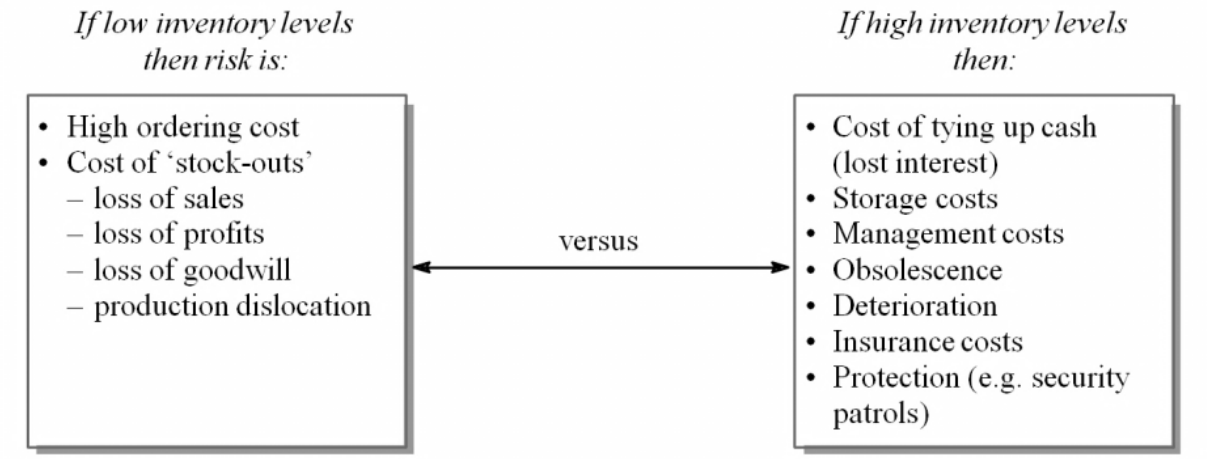

Figure 1.3 Trade-off Inventory Management (Source: Arnold, 2008: 545)

A firm has to look at each of the three parts of WCM and try to determine the optimal level based on the trade-offs discussed above. This optimal level can be reached if it maximizes the value of a firm (Howorth and Westhead 2003, Deloof 2003, Afza and Nazir 2007). Theoretically, in a Chief Financial Officer (CFO) perspective, WCM is a simple and straightforward concept, which is ensuring enough financial resources to fund the current liabilities and current assets (Harris, 2005). In practice, WCM is one of the most important issues in an organization where CFO's are struggling to reach the optimal level of each of the three parts of WCM (Lamberson, 1995).

How WCM determines the level of working capital depends on the Working Capital Policy (WCP) of a firm. According to Arnold (2008) there are two extreme opposite WCP's. The first is a relatively relaxed approach with large cash reserves, more generous customer credit and high inventories. This approach is adopted by companies which operate in an uncertain environment where buffers are needed to avoid production stoppages (Arnold, 2008: 535). The advantages of this approach are e.g. reduced supply costs, protection against price fluctuations and an increase in sales, profit and goodwill due to high inventories and high accounts receivables. (Garcia-Ternuel and Martinez-Solano, 2007). However there are several disadvantages, which are for example higher costs due to the high inventory level, decrease in goodwill due to using large amount of

trade credit and increase in risk of default of payment of a customer. Other advantages and disadvantages can be found among the trade-offs of the three parts of WCM accounts receivables, accounts payables and inventories.

The opposite of this approach is the aggressive WCM policy. This is stance is taken by companies who operate in a stable and certain environment where working capital is to be kept at a minimum. Firms hold a minimal inventory level, cash buffers and force customers to pay at the earliest moment possible. But this policy is criticised by Wang (2002). He argues that lowering the inventory level can decrease sales. Advantages of this approach are mainly the reduction in costs due to the low levels of inventories and account receivables. The risks taken by a firm is also low, because of the low levels of accounts receivables used with this approach. The disadvantages of this approach are mainly the reduction of sales, goodwill and profit due to the lack of inventories and trade extension to a firm's customers. Other advantages and disadvantages of this approach can be seen in the trade-off figures mentioned earlier.

When a firm is determining a WCM policy, its faces a dilemma of achieving the optimal level of working capital, where the desired trade-off between liquidity and profitability is reached (Nazir and Afza, 2009; Hill et al., 2010; Smith, 1980 and Nasr, 2007). This trade-off is a choice between risk and return. An investment with more risk will result in more return. Thus, a firm with high liquidity of working capital will have low risk and therefore low profitability. The other way around is when a firm has low liquidity of working capital, which result in high risk but high profitability. When determining a WCM policy, a firm has to consider both sides of the coin and try to find the right balance between risk and return.

B. Studies on working capital (management)

The literature on working capital and WCM uses various methods to explain and study its meanings and outcomes. The significant part of the literature focusses on the relation between WCM and a firm's profitability. Other studies have tried to decipher the determinants of the three parts of WCM and others have focussed more on the different policies concerning working capital. These different methods will be explained in this paragraph and the major studies concerning these methods will be discussed.

1. Effects of working capital management on a firm's profitability

The main body of the literature of working capital focusses on studying the relation between WCM and firm's profitability. These studies evaluate WCM, by trying to determine the effect of a firm's working capital management on its profitability. They argue that a WCM, which resulted in the highest profitability, must be the best way of managing working capital that can be implemented. All these studies have used regression analyses using different independent variables for profitability. The main used independent variable operationalizing WCM is the Cash Conversion Cycle (CCC). The

CCC basically shows how long a firm takes to convert resource inputs into cash flows (Quayyum, 2012). The CCC will be discussed in-depth in the third chapter of this thesis. There are also several studies that have done research on accounts receivables, accounts payables and inventories individually. Various studies on the effect of WCM on a firm's profitability are summarized in appendix B, where e.g. samples are described, which countries has been the focus of these studies and what variables were used.

Authors such as Deloof (2003), Shin and Soenen (1998), Laziridis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007), Samiloglu and Demirgunes (2008), Karaduman et al. (2011), Uyar (2009) and Wang (2002), whom did research in respectively Belgium, USA, Greece, Spain, Turkey, Turkey, Turkey and Japan and Taiwan all found a negative relation between WCM, using the CCC, and firm profitability. This means that having a WCM policy which results in a low as possible accounts receivables and inventories and the highest amount of accounts payables leads to the highest profitability.

Contradicting evidence is found by Gill et al. (2010), whom did research in the USA and found a positive relation between CCC and a firm's profitability. But they did find a highly significant negative relation between accounts receivables and a firm's profitability. They suggest that firm can enhance their profitability by keeping their working capital to a minimum. This is because they argue that less profitable firms will pursue a decrease of their accounts receivables in an attempt to reduce their cash gap in the CCC (Gill et al., 2010).

Other studies have mainly focussed on emerging market. These studies are Raheman and Nasr (2007), Zariyawati et al. (2009), Falope and Ajilore (2009), Dong and Su (2010), Mathuva (2010) and Quayyum (2012) whom did research in respectively Pakistan, Malaysia, Nigeria, Vietnam, Kenya and Bangladesh. All these studies have found a significant negative relation between the cash conversion cycle and a firm's profitability. This means that managers can create value for their firms, by keeping their working capital to a reasonable minimum.

Contradicting evidence is found in India by Sharma and Kumar (2011). They found evidence of a positive relation, which means that loosening the three parts of a firm working capital management leads to higher profit. They argue that this is caused by the fact that India is an emerging market and reputations of creditworthiness of firms are not fully developed and therefore many companies loosen their working capital management. Another reason they state is that only profitable firms can loosen their working capital and therefore it's because these firms are profitable, that they loosen their working capital management and not the other way around.

Contradicting evidence is found on the effect of accounts payables on the profitability of a firm. According to the cash conversion cycle, the number of days accounts payables needs to be as large as possible. But researchers such as Deloof (2003), Sharma and

Kumar (2011), Lazaridis (2006), Baños-Caballero (2010) and Karaduman (2011) have all found a negative relations between account payables and profitability. The first reason for this could be that more profitable firms pay earlier than less profitable firms, which in turn would affect the profitability and not the other way round. An alternative reason is given by Deloof (2003); by arguing that if a firm wait too long to pay their bills they have to pay without a discount. By speeding up these payments a firm could receive this discount and which will increase the profitability.

As mentioned before, authors have also studied the three parts of the CCC individually. These parts are the number of days accounts receivables, inventories and accounts payables. In the table 2.1 on the next page an overview is given about which effects the various authors have found between these three parts and a firm's profitability. As can be seen in the table 2.1, is that almost all authors have found a negative effect of the three parts on firm's profitability. Sharma and Kumar (2011) argued that the positive relation they found between accounts receivables and profitability is caused by the fact that Indian firms have to grant more trade credit to sustain their competitiveness with their foreign competitors, which have superior product and services.

Mathuva (2010) found contradicting evidence with the management of inventories in Kenya. He argued that companies increase their inventory levels to reduce the cost of possible production stoppages and the possibility of no access to raw materials and other products. He further stated the findings of Blinder and Maccini (1991), which indicate that higher inventory levels reduces the cost of supplying products and also protects against price fluctuations caused by changing macroeconomic factors.

Also contradicting evidence is found by Mathuva (2010) with the management of account payables. He found a positive effect of the number days accounts payables on a firm's profitability in Kenya. He explained this positive relation with two reasons, first he argued that more profitable firms wait longer to pay their bills. These firms use these accounts payables as a short-term source of funds. The second argument why firms increase their accounts payables is that these firms are able to increase their working capital levels and thus increasing their profitability. This is in line with theory of a negative effect of the Cash Conversion Cycle (CCC) on the profitability of a firm. This is caused by the fact that the number of days accounts payables needs to be add in the measurement of the CCC. Thus a higher amount of a number of days accounts payables leads to a higher profitability with a negative relation between the CCC and a firm's profitability.

TABLE 2.1

Effects of individual parts of the cash conversion cycle

Effect → **Variable ↓**	**Significant negative relation on a firm's profitability**	**Significant positive relation on a firm's profitability**
Number of days Accounts Receivables	Deloof (2003) Laziridis and Tryfonidis (2006) Gill et al. (2010) Garcia-Teruel and Martinez-Solano (2007) Samiloglu and Demirgunes (2008) Karaduman et al. (2011) Falope and Ajilore (2009) Raheman and Nasr (2007) Mathuva (2010)	Sharma and Kumar (2011)
Number of days Accounts Payables	Deloof (2003) Laziridis and Tryfonidis (2006) Garcia-Teruel and Martinez-Solano (2007) Karaduman et al. (2011) Sharma and Kumar (2011) Falope and Ajilore (2009) Raheman and Nasr (2007)	Mathuva (2010)
Number of days Inventories	Deloof (2003) Laziridis and Tryfonidis (2006) Garcia-Teruel and Martinez-Solano (2007) Samiloglu and Demirgunes (2008) Karaduman et al. (2011) Sharma and Kumar (2011) Falope and Ajilore (2009) Raheman and Nasr (2007)	Mathuva (2010)

2. Determinants of trade credit

The other main body of the literature of working capital focusses on trade credit. Trade credit can either be given by a supplier in the form of accounts receivables, or can be received by a customer in the form of accounts payables. The authors of this body of literature on working capital are studying why firms decide to receive or to grant trade credit. The literature offers various theories to explain this decision. These are based on the advantages of either the supplier or customer, from the operational, commercial and financial perspective (Garcia-Teruel and Martinez-Solano, 2010). The motives for each perspective will be elaborated in the following part. Also some motives outside these perspectives will be discussed. Later, the results of the most influential articles on trade credit motives are discussed.

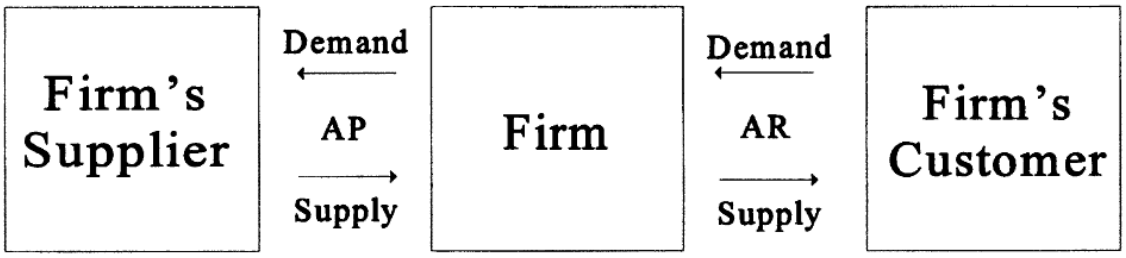

Figure 1.4 The trade credit relationships (Source: Petersen and Rajan, 1997: 668)
The amount of trade credit extended by a supplier to the firm will appear as the accounts payables. The amount of trade credit extended by the firm to its customer will appear as the accounts receivables.

Financial Motives

Trade Credit extension to assess the Buyer's Creditworthiness

The imperfect information leads to the uncertainty about the buyer default risk. By extending a trade credit to this buyer a seller can evaluate the creditworthiness by looking at the buyers payment practices. These practices can identify which buyer may be in financial difficulties. The common credit term given to these buyers is the two part trade credit, where the buyer gets a discount if he pays within ten days. If this discount is not taken, the buyer has to pay after the tenth day, with a very high effective interest rate till the bill is paid. Failure to pay within the discount period could signal financial distress and it would than merit to monitor the buyer more closely.

The other motive which is in line with the above motive is the advantage a non-financial firm has when assessing creditworthiness compared to financial institutions. This advantage enables certain non-financial firms with high creditworthiness to financially aid their customers which have difficulties accessing capital market, because of their low credit rating (Garcia-Teruel and Martínez-Solano, 2010; Emery, 1984; Mian and Smith, 1992; Petersen and Rajan, 1997; Schwartz, 1947 and Smith, 1987). A supplier has a greater ability for obtaining detailed information about its customers creditworthiness, due to the continues contact with the customer. Also when a customer is likely to default on a payment, the supplier can easily cut off the supply of merchandise that is paid regularly (Garcia-Teruel and Martínez-Solano, 2010).

Operational Motives

Trade Credit and Variable Demand

An operational motive of using trade credit is that it enables to operate in more efficient way. It also leads to cost improvements through the separation of delivery of goods and the payment (Garcia-Teruel and Martínez-Solano, 2010). This is because the separation reduces the uncertainty about the level of cash that is needed to finish payment (Ferris, 1981). Emery (1987) argued that this provides more flexibility in the conduct of operations, because fluctuations can be coped with the use of trade credit. He also argued that a firm can reward a customer who acquires merchandise in a low demand period. According to Garcia-Teruel and Martínez-Solano (2010) this relaxing of trade credit terms enables the supplier to reduce the inventory costs of the excessive inventories that would elsewise accumulate if they kept production constant. This is supported by the finding of Long et al. (1993) where firms with variable demand extend more credit than firms with stable demand (Ng et al., 1999).

Commercial Motives

Trade credit as price discrimination

Trade credit can be used as a form of price discrimination by firms, according to whether delays and discount are given to its customers (Brennan et al., 1998; Mian and Smith, 1992). There are two ways of implementing this price discrimination to firms. The first is allowing a delay in payment and second is by giving a discount in payment, which can be seen as a price reduction. This theory of price discrimination is empirically tested by Petersen and Rajan (1997). They found that firms with a high profit margin benefits when they raise their sales. Through granting more trade credit, a firm is able to raise their sales. This is beneficial for firms with high profit margins, because the profits of this raising of sales surpass the costs of granting trade credit (Petersen and Rajan, 1997; Garcia-Teruel and Martínez-Solano, 2010).

