Effects of Working Capital Management on Company Profitability

An industry-wise study of Finnish and Swedish public companies

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Abstract: Working Capital Management has lately been a hot topic since the financial turmoil of the late 2000's. Companies search for liquidity and operational efficiency through minimizing their investment in working capital. However, can working capital management add to corporate profitability and shareholder value? This has been studied in this thesis. The efficiency of working capital management can be determined by the cash conversion cycle and the net trade cycle. By testing the two variables with corporate profitability, we can see that Finnish and Swedish corporations can increase their gross operating profitability by reducing the cash conversion cycle and net trade cycle. Also, the different components of the cash conversion cycle have been studied. There is significant evidence that by effectively managing each part of working capital, a company can increase the net present value of its cash flows, thus adding to shareholder value.

Keywords: Working Capital Management, profitability, Net Working Capital, corporate finance, cash conversion cycle, net trade cycle, industry differences

CONTENTS

APPENDICES

TABLES

FIGURES

List of abbreviations:
A/P – Accounts Payable
A/R – Accounts Receivable
CCC – Cash Conversion Cycle
COGS – Cost of goods sold
DIO – Days inventory outstanding
DPO – Days payables outstanding
DSO – Days sales outstanding
KPI – Key Performance Indicator
NTC – Net Trade Cycle
NWC – Net Working Capital
OLS – Ordinary Least Squares
ROA – Return on Assets
ROE – Return on Equity
WCCC – Weighted Cash Conversion Cycle
WCM – Working Capital Management
WCR – Working Capital Requirement

1 INTRODUCTION

1.1. Description of the problem area

As the financial markets have turned into turbulence during the last years of the 2000s, an increasing number of companies turn to their working capital in search of liquidity. A liquid company has more cash in hand to pay its debtors in time and reduce its net financial costs. Furthermore, a more liquid company has the ability to quickly invest in profitable opportunities.

Working capital is usually defined in terms of net working capital. Net working capital is the difference between current assets and current liabilities. This means that by e.g. shortening the time of collecting receivables, deferring payments and keeping a minimal inventory, a company can reduce its net working capital. Working capital also encompasses cash management, for example how to invest idle cash funds without losing out on liquidity.

There has been some research in the field of working capital management and how it can influence corporate profitability (e.g. Shin & Soenen (1998), Hawawini;Viallet;& Vora (1986), Deloof (2003), Lazaridis & Tryfonidis (2006)). A more liquid company can invest its capital in something more productive than working capital. Also, capital efficiency adds to shareholder value, as the net present value of cash flows increases. The question arises if we can see that efficient working capital management in Finnish and Swedish public companies would improve corporate profitability? Also, which are the key metrics that are used to define working capital management efficiency? In other words, what drivers should companies look to when minimizing their investment in working capital?

The issue with working capital is that it cannot be reduced to a minimum without operational compromises. This means that companies need to optimize and manage their working capital in a way that does not compromise future sales and profits. For example, companies that shorten their payment terms too much might have difficulties in selling their products. Most customers appreciate a longer payment period to improve their own working capital or to check product quality. By minimizing inventory levels a company might not be able to take advantage of a sudden upturn in their demand and

miss out on sales. Also by deferring payments the company can incur heavy financing rates on their credit or miss out on discounts given for prompt payment. These metrics and drivers are very industry specific, as in some industries cycle times are very fast (e.g. retail) whereas in some industries, such as manufacturing, the cycle times can be much longer, thus binding more capital into operations. This leads to a situation where we need to study working capital industry-wise, which has been taken into consideration in this thesis.

Another problem that arises with large amounts of working capital is financing the capital. A company can try to finance its working capital with short-term liabilities and shareholders' equity, or it can depend on long-term financing. This area will also be addressed in this thesis.

Previous studies have studied the correlation between efficient working capital management and profitability (e.g. Deloof 2003 and Shin & Soenen 1998). These studies, though, take into account all firms within a geographical area such as Belgium or the United States. This study will have a cross-national view with both Swedish and Finnish companies and the study is also limited to public companies. The previous studies have found a correlation between profitability and working capital management, but they lack depth as in which industries the effect is most prevalent. This thesis will address the industry-specific nature of working capital by splitting the sample into thirteen industries.

This thesis will introduce the reader to different measures of working capital and techniques of efficient working capital management. Previous studies in the area have used either the cash conversion cycle (e.g. Deloof 2003) or the net trade cycle (e.g. Shin & Soenen 1998) as proxies for efficient working capital management. The main reason of this thesis is to study how efficient working capital management can improve company profitability and add shareholder value. The different metrics and working management drivers will be studied with corporate profitability in mind.

1.2. Problem area and restrictions

The management of working capital is essential for the company to remain liquid enough to meet its short term creditors. But can proper working capital management make a company more profitable than a competitor who does not manage its working capital? What are the different metrics and processes that need to be improved to increase profitability through working capital management? This thesis is restricted to the different processes around working capital management and will concentrate on a few different metrics to find out how companies can perform better by managing working capital. The method used will be a quantitative study of how working capital management affects profitability in Finnish and Swedish publically traded companies. Industry effects in the investment in working capital will also be addressed.