Offering Delayed Payment to Guarantee Product Quality

Another commercial motive of using trade credit is for the assessment of product quality. This is first suggested by Smith in 1987, where he argued that suppliers can permit customers to assess the quality of the products before payment, through granting trade credit terms. When the quality of a product is difficult to assess, a supplier can extend the agreed terms even longer. Lee and Stowe (1993) argued that trade credit is best way to guarantee the quality of a product. Garcia-Teruel and Martínez-Solano (2010) argued that therefore smaller and younger firms will give more trade credit, since their customers don't have any reasons to trust that the quality of their products is sufficient. This argument is supported by the finding of Long et al. (1993). They found that smaller firms, and firms who lack product quality reputation, extend more trade credit relative to sales. More recently Pike et al. (2005) found that in the US, UK and Australia trade credit can

be used to reduce the information asymmetries between a buyer and a seller, where product quality is a main part of.

Other motives of extending Trade Credit

Specific Investment in the Buyer-Seller Relationship

Smith (1987) argued that if a supplier has a specialized and non-salvageable investment in a buyer, that this investment could be an important determinant for extending trade credit to this buyer. This credit term will give the seller the possibility to monitor the buyer more closely and could determine the risk of this investment. This is based on the fact that an investment can only be earned back if the buyer stays in business. In other words the seller can protect the investment by using credit to learn about the financial position of the buyer and act early if this buyer is in financial distress.

Scale Economies in Extending Credit

A firm's size affects the extending of trade credit to its customers. The larger the seller is, the larger its customer base will be. This higher amount of customers increases the probability of a default on payment among these customers. For this reason larger firms has to monitor its customers more closely and an important tool for this monitoring is the extending of trade credit.

Studies on determinants of Trade Credit

Huyghebaert (2006) studied the trade credit use of Business start-ups. He found that their high failure risk, financial constraints, and their lack of relation with banks and suppliers significantly influence their trade credit use. These factors significantly increase the use of trade credit by these start-up firms. He also found that suppliers have an advantage in financing high-risk customers, but only in certain circumstances. The first situation which brings an advantage is when raw materials are often replaced and thus leads to a high frequency trade credit use. Second is when these start-ups have high raw materials levels and third when these start-ups operate in an industry with a low concentration ratio.

Garcia-Teruel and Martinez-Solano (2010) studied the trade credit use of Small and Medium Enterprises (SMEs) in Europe. They found that the trade credit offered by suppliers is especially important for SMEs, because they have more difficulties obtaining finance through credit institutions. They also found that firms with greater capacity of obtaining relatively cheap financial resources grant more trade credit to their customers. These results support the theory that trade credit can be explained by the advantages a supplying firm has over financial institutions. However, they didn't find evidence that support the quality assessment motive of using trade credit. They did find support for the price discrimination motives, because the data indicate that firms with higher profit margins grant more trade credit. Further support of this argument is given by the fact that firms who faces a reduction in their sales; react by increasing the trade credit to balance

the decrease in sales. Evidence is also found that when firms are able to access other cheaper financial resources, like bank loans, they use less trade credit (substitution effect).

Petersen and Rajan (1997) did research on the theories and motives of the use or granting of trade credit. They focussed on smaller firms who have a limited access to the capital market. They found that firms grant more trade credit to firms with higher credit worthiness, but these firms use less trade credit when they have access to the capital market. Also evidence is found which support the theory that supplying firms have advantages over financial institutions concerning short-term financing. They argue that this is mainly due to the fact that these suppliers have more current information compared to the information of financial institutions. Also evidence is found for the motives of these suppliers for extending trade credit when they have a large interest in the survival of the customer and suppliers are able to liquidate the goods without much loss. As mentioned before, they also found evidence supporting the theory of price discrimination with firm with high profit margins.

3. Determinants of inventories

In previous paragraph the determinants of trade credit are discussed. As mentioned earlier in this paper trade credit can either be accounts payables or accounts receivables, but what of the other part of WCM, inventory management. There are several motives for lower or higher levels of inventories and highly depends on what business a company is in. The most widely and simple motive of managing inventories is the cost motive, which is often based on the Transaction Cost Economics (TCE) theory (Emery and Marques, 2011). To be competitive, companies have to decrease their costs and this can be accomplished by keeping the costs of stocking inventory to a reasonable minimum (Gaur et al., 2005). This practice is also highly valued by stock market analysts (Sack, 2000). There are also other motives of managing inventories which will be discussed in the following part and empirical evidence will be given which supports these different motives.

Higher inventory levels and variable demand

The main motive of keeping high levels of inventories, which are raw materials, work-in-progress, and finished goods, is to keep them as a buffer against demand fluctuations, production stoppages and other unexpected problems (Cuthbertson and Gasparro, 1993; Lieberman et al, 2009). This motive is supported by evidence found by Cachon and Olivares (2010), who found that among automotive companies in the US, inventories are used as safety stocks to better withstand demand fluctuations. Kahn (1987) also found evidence that companies increase their amount of stocks to decrease the probability of stockouts when demand is high and thus inventory levels are determined by the fluctuations of sales of a company.

Just-in-time inventory system

Managerial decisions have a huge impact on the levels of inventories. During the seventies and eighties of the 20th century Japanese manufacturing companies increased their activities significantly in the U.S. markets. They also brought in new ideas of managing companies and since they increased their market shares substantially, it was apparent that some of these new ideas of managing were very successful. One of these ideas affected the way of managing inventories, which was called the Just-In-Time (JIT) inventory management system. The basic idea of this system was that companies should deliver products to their customer just-in-time. By doing this, companies won't have to have large amounts of stocks to be able to deliver goods. This saves a lot of costs concerning inventory stocking. The question of whether companies in the U.S. did decrease their amount of stocks was studied by Chen et al. (2005). They found that a large amount of companies did significantly reduce their inventory levels. This reduction was mostly implemented on the levels of work-in-progress inventory. This decrease in inventory levels is also found by Rajagopalan and Malhorta (2001) who studied a number of industries in the manufacturing sector in the U.S.

Higher inventory levels and production costs

Another reason for companies to increase their finished goods inventory levels is to be able to produce in periods in which production costs are relatively low (Blinder and Maccini, 1990; Eichenbaum, 1984; and Eichenbaum, 1989). A comparable motive of increasing inventory levels is when companies can produce cheaper in batches, which can result in relatively high inventory levels.

Other determinants of Inventory management

Lieberman et al. (2009) studied the determinants of inventory policies of automotive companies in the United States. They found that both technological and managerial factors have a significant influence on the determining of the levels of inventories. Technological factors, like longer setup and processing times increases the level of inventories. While the average price per piece of inventory decreases the inventory levels. They also found that managerial factors, like more employee training and problem solving training have a reducing effect on the inventory levels.

Lieberman et al. (2009) also found that when companies have a greater and more frequent communications with their supplier, the inventory levels will be lower. This finding is supported by Milgrom and Roberts (1988) that view inventory and communication with a supplier as substitutes.

Also macro-economic conditions have a profound impact on the levels of the different types of inventories. Chen et al. (2005) found that when interest rates are increasing, the levels of work-in-progress are decreased. Also evidence is found that inflation has a positive effect on the acquiring of raw materials. This is caused by the fact that companies

wanted to buy these materials before the prices of these materials rise even more. They also found that when managers assume better economic conditions in the future, they increase the levels of finished goods (Chen et al., 2005).

4. Research on working capital policies

The literature focussing on working capital policies is, compared to the two other methods, somewhat smaller. In this literature, there is a long debate between the risk and return of the different working capital policies (Pinches, 1991; Brigham and Ehrhardt, 2004; Moyer et al., 2005; Gitman, 2005). The more aggressive approach, where the working capital is minimized, is associated with lower risk and return. The relaxed approach, with high cash reserves and high inventory, is associated with higher risk and return (Gardner et al., 1986; Weinraub and Visscher, 1998).

The studies focussing on WCM policies are trying to determine the effect of a policy on a firm's risk and profitability. This is effect is for example studied by Afza and Nazir in 2007. They operationalize the policies by calculate the ratio of total current assets divided by total assets, where a lower ratio means a relatively aggressive policy. The accounts payables are operationalized by calculating the ratio of current liabilities divided by total assets, where a higher ratio means a relatively aggressive policy (Afza and Nazir, 2007). The effect of these two variables are tested on a firm's risk, measured with the standard deviation of sales and a firm's profitability using return on assets, return on equity and Tobin's q.

The results of Gardner et al. (1986) and Weinraub and Visscher (1998), shows that a relatively aggressive approach leads to higher profitability of a firm. Contradicting evidence is found by Afza and Nazir (2007) which found a negative relationship between the aggressiveness of working capital policies and a firm's profitability. They argue that this phenomenon may be attributed to the inconsistent and volatile economic conditions of Pakistan. The studies Carpenter and Johnson (1983) and Afza and Nazir (2007) didn't find a significant relationship between the working capital policies of firms and their operating and financial risk. Therefore the theory that indicates that a relaxed approach leads to higher risk is not proven.

This chapter started with the introduction of the basics of working capital. Working Capital Management (WCM) was discussed and the different trade-offs concerning the three parts of WCM, which are accounts receivables, accounts payables and inventories are mentioned. Afterwards the different WCM policies a firm can choose are summarized, and the advantages and disadvantages they have are discussed.

In the second part of this chapter the main bodies of working capital research are discussed in detail. First the literature on the relation of WCM and firm's profitability is summarized. In the second part of the paragraph an overview of the literature study on the determinants of trade credit is given. The third paragraph explained the motives and

determinants of the different types of inventories. It ended with the discussion of the literature concerning WCM policies. In the next chapter the hypotheses will be developed, using the expectations based on the different theories and studies concerning working capital management.

"Friends show their love – in times of trouble, not in happiness."

- Euripides

III. HYPOTHESES

A. Hypotheses development

The hypotheses that will be explained in this chapter have to test (i) how working capital can be managed in the most profitable way in The Netherlands during non-crisis years, and (ii) whether working capital management needs to be changed in times of a crisis by relatively large public listed firms in The Netherlands. To study the effect of WCM on firm's profitability during non-crisis years and crisis years, each individual part of WCM will be studied and also the combined measure for WCM, the Cash Conversion Cycle (CCC), will be studied.

B. Working capital management during non-crisis years

The research on the effect of accounts receivables on a firm's profitability during non-crisis periods is numerous. All these studies have found a negative relation between the number of days accounts receivables and a firm's profitability, with the exception of Sharma and Kumar (2011) (Deloof, 2003; Laziridis and Tryfonidis, 2006; Gill et al., 2010; Garcia-Teruel and Martinez-Solano, 2007; Samiloglu and Demirgunes, 2008; Karaduman et al., 2011; Falope and Ajilore, 2009; Raheman and Nasr, 2007; and Mathuva, 2010).

This negative relation is also expected to be found in this sample. There are several reasons for this expectation. The first reason is that public listed firms in The Netherlands have a high reputation concerning the quality of their products, because most of these firms have much invested in their goodwill and most of these firms are relatively old. This results in the fact that customers of these firms have no reason to use accounts receivables to determine the quality of the supplied products. The second reason is that firms during non-crisis periods are better off keeping the risks they take to reasonable minimum. This can be lowered by keeping the accounts receivables to a minimum. Since these two main reasons of increasing accounts receivables aren't important, the firms of this sample have only one aim concerning the management of accounts receivables, which is keeping costs to a minimum. These costs of accounts receivables are mainly caused by administrative and opportunity costs, but also by the costs concerning the debt collection management. Because of this vast evidence for a negative relation and the above mentioned arguments, the following hypothesis is developed:

Hypothesis 1: The accounts receivables of a firm are significant negatively related to a firm's profitability during non-crisis years.

In the measurement of the Cash Conversion Cycle (CCC) of a firm, the number of days accounts payables needs to be deducted. Since almost all researchers who studied the effect of the CCC on firm's profitability found a negative relation, it is expected that accounts payables have therefore a positive effect on firm profitability (Deloof, 2003; Shin and Soenen, 1998; Laziridis and Tryfonidis, 2006; Garcia-Teruel and Martinez-Solano, 2007; Samiloglu and Demirgunes, 2008; Karaduman et al., 2011; Uyar, 2009; Wang, 2002; Raheman and Nasr, 2007; Zariyawati et al., 2009; Falope and Ajilore, 2009; Dong and Su, 2010; Mathuva, 2010; and Quayyum, 2012). But according to empirical evidence found by Deloof (2003), Laziridis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007), Karaduman et al. (2011), Sharma and Kumar (2011), Falope and Ajilore (2009) and Raheman and Nasr (2007) this is not the case. They found that accounts payables have a negative effect on a firm's profitability. Deloof (2003) argues that this is, because less profitable firms pay their bills earlier, in this case profitability influences the account payables policy and not vice versa. He also argued a second reason, which is that firms pay their bills to late and therefore don't have the opportunity to get a discount when paying early.

In this study this negative relation is also expected. The reason for this relation is in line with the second argument made by Deloof (2003), and is based on the costs involved using accounts payables. As explained earlier in this thesis is that account payables have often a "2 in 10, net 30" policy. This means that when firms pay their bills within 10 days they get a two percent discount. This can also be interpreted as follows: if they pay after these 10 days, they have to "pay" this two percent. This can be transformed in an huge annual rate of almost 40 percent. Also the reason for accounts payables as a source of funds is not needed for the firms in this sample, since these firms have a relatively high access to the capital market. Other reasons for not using accounts payables is the possible loss of goodwill when firms do use their accounts payables and thus paying later. Since reducing costs is profitable for a firm and the firms in this sample don't have the need of using accounts payables as a source of funds, the following relation is expected and will be tested using the following hypothesis:

Hypothesis 2: The accounts payables of a firm are significant negatively related to a firm's profitability during non-crisis years.

The relation between the management of inventories and firm's profitability is studied by Deloof (2003), Laziridis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007), Samiloglu and Demirgunes (2008), Karaduman et al. (2011), Sharma and Kumar (2011), Falope and Ajilore (2009), Raheman and Nasr (2007) and Mathuva (2010). They found that the effect of the number of days inventories have a negative effect on a firm's profitability. Contradicting evidence was found by Mathuva (2010), who found a positive effect. He argued that this is because firm with higher inventory levels reduce costs by avoiding production stoppages with the high inventory level.

It is expected that firms in the sample of this study are better off keeping the levels of inventories to a reasonable minimum during non-crisis years. The first reason for this assumption is that the motive of using large inventories concerning the avoidance of production stoppages are not applicable for the firms in this study. This is because these firms are relatively highly developed concerning their production and supply chain. The second and most important reason for firms to keep inventory levels low are the costs involved. These costs are for example storage costs, management costs, security costs, insurance costs and cost of tying up cash. Since all the other authors found evidence of a negative effect of inventories on a firm's profitability and because inventories are very expensive and the firms of this sample have no motives of using high levels of inventories, the following hypothesis is developed:

Hypothesis 3: The inventory level of a firm is significant negatively related to a firm's profitability during non-crisis years.

The effect of the combined parts of WCM, using the Cash Conversion Cycle (CCC) is expected to be negative during non-crisis years. This expectation is made because both the number of days accounts receivables and the number of days inventories which are part of the CCC are expected to be negatively related to a firm's profitability. Further is expected that the different (negative instead of positive effect) expectation concerning the number accounts payables will not change the expected negative effect of the CCC. This expectation is also supported by the vast empirical evidence found by the various authors who studied the effect of the cash conversion cycle of a firm's profitability. (Deloof, 2003; Shin and Soenen, 1998; Laziridis and Tryfonidis, 2006; Garcia-Teruel and Martinez-Solano, 2007; Samiloglu and Demirgunes, 2008; Karaduman et al., 2011; Uyar, 2009; Wang, 2002; Raheman and Nasr, 2007; Zariyawati et al., 2009; Falope and Ajilore, 2009; Dong and Su, 2010; Mathuva, 2010; and Quayyum, 2012). To proof this effect, the following hypothesis needs to be tested:

Hypothesis 4: The cash conversion cycle of a firm is significant negatively related to a firm's profitability during non-crisis years.

C. Working capital management during crisis years

To understand the expectations of how working capital is managed during crisis years, the main problem firms face in times of a crisis needs to be explained. This problem is that firms are not able to access financial resources from the capital market. This problem is caused by the restrictions that banks have implemented on short-term loans, which leads to financially constraint firms. Before the hypotheses are developed regarding WCM during crisis years, theories and empirical evidence regarding financial constraints and its solutions are discussed.

The bank lending theory predicts that during monetary contractions banks restrict some loans extended to firms (Nilsen, 2002). These restrictions causes firms, especially smaller firms, to pass by good investment opportunities. Gertler and Gilchrist (1994) showed that smaller firms have a significant share in the decline in production in times of a crisis. The question of whether these restrictions are also implemented during the financial crisis of 2008-2009, is studied by Ivashina and Scharfstein (2008). They found that banks indeed scaled back lending, which resulted in a 36% decline in August – October 2008 compared to the prior three-month period. This decline caused financial constraints for corporations all over the world, and this was also the case in The Netherlands.

Many firms have cited that restrictions of bank credit are one of the most important constraints to operation and growth of their business. These constraints have the most effect on small to medium firms (Love and Zaidi, 2010). During the times of a crisis, the financing constraints are likely to grow, which will lead to cutting of investments and research and development and bypassing of attractive investment projects by firms (Campello et al., 2009). Because of these constraints, financially constraint firms have to look at alternative sources for their financial needs. These funds are needed to survive the turbulent times of a crisis.

Meltzer (1960) was one of the first authors who found a suitable substitute for bank loans. He found that when bank scale back lending, firms with relatively high cash balances increase their accounts receivables. These accounts receivables are granted to financially constraint firms in the form of trade credit, which can be seen as a short-term loan.

For firms which are financially constrained and for which there is no alternative source of finance, a trade credit might be a substitute for a short-term bank loan (Kohler et al., 2000). In spite of the fact that this argument is contested by Gerlet and Gilchrist (1993) and Oliner and Rudebusch (1996) there are several studies that found supporting evidence for this argument. Ramey (1992) found that when money is tightened, trade credit is raised. Both in the long run and short run these variables are positively related.

Swartz (1974) also found evidence that when money is tight, smaller firms will increase their trade credit as a short-term source of funds instead of bank credit. Laffer (1970) also

confirms these findings and argued that trade credit is a very close substitute for bank credit, and he found evidence that a decline of bank credit are to a large extent substituted by trade credit.

Yang (2011) also found evidence which implies that trade credit is a substitute of a bank loan, he also found a positive relation between accounts receivables and bank loan, which means that they are complementary to each other. He also found that accounts payables steadily increases during a crisis. The empirical evidence indicates that financially constrained firms are more likely to be negatively affected by a crisis, and are more likely to cut their accounts receivables and increase their use of trade credit.

A remarkable finding of Nilsen (2002) is that he found that larger firms without bond rating also increase their use of trade credit, even when they have high amount of cash. These findings suggests that smaller and larger firms, which are credit constrained, lack other financing alternatives, and thus can only use the available trade credit as the alternative fund (Nilsen, 2002). That large firms without bond ratings increase their use of trade credit is supported by the findings of Yang (2011). These findings are in contradiction with the finding of articles such as Ramey (1992) and Love et al. (2007). Nilsen (2002) argues that these cash rich firms use its cash reserve as a precaution, because they are financially constrained and are likely to have a more volatile demand, which they have to cope with. This explanation is supported by the findings of Calomiris et al. (1995), which implies that large firms, which are financially constrained, build "buffer stocks" of current assets. They also found that cash reserves are used to finance accounts receivables at the start of a recession. When constrained firms are hit with unanticipated increase in inventories, due to demand fluctuations, they are supported through trade credit by firms which have better access to financial markets (Calomiris et al., 1995.)

What can be concluded in the above discussion is that financially constraint firms, either large or small, increase the use of trade credit to substitute the non-accessible bank loans. As mentioned before, Meltzer (1960) found evidence that high cash rich firms increase their extension of trade credit. This evidence is supported by the finding of Swartz (1974). He found that these firms are large, and still have access to the capital market. These firms will increase their borrowing capacity to channel funds to their customers, through their accounts receivables. As larger firms increase their role as a financial intermediate during periods of a crisis, they sell more financial resources along with their products (Meltzer, 1960). These findings are confirmed by Brechling and Lipsey (1963). They found evidence indicating that in periods of financial constraints, credit terms tended to become longer than normal, and the other way around, when money is easy to get, these terms became shorter than normal (Swartz, 1974). Yang (2011) also found evidence that indicate that firms which are not financially constrained increase their accounts receivables and so extend more trade credit to their customers.

Love et al. (2007) study the effects of the 1997 Asian crisis on firms operating in several Asian countries, and the effect of 1994 peso devaluation on Mexican firms. They found an increase in trade credit at the height of a crisis, followed by a collapse of trade credit right after the crisis events. This collapse can be explained with two reasons, the first is that firms that extent trade credit suffer financial constraints themselves and therefore grant less trade credit (supply effect). The second reason is demand driven, i.e., customers aren't willing to receive trade credit anymore (Love et al., 2007). They found that firms before the crisis, with high short term debt, extend significant trade credit. After a crisis, this extension is sharply cut, which means that the pre-crisis high short-term debt financial position is very disadvantageous after a crisis (Love et al, 2007).

Most of the above mentioned studies found evidence that trade credit can be seen as substitute to a short-term bank loan; this is definitely the case during a crisis. There is also contradicting evidence found towards this assumption in Japan. Taketa and Udell (2007) did research after the impact of financial shocks on the flow of credit to small and medium-sized firms. They hypothesised that some lending channels are closed during these shocks and some are increased to substitute the closed ones. They focussed on the trade credit channel and if this channel could be the substitute of the closed channels. But they found little evidence that trade credit could play this role. What they truly found is more of a contradicting nature; they found that during the Japanese financial crisis, the trade credit channel is complement to the still existing bank lending channel.

As discussed in this paragraph, large firms can be seen as financial intermediaries in times of a financial crisis, but the risks and rewards that these firms have to consider, when they provide financing, is not discussed. This is first studied by Pike and Cheng (2001); they held a survey among large firms from the United Kingdom. The survey showed that 77% of their respondents' main goal of managing trade credit is to minimalize risk. This means that other goals of U.K. firms, such as profit and sales increase, are seen as secondary goals. Because a financial crisis increases the chance of a buyer's default, and therefore the firm's risk, this may yield to the less extension of trade credit by these large firms. Even if they have the ability and resources to provide it. In spite of this contradicting evidence, the expectations are that large public listed firms increase their extension of trade credit or the given terms in this extension in times of a crisis, to support their financially constraint customers. This behaviour could enable the survival of the financially constraint customers of the aiding firm in times of a crisis. This aid to these customers could save future sales, which in turn could increase the short-term, but mainly long-term, profitability of the aiding firm. To test the relation between accounts receivables and a firm's profitability, both the short-term and somewhat longer-term effects will be tested in times of a crisis. Since the aid to financially constraint customers is beneficial for the profitability of a firm, the following hypotheses are expected, concerning accounts receivables during a crisis period:

Hypothesis 5: The effect of a firm's accounts receivables on its profitability will be positive during crisis period.

Hypothesis 6: The effect of a firm's accounts receivables on a firm's profitability is positive on a relative longer term during crisis years.

Not much is written about both inventory management and the use of accounts payables during the time of a crisis. In non-crisis periods, as is discussed in paragraph B of this chapter, both the number of days of inventory and accounts payables need to be as minimal as possible to gain the most profit. Since any theory is not stating otherwise, this is still expected to be kept as minimal as possible during a crisis. Mostly because cutting any cost during a crisis is very important, even for larger firms, to survive the turbulent times of a crisis. By keeping the inventories as low as possible, much storage costs are circumvented this way. Also by keeping the accounts payables as low as possible, circumvents to high interest costs if a discount on payment is not taking with a typical "2 in 10, net 30" term. Therefore the following hypotheses are developed to test if the managing of inventories and accounts payable need to be changed.

Hypothesis 7: The level of inventories has a negative effect on a firm's profitability during crisis periods.

Hypothesis 8: The amount of accounts payables has a negative effect on a firm's profitability during crisis periods.

The combined effect of the accounts receivables, accounts payables and inventories have on a firm's profitability, will be tested using the Cash Conversion Cycle (CCC). The effect is has on firm's profitability during non-crisis years is expected to be negative, as is explained in the previous paragraph. This negative relation is still expected to exist during a crisis period, because the effects on profitability of accounts payables and inventories are not expected to change in times of a crisis. Furthermore the expected change of the effect of the accounts receivables is expected to be not enough to alter the negative effect the CCC has on a firm's profitability. Therefore the following hypothesis is developed:

Hypothesis 9: The effect of the cash conversion cycle on firm's profitability during crisis years is negative.

"When true friends meet in adverse hour; 'Tis like a sunbeam through a shower. A watery way an instant seen, the darkly closing clouds between."

- Sir Walter Scott

IV. METHODOLOGY

A. Research design

To understand how working capital should be managed by public listed firms in The Netherlands based on a firm's profitability during non-crisis periods, the hypotheses 1 to 4 needs to be tested. To see if there are any differences between the crisis period and the non-crisis period, the hypotheses 5, 6, 7, 8 and 9 have to be tested. This chapter will explain how each of these hypotheses are studied. The second part of this chapter addresses the choice of the dependent, independent and control variables. This chapter ends with part C, which discusses the sample of this study and the data collection.

As mentioned earlier in this thesis, working capital management consists of three different parts. These parts are accounts receivables, accounts payables and inventories. In the upcoming analyses, each of these parts will be studied, with the aim of determining the most profitable way to manage each of these parts during a non-crisis and crisis period. Also the combined parts of WCM will be studied in the form of the cash conversion cycle. Each of these four different variables will be analysed using the Ordinary Least Square (OLS) regression analyses.

The working capital cycle represents the time difference between the acquisition of raw materials and other inputs, and the receiving of cash from the sale of the finished goods. The Cash Conversion Cycle (CCC) is a part of this working capital cycle. The CCC is the time lag between the paying of the raw materials and the receipt of money from the sale of goods. In other words, the period between the acquiring of raw materials and the paying of these materials plus the cash conversion cycle forms the working capital cycle of a firm. The cash conversion cycle is measured using the following formula:

Cash Conversion Cycle = the number of days inventories + the number of days accounts receivables – the number of days accounts payables.

According to Arnold (2008) the shorter this cycle, the fewer resources are needed by the company. So the longer the cycle is the higher will be the investment in the working capital. But also a longer cycle could increase sales, which could lead to higher profitability. But this longer cycle, will also lead to higher investment and could rise faster than the benefits of the higher profitability. Many authors like Shin and Soenen (1998) have argued that it is important for firms to shorten the CCC, as managers can create value for their shareholders by reducing the cycle to a reasonable minimum (Sharma and Kumar, 2011).

The number of days accounts receivables, inventories and accounts payables are used as the operationalization of the management of trade credit and inventory. As mentioned above, the CCC will be used as a comprehensive measure of WCM (Deloof, 2003). The

effect of these four variables on a firm's profitability will be tested using OLS regression analyses. This methodology is used in articles such as Sharma and Kumar (2011), Karaduman et al. (2011), Lazaridis and Tryfonidis (2006), Deloof (2003), Falope and Ajilore (2009), Garcia-Teruel and Martinez-Solano (2007), Dong and Su (2010), Matuva (2010) and Raheman and Nasr (2007).

The above articles use two different dependent variables for their regression analyses, which are Return on Assets (ROA) and Gross Operating Profit (GOP). For robustness both these dependent variables will be used. What needs to be highlighted here is that more attention should be given to the regression models using GOP, because this measure is more reliable in studying the effect of WCM on a firm's profitability. There are several reasons for this higher reliability, the first reason is that it measures only the performance of the operating activities of a firm. This is because the measurement of the gross operating profit, which is sales minus costs of goods sold, excludes taxes, interest costs, depreciation and amortization (Lazaridis and Tryfonidis, 2006 and Gill et al., 2010). The second reason is also based on the fact that this measurement focusses on the operational performance. This is because it excludes the income gained through the financial activities by firms, this is done through the exclusion of fixed financial assets, which are deducted from the total assets. GOP is calculated as follows (Lazaridis & Tryfonidis, 2006 and Deloof, 2003):

GOP = (Sales – Cost of Goods Sold)/ (Total Assets – Fixed Financial Assets)

As can be read in the hypothesis six, is that in this study also a relative longer term effect of the accounts receivables will be tested during the crisis period. As mentioned earlier in the chapter three Hypothesis, relative larger (public listed) firms can be seen as financial intermediaries during crisis periods (Meltzer, 1960; Brechling and Lipsey, 1963; Ramey, 1992; Kohler et al., 2000 and Yang, 2011). This practically means that firms from this sample increase their accounts receivables or increase the terms of these short-term loans during crisis periods. This aiding of these firms to their financially constraint customers is vital for the survival of these customers during a crisis period. This study tries to analyse of whether this aiding is profitable for the firms who aid their customers. What also is mentioned earlier is that it is very likely that this aiding is only profitable on the longer term. Therefore the analyses of the relative longer term effect is vital for the understanding of the management of accounts receivables during crisis periods.

A method that will enable this analyses, is using lead variables in the upcoming regression analyses. This is not used, to my knowledge, in other studies on working capital management. It basically means that the accounts receivables of one year have a positive effect of the next years profitability of a firm. For the sample of this study it means that is the effect of the accounts receivables of the years 2008 and 2009 on the profitability of the firms during the years 2009 and 2010 is analysed. Also benefits of this method is that is very much in line with the normal analyses and methods of the effect of WCM on

firm's profitability, because this method still uses regression analyses with the same independent variables. In this method not the normal dependent variables ROA_i and GOP_i are used but the leaded versions of this variable: ROA_{it+1} and GOP_{it+1}.

The regression analyses that will be used in this study are based on the following equations:

(1) $GOP_{it} = \beta_0 + \beta_1 AR_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(2) $ROA_{it} = \beta_0 + \beta_1 AR_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(3) $GOP_{it+1} = \beta_0 + \beta_1 AR_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(4) $ROA_{it+1} = \beta_0 + \beta_1 AR_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(5) $GOP_{it} = \beta_0 + \beta_1 AP_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(6) $ROA_{it} = \beta_0 + \beta_1 AP_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(7) $GOP_{it} = \beta_0 + \beta_1 INV_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(8) $ROA_{it} = \beta_0 + \beta_1 INV_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(9) $GOP_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

(10) $ROA_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GROWTH_{it} + \beta_5 CR_{it} + \beta_6 FATA_{it} + \varepsilon_{it}$

Where GOP and ROA measures the firm profitability, SIZE, the company size as measured by natural logarithm of sales, DEBT, the leverage, GROWTH, the sales growth, CR, the current ratio, FATA, the fixed financial assets to total assets ratio, AR, the number of days accounts receivables, AP, the number of days accounts payables, INV, the number of days inventories and CCC, the cash conversion cycle. The equation is estimated using the regression-based framework Ordinary Least Squares (OLS) as used by Deloof (2003), Sharma and Kumar (2011), Zariyawati et al. (2009), Shin and Soenen (1998), Falope and Ajilore (2009), Lazaridis and Tryfonidis (2006), Baños-Caballero et al. (2010), Quayyum (2012), Gill et al. (2010) and Samiloglu and Demirgunes (2008). In order to check the presence of autocorrelation and multicollinearity in data Durbin Watson (D-W) and Variance Inflation Factor (VIF) statistics will be used. D-W and VIF are used by

various authors, like Sharma and Kumar (2011), Falope and Ajilore (2009), Dong and Su (2010), Mathuva (2010), Lazaridis and Tryfonidis (2006), Gill et al. (2010) and Samiloglu and Demirgunes (2008).