1.3. Purpose of the thesis

The purpose of this thesis is to research whether working capital management can affect company profitability in Finnish and Swedish companies. A study between Finnish and Swedish companies' working capital management is interesting, because Sweden has a longer history in industrialization than Finland (Blomström & Kokko, 2006). Otherwise, the economic and political situation is very much alike, thus contributing to a good research environment. The purpose of this thesis is also to find out which working capital metrics and drivers affect profitability the most, and in which industries working capital management effects profitability the most. Publically traded companies have been chosen as the sample, as these companies have shareholder pressure on optimizing their operations in order to maximize shareholder value.

1.4. The structure of the thesis

The structure of the thesis is as follows: an overview of working capital and terminology around it is presented in chapter two. Some key metrics and definitions are defined in this chapter, which are crucial for the research section of the thesis. In chapter three, previous research in the field will be presented. The studies will represent areas that will be researched and tested in the research part. In the fourth chapter, the research method, data and descriptive statistics are presented. The research results and conclusions are shown and discussed in chapter five. Lastly, the sixth chapter summarizes the study.

2 WORKING CAPITAL

2.1. Introduction

The purpose of this chapter is to introduce key principles around working capital and general theory around it. Because of the nature of this thesis, an introduction to Fisher's separation theorem is given. This chapter will then introduce vocabulary and drivers behind working capital, and how the proper management of working capital can improve liquidity and profitability in a company.

2.2. Fisher's separation theorem

In order to avoid confusion, a short introduction to Fisher's separation theorem is in place. According to Hochstein (2001), the idea of the Fisher separation theorem is:

> "Given perfect and complete financial capital markets, the production decision (investment) is seen as governed solely by an objective market criterion (maximizing wealth), with no regard to the individual's subjective preferences that enter into the consumption decision."

What this means, in theory, is that companies should avoid confusion between *an investment* and *financing* the investment. Fisher's separation theory has to do with working capital because a company should always separate how much they invest in working capital versus how they will finance working capital. Section 2.3 will discuss the difference between the investment and financing of working capital by defining terms such as gross working capital and net working capital. Also, working capital in the balance sheet will be introduced. Section 2.4 will go more in depth into the financing of working capital and company investments in general.

2.3. Working capital in the balance sheet

The two most important terms when discussing working capital are *gross working capital* and *net working capital.* Next, these two terms will be discussed and defined.

The investment that is needed for receivables, inventories and cash is generally called working capital or *gross working capital*. A certain part of the investment in working capital is financed by short-term financing (current liabilities) – meaning payables, current maturities etc. The difference between the current assets and current liabilities is the *net working capital*. Net working capital (NWC) indicates how much a company has

to invest of its long-term capital to finance its working capital. Net working capital may also be negative, in which case the company has more current liabilities then assets. According to Fisher's separation theorem, gross working capital is the *investment* and net working capital the *financing* of the working capital. In reality, though, a company has to attend to both these factors when optimizing working capital and maximizing profitability and liquidity (Brealey;Myers;& Allen, 2006 pp 843).

Table 1 shows as an example the part of the balance sheet that has an impact on working capital.

	20xx		20xx
Cash	xx	**Accounts payable**	**xx**
Marketable securities	xx	Current maturities of LT debt	xx
Receivables	**xx**	Notes Payable	xx
Inventory	**xx**	Accrued expenses	xx
Prepaids	xx	Taxes payable	xx
Other current assets	xx	Other current liabilities	xx
Total Current Assets	**xxx**	**Total Current Liabilities**	**xxx**

Table 1 Example of working capital in a balance sheet (LT = long term debt) (Strischek, 2001)

The efficient management of these balance sheet items can decrease a company's NWC. As an example, by more aggressively collecting receivables, a company does not have to rely as much on long-term financing (which may be costly[1]) to finance its operations. Ideally, from a lenders point of view, the current liabilities should cover most of the financing for current assets, and the shareholders equity the rest (Strischek, 2001).

Most importantly for this study, a separation between *operational* working capital and *financial* working capital has to be made. The operational working capital, that is, the part that can be optimized and affected by the company's operations, are the accounts receivable, inventories and accounts payable. These are bolded in Table 1. The rest, i.e. cash, marketable securities, prepaids and all other current liabilities are a *financial* decision of the company, and has very little to do with the company's operations in itself. This study will focus solely on the operational net working capital. This can be defined simply as receivables plus inventories minus payables.

[1] The company has to take into account the cost of equity and the cost of debt, or in other words, their Weighted Average Cost of Capital (WACC) to determine in case they should rely on long term financing. This, though, is beyond the scope of this thesis.

The more a company ties its assets in working capital, the more illiquid it is. In other words, the effective management of working capital allows the company to invest in future growth, pay back short-term financing and reduce financing costs. The issue lies in the optimization of the working capital; the company cannot reduce its working capital to a bare minimum without it compromising future growth and sales. A certain level of receivables (giving customers credit) and inventories is needed to satisfy customer needs. An optimal level of working capital could be seen as one where a balance is attained between risk and efficiency (Filbeck & Krueger, 2005).

2.4. Financing working capital

A company's resources are usually invested in capital investments, such as machinery, plants and equipment, and in short-term investments, i.e. working capital. How a company finances these investments depends on the capital structure of the company. This part discusses the financing of day-to-day operations, meaning working capital.