B. Variable choice

In this paragraph the variables will be discussed individually and a table is given of the variable definitions. In Appendix C a table can be found giving information of how each variable is measured.

1. Firm Profitability

There are many different measurements of firm profitability among the researchers who studied the relation between WCM and firm profitability. The simplest form among these measurements is Return on Assets (ROA), which is measured by dividing net income with total assets. This is used by Sharma and Kumar (2011), Falope and Ajilore (2009), Wang (2002), Samiloglu and Demirgunes (2008), Garcia-Teruel and Martinez-Solano (2007), Nazir and Afza (2009) and Karaduman et al. (2011). According to Padachi et al. (2006) ROA is a good measure for firm profitability, because it relates the profitability of a company with its assets.

Padachi et al. (2010) uses gross operating profit divided by total assets. Zariyawati et al. (2009) and Shin and Soenen (1998) used almost the same measurement, the only difference is that they used gross operating profit before depreciation divided by total assets. Shin and Soenen (1998) also used a second measurement of firm profitability, which is gross operating profit before depreciation divided by net sales, but this measurement is not used by any other researcher.

The last main measurement is gross operating profit before depreciation and amortization divided by total assets minus financial assets. This measurement is used by Deloof (2003), Raheman and Nasr (2007) and Lazaridis and Tryfonidis (2006). This measurement is not used by Sharma and Kumar (2011), due to the unavailability of such data regarding Indian firms in their financial disclosure.

The profitability measures that will be used in this study is gross operating profit before depreciation and amortization divided by total assets minus financial assets, in this study this measurement is abbreviated to GOP. Also Return on Assets (ROA) is used as the second dependent variable. GOP is chosen, because this measurement is used by influential studies such as Deloof (2003), Raheman and Nasr (2007) and Lazaridis and Tryfonidis (2006). Furthermore because other studies couldn't have used this measure because of the unavailability of data regarding financial assets, as was the case with Sharma and Kumar (2011). ROA is at first chosen, because the largest part of Working Capital research uses ROA as the dependent variable, and secondly it's chosen because with two different dependent variables robustness can be checked.

2. Debt

There are two ways to measure leverage that is used in the literature on the relationship between firm profitability and WCM. The first is calculated by dividing total debt with total assets. This is used in the studies of Raheman and Nasr (2007), Samiloglu and Demirgunes (2008), Sharma and Kumar (2011), Shin and Soenen (1998) Lazaridis and Tryfonidis (2006) and Karaduman et al. (2011). The other measurement does not include account payables and is calculated by dividing short term bank loans plus long term bank loans with total assets. This is used in the studies of by Deloof (2003), Padachi et al. (2010), Zariyawati et al. (2009), Lazaridis and Tryfonidis (2006) and Falope and Ajilore (2009). In this study the second measurement will be used, because account payables is studied individually and therefore it's logical to choose the control variable of debt where the account payables are excluded.

3. Current Ratio

There is only one measurement for this variable and is calculated by dividing current assets with current liabilities. Only the studies of Zariyawati et al. (2009), Shin and Soenen (1998) and Sharma and Kumar (2011) use this variable. To enhance robustness of this study this control variable will also be used in the upcoming analyses.

4. Size

This control variable is operationalized in two ways in the literature of WCM. The first type uses the natural logarithm of assets to determine the size of a firm. This is used in the studies of Samiloglu and Demirgunes (2008) and Sharma and Kumar (2011). But the most widely used type of measurement is the natural logarithm of sales, which is used by Padachi et al. (2010), Dong and Su (2010), Deloof (2003), Raheman and Nasr (2007) and Karaduman et al. (2011). In this study the natural logarithm of sales will be used as a measurement for size, because it is often used in the working capital literature.

5. Growth

This control variable is calculated as follows: this year's sales minus previous year's sales divided by previous year's sales. This control variable is used in studies like Samiloglu and Demirgunes (2008), Sharma and Kumar (2011), Shin and Soenen (1998), Karaduman et al. (2011), Deloof (2003), Falope and Ajilore (2009) and Zariyawati et al. (2009).

6. Fixed Financial Assets

The last control variable that will be used is the Fixed Financial Asset ratio and is calculated by dividing fixed financial assets with total assets. This control variables is used in the studies of Deloof (2003), Raheman and Nasr (2007) and Dong and Su (2010). Other studies didn't use this variable because of the possible lack of data regarding fixed financial assets. According to Deloof (2003) fixed financial assets are shares in other firms. These are intended to contribute to the activities of the firm that holds them by establishing a lasting and specific relation and loans, which were granted with the same purpose (Deloof, 2003).

TABLE 3.1

Glossary and Variable Definitions

Table 3.1 reports the variables of the study and their definitions. (Source: Hillier, D. & Ross, S. & Westerfield, R. & Jaffe, J. & Jordan, B. (2010). *Corporate Finance* (European Edition). Berkshire, UK: McGraw-Hill.) (Source: Leach, J. C. & Melicher R.W. (2009). (Int. ed.). Mason, USA: South-Western.)

Variable	Definition
Working Capital	Measures how long a firm will be deprived of cash if it increases its investment in resources in order to expand customer sales.
Net working capital	Current assets minus current liabilities
Trade credit	Financing provided by suppliers in the form of delayed payments due on purchases made by the venture.
Accounts Receivables	Credit Sales made to customers
Accounts Payables	Short-term liabilities owed to suppliers for purchases made on credit.
Inventories	Raw materials, work-in-process, and finished product that the venture hopes to sell.
Financially constraint	Firms which are not able to attract sufficient financial funds for their day-to-day operations.
Bankruptcy	A firm is "bankrupt" when a petition for bankruptcy is filled with a federal bankruptcy court.
Current assets	Cash and other assets that are expected to be converted into cash in less than one year.
Current liabilities	Cash and other liabilities that have to be paid within one year.
Debt Covenant	Restrictions on a lending firm imposed by a bank.
Return on Assets	Measure of profit per asset value (1-year average).
Gross Operating Profit	Measure of profit before depreciation and amortization (1-year average).
Size	Natural logarithm of sales.
Debt	Short-term and long-term debt divided by total assets.
Long-term debt	Loans that have maturities of longer than one year.
Short-term debt	Loans that have maturities of shorter than one year.
Growth	1-year growth of sales.
Fata	Fixed financial assets divided by total assets.
Current Ratio	Current assets divided by current liabilities.
β	Coefficient of influence on the profit of a firm.
ε	Error variable of the regression analyses.
Industry segments	Number of business segment that make up the company's revenue in according with the Nomenclature statistique des activités économiques dans la Communauté européenne (NACE).
Durbin-Watson	A number that test for autocorrelation in the residuals from a statistical regression analysis. It ranges from zero to four and a score of two implies that there is no autocorrelation in the sample.
VIF-score	A number that test for multicollinearity in an ordinary least squares regression analysis. The common rule of thumb is that a VIF-score of 5 or higher means that there is a high multicollinearity.

TABLE 3.2

Variable Measurements

Table 3.2 reports the different measurements of the various variables used in the upcoming analyses. The reasons for these measurements are given in paragraph B of this chapter and are based on the various studies on the literature of Working Capital and its management.

The Dependent variable		
Gross Operating Profit (GOP)	The ratio of operating income plus depreciation and amortization to total assets minus financial assets	= (Sales – Cost of Goods Sold) / [Total Assets – Financial Assets]
Return on Assets	The return on assets	= Net Income / Total Assets
The Explanatory variables		
AR	Number of days account receivables	= Account Receivables/[Net Sales/365]
AP	Number of days account payables	= Account Payables/[Cost of Goods Sold/365]
INV	Number of days inventory	= Inventories/[Cost of Goods Sold/365]
CCC	Cash Conversion Cycle	= AR + INV – AP
The Control Variables		
SIZE	Logarithm of sales	= Natural Logarithm of Sales
DEBT	Leverage	= Financial Debt / Total Assets
GROWTH	Sales Growth	= $Sales_1$ - $Sales_0$ / $Sales_0$
CR	Current Ratio	= Current Assets / Current Liabilities
FATA	Fixed Financial Asset ratio to Total Assets	= Fixed Financial Assets / Total Assets

C. Data collection

1. Sample description

The sample of this study will contain Dutch public listed firms on the Euronext Amsterdam. The sample period that forms the crisis period, will be the years 2008-2009. The sample of the non-crisis years will be the years 2004-2006. The fifty largest companies of the Netherlands will form the data sample, which are listed on either the Amsterdam Exchange Index (AEX) or the Amsterdam Midkap Index (AMX). Because these firms are publicly listed, much detailed information of these firms are accessible, like cash flow statements, which is needed to calculate the cash conversion cycles and the financial assets, which is needed to calculate the financial asset ratio. Financial institutions, banking, insurance, utility companies, renting and real-estate were excluded from the sample because of their specific nature of services.

The total sample will contain about 37 firms with observations over the period 2004-2006 and 2008-2009, which are named and classified individually on the NACE classification index in Appendix A. The total firm-years observations are approximately 185. This number of observations should give enough reliability for this research.

TABLE 3.3

The Economic Sector and Number of Firms 2004-2006 and 2008-2009

The Economic Sector	Number of firms
Manufacturing	14
Information and Communication	8
Construction	3
Transportation and Storage	3
Mining and quarrying	3
Wholesale and retail trade	2
Professional, scientific and technical activities	1
Administrative and support service activities	3
Total	37

This table is based on the classifications of NACE, which is a European industry standard classification system consisting of a 6 digit code. It can also be applied to the ISIC and SIC code, because the first two digits of a code of a company are the same for each of these three classification systems.

2. Data source

Data will be gathered using the databases of the website company.info. This website is gathers numerous kinds of data regarding firms in The Netherlands. This website is available to all students of the University of Twente. Data that is gathered from the databases are e.g. account receivables, account payables, inventory levels, revenues, cost of goods sold, industry sector, current ratios, leverage ratio, fixed financial assets, total assets, profitability ratios and earnings before interest, taxes, depreciation and amortization. Data that wasn't available through these databases was supplemented by the annual reports of the firms.

"There are so many men who can figure costs, and so few who can measure values."

- Author unknown

V. EMPIRICAL FINDINGS

A. Descriptive statistics

Table 4.1 reports the descriptive statistics of the relevant variables of the empirical findings of the non-crisis years and table 4.2 reports the crisis year's descriptive statistics. In table 4.3 and 4.4 the Pearson's correlations can be found of the non-crisis and crisis periods. In this paragraph the descriptive statistics of this study will be compared with the descriptive statistics of other studies on the literature the effect of working capital management on a firm's profitability. These comparisons will focus on the findings of the non-crisis period of this study, because only this period has been studied by other authors. The crisis period can be compared with the findings of the non-crisis period of this study; this will be done at the end of this paragraph.

Table 4.1 shows that the mean value of return on assets is around 7%, while the median is 6%. These figures are somewhat matching the results of the study in Spain by Garcia-Teruel and Martinez-Solano (2007), where the mean was 8% and the median 6,7%. Other studies who used ROA as the dependent variable, found very different means and medians. Falope and Ajilore (2009) found in Nigeria a mean of 16% and a median of 15%, Sharma and Kumar (2011), respectively 197% and 171% in India and Samiloglu and Demirgunes (2008) found a mean of 2% in Turkey. These big differences are mainly caused by the fact that these studies have focussed on emerging markets such as Nigeria, and booming markets such as India.

The mean and median of Gross Operating Profit (GOP) found in this study are respectively 13% and 12%. These numbers can be matched with the results in Belgium by Deloof (2003) who found a mean of 12,2% and a median of 10,6%, Shin and Soenen (1998) who found respectively 15,2% and 14,5% in the US and Raheman and Nasr (2007) who found a mean of 13,3% in Pakistan. The results are somewhat different from the findings of Gill et al. (2010) who found a mean of 30% in the US, Dong and Su (2010) who found a mean of 35% in Vietnam, Zariyawati et al. (2009), who found a mean of 6,1% in Malaysia and the findings of Lazaridis and Tryfonidis (2006), who found a mean of 24,5% and a median of 20,9% of a sample of 131 firms listed on the Athens Stock Exchange.

The average number of days accounts receivables of the sample is 63,91 days and has a median of 59,93 days. These results are somewhat higher than the findings of Deloof (2003) of respectively 54,64 days and 51,44 days, Gill et al. (2010), who found an average of 53,48 days in the US, Dong and Su (2010), who found an average of 51,91 days and of Raheman and Nasr (2007), who found a mean of 54,79 days. Somewhat matching results are found by Falope and Ajilore (2009), who found respectively 61,21 days and 59,34 days. Findings that were higher than this study was found by Garcia-Teruel and Martinez-Solano (2007), who found respectively 96,82 days and 96,29 days, by Sharma and Kumar

(2011), who found a mean of 471,74 days and a median of 366 days, by Samiloglu and Demirgunes (2008), who found a mean of 139,07 days and by Lazaridis and Tryfonidis (2006), who found an average of 148,25 and a median of 130 days. The differences of for example Garcia-Teruel and Martinez-Solano (2007) is caused by the fact that they focussed on smaller firms and Sharma and Kumar (2011) focussed on the booming market of India.

The average days of accounts payables used by firms of the sample of this study is 44,72 and with a median of 42,49 days. Matching results was found by Gill et al. (2010), who found an average of 49,5 days, by Deloof (2003), who found a mean of 56,77 days with a median of 51,96 days, by Dong and Su (2010), who found an average of 45,4 days, by Raheman and Nasr (2007), who found an average of 59,85 days and by Falope and Ajilore (2009), who found an average of 39,77 days and a median of 43,56 days. Higher average results of 96,1 days, 97,8 and 683 days was found by respectively Lazaridis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007) and Sharma and Kumar (2011).

The findings of this study for the number of days of inventories are on average 36,88 days with a median of 28,46 days. Comparable results were found by Deloof (2003) and Falope and Ajilore (2009). All the other studies who studied the number of days inventories, such as Garcia-Teruel and Martinez-Solano (2007), Dong and Su (2010), Raheman and Nasr (2007) and Gill et al. (2010) found an average near or above 80 days of inventories. I assume that this is due to the fact that in these other studied countries the number of manufacturing firms is a lot higher compared to countries such as The Netherlands and Belgium.

The findings of the Cash Conversion Cycle (CCC) vary for the different firms of the sample. The difference between the lowest CCC of 4,39 days and the highest of 174,32 days is staggering. The average cash conversion cycle of the firms in the sample is 56,08 days with a median of 52,68 days. Studies among the literature of working capital show various different averages of the CCC. Gill et al. (2010) found an average of 89,94 days, Raheman and Nasr (2007) found an average of 72,96 days, Lazaridis and Tryfonidis found a mean of 188,99 days while Sharma and Kumar found the highest average of 449,09 days. A comparable finding of 44,48 days is found by Deloof (2003). This strengthens the sample of this study, because Deloof did research in Belgium, which is very similar to The Netherlands.

The above comparisons with the descriptive statistics from the non-crisis period of this study and with the descriptive statistics of the other studies on working capital management and its effect on the profitability of a firm shows that the sample is somewhat comparable to the samples of the other studies. The highly comparable results of the sample of the article of Deloof (2003) is even more significant, because Belgium has very similar macro-economic conditions compared to The Netherlands, which further indicate the validity of the sample of this study.