A company's net working capital has to be financed in one way or another. In case the net working capital is positive (that is, current assets exceed current liabilities), the net working capital is financed with long-term capital such as equity or long-term borrowing. In case the net working capital is negative (liabilities exceed assets), the NWC is financed with short-term capital, which can increase the cost of borrowing significantly.

The cost of assets that a company purchases over time is called a company's *cumulative capital requirement* (Brealey;Myers;& Allen, 2006 pp 841-842). The cumulative capital requirement usually grows irregularly, having to do with the cyclical nature of most businesses (year-to-year or month-to-month). This capital requirement can be financed with either long-term or short-term financing. In case long-term financing is not enough to cover the capital requirement, the firm must obtain short-term financing for its operations. In case the long-term financing is more than the cumulative capital requirement, the company has a surplus of cash. This determines if the company is a short-term borrower or lender. (Brealey;Myers;& Allen, 2006 pp 842)

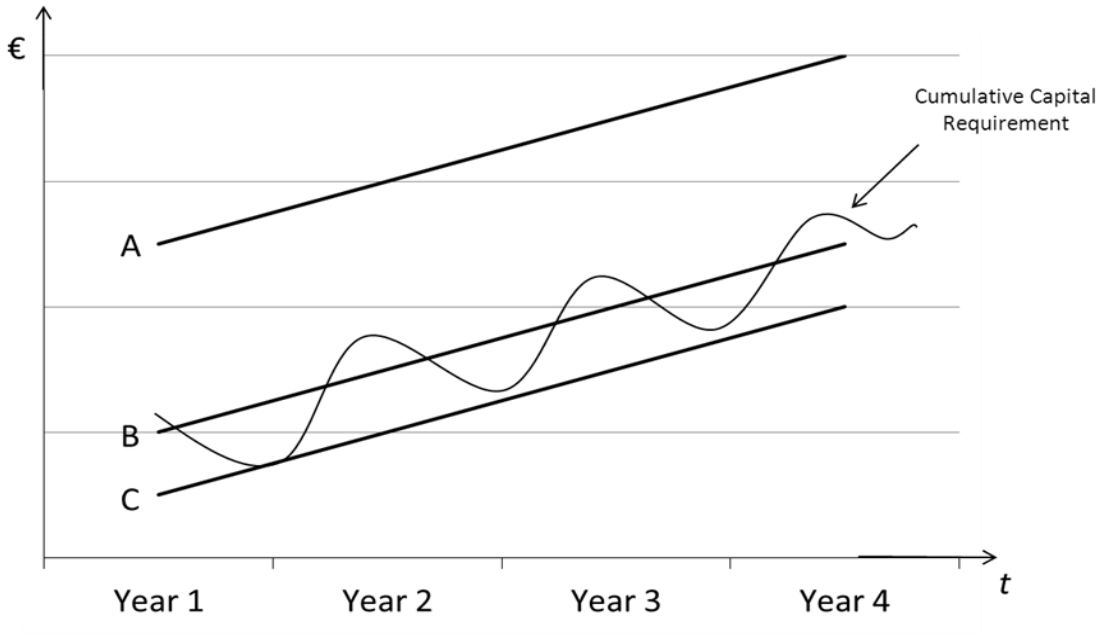

Figure 1 Cumulative Capital Requirement (reproduced from Brealey, Myers and Allen, 2006)

Figure 1 shows the cumulative capital requirement graphically. The different scenarios, or strategies, are marked A, B and C. The lines are slightly upward sloping, as usually companies acquire more capital as they grow. Revenue growth also binds more cash in working capital as will be pointed out in section 2.6. In this case, line A indicates a strategy where the company constantly holds excess cash, which in turn can be invested in short-term securities. Line B denotes a strategy where the company is a short-term lender part of the year and a short-term borrower the other part. Line C shows a strategy where there is a permanent need for short-term financing.

The picture shows, in other words, how a company's working capital requirements affect its financing decisions. In some cases, a company that binds a lot of capital into its gross working capital (that is, its current assets), might need to use more long-term financing than a company which can match the maturities of its short-term liabilities with its short-term assets. This is very industry specific, which will also be addressed in the prior research –section, as well as in the research hypotheses, of this thesis.

The strategies in Figure 1 are only examples. There might not be an optimal strategy for one company, as pointed out by Brealey, Myers and Allen (2006). There is, however, support for the theory that most financial managers try to match the maturities of their liabilities and assets (Graham & Harvey, 2001). This means that long-lived assets, such

as machines or buildings, are financed with long-term financing, while working capital is financed (as much as possible) by short-term financing. Of course the net working capital usually is positive, which implies a permanent investment in working capital. The part that of net working capital that exceeds current liabilities is thus financed with long-term financing, such as equity, loans or bonds. (Brealey;Myers;& Allen, 2006 pp 842)

2.5. Managing working capital

Weinraub and Visscher (1998) mention that finance textbooks typically discuss working capital in terms of risk and return tradeoffs in alternate working capital management strategies. They classify three different categories of WCM: aggressive, moderate (or matching) and conservative. Aggressive management is when working capital investment and financing is characterized by high risk and high returns. Moderate, or matching, policy entails lower risk and returns, and finally conservative strategies have the lowest risk/return ratios.

To effectively manage working capital, the company needs to direct its attention to four different short-term assets – accounts receivable, inventories, cash and short-term securities (Brealey;Myers;& Allen, 2006 pp 813). The different short-term assets are discussed below.

2.5.1. Accounts receivable

A company accrues accounts receivable when it sells its goods on credit. Depending on the payment terms, the company might receive cash in weeks or even months. A company can manage its accounts receivable by credit management, meaning that decisions regarding terms of sale, credit analysis and decision and collection policy have to be made. By, for example, improving the efficiency of collection, the company can gain significant advantages in working capital. A too aggressive collection, though, can affect the company's sales, and can create a conflict between sales and collection (Brealey;Myers;& Allen, 2006 pp 814-819). A company can also rely on factoring to shorten its cash cycle. Factoring means that the company sells its receivables to a factor, which usually holds a percentage of the payable sum as interest.

2.5.2. Inventory management

Inventory is another important current asset. Depending on the industry the company is active in, the inventories may consist of different things; e.g. raw materials, works in progress or finished goods. Managing and optimizing inventory levels are tedious tasks which require balancing between sales and tied-up capital. In case the inventory levels are too low, the company might miss out on sales when demand arises or might not be able to deliver goods on time. On the other hand, too much inventory ties up capital that can be used elsewhere more effectively. The trend has been to lower inventory levels over the past decades (Brealey;Myers;& Allen, 2006 pp 821). For example, 30 years ago U.S companies had approximately 12% of total assets tied up in inventory, whereas today the percentage is around six (Brealey;Myers;& Allen, 2006 pp 821). A concept that is often used for inventory management is just-in-time approach. The just-in-time means that inventories are kept to a bare minimum and optimizing the supply chain processes to serve so that the inventories never exhaust. (Brealey;Myers;& Allen, 2006 pp 821)

2.5.3. Cash management and short-term securities

Cash can be compared to inventories as it is also something of a raw material that the company needs to do business. It is very often comfortable for companies to hold large quantities of idle cash for liquidity purposes or so that they do not have to raise more capital at a short notice. The issue with holding too much cash at hand is the cost of capital. In case the company can invest some of its cash into marketable securities, it can reduce its cost of capital and gain return on their idle funds. The problem is that the company cannot invest all cash into securities, as the transaction costs would rise too high. The larger the company, though, the more minimal these transaction costs are in relation to the profit made from investing in the securities. Many companies use *sweeping* as a method of gaining profit on their cash balances. Cash sweeping entails that the cash balances of the company are transferred into overnight money market deposit accounts (MMDA's) which pay an overnight interest rate (usually a swap rate). Other short-term securities that companies can invest their liquid funds in are commercial papers, bonds, mutual funds, corporate notes and mortgage-backed securities. (Brealey;Myers;& Allen, 2006 pp 821-822)

2.6. Metrics used in working capital management

The main metrics of working capital and its effective management, besides the already introduced metric of NWC, are days sales outstanding (DSO), days payables outstanding (DPO), days inventory outstanding (DIO) cash conversion cycle (CCC), and net trade cycle (NTC).

Days sales outstanding expresses the number of days worth of sales (or revenue) still outstanding in the balances (receivables). The DSO can be improved by optimizing the collection process in a company. Also, credit policies in a company can be harmonized, which leaves less room for sales to give out lax payment schedules.

$$DSO = \frac{Avg.Accounts\ Receivable}{Sales} \times 365$$

(Banomyong, 2005)

Days payables outstanding expresses the number of days worth of payments still outstanding at the end of the period. This figure tells how many days the company, on average, uses to pay out its liabilities. By lengthening this period, the company can to some degree improve its net working capital. The DPO is usually expressed in terms of cost of goods sold (COGS).

$$DPO = \frac{Avg.Accounts\ Payable}{COGS} \times 365$$

(Banomyong, 2005)

Days inventory outstanding is a financial and operational figure that estimates the value of inventory. The value is given by days of inventory outstanding, in terms of cost of goods sold. The number can be seen as the time it takes to convert inventory into revenue.

$$DIO = \frac{Avg.Inventory}{COGS} \times 365$$

(Banomyong, 2005)

The *cash conversion cycle* is a combination of the previous metrics. The cash conversion cycle (CCC) is an additive measure, which measures the number of days

funds are tied to inventories and receivables, minus the number of days payments are deferred to suppliers (CCC = DIO + DSO – DPO). The CCC expresses, in other words, how many days it takes from the purchases of raw materials to collecting the receivables of the finished product. The cash conversion cycle is illustrated in Figure 2 (partly reproduced from Richards & Laughlin, 1980).