As mentioned before the descriptive statistics of the crisis period of 2008 and 2009 cannot be compared to other studies, because all these studies focus on non-crisis periods. What is possible is a comparison between the descriptive statistics of the non-crisis and the crisis period of this study. This comparison is done using the independent samples t-test, to test if the differences are indeed statistically significant. The results are presented in table 4.0. An interesting thing to note in this comparison is that all the average number of days accounts payables, accounts receivables and inventories, and also the CCC is lower during the crisis period. As can be seen in the table only the number of days accounts receivables during the crisis period is statistically different from the non-crisis period. This decrease was not expected, since earlier in this thesis is explained that relative large public listed firms increase their accounts receivables and can be seen as financial intermediaries in times of a crisis. This contradicting evidence should not be taken that hard, because it is based on the accounts receivables of 31st of December of 2008 and 2009. Since these are no average numbers, it could mean that throughout the middle of these crisis years firm indeed increase their accounts receivables. Another vital aspect which undermines this contradicting evidence is the fact that is doesn't measure the true terms on which the accounts receivables are given to the financially constraints customer. This means that firms can increase these terms from 30 days to 60 days without it becoming apparent in this analysis.

TABLE 4.0

Comparison of means between non-crisis and crisis period

Table 5.1 presents the independent samples t-test results for each variable comparing the means of non-crisis period with the crisis period

Variables	Mean NonC	Mean Crisis	t-score	Sig. (2-tailed)
Return on Assets	0.07	0.03	4.452	0.000
Gross Operating Profit	0.13	0.10	2.977	0.03
No. of days Accounts Receivables	63.91	56.54	1.839	0.068
No. of days Accounts Payables	44.72	41.56	0.939	0.349
No. of days Inventory	36.88	34.61	0.402	0.688
Cash Conversion Cycle	56.08	49.59	1.039	0.300
No. of days Net Credit	24.24	18.88	1.309	0.192
Fixed Financial Assets Ratio	0.07	0.09	-0.943	0.347
Leverage	0.41	0.43	-1.009	0.314
Size (natural logarithm of sales)	15.13	15.32	-0.827	0.410
Current Ratio	1.4	1.29	1.189	0.236
Sales Growth	0.10	-0.007	3.951	0.000

What also is worth mentioning is that the profits of the crisis period, ROA and GOP, are statistically lower compared to the non-crisis period. This difference is also very reasonable, because it's very likely that profits will decrease in crisis periods compared to the non-crisis period. Another variable which showed a big decline was sales growth, during the non-crisis period sales increases on average with 11%, while during the crisis years it declined on average -0.007%. This decline is also very reasonable during crisis years.

TABLE 4.1

Descriptive Statistics of non-crisis years ('04-'06)

Table 4.1 presents the mean, standard deviation (SD), minimum, 5th, 25th, 50th(median), 75th, and 95th percentile as well as the maximum of selected variables. Size is in billions of euros and the variables Return on Assets, Gross Operating Profit, Fixed Financial Assets Ratio, Leverage and Sales Growth are given in rates, which have to be multiplied by hundred to gain percentages.

			Percentiles						
Variables	**Mean**	**SD**	**Min**	**5th**	**25th**	**Median**	**75th**	**95th**	**Max**
Return on Assets	0.07	0.05	-0.03	0.01	0.04	0.06	0.09	0.15	0.31
Gross Operating Profit	0.13	0.07	0.01	0.03	0.08	0.12	0.17	0.24	0.42
No. of days Accounts Receivables	63.91	27.15	10.69	30.11	44.38	59.93	81.48	114.29	171.73
No. of days Accounts Payables	44.72	22.79	2.77	6.79	31.57	42.49	52.45	93.09	128.59
No. of days Inventory	36.88	35.87	0	0	3.36	28.46	61.15	104.27	136.39
Cash Conversion Cycle	56.08	36.97	0.31	4.39	28.32	52.68	81.78	129.98	174.32
No. of days Net Credit	24.24	27.50	-39.37	-13.19	0.02	18.13	48.39	66.45	99.05
Fixed Financial Assets Ratio	0.07	0.09	0.00	0.00	0.01	0.04	0.09	0.34	0.39
Leverage	0.41	0.18	0.02	0.07	0.30	0.40	0.53	0.71	0.83
Size (in € billions)	16.34	50.10	0.00	0.00	1.09	2.89	10.06	44.58	318.85
Current Ratio	1.4	0.59	0.45	0.65	1.02	1.29	1.67	2.74	3.30
Sales Growth	0.10	0.18	-0.35	-0.19	0.00	0.07	0.18	0.45	0.89

TABLE 4.2

Descriptive Statistics of crisis years ('08-'09)

Table 4.2 presents the mean, standard deviation (SD), minimum, 5th, 25th, 50th(median), 75th, and 95th percentile as well as the maximum of selected variables. Size is in billions of euros and the variables Return on Assets, Gross Operating Profit, Fixed Financial Assets Ratio, Leverage and Sales Growth are given in rates, which have to be multiplied by hundred to gain percentages.

			Percentiles						
Variables	**Mean**	**SD**	**Min**	**5th**	**25th**	**Median**	**75th**	**95th**	**Max**
Return on Assets	0.03	0.07	-0.32	-0.12	0.01	0.04	0.06	0.13	0.19
Gross Operating Profit	0.10	0.07	-0.03	-0.03	0.05	0.10	0.15	0.21	0.26
No. of days Accounts Receivables	56.53	25.29	4.81	19.18	39.67	53.08	72.18	106.61	121.67
No. of days Accounts Payables	41.55	21.34	3.27	6.12	28.34	42.07	49.58	92.39	100.14
No. of days Inventory	34.60	39.15	0.00	0.00	1.83	21.42	50.04	95.31	215.05
Cash Conversion Cycle	49.59	46.23	-11.56	-6.73	18.66	45.19	65.28	158.30	274.76
No. of days Net Credit	18.88	26.07	-27.61	-17.25	-0.76	10.69	43.43	64.99	70.84
Fixed Financial Assets Ratio	0.09	0.10	0.00	0.00	0.02	0.04	0.10	0.55	0.64
Leverage	0.43	0.15	0.08	0.13	0.32	0.44	0.54	0.70	0.80
Size (in € billions)	19.46	62.91	0.00	0.00	1.59	3.39	13.56	80.07	458.00
Current Ratio	1.29	0.61	0.09	0.60	0.92	1.17	1.43	2.90	3.08
Sales Growth	-0.07	-0.00	-0.45	-0.40	-0.09	-0.00	0.09	0.27	0.53

B. Pearson's correlations

The table 4.3 and 4.4 show the results of the correlation analyses of the non-crisis period and crisis period. In this paragraph both these periods will be discussed, but the significant results of the non-crisis period will be compared to other studies who conducted similar analyses.

The results of the non-crisis Pearson correlation analysis shows that the number of days accounts payables negatively relates two both the dependent variables return on assets and gross operating profit. This relation is consistent with the results of the correlation analyses conducted by Falope and Ajilore (2009), Karaduman et al. (2011), Deloof (2003), Raheman and Nasr (2007) and Garcia-Teruel and Martinez-Solano (2007). Contradicting evidence is found with the correlation analyses of Lazaridis and Tryfonidis (2009) and Dong and Su (2010), who found a positive relation between the number of days accounts payables and a firm's profitability. They reason that more profitable firms delay their payment to suppliers.

Not much can be said about the other parts of the cash conversion cycle, the number of days accounts receivables and inventories, because of the absence of a significant relation. What is interesting to note is that the results shows a positive effect of the days of net trade credit on GOP. This indicates that a higher level of accounts receivables could facilitate a higher profit.

The control variable sales growth shows a positive relation on the dependent variables, which is consistent with the articles Deloof (2003), Shin and Soenen (1998), Falope and Ajilore (2009), Karaduman et al. (2011), Zariyawati et al. (2009) and Padachi et al. (2010). The last control variable which indicated a significant positive relation towards the dependent variable is current ratio. This is consistent with the finding of Zariyawati et al. (2009) and Shin and Soenen (1998).

The results of the crisis period correlation analysis show a negative relation between the number of days accounts payables and GOP. This means that managers of firms can create value by keeping the levels of accounts payables to a minimum. Further evidence indicates that the effect of the number days inventories on a firm's profitability is negative for crisis periods. Firms are thus better off keeping their inventory level to a reasonable minimum. The most interesting result to note is the negative effect the cash conversion cycle has on a firm's profitability during crisis periods. This could imply that managers are also creating value if they keep the number of days accounts receivables to a minimum.A shortcoming of Pearson correlations is that they are not able to identify the causes from consequences, therefore regression analyses will be held (Deloof, 2003).

TABLE 4.3

Non-Crisis Period Pearson's Correlation ('04-'06)

Table 4.3 represents the correlations between the different variables. A correlation with ** means its significant at the 0.01 level (2-tailed) and a correlation with * means its significant at the 0.05 level (2-tailed).

	ROA	GOP	AR	AP	INV	CCC	NTSC	FATA	LEV	SIZE	CR
ROA	1										
GOP	0.608**	1									
AR	-0.098	-0.118	1								
AP	-0.237*	-0.287**	0.368**	1							
INV	0.028	-0.007	-0.112	0.307**	1						
CCC	0.101	0.084	0.398**	-0.049	0.698**	1					
NTSC	0.109	0.182*	0.684**	-0.416**	-0.338**	0.431**	1				
FATA	-0.002	0.025	-0.229**	-0.089	0.084	-0.031	-0.158	1			
LEV	-0.089	-0.129	-0.258**	-0.286**	0.051	0.037	-0.044	-0.038	1		
SIZE	0.009	-0.128	-0.381**	0.149	0.064	-0.309**	-0.488**	0.276**	-0.073	1	
CR	0.402**	0.230**	0.178*	-0.093	0.451**	0.625**	0.233**	-0.003	-0.264**	-0.272**	1
GROWTH	0.277**	0.331**	0.394**	-0.033	-0.030	0.285**	0.422**	-0.179*	-0.118	-0.214*	0.302**

TABLE 4.4

Crisis Period Pearson's Correlation ('08-'09)

Table 4.4 represents the correlations between the different variables. A correlation with ** means its significant at the 0.01 level (2-tailed) and a correlation with * means its significant at the 0.05 level (2-tailed).

	ROA	GOP	AR	AP	INV	CCC	NTSC	FATA	LEV	SIZE	CR
ROA	1										
GOP	0.539**	1									
AR	-0.071	-0.173	1								
AP	-0.041	-0.227*	0.341**	1							
INV	-0.166	-0.354**	0.104	0.197*	1						
CCC	-0.160	-0.290**	0.478**	-0.108	0.813**	1					
NTSC	0.007	0.110	0.680**	-0.442**	-0.095	0.495**	1				
FATA	0.033	0.028	-0.251*	-0.035	0.134	-0.008	-0.212*	1			
LEV	0.059	0.057	-0.196	-0.423**	-0.021	0.066	0.152	-0.025	1		
SIZE	0.163	-0.051	-0.277**	0.291**	-0.010	-0.294**	-0.486**	0.320**	-0.221*	1	
CR	0.039	-0.130	0.228*	-0.137	0.502**	0.610**	0.268*	-0.053	-0.048	-0.286**	1
GROWTH	0.212*	0.387**	-0.091	-0.181	-0.463**	-0.352**	0.094	-0.164	0.130	0.042	-0.230*

C. Regression analyses

In the following part the regression analyses are used to investigate the impact of WCM on corporate profitability for the crisis years and also the non-crisis years period. Each regression equation, given earlier, and its corresponding table will be discussed in detail. Numerous regressions are held for this study, but four most implicating regression models for each regression equation are presented in the tables. These tables present four different regression models with four different sets of control variables, first to check robustness and second to see if relations exist when certain control variable(s) are excluded.

All the presented regression models include the dummy variables. The first dummy determines the effect of whether the industry sector influences the profitability of a firm. The firms are divided in three sectors, which are Manufacturing, Information and Communication and Other Sectors. The second dummy variable tests the influence of particular years, which are 2004 – 2006 for the non-crisis period and 2008 and 2009 for the crisis period.

The regression analyses are tested to see if there is a presence of autocorrelation and multicollinearity in the data, using Durbin Watson (D-W) and Variance Inflation factor (VIF) statistics. The scores of these statistical tests are accepted, implicating that there is no presence of autocorrelation and multicollinearity in the data. The D-W statistics values lie between 1.277 and 2.187, where a score of 2 indicate that there is no autocorrelation and 0 score indicating that there is autocorrelation. The authors Makridakis and Wheelwright (1978) consider D-W value between 1.5 and 2.5 as acceptable level indicating no presence of collinearity. Some of these scores are somewhat lower than 1.5, but since the common rule indicate that score lower than 1.0 may cause alarm, these score are still accepted. The highest VIF score was 2.715, and is accepted because the common rule of thumb is that a VIF-score of 5 of higher means that there is a high multicollinearity. In the regression table 1 to 8 the t-score are given between ( ), and * indicating a 10% significance, ** indicating a 5% significance and, *** indicating a 1% significance. The VIF scores can be found between the [ ].

In the upcoming analyses and discussions both the non-crisis and crisis period will be discussed separately. In the discussion of the results of the non-crisis period the sign and the impact of the different parts of WCM will be discussed and compared to other studies which have studied WCM during non-crisis years. The results of the crisis period will also discuss the sign and impact of the WCM parts during crisis years, but will only be compared to the results of the non-crisis period of this study.

1. Effects of accounts receivables on firm's profitability

Non-Crisis Period

Table 4.5 and table 4.6 report the results of respectively estimating equation 1 and equation 2. A look on the non-crisis years regression analyses results indicate a negative relation between accounts receivables and gross operating profit (divided by total assets minus financial assets), all the results have a 1% significance. The results of table 4.6, which shows the results of the dependent variable return on assets, showed a negative relation. Three of these results had 5% significance and one of these 1% significance. These results are robust, since all the models showed a significant negative relation. This indicates that firms can create profit by keeping the levels of their accounts receivables to a minimum. This negative effect of accounts receivables on a firm's profitability is found by the majority of studies on WCM. Similar studies like Deloof (2003), Gill et al. (2010), Lazaridis and Tryfonidis (2006) and Garcia-Teruel and Martinez-Solano (2007) all found a significant negative relation between the number of days accounts receivables and the profitability of a firm. Only one contradicting positive relation is found by Sharma and Kumar (2011), as mentioned earlier, they argue that this is caused by the fact that Indian firms have to grant more trade credit to sustain their competitiveness with their foreign competitors, which have superior product and services.

To discuss the impact of accounts receivables, an explanation is needed on the interpretation of the coefficients found by the different regression analyses. For example a regression analysis gives a coefficient of -0.00103 with the number of days accounts receivables using the dependent variable gross operating profit divided by (total assets – financial assets). The first step of the interpretation is to multiply is with 100 to make it a percentage, which makes the effect -0.103%. The interpretation associates this percentage with an increase of 1 day accounts receivables. Take for example a firm with an average GOP of 15% on a yearly basis and an average number of days accounts receivables of 65 days. If this firm decides to give one of his customers more trade credit resulting with an increase of the average days of accounts receivables to 66 days, the profitability of this firm will decrease with -0.103% to 14.897% annually.