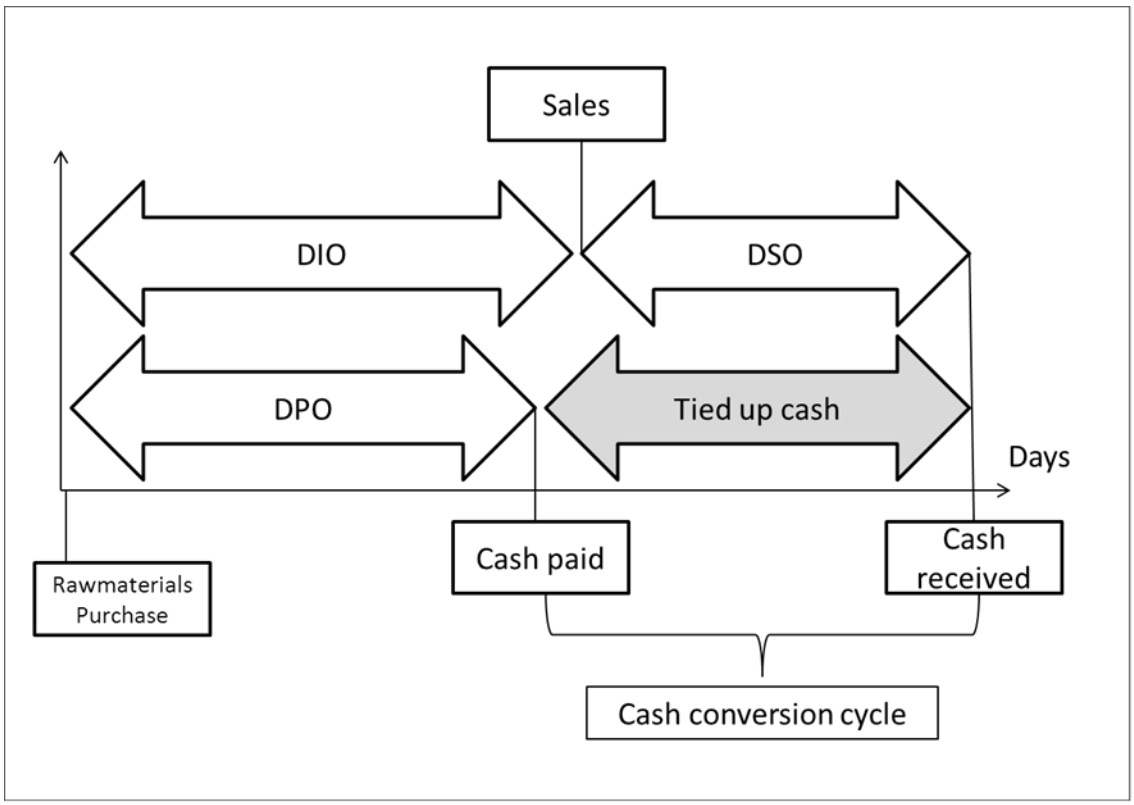

Figure 2 Cash Conversion Cycle

The net trade cycle is a measure that is easier to use than the cash conversion cycle, as it expresses the different components of the cash conversion cycle as a percentage of sales. The net trade cycle is calculated by dividing the net sales of a company with its net working capital. The net trade cycle also indicates the number of days sales the company has to finance its working capital (Shin & Soenen, 1998). By calculating the net trade cycle, the company can easily estimate additional financing needs as an expression of the projected sales growth. The calculation would be as follows: in case of a 30-day NTC, an increase of 1 million in sales would require working capital financing of approximately 83.000€ (30/360 * 1.000.000).

The net trade cycle is also a very important metric because it can add to shareholder value if managed properly. By shortening the net trade cycle, the present value of net cash flows will be higher, thus generating value for the owners (Shin & Soenen, 2000). The shortening of the net trade cycle also contributes to managing the working capital as it reduces the need for external financing and lowers the cost of borrowing, improving the financial performance of the company.

Table 2 summarizes the different key metrics that are used in this study. The first column shows the abbreviation for the metric, the second the calculation steps and the third an example of how the measure can be used.

Metric	Calculation	Usage / Defines
DSO	$DSO = \frac{Avg.Accounts\ Receivable}{Sales} \times 365$	Days credit given to customers
DPO	$DPO = \frac{Avg.Accounts\ Payable}{COGS} \times 365$	Days credit given by suppliers
DIO	$DIO = \frac{Avg.Inventory}{COGS} \times 365$	Inventory turnover time in days defined as cost of goods sold
CCC	$CCC = DSO + DIO - DPO$	How many days it takes for the company to receive cash after cash outlay
NTC	$NTC = \frac{Net\ Sales}{Net\ Working\ Capital} / 365$	How many days worth of sales the company has to finance

Table 2 Summary of WCM metrics

The metrics shown in Table 2 are all used in the correlation and regression models that are presented in the research part of this thesis. These metrics are also commonly used by other scholars in the area of working capital management, as presented in chapter three.

2.7. Working capital management and profitability

To observe how working capital management can affect profitability, one needs to take a look at a company's cash flows. As Shin & Soenen (1998) state in their study, a longer cash conversion cycle might indicate that a company's sales are rising and that the company can compete by having lax credit policies or high inventories. But on the contrary, a higher cash conversion cycle can actually hurt a company's profitability by increasing the time that cash is tied to non-interest bearing accounts such accounts receivable. By shortening the cash conversion cycle, the company's cash flows will have a higher net present value (NPV) because cash is received quicker.