The percentages found in table 4.5 with the dependent variable GOP, were -0.103%, -0.105%, -0.112% and -0.115%. A similar percentage was found by Deloof (2003), who found that an increase of 1 day of accounts receivables is associated with a decrease of GOP by 0.044%. The difference is likely to be caused by the fact that this study only focussed on large firms and Deloof (2003) also included Small to Medium Enterprises (SMEs). The larger negative percentage of these larger firms is likely to be caused by the larger customer base of these firms. This results in higher risk of a default of payment by a customer, which in turn affects the effect of accounts receivables on a firm's profitability. Another explanation is that larger firms already have a large reputation concerning the quality of the products they produce. Raheman and Nasr (2007) found a stronger negative effect of accounts receivables on the profitability of a firm, which is

-0.210%. This difference is likely to be caused by the very different macro-economic conditions of Pakistan compared to The Netherlands. Also a somewhat stronger negative percentage of -0.300% is found by Gill et al. (2010) in the US. This is likely to be caused by the fact that they study large firms listed on the New York Stock Exchange. Lazaridis and Tryfonidis (2006) found even a stronger negative percentage, which is -2.932%. This huge difference is difficult to explain, but is likely to be caused by the different macro-economic conditions and the fact that firms in Greece have three times higher days of accounts receivables compared to this study and the studies of Deloof (2003) and Raheman and Nasr (2007).

The table 4.6 using the dependent variable Return On Assets (ROA) shows the following percentages: -0.043%, -0.050%, -0.054% and -0.051%. A similar percentage is found by Karaduman et al. (2011) in Turkey. He found that an increase of 1 day accounts receivables decreases the return on assets with -0.040%. A weaker effect was found by Garcia-Teruel and Martinez-Solano (2007). They found a percentage of -0.020%, but this can be explained by the sample focus of small to medium sized firms. Falope and Ajilore (2009) found a percentage of -0.300%. This difference is likely to be caused by the different macro-economic conditions in Nigeria. A huge percentage of +3.8% was found by Sharma and Kumar (2011). Also this huge difference is difficult to explain, but is likely to be caused by the almost 10 times higher amount of days of accounts receivables in the sample of Sharma and Kumar (2011). Also the macro-economic differences can explain some of the difference.

The results of the two tables show that during the non-crisis period the control variables sales growth and current ratio showed a positive relation with a firm's profitability. These results showed a significance on a 10% and 5% level. It is reasonable that sales growth has a positive impact of a firm's profitability. Also the positive effect of the current ratio is normal, because a good liquidity level is required by creditors such as suppliers. For a company a very high level could indicate an inefficiency concerning the management of cash (Hillier et al., 2010).

An overall view on the results of the relation between the number of days accounts receivables and the profitability of a firm during the non-crisis period, gives a reasonable indication of the management of accounts receivables during the non-crisis period. The conclusion can be made that relative large public listed firms in The Netherlands are better of keeping their levels of accounts receivables to a minimum during non-crisis years.

Crisis Period

The results of the relation between accounts receivables and firm's profitability of the crisis period can be found in the tables 4.5 and 4.6 under the columns '08-'09. None of the tables showed a significant relation.

The absence of any significant relation for both the dependent variable may indicate that the relation between accounts receivables and firm's profitability is changed in times of a crisis. It could imply that certain firms should not minimize their accounts receivables during crisis periods, but since there is no significant relation this cannot be concluded.

2. Effects of accounts receivables on firm's profitability on the longer-term

In this paragraph only the crisis period will be discussed, because the change in relation between accounts receivables and firm's profitability is only expected to happen during crisis periods. Both the dependent variables GOP and ROA are used to give extra robustness to these analyses.

The results of the equations using the lead dependent variables GOP_{+1} and ROA_{+1} are given in the tables 4.7 and 4.8. Table 4.8 using ROA_{+1} as the dependent variable show three positive results with a 10% significance. The impact percentage with ROA are -0.036% and -0.032%. The result of table 4.7 using the GOP variable show two 10% significant positive effects and two 5% significant positive effects. The results indicate that an increase of 1 day accounts receivables increases the profitability of a firm in the next year by approximately 0.066% for the GOP measure and approximately 0.033% for the ROA measure. As explained in chapter thee Methodology, the measurement of GOP is more reliable in studying the effect of WCM on a firm's profitability than ROA (Lazaridis and Tryfonidis, 2006; Gill et al., 2010 and Deloof, 2003).

The most notable of these results is that they all show a positive significant sign. It implies that in crisis periods, firms are better off increasing their number of days accounts receivables, based on the profitability of the next year. The reason for this is that larger firms are lending aid to their financially constraint customers and by doing that, saving a part of their future sales. Since these future sales are only enhancing the profitability of a firm in the near future, makes these positive relations very reasonable. What also needs to be highlighted here is that the potential benefits of these firms, by lending aid to their customers, are very likely to increase overtime. The regression analyses are only a snapshot of the short-term benefits and further research should study the long-term benefits of increasing the number of days accounts receivables by larger firms during crisis periods.

What future research should also keep in mind is that regression analysis based on yearly data is not the best way of studying the effect of accounts receivables which are using on

average 30 day terms. A better way of studying the longer term effect of accounts receivables would be based on quarterly data. In this way, can be analysed what the effect is of accounts receivables during crisis periods after two or three quarters and not a whole year. This also could give more statistical significance to the relation, because it lowers the possibility a third variable, disturbing the relation between accounts receivables and firm's profitability.

Based on these findings it can be concluded that relatively larger public listed firms or in other words firms which are comparable to the firms used in this sample, have to change their way of managing accounts receivables during crisis periods. Firms still have to decide on their own if the benefits of extending trade credit exceed risk taken this way. But based firstly on the relative cheapness of extending trade credit by large firms during crisis periods, because they still have access to the capital market and bank don't take much risk in extending a short-term loan to these high reputable firms, which keeps the interest costs low. Secondly by keeping in mind that goods delivered can easily and cheaply be called back and used again, the overall implication of these findings should give firms enough reasons to indeed increase their number of days accounts receivables during crisis years.

TABLE 4.5

Regression Results of Equation AR with Dependent Variable GOP

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
No. of days Acc. Receivables	-0.00103	-0.00097	-0.00105	-0.00095	-0.00112	-0.00094	-0.00115	-0.00095
	(-2.940)***	(-1.511)	(-3.127)***	(-1.405)	(-3.143)***	(-1.452)	(-3.260)***	(-1.377)
	[1.522]	[1.352]	[1.455]	[1.524]	[1.578]	[1.372]	[1.582]	[1.527]
Size	-0.008	-0.002	-	-	-0.009	-0.002	-0.005	-0.001
	(-1.398)	(-0.219)			(-1.601)	(-0.145)	(-0.901)	(-0.118)
	[1.212]	[1.155]			[1.247]	[1.208]	[1.418]	[1.421]
Debt	-	-	-	-	-0.062	0.030	-0.031	0.031
					(-1.306)	(0.319)	(-0.619)	(0.317)
					[1.191]	[1.114]	[1.356]	[1.179]
Growth	0.117	0.036	0.092	0.036	0.113	0.034	0.092	0.034
	(2.447)**	(0.372)	(1.893)*	(0.366)	(2.353)**	(0.345)	(1.886)*	(0.345)
	[1.301]	[1.622]	[1.387]	[1.653]	[1.308]	[1.630]	[1.388]	[1.656]
Current Ratio	-	-	0.036	0.001	-	-	0.029	0.001
			(2.448)**	(0.039)			(1.772)*	(0.038)
			[1.348]	[1.537]			[1.667]	[1.846]
Financial Asset Ratio	0.081	-0.050	0.080	-0.055	0.076	-0.053	0.082	-0.053
	(0.975)	(-0.458)	(0.988)	(-0.516)	(0.915)	(-0.481)	(0.995)	(-0.479)
	[1.075]	[1.203]	[1.070]	[1.147]	[1.077]	[1.212]	[1.079]	[1.215]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	-0.037	Yes	-0.037	Yes	Yes	Yes	-0.037
Adjusted R^2	0.090	0.026	0.126	0.025	0.179	0.012	0.117	-0.003
Durbin-Watson Stats.	1.436	1.759	1.488	1.757	1.432	1.766	1.468	1.766
N	104	74	74	74	104	74	104	74

TABLE 4.6

Regression Results of Equation AR with Dependent Variable ROA

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
No. of days Acc. Receivables	-0.00043	0.00017	-0.00050	0.00020	-0.000511	0.00016	-0.00054	0.00006
	(-2.026)**	(0.457)	(-2.330)**	(0.546)	(-2.453)**	(0.423)	(-2.766)***	(0.163)
	[1.522]	[1.352]	[1.565]	[1.312]	[1.578]	[1.372]	[1.572]	[1.527]
Size	-0.001	0.007	-0.003	0.006	-0.002	0.006	0.003	0.008
	(-0.390)	(1.170)	(-0.758)	(0.999)	(-0.707)	(1.087)	(0.793)	(1.286)
	[1.212]	[1.155]	[1.241]	[1.141]	[1.247]	[1.208]	[1.424]	[1.421]
Debt	-	-	-0.054	-0.015	-0.055	-0.013	-0.010	-0.003
			(-1.881)*	(-0.280)	(-1.905)*	(-0.231)	(-0.349)	(-0.050)
			[1.188]	[1.106]	[1.191]	[1.114]	[1.352]	[1.179]
Growth	0.066	0.091	0.063	0.097	0.062	0.092	0.034	0.097
	(2.257)**	(1.635)	(2.201)**	(1.774)*	(2.141)**	(1.636)	(1.255)	(1.710)*
	[1.301]	[1.622]	[1.301]	[1.573]	[1.308]	[1.630]	[1.416]	[1.656]
Current Ratio	-	-	-	-	-	-	0.042	0.013
							(4.541)***	(0.741)
							[1.665]	[1.846]
Financial Asset Ratio	-0.029	-0.034	-	-	-0.034	-0.033	0.008	-0.035
	(-0.578)	(-0.546)			(-0.675)	(-0.519)	(0.223)	(-0.554)
	[1.075]	[1.203]			[1.077]	[1.212]	[1.083]	[1.215]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	0.019	Yes	0.020	Yes	0.019	Yes	0.020
Adjusted R^2	0.094	0.040	0.123	0.037	0.118	0.026	0.267	0.019
Durbin-Watson Stats.	1.423	1.915	1.425	1.882	1.420	1.917	1.400	1.908
N	104	74	104	74	104	74	104	74

TABLE 4.7

Regression Results of Equation AR with Dependent Variable GOP_{+1}

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis. T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression. The significance of the number of days accounts receivables are transformed to one tailed, because a positive relation is predicted.

	Regression Model			
Independent Variables	(1)	(2)	(3)	(4)
Non-Crisis/Crisis Periods	'08 – '09	'08 – '09	'08 – '09	'08 – '09
No. of days Acc. Receivables	0.00067	0.00067	0.00070	0.00061
	(1.705)**	(1.483)*	(1.714)**	(1.432)*
	[1.050]	[1.327]	[1.118]	[1.204]
Size	-	-	-	-0.005
				(-0.682)
				[1.261]
Debt	0.123	0.123	0.123	0.115
	(1.929)*	(1.861)*	(1.910)*	(1.724)*
	[1.038]	[1.480]	[1.444]	[1.090]
Growth	0.114	0.109	0.118	0.122
	(1.783)*	(1.582)	(1.793)*	(1.793)*
	[1.448]	[1.626]	[1.521]	[1.601]
Current Ratio	-	-	-	0.003
				(0.146)
				[1.186]
Financial Asset Ratio	-	0.026	0.022	0.034
		(0.340)	(0.295)	(0.444)
		[1.146]	[1.108]	[1.162]
Industry Dummy	No	Yes	No	No
Year Dummy	0.061***	0.059**	0.061**	0.061**
Adjusted R^2	0.101	0.101	0.098	0.069
Durbin-Watson Stats.	2.134	2.143	2.187	2.161
N	74	74	74	74

TABLE 4.8

Regression Results of Equation AR with Dependent Variable ROA_{+1}

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis. T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression. The significance of the number of days accounts receivables are transformed from two to one tailed, because a positive relation is predicted.

	Regression Model			
Independent Variables	(1)	(2)	(3)	(4)
Non-Crisis/Crisis Periods	'08 – '09	'08 – '09	'08 – '09	'08 – '09
No. of days Acc. Receivables	0.00036	0.00032	0.00032	0.00026
	(1.492)*	(1.308)*	(1.308)*	(1.016)
	[1.312]	[1.372]	[1.372]	[1.527]
Size	0.00041	0.001	0.001	0.002
	(0.108)	(0.268)	(0.268)	(0.512)
	[1.141]	[1.208]	[1.208]	[1.421]
Debt	0.001	0.003	0.003	0.009
	(0.024)	(0.085)	(0.085)	(0.243)
	[1.106]	[1.114]	[1.114]	[1.179]
Growth	0.044	0.039	0.039	0.042
	(1.214)	(1.058)	(1.058)	(1.131)
	[1.573]	[1.630]	[1.630]	[1.656]
Current Ratio	-	-	-	0.008
				(0.686)
				[1.846]
Financial Asset Ratio	-	-0.029	-0.029	-0.030
		(-0.693)	(-0.693)	(-0.724)
		[1.212]	[1.212]	[1.215]
Industry Dummy	Yes	Yes	Yes	Yes
Year Dummy	0.028**	0.028**	0.028**	0.028**
Adjusted R^2	0.011	0.002	0.003	-0.008
Durbin-Watson Stats.	2.082	2.124	2.124	2.181
N	74	74	74	74

3. Effects of accounts payables on firm's profitability

Non-Crisis Period

The results of the relation of accounts payables and a firm's profitability during the non-crisis period is given in tables 4.9 and 4.10 under the columns '04-'06. The regression analyses using the dependent variable GOP show a negative effect of accounts payables on firm's profitability during non-crisis years, with a 1% significance. The results of the ROA regression analyses also show a 1% significant negative relation. The results of both the dependent variables are robust, because all the regression models show a negative relation with 1% significance. This indicates that managers keeping the levels of accounts payables to a minimum increase their firms profits. This is in contradiction with the cash conversion cycle, which prescribes that firm's need to keep their accounts payables as high as possible. An explanation for this difference is that more profitable firms pay their bills earlier, also stated by Deloof (2003). This reasoning is the other way around, so that profit explains the number of days accounts payables. Another reason is that firms who pay their bills earlier receive a discount, which in turn affects profitability. Also the sample focus of larger firms can have an effect on this relation. Smaller firms might have no access to the capital market even in non-crisis periods, therefore their only substitute is to use accounts payables as a short-term source of funds. For larger firms such a need for substitution does not exist, and therefore has a different effect on the profitability of larger firms.

A negative relation is also found by article such as Lazardis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007) and Raheman and Nasr (2007). Of all the articles, only Mathuva (2010) found a positive relation between accounts payables and firm's profitability in Kenya. As mentioned earlier in this thesis, he argued that this is because profitable firms wait longer to pay their bills and firms use these short-term loans as a source of funds to increase their working capital investment and thus increasing their profitability.

In the table 4.9, showing the results of the regressions with GOP, the impact percentages are -0.135%, -0.130%, -0.129 and -0.136%. A somewhat similar percentage is found by Deloof (2003), who found -0.054%. The difference with the result of this study is caused by the different focus of this study, which is solely larger firms and Deloof also included smaller firms. A stronger negative effect is found by Raheman and Nasr (2007) who found a percentage of -0.200%, this difference is likely to be caused by the different macro-economic conditions.

The table 4.10 show the following percentages for the regression analyses using ROA as the dependent variable: -0.058%, -0.061%, and -0.064%. Similar results were found by Karaduman et al. (2011), who found a percentage of -0.040% in Turkey. Garcia-Teruel and Martinez-Solano (2007) found a somewhat smaller percentage of -0.020%, which is caused by the focus on Spanish SMEs in their sample. This smaller percentage of -0.020% is also found by Falope and Ajilore (2009) in Nigeria and also is caused by a sample of

smaller firms. A very high percentage is found by Sharma and Kumar (2011), who found -0.400% in India. This difference can be contributed to the different macro-economic conditions and the 15 times higher number of days of accounts payables compared to this and the other studies on WCM.