Smith (1980) was one of the first to study the trade-off between liquidity and profitability in working capital management. This, however, can according to Shin & Soenen (1998) have a negative impact on company decisions, as a shorter cash conversion cycle can contribute to both a better liquidity and higher profitability. So instead of having to make a decision between liquidity and profitability, a company must usually optimize the link between sales and finance. As stated earlier, many companies use long credit periods or high inventories as to enhance sales (Shin & Soenen, 1998) but a lower cash conversion cycle leads to higher NPV of cash flows. This is thus, *de facto,* a trade-off between sales flexibility and financial policies.

One could also argue that working capital management affects profitability purely by definition. As the DuPont model indicates (Brealey;Myers;& Allen, 2006 pp 796), return on assets (ROA) can be defined as:

$$ROA = \frac{Net\ income}{Sales} \times \frac{Sales}{Total\ assets}$$

In this formula, net income per sales is usually called *operating profit margin* and sales per total assets *the asset turnover.* The total assets include fixed assets and current assets. As defined previously, current assets consist of gross working capital. Thus, by reducing the amount of capital invested in working capital, the company can effectively increase their asset turnover ratio, which in turn will increase ROA. As the DuPont model further shows, this will increase the return on equity (ROE) and thus increase shareholder value (not including taxes):

$$ROE = ROA \times \frac{Assets}{Equity}$$

In this formula, assets per equity defines the company's financial leverage.

2.8. Chapter summary

The purpose of this chapter was to give the reader an introduction to working capital. Working capital was defined in the balance sheet as current liabilities and current assets. The net working capital concept was also discussed; net working capital is defined as the difference between current assets and current liabilities. The net working capital principle presents a whole new question – financing of working capital. This was

discussed briefly, using the cumulative capital requirement as an example. A positive net working capital is financed with long-term capital. A negative net working capital is financed with short-term capital.

The different components of the working capital on the balance sheet are discussed. The areas include accounts receivable, inventories, cash management and short-term securities. Different methods of improving efficiency in these areas are also briefly mentioned

The different aspects and measures of working capital are then discussed. Most importantly, the cash conversion cycle (CCC) and the net trade cycle (NTC) were introduced. Components of these are the days payables outstanding (DPO), days sales outstanding (DSO) and days inventory outstanding (DIO)..

As this study will provide insights in whether there is a link between working capital management and profitability, a short introduction to why working capital management might improve profitability is given. There are two ways to prove that working capital management increases profitability. One is a financial view where the net present value of cash flows is increased because of shorter cycle times. The other, relying more on accounting ratios, shows how working capital management affects the return on equity through the DuPont analysis.

3 PRIOR RESEARCH IN THE FIELD

3.1. Introduction

In this chapter, prior studies and facts around the subject of working capital management will be presented. This chapter will introduce studies conducted around the effects of working capital management on liquidity and profitability, the differences of working capital management in different industries as well as a short review of techniques used to manage working capital.

3.2. Measuring working capital management in literature

Different metrics of working capital management and efficiency were introduced in part 2.6. In this section, metrics used by scholars and the metrics used in this study will be presented.

3.2.1. Working capital efficiency

The first metric introduced was the cash cycle, by Gitman (1974), which reported how many days it took for the company to receive cash after procurement of raw materials.

The second metric, which is also used in this study, is the cash conversion cycle, which is basically the net cash cycle. It was introduced by Richards and Laughlin (1980). This metric subtracts the accounts payable time from the cash cycle, giving a net cycle time for cash.

Gentry, Vaidynauthan and Lee (1990) use a weighted cash conversion cycle, which weighs the different components of the cash conversion cycle with the respected account it is related to. The issue with this metric is that it is many times impossible to find enough data to conduct a study with this metric, as it requires detailed account balances for different inventory types, such as raw materials, works-in-progress and finished goods.

The last metric for working capital efficiency, the net trade cycle, was introduced by Shin and Soenen (1998). The net trade cycle adjusts the different components of the cash conversion cycle according to the sales of the company. The net trade cycle will also be used in this study.

3.2.2. Working capital requirement

Most companies, depending on industries, have a considerable investment in operations, which can be defined as working capital (Hawawini;Viallet;& Vora, 1986). How much a company needs to invest in working capital can be calculated by using the net working capital concept introduced in 2.3. Hawawini et al. point out, though, that cash and marketable securities as well as overdrafts and payables to banks cannot be seen as part of operations, but are purely financial. Hence, they derive that the working capital requirement (WCR) for a company is:

$$WCR = NWC - NLB$$

where NWC is net working capital and NLB net liquid balance. The net liquid balance can be defined as:

$$NLB = C - STB$$

where C is cash and marketable securities and STB overdrafts and notes payable to banks.

Hawawini et al (1986) continue that a firm's working capital requirement is affected by four components, which in turn are functions of some variables. The four major components are accounts receivable, inventories, accounts payable and net accruals. The functions that affect these are the firm's technology, managerial (operational) efficiency and the level of sales.

3.3. Working capital techniques and practices

Companies use different techniques to manage their working capital. The management of working capital may depend on several different factors, as for example industry, as will be discussed in part 3.6. Gilbert and Reichert (1995) find that over 70% use some form of cash management techniques and within some industries even 100% usage. The following working capital items were studied in the article: cash, securities, accounts receivable and inventory. They find that overall usage of working capital models rose from 1980-1985, with the authors implying that this had to do with the historically very high interest rate levels.

Surprisingly, only 20% of companies use security portfolio management (Gilbert & Reichert, 1995). The authors point out that traditional non-financial companies invest a relatively small part of their assets into securities. The companies that do invest in securities do it mostly for liquidity reasons. Accounts receivables models were used by nearly 60% of the companies as was inventory management models. The authors point out that inventory management models became more frequent during the mid-80's, most likely as a consequence of the rise of just-in-time management.

3.4. The effects of WCM on liquidity

As studied by Richards and Laughlin (1980), the effects of working capital management can have a big impact on a company's liquidity. Many companies may have excellent future prospects and cash flow projections, but fail because of neglecting the financing of working capital. Richards and Laughlin use the cash conversion cycle as an effective measure of liquidity, as opposed to the traditional balance sheet based liquidity ratios (such as current ratio or quick ratio). They argue that by using the cash conversion cycle, attention can be directed by the company and analysts to the timing of cash inflows and outflows. They point out that the traditional measures miss out on this very crucial point of liquidity analysis, where the companies cash inflows and outflows hardly ever coincide. They conclude that by using the cash conversion cycle, the managing of working capital will assure that enough capital is allocated to liquidity and funds are allocated properly.

As the aim of the management of a company is to maximize future profits, they need to invest in projects with the highest net present value. This means that an optimal mix of capital invested between working capital and capital investments should be found, as working capital usually yields smaller profits than capital investments (Schilling, 1996). Schilling (1996) also argues that finding the optimal liquidity position is the main activity of working capital management. For managing liquidity, he suggests that the cash conversion cycle is the most dynamic tool. The relationship is that the longer the CCC, the minimum level of needed liquidity rises, and conversely, the shorter the CCC, the minimum level of liquidity needed decreases. The author also points out that the company has to carefully review if they should extend their credit period for e.g. new product launches, or instead try to keep benchmarked credit periods. He argues that the

company should use an economic value added (EVA) approach to these decisions in an attempt to maximize shareholder value.

On an opposite note, Fazzari and Petersen (1993) write that working capital can be used to smooth out liquidity when companies try to keep a certain level of fixed (capital) investments. They argue that even constrained firms can use working capital to smooth out shocks of cash-flows from fixed investments. Fazzari and Petersen would even go so far as to setting the net working capital to negative levels. This means that companies can make short-term liquidity possible by adjusting their working capital without having to cut down on fixed investments.

Moss and Stine (1993) research the effect of cash conversion cycle and the firm's size in the retail branch. Along with their findings that larger firms have shorter cash conversion cycles, they find that there is a significant positive correlation between the cash conversion cycle and the current and quick ratios. This means that the conventional liquidity ratios current and quick ratio do not essentially capture the company's cash situation, as funds are being tied up in working capital. In essence, companies, especially smaller ones, should try to focus on their cash conversion cycle to maximize short-term operational liquidity (Moss & Stine, 1993). Focusing too much on static, end-of-period figures might actually worsen the company's financial situation.

3.5. The effects of WCM on profitability

The effect of working capital management on profitability is an interesting point of study, because it is too often a neglected part of finance management in many companies (Soenen, 1993, Fazzari and Petersen, 1993). This part of the thesis will introduce different studies conducted around the effects of working capital management, in particular the impact on cash conversion cycle or net trade cycle, on corporate profitability.

3.5.1. The effects of NTC on profitability

As mentioned in the previous chapter and section, the cash conversion cycle has a clear impact on company liquidity and profitability. In the article by Soenen (1993) the effects of the cash conversion cycle on corporate profitability is studied in practice. The idea behind the study is that managers can minimize loans or generate returns on

investments with excess cash, thus lessening net interest expenses by monitoring the CCC. As already mentioned earlier, the cash conversion cycle can determine how much a company has to rely on external financing. As the CCC is not comparable across different companies, Soenen uses the net trade cycle (where CCC is divided by sales) to make the measure more dynamic. As a measure of profitability, he uses return on total assets. He mentions that even though from an investor's point of view return on equity would be more interesting to study, the return on assets disregards the financial leverage aspect of the firm. The study concentrates on 20 different industries from the year 1970 – 1989. The mean amounts for NTC and return on assets is used instead of averages so that the outliers do not bias the research.

Soenen (1993) concludes that shorter net trade cycles are usually correlated to higher profitability and vice versa. He does point out that the level of significance is not very strong. A significant relationship was found in 9 out of 20 industries studied.

Shin and Soenen (1998) study the efficiency of working capital management and corporate profitability. In their study, they first introduce different measures of working capital management, and then test a large sample of 58,985 firm years for a correlation between WCM and profitability.

The measures for WCM the authors introduce are cash conversion cycle (CCC), weighted cash conversion cycle (WCCC, introduced by Gentry, Vaidyanathan and Lee (1990)) and the net trade cycle (NTC). The CCC is basically the number of days between paying out cash (A/P) and collecting cash (A/R). The measure can be calculated by adding the days that cash is committed to inventories and receivables minus the days that payments are deferred to suppliers. In the WCCC, the timing is scaled to the amount of funds in each step. This means that the WCCC is comprised of both the funds and number of days for each stage.

The NTC is basically a calculation of the CCC in percentage. This means that each component of the CCC is converted into a percentage by dividing it with the total sales. This way, the different components are additive.

Shin and Soenen first use a correlation analysis between the NTC, profitability (return on sales and return on assets) and risk-adjusted stock returns (risk adjusted using Jensen's Alpha and Treynor Index). The correlations coefficients show a significant

negative relationship between NTC and profitability measures. Only the Spearman rank between NTC and return on sales is positive. These results, according to the authors, confirm their hypothesis that shorter trade cycles create greater profits. They point out that their research also shows that traditional measures of liquidity, such as the current ratio, have severe deficiencies. They also find that companies with greater NTC also have greater leverage, meaning that they have to finance operations (particularly working capital) by borrowing.

Shin and Soenen also use a regression analysis to investigate the relationship between profitability, risk-adjusted stock returns and the length of the NTC. They argue that the results show strong evidence of the link between the net trade cycle and corporate profitability. The regression coefficient is negative and significant at the 0.01 level. It shows that a company with a relatively short NTC is more profitable and has a higher risk-adjusted stock return. They also find that profitability is significantly negatively related to the current ratio, meaning that liquid companies are more profitable than non-liquid. They conclude that by managing the working capital and reducing the NTC a company can create additional shareholder value and should be addressed by financial executives in all companies. Parts of the regression and correlation models used by Shin and Soenen (1998) will be used in the research part of this study.

3.5.2. The effects of CCC on profitability

The effect of working capital management on Belgian companies' profitability is studied in the article by Deloof (2003). He bases his study on a database provided by the National Bank of Belgium, which is comprised of 2000 most important Belgian firms. He excluded companies from energy and water, banking and finance and other services. He also left out with the 1% outlying values for number of days accounts receivable, number of days inventories, number of days accounts payable, net operating income and gross operating income. He thus had a set of 5045 company years with observations from 1009 firms from 1992-1996.

He measures profitability by gross operating income, which is defined as sales minus cash cost of goods sold, and this is divided by total assets minus financial assets. He mentions that for many firms, financial assets (mainly shares in other firms), are a significant part of total assets. This is the reason why ROA is not used as a measure of

profitability. Stock value cannot be used in this case as very few of the major Belgian companies are listed on the stock exchange.

The author uses cash conversion cycle as a comprehensive measure for working capital management. He defines cash conversion cycle as: number of days accounts receivable + number of days inventory – number of days accounts payable. As control variables he uses sales growth, the financial debt ratio, the ratio of fixed financial assets to the total assets and the variability of net operating income (variability defined as the standard deviation of net operating income for the firm 1991-96).

Deloof (2003) then uses a Pearson correlation analysis for all variables considered. He points out that the Pearson correlations do not allow for identification of causes from consequences, and thus uses next a regression analysis to investigate the impact of WCM on corporate profitability. He finds a negative relation between WCM and profitability, but he states that it cannot be ruled out that the negative relation is to some extent a consequence of profitability affecting WCM and not vice versa. He thinks that the most plausible explanation for the negative relation between accounts payable and profitability is that less profitable firms will wait longer to pay their invoices than the more profitable ones. In case of inventories, a negative relation to profitability can be caused by declining sales. On the other hand, a negative relation between accounts receivable and profitability is not explainable. Deloof points out that studies (e.g. Schwartz, 1974 and Emery 1984) have been made that support the view of companies with high accounts receivable are more profitable than those with low receivables. This relation is supported by the logic that companies which are not strapped for cash will give their customers longer payment terms than those with shortage of cash.

Deloof (2003) also uses a regression analysis on the sample data to investigate the impact of working capital management on profitability. He uses a fixed effects model to capture the effects of variables that are particular to each firm and time. He also uses a plain OLS regression, which will also be used in this thesis. In his OLS regression, he includes the same variables as in the Pearson correlation, plus four yearly dummies and 37 industry dummies. He uses White's correction to take into account any heteroscedasticity in his sample.

He concludes in his paper that most firms have substantial amounts of cash invested in working capital, thus it can be expected that firms can manage working capital to significantly impact profitability. He states that he finds a significant negative relation between gross operating income and the number of days accounts receivable, inventories and accounts payable in Belgian companies. The writer points out that the study suggests that managers can create value for the shareholders by reducing the number of days accounts receivable and inventories to a reasonable minimum. The view that less profitable firms wait longer to pay their invoices is confirmed by the study.

In the study by Lazaridis and Tryfonidis (2006) the relationship between WCM and profitability of listed companies in the Athens stock exchange is studied. They use the cash conversion cycle as a model for efficient working capital management and gross operating profit as a determinant of profitability. Gross operating profitability is defined as: (Sales – COGS) / (Total Assets – Financial Assets). Other variables the authors have chosen to study are sales growth, fixed financial assets ratio and financial debt ratio.

The authors conclude in their study that their results coincide with the results from Shin and Soenen (1998) and Deloof (2003). They observe a negative relation between the cash conversion cycle and profitability. As with Deloof, the authors also find that less profitable companies have longer accounts payable periods, which could be seen as a delay of paying invoices if the company is short of cash. Also, the negative relation between accounts receivable and profitability would suggest that less profitable companies try to improve their efficiency and liquidity by reducing the cash gap in the CCC. A negative relation between profitability and days of inventory outstanding suggests a mismanagement of inventory levels and a drop in demand, which in turn