The results of the tables 4.9 and 4.10 show that the control variables current ratio and size have a significant positive effect on a firm's profitability during the non-crisis period. The effect of the current ratio is explained earlier, but the effect of size isn't. This effect is reasonable, because the natural logarithm of sales is used to measure size and more sales lead to a higher profits in normal circumstances.

Crisis Period

The results of the relation between accounts payables and firm's profitability during the crisis period is given in the tables 4.9 and 4.10 under the '08-'09 columns. All the regression models done with the dependent variable GOP showed a negative relation with a 5% significance. Of the results of the regression models using ROA as the dependent variable, none showed a significant relation. This might be caused by non-operational factors affecting firms with this measurement of a firm's profitability. Since the results with the dependent variable GOP indicated a significant negative effect of accounts payables on the profitability of a firm, managers are better of keeping the levels of accounts payables to a reasonable minimum during crisis years.

The percentages found in the table are -0.171%, -0.191%, -0.193% and -0.197%. These impact percentages are somewhat higher compared to the results of the non-crisis period. This could suggest that minimizing the accounts payables during crisis years is even more important compared to its management during non-crisis years. Since the sign is similar, it can be concluded that the managing of accounts payables doesn't have to be altered when firms are faced with a crisis period.

TABLE 4.9

Regression Results of Equation AP with Dependent Variable GOP

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
No. of days Acc. Payables	-0.00135	-0.00171	-0.00130	-0.00191	-0.00129	-0.00193	-0.00136	-0.00197
	(-3.755)***	(-2.320)**	(-3.643)***	(-2.499)**	(-3.625)***	(-2.419)**	(-3.730)***	(-2.380)**
	[1.219]	[1.343]	[1.184]	[1.457]	[1.184]	[1.566]	[1.241]	[1.661]
Size	-	-	0.003	0.010	0.004	0.010	0.003	0.010
			(0.581)	(0.875)	(0.654)	(0.874)	(0.459)	(0.824)
			[1.277]	[1.592]	[1.285]	[1.609]	[1.339]	[1.652]
Debt	-0.050	-0.033	-	-	-	-	-0.045	-0.020
	(-1.034)	(-0.343)					(-0.899)	(-0.203)
	[1.329]	[1.215]					[1.385]	[1.249]
Growth	-	-	-	-	0.044	-0.010	0.042	-0.011
					(0.951)	(-0.104)	(0.917)	(-0.107)
					[1.271]	[1.750]	[1.273]	[1.750]
Current Ratio	0.021	-0.027	0.029	-0.006	0.025	-0.017	0.020	-0.018
	(1.463)	(-1.025)	(2.033)**	(-0.599)	(1.660)*	(-0.603)	(1.199)	(-0.631)
	[1.332]	[1.372]	[1.322]	[1.491]	[1.448]	[1.547]	[1.686]	[1.670]
Financial Asset Ratio	0.055	-0.066	0.057	-0.095	0.064	-0.097	0.059	-0.097
	(0.684)	(-0.654)	(0.708)	(-0.894)	(0.789)	(-0.889)	(0.718)	(-0.875)
	[1.075]	[1.083]	[1.081]	[1.202]	[1.090]	[1.265]	[1.096]	[1.266]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	-0.041	Yes	-0.040	Yes	-0.042	Yes	-0.042
Adjusted R^2	0.153	0.070	0.147	0.079	0.146	0.065	0.144	0.051
Durbin-Watson Stats.	1.277	1.939	1.295	1.975	1.307	1.969	1.295	1.969
N	104	74	104	74	104	74	104	74

TABLE 4.10

Regression Results of Equation AP with Dependent Variable ROA

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
No. of days Acc. Payables	-0.00058	0.00008	-0.00061	-0.00014	-0.00061	0.00007	-0.00064	0.00007
	(-2.825)***	(0.177)	(-3.069)***	(-0.300)	(-3.049)***	(0.154)	(-3.096)***	(0.144)
	[1.219]	[1.343]	[1.184]	[1.457]	[1.184]	[1.566]	[1.241]	[1.661]
Size	-	-	0.007	0.009	0.007	0.008	0.006	0.008
			(2.226)**	(1.324)	(2.238)**	(1.161)	(2.064)**	(1.134)
			[1.277]	[1.592]	[1.285]	[1.609]	[1.339]	[1.652]
Debt	-0.028	-0.016	-	-	-	-	-0.017	-0.001
	(-1.026)	(-0.266)					(-0.599)	(-0.019)
	[1.329]	[1.215]					[1.385]	[1.249]
Growth	-	-	-	-	0.009	0.098	0.009	0.098
					(0.360)	(1.695)*	(0.337)	(1.681)*
					[1.271]	[1.750]	[1.273]	[1.750]
Current Ratio	0.031	0.001	0.040	0.009	0.039	0.014	0.037	0.014
	(3.726)***	(0.037)	(4.960)***	(0.571)	(4.611)***	(0.891)	(4.034)***	(0.846)
	[1.332]	[1.372]	[1.322]	[1.491]	[1.448]	[1.547]	[1.686]	[1.670]
Financial Asset Ratio	-0.028	-0.033	-0.036	-0.059	-0.034	-0.035	-0.036	-0.035
	(-0.605)	(-0.535)	(-0.788)	(-0.927)	(-0.749)	(-0.540)	(-0.760)	(-0.535)
	[1.075]	[1.083]	[1.081]	[1.202]	[1.090]	[1.265]	[1.096]	[1.266]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	0.00004	Yes	0.001	Yes	0.020	Yes	0.020
Adjusted R^2	0.263	-0.018	0.292	0.007	0.286	0.034	0.281	0.019
Durbin-Watson Stats.	1.415	2.014	1.376	2.007	1.386	2.020	1.384	2.020
N	104	74	104	74	104	74	104	74

4. Effects of inventories on firm's profitability

Non-Crisis Period

The regression results of the relation between inventories and firm's profitability are shown in table 4.11 and 4.12. The table 4.11 representing the regressions using the GOP as the dependent variable shows that none of the relations studied showed a significant relation. The regression analyses using the dependent variable using ROA are represented in table 4.12 and shows that there is a negative relation with a 5% significance. These results lack robustness. This lack of significance using GOP as the dependent variable and the lack of robustness is likely caused by the various different types of organizations among the sample of this study. For example a manufacturing firm has a lot more inventories compared to an employment agency.

A negative relation was also found by articles, such as Deloof (2003), Lazaridis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007), Karaduman et al. (2011) and Raheman and Nasr (2007). Only Mathuva (2009) found contradicting positive evidence in Kenya. He argued that firms keep higher levels of inventory to minimalize the risk of possible production stoppages or when a firm has temporarily no access to raw materials.

The significant percentages found with the regression analyses are -0.037% and -0.039%. A somewhat similar result was found by Karaduman et al. (2011), who found a percentage of -0.020%. A smaller percentage was found by Garcia-Teruel and Martinez-Solano (2007), who studied smaller to medium enterprises and found for these firms a percentage of -0.010%. A bigger percentage of -0.300% was found by Sharma and Kumar (2011) and is likely to be caused by the 16 times higher inventory level of the firms of their sample. Also macro-economic differences might have caused some of the difference.

The results show that firms from the sample of this study are better off keeping their inventory levels as low as possible during non-crisis years. Firms should realize that this is based on the more unreliable dependent variable ROA. This is also based on a sample with various different types of firms with various types and different levels of importance of inventories.

Crisis Period

The results of the regression analyses studying the relation between inventories and profitability during the crisis period is represented in the tables 4.11 and 4.12 under the columns '08-'09. The analyses using the dependent variable GOP show negative relation with 10% and 5% significances. Of the regressions using ROA as the dependent variable only one indicated a negative relation between inventories and profitability with a 10% significance. This indicates that a firm from this sample can create profit if they keep their inventories to a reasonable minimum.

The impact percentages of the regressions analyses using GOP are -0.087%, -0.088%, -0.104% and -0.099%. With the dependent variable ROA the percentage is -0.055%. If a comparison is made between these percentages and the percentages from the non-crisis periods, it stands out that the percentages from the crisis period are higher. This makes clear that firms should keep even more control over their inventory levels compared to the non-crisis period. But since both periods show a negative sign, firms don't have to alter their inventory management when faced with a crisis.

TABLE 4.11

Regression Results of Equation INV with Dependent Variable GOP

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
No. of days Inventories	-0.00015	-0.00087	0.00009	-0.00088	0.00006	-0.00099	-0.00014	-0.00104
	(-0.489)	(-1.741)*	(0.284)	(-1.889)*	(0.196)	(-1.824)**	(-0.430)	(1.772)*
	[1.998]	[1.996]	[1.810]	[1.742]	[1.818]	[2.376]	[2.138]	[2.700]
Size	-0.00028	-0.001	-0.005	0.00036	-0.004	0.001	0.00017	0.002
	(-0.048)	(-0.074)	(-0.936)	(0.036)	(-0.637)	(0.058)	(0.977)	(0.144)
	[1.240]	[1.316]	[1.084]	[1.167]	[1.132]	[1.170]	[1.337]	[1.441]
Debt	-	-	-0.045	0.059	-0.035	0.064	0.001	0.070
			(-0.916)	(0.629)	(-0.710)	(0.675)	(0.015)	(0.702)
			[1.137]	[1.090]	[1.162]	[1.108]	[1.411]	[1.223]
Growth	-	-	-	-	0.065	-0.047	0.045	-0.047
					(1.366)	(-0.418)	(0.917)	(-0.421)
					[1.188]	[2.157]	[1.275]	[2.159]
Current Ratio	0.034	0.00005	-	-	-	-	0.030	0.007
	(2.115)**	(0.002)					(1.582)	(0.212)
	[1.470]	[1.708]					[1.956]	[1.885]
Financial Asset Ratio	0.097	-0.022	0.089	-0.029	0.101	-0.037	0.104	-0.038
	(1.129)	(-0.213)	(1.019)	(-0.278)	(1.155)	(-0.348)	(1.200)	(-0.348)
	[1.063]	[1.119]	[1.061]	[1.131]	[1.072]	[1.169]	[1.073]	[1.169]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	-0.042	Yes	-0.042	Yes	-0.050	Yes	-0.051
Adjusted R^2	0.030	0.036	-0.007	0.042	0.002	0.030	0.018	0.015
Durbin-Watson Stats.	1.284	1.933	1.252	1.951	1.269	1.934	1.298	1.947
N	104	74	104	74	104	74	104	74

TABLE 4.12

Regression Results of Equation INV with Dependent Variable ROA

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
No. of days Inventories	-0.00037	-0.00055	-0.00005	-0.00042	-0.00007	-0.00027	-0.00039	-0.00042
	(-2.223)**	(-1.922)*	(-0.285)	(-1.567)	(-0.381)	(-0.866)	(-2.277)**	(-1.240)
	[1.998]	[1.996]	[1.810]	[1.742]	[1.818]	[2.376]	[2.138]	[2.700]
Size	0.006	0.009	-0.001	0.006	0.00001	0.006	0.006	0.009
	(1.806)*	(1.482)	(-0.303)	(1.054)	(0.004)	(1.003)	(1.912)*	(1.437)
	[1.240]	[1.316]	[1.084]	[1.167]	[1.132]	[1.170]	[1.337]	[1.441]
Debt	-	-	-0.047	-0.004	-0.041	-0.011	0.018	0.010
			(-1.617)	(-0.082)	(-1.395)	(-0.201)	(0.636)	(0.182)
			[1.137]	[1.090]	[1.162]	[1.108]	[1.411]	[1.223]
Growth	-	-	-	-	0.041	0.059	0.008	0.057
					(1.460)	(0.916)	(0.300)	(0.884)
					[1.188]	[2.157]	[1.275]	[2.159]
Current Ratio	0.047	0.021	-	-	-	-	0.049	0.022
	(5.446)***	(1.226)					(4.872)***	(1.224)
	[1.470]	[1.708]					[1.956]	[1.885]
Financial Asset Ratio	-0.021	-0.052	-0.032	-0.054	-0.024	-0.043	-0.019	-0.044
	(-0.468)	(-0.873)	(-0.617)	(-0.881)	(-0.472)	(-0.700)	(-0.416)	(-0.718)
	[1.063]	[1.119]	[1.061]	[1.131]	[1.072]	[1.169]	[1.073]	[1.169]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	0.001	Yes	0.002	Yes	0.013	Yes	0.012
Adjusted R^2	0.260	0.058	0.056	0.037	0.067	0.035	0.248	0.042
Durbin-Watson Stats.	1.369	2.013	1.422	1.971	1.447	1.968	1.389	2.000
N	104	74	104	74	104	74	104	74

5. Effects of the cash conversion cycle on firm's profitability

Non-Crisis Period

The results of the regression analyses studying the relation between the Cash Conversion Cycle (CCC) and a firm's profitability are presented in the table 4.13 and 4.14. Results of the non-crisis period are presented under the columns indicated by '04-'06. None of the regressions which used the GOP as the dependent variable found a significant relation and three regression analysis using ROA as the dependent variable showed a negative relation with a 5% significance. This absence of significance is likely to be caused by the negative effect of the number of days of account payables. As explained before in this thesis, the number of days accounts payables needs to be added in the measurement of the CCC. Since a negative effect is found with the accounts payables, this is likely disturbing the relation between the CCC and a firm's profitability.

Studies like Deloof (2003), Shin and Soenen (1997), Lazaridis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007), Uyar (2009), Wang (2002) and Karaduman et al. (2011) all found a significant negative relation between the CCC and a firm's profitability. Contradicting evidence is found by Gill et al. (2011) in the US, who found a positive relation between the two variables. This is likely to be caused by the positive, but not significant, relation between inventories and firm's profitability. Also contradicting evidence is found by Sharma and Kumar (2011) in India, who argued that this is caused by the fact that companies don't have much reputation concerning creditworthiness and therefore many of these firms loosen their working capital policies.

The significant results that was found had impact percentages of -0.041% and -0.042%. Smaller percentages were found by Garcia-Teruel and Martinez (2007), Karaduman et al. (2011) and Wang (2002), who found respectively percentages of -0.010%, -0.020% and -0.002%. The difference is likely caused by the different macro-economic conditions and the focus on smaller firms in the studied sample. Much stronger percentage was found by Lazaridis and Tryfonidis (2006), Zariyawati et al. (2009), Mathuva (2010), Falope and Ajilore (2009) and Raheman and Nasr (2007). They found respectively the following percentages -1.900%, -0.510%, -0.100%, -0.300% and -0.638%. These differences can mainly be contributed to the difference in macro-economic conditions.

Crisis Period

The results of the crisis period can also be found in table 4.13 and 4.14, except under the '08-'09 columns. None of the regression models using both dependent variables showed a significant relation between the cash conversion cycle and the profitability of a firm. The absence of significance is very reasonable, because of prior explained negative effect of accounts payables, but also because of the absence of significant relation between accounts receivables and a firm's profitability during crisis years. Both these changes disturb the effect the CCC has on a firm's profitability.

What these findings of the CCC signify is that the CCC is rather a strange measure of evaluating WCM. This is mainly caused by the fact that accounts payables show a very different relation towards a firm's profitability than what the CCC expects. Also the reason of studying the CCC is somewhat strange if it's possible to get a more precise understanding of WCM if the parts of the CCC are tested individually. I therefore argue that future research should not study the combined evaluating measure of WCM, which is the CCC, but study accounts receivables, accounts payables and inventories individually.

TABLE 4.13

Regression Results of Equation CCC with Dependent Variable GOP

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
Cash Conversion Cycle	0.00014	-0.00041	0.00015	-0.00043	0.00016	-0.00043	-0.00009	-0.00045
	(0.478)	(-1.039)	(0.524)	(-1.087)	(0.545)	(-1.090)	(-0.253)	(-1.003)
	[1.799]	[1.658]	[1.815]	[1.670]	[1.816]	[1.675]	[2.421]	[2.170]
Size	-0.002	-0.004	-0.002	-0.003	-0.002	-0.003	-0.001	-0.002
	(-0.331)	(-0.351)	(-0.281)	(-0.330)	(-0.381)	(-0.258)	(-0.083)	(-0.212)
	[1.326]	[1.292]	[1.323]	[1.239]	[1.333]	[1.320]	[1.389]	[1.449]
Debt	-	-	-0.038	0.055	-0.036	0.058	-0.001	0.062
			(-0.775)	(0.582)	(-0.742)	(0.603)	(-0.017)	(0.600)
			[1.158]	[1.093]	[1.159]	[1.110]	[1.449]	[1.254]
Growth	0.063	0.022	0.051	0.019	0.057	0.015	0.049	0.014
	(1.259)	(0.217)	(1.013)	(0.182)	(1.117)	(0.139)	(0.969)	(0.135)
	[1.301]	[1.824]	[1.326]	[1.803]	[1.337]	[1.853]	[1.351]	[1.854]
Current Ratio	-	-	-	-	-	-	0.029	0.004
							(1.455)	(0.109)
							[2.218]	[2.149]
Financial Asset Ratio	0.102	-0.018	-	-	0.100	-0.026	0.106	-0.026
	(1.182)	(-0.168)			(1.156)	(-0.239)	(0.086)	(-0.238)
	[1.068]	[1.146]			[1.069]	[1.163]	[1.070]	[1.163]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	-0.039	Yes	-0.040	Yes	-0.040	Yes	-0.040
Adjusted R^2	0.010	0.103	0.001	0.013	0.005	-0.001	0.017	-0.017
Durbin-Watson Stats.	1.281	1.862	1.288	1.871	1.279	1.870	1.297	1.874
N	104	74	104	74	104	74	104	74

TABLE 4.14

Regression Results of Equation CCC with Dependent Variable ROA

The explanatory and dependable variables are defined in tables 3.1 and 3.2. Each of the below columns represent a different regression analysis and are either held during the non-crisis period ('04-'06) or the crisis period ('08-'09). T-scores are shown in ( ), VIF-scores are shown in [ ], and * indicates a 10% significance, ** indicates a 5% significance, and *** indicates a 1% significance. Both the industry dummy and the year dummy are used in each regression.

	Regression Model							
Independent Variables	(1)		(2)		(3)		(4)	
Non-Crisis/Crisis Periods	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09	'04 – '06	'08 – '09
No. of days Acc. Payables	-0.00042	-0.00028	-0.00041	-0.00022	0.00003	-0.00009	-0.00041	-0.00023
	(-2.548)**	(-1.163)	(-2.282)**	(-0.877)	(0.178)	(-0.392)	(-2.269)**	(-0.905)
	[2.021]	[1.948]	[2.421]	[2.164]	[1.816]	[1.675]	[2.421]	[2.170]
Size	-	-	0.003	0.006	0.0003	0.005	0.004	0.007
			(1.059)	(1.027)	(0.084)	(0.835)	(1.074)	(1.149)
			[1.381]	[1.366]	[1.333]	[1.320]	[1.389]	[1.449]
Debt	-	-	0.022	0.005	-0.042	-0.013	0.021	0.010
			(0.753)	(0.094)	(-1.453)	(-0.242)	(0.735)	(0.169)
			[1.446]	[1.237]	[1.159]	[1.110]	[1.449]	[1.254]
Growth	0.023	0.073	0.026	0.083	0.039	0.079	0.025	0.077
	(0.855)	(1.242)	(0.969)	(1.426)	(1.292)	(1.315)	(0.935)	(1.292)
	[1.337]	[1.813]	[1.341]	[1.803]	[1.337]	[1.853]	[1.351]	[1.854]
Current Ratio	0.048	0.016	0.053	0.022	-	-	0.053	0.023
	(5.015)***	(0.944)	(4.922)***	(1.173)			(4.882)***	(1.172)
	[1.733]	[1.792]	[2.214]	[2.148]			[2.218]	[2.149]
Financial Asset Ratio	-0.011	-0.024	-	-	-0.023	-0.040	-0.014	-0.040
	(-0.249)	(-0.398)			(-0.446)	(-0.642)	(-0.297)	(-0.652)
	[1.060]	[1.092]			[1.069]	[1.163]	[1.070]	[1.163]
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	0.013	Yes	0.016	Yes	0.016	Yes	0.015
Adjusted R^2	0.252	0.041	0.225	0.040	0.066	0.026	0.248	0.031
Durbin-Watson Stats.	1.413	1.989	1.417	1.992	1.435	1.979	1.411	2.001
N	104	74	104	74	104	74	104	74

"When written in Chinese the word "crisis" is composed of two characters – one represents danger and the other represents opportunity."

- John F. Kennedy

VI. CONCLUSIONS

This study investigates how relatively large public listed companies in The Netherlands can manage their working capital in the most profitable way, during non-crisis periods and during a crisis period. Working capital is studied as a whole, but its parts are also studied individually. The non-crisis period and crisis period are then compared with each other and differences are highlighted. In this thesis a sample of 37 public listed companies from The Netherlands are used, listed on either the AEX or AMX. The non-crisis sample period ranged from 2004 to 2006 and the crisis period from 2008 to 2009 and resulted in approximately 185 firm-years.

The method that was used is the OLS regression analysis, in which the number of days accounts receivables, accounts payables, inventories and the cash conversion cycle are analysed. These four different variables are analysed using multiple regressions with different sets of control variables, checking for robustness this way.

The analyses of the number of days accounts receivables indicate that there is a significant negative relation between these days and firm's profitability during a non-crisis period. No significant relation is found during the crisis period, which indicate that the relation between accounts receivables and a firm's profitability is changed in times of a crisis. The analyses of the relation between accounts receivables and the lead dependent variable gross operating profit divided by total assets minus financial assets showed a significant positive relation. This suggests that on the somewhat longer-term it's beneficial for larger firms to aid their financially constraint customers through the increase of their accounts receivables. This is caused by the fact that future sales of this customer are saved this way. Furthermore, long-term benefits of this aiding are not studied in this thesis and are very likely to be a lot more than the short-term benefits. This implies that for relatively large public listed firms the policy concerning accounts receivables needs to be altered during a crisis period. These firms need to take an in-depth view of their customers and try to find out that if their aid, through their accounts receivables, realizes the survival of their customers. If this is indeed the case then the choice of giving a customer trade credit depends on the short-term benefits but mainly on the long-term benefits and the risk that is taken by this choice. But based on the fact that it's relatively cheap for reputable large firms and risks are not high because delivered product can be called back and sold again, large firm should alter their managing of accounts receivables during crisis years. Thus managers can create value over time by increasing their accounts receivable levels of their firms during crisis periods.

The relation between the number of days accounts payables and firm's profitability is negative, robust and significant during non-crisis years. This negative, significant and robust relation is also found during the crisis period. The same result, for the non-crisis period, is found by Deloof (2003), who argues that more profitable firms pay earlier,

which results in a negative relation. Another reason for this negative relation is that firms, who pay earlier, receive a discount which results in a higher profit. Also larger firms don't have the need for accounts payables as a short-term source of funds, because they still got capital market access in both periods. Because off the same negative relation for both the non-crisis period and the crisis period, firms don't need to alter their WCM policy concerning accounts payables when faced with a crisis.

Inventory management is best managed if it's kept to a minimum during non-crisis periods in The Netherlands. This is based on the negative significant relation found during this period. During the crisis period a stronger, negative and significant effect of inventories is found on the profitability of a firm. This means that the impact of inventory level on the profitability of a firm is higher during crisis periods. For this reason firms should even give more attention to the inventory levels during crisis periods, and make certain the levels of inventories are kept at a reasonable minimum.

The analyses of the relation between the cash conversion cycle and firm's profitability indicate that during the non-crisis period firms can create profit by keeping their cash conversion cycle to a minimum. The results of the crisis period show that there is no significant relation between the CCC and a firm's profitability during this period. This is likely to be caused by the changed effect of the accounts receivables during the crisis period. Also the negative effect the accounts payables have on a firm's profitability for both periods might disturb the effect of the CCC. What further needs to be highlighted here is that the relevance of the Cash Conversion Cycle (CCC) is not that high for the evaluation of working capital management. This is because in this study I evaluated the parts of the CCC individually and therefore management implications should be based on those more reliable individual analyses.

As with all research, there are some limitations of this study. The main limitation of this study is the relative small sample size, which consists of 178 firm-years. Other research such as Deloof and Shin and Soenen used respectively 5,045 and 58,985 firm-years. Also limitations exist with the crisis period research. This research focusses solely on firms from The Netherlands, to truly understand the working capital management during crisis a much broader scope is needed. The research should include multiple countries or at least a relative bigger country such as the United States, China or India. Also limitations are caused by the fact that only one crisis period, the financial crisis of 2008-2009, is used. To increase the validity of this research, studies should include multiple crisis periods with different causes and implications.

Further limitations are caused by the fact that the analyses are done with annual data. Future research can be more precise when using data based on quarterly data. It would be even more precise when average quarterly data is used for the number of days accounts receivables, accounts payables and inventories.

Future research should also study the determinants of trade credit during crisis periods. This research should enhance the understanding of the reasons behind the extension of trade credit during crisis periods. Also an understanding of the taken risks by this extension is vital for the overall understanding of working capital management during crisis years.

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APPENDICES

Appendix A List of names of firms in according with their NACE industry sector

The Economic Sector	Name of the firm
Mining and quarrying	Fugro Royal Dutch Shell SBM Offshore
Transporting and Storage	Air France-KLM Post NL (Formerly TNT) Vopak
Information and Communication	Reed Elsevier Wolters Kluwer Imtech KPN Logica Ordina TomTom Unit4
Wholesale and retail trade	Ahold Mediq
Professional, scientific and technical activities	Arcadis
Administrative and support service activities	Brunel International Randstad Holding USG People
Construction	BAM Group Boskalis Heijmans
Manufacturing	Philips Aalberts Industries Akzo Nobel ArcelorMittal DSM AMG Ten Cate Wavin CSM Heineken Nutreco Unilever ASM International ASML
Total	**37**

Appendix B Overview of studies on the effect of WCM on a firm's profitability

Shin & Soenen (1998) used the Net-Trade Cycle (NTC) to operationalize Working Capital Management (WCM) to determine the relation with firm profitability. This relation is tested using a correlation and regression analysis, by industry and working capital intensity. They used a very large data sample consisting of 58,985 firm years covering the period 1975-1994. They found evidence of a strong negative relation between NTC and firm profitability. They also found a negative relation between NTC and higher risk-adjusted stock return, which means that shortening a firm's NTC will lead to a higher shareholders value.

Wang (2002) examined the relation between liquidity management and operating performance, and the between liquidity management and corporate value for firms in Japan and Taiwan. He found a negative relation between Cash Conversion Cycle (CCC) and Return on Assets (ROA) and between CCC-ROE, but both are sensitive to industry factors. The findings also imply that aggressive liquidity management, e.g. shortening the CCC, improves operating performance, which is in line with the finding of Jose et al. (1996), and Shin and Soenen (1998). Shortening the CCC is also associated with higher corporate value for both countries.

Deloof (2003) did research in Belgium after the relation between working capital management and firm profitability. His sample consisted of 1009 non-financial firms. His data was gathered over the 1992-1996 period, which led to 5045 firm-year observations. Profitability is measured by gross operating profit divided by total assets minus financial assets, so ROA is not considered as a measure for profitability. The level of WCM is measured with the cash conversion cycle. The result of his study is consistent with Shin and Soenen (1998). He found a negative relation between gross operating profit and the three parts of the CCC, which are account payables, account receivables and inventories. These findings imply that managers can create shareholder value by shortening the CCC. He explained the negative relation between profitability and account payables with the view that less profitable firms wait longer to pay their bills.

Lazaridis and Tryfonidis (2006) studied the relation between working capital management and corporate profitability in Greece. They used a sample consisting of 131 companies listed on the Athens Stock Exchange from the period of 2001-2004. They observed a negative relation between profitability, measured through gross operation profit, and working capital management, measured with the cash conversion cycle. They also found that account payables are negatively related to profitability, which is in line with Deloof (2003).

Raheman and Nasr (2007) did research in Pakistan and provided more evidence for the negative relation between profitability and the CCC, which is the measure for working capital management efficiency in this study. They used Pearson's correlation, and

regression analysis on the data sample of 94 companies listed on the Karachi Stock Exchange for a period of six years from 1999-2004. They found evidence for a negative relation between liquidity and profitability and a positive relation between the size of the firm and profitability. There is also evidence for a significant negative relationship between debt used by the firm and its profitability (Raheman & Nasr, 2007).

Garcia-Teruel and Martinez-Solano (2007) studied the effect of working capital management on the profitability of Small and Medium Enterprises (SMEs) in Spain. They used a panel data regression methodology, consisting of 8,872 SMEs covering the period 1996-2002. The results demonstrate that managers can create shareholders value by shortening their firm's number of days accounts receivables and inventories. Also shortening the firm's cash conversion cycle enhances profitability, which is in line with the above mentioned studies of Deloof (2003), Shin and Soenen (1998) and Wang (2002). They argue that SMEs should particularly be concerned with WCM, because they can create value if they keep their CCC to a reasonable minimum.

Samiloglu and Demirgunes (2008) analysed the effect of WCM on firm profitability in Turkey. They used a small sample of manufacturing firms listed on the Istanbul Stock Exchange for the period of 1998-2007 using a multiple regression model. The empirical evidence shows that the number of days accounts receivables and inventory and leverage have a negative effect on firm profitability.

Zariyawati et al. (2009) used a panel data of 148 firms obtained from six different economic sectors over the period 1996-2006, which led to 1,628 firm year observations. The authors aim is to understand the relation between WCM and firm profitability of firms listed in Malaysia. The results of the Pooled Ordinary Least Squares (OLS) regression analysis showed a strong negative significant relation between CCC and firm profitability.

Falope & Ajilore (2009) aimed to determine the effect of WCM on profitability performance using panel data of the sample of non-financial Nigerian firms for the period 1996-2005. They found a negative relation between operating profitability and the number of days of inventories, account payables and account receivables for a sample of fifty Nigerian firms listed on the Nigerian Stock Exchange. They also found that there is no significant difference between small and larger firms, so both can enhance profit by shortening its cash conversion cycle.

Dong & Su (2010) investigate the relation between profitability and the cash conversion cycle and components in Vietnam. They use a sample of secondary data on public listed firms on the Vietnam stock market for the period of 2006-2008. They measure firm profitability through gross operating profit and found that there is a negative relation between the CCC and firm profitability. Compared to the other studies mentioned here, this study has a significant weakness, which is the shortness of the sample period.

Sharma & Kumar (2011) study the effect of WCM on profitability of Indian firms. They use a sample of 263 non-financial BSE 500 firms listed on the Bombay Stock Exchange from 2002 to 2008. They analysed the data by using OLS multiple regression. What they found, is in contradiction with all the above mentioned studies. They found a positive relation between WCM and firm profitability, although the CCC-ROA relation is not statistically significant. They found that account receivables are also positively related with ROA and that account payables are negatively related to ROA. This means that when Indian firms increase their cash conversion cycle, profitability will be higher. The authors argue that this is because India is an emerging market. Firms are seen more profitable if they give their clients more trade credit, therefore they have more clients, who means more sales, which in turn leads to more profitability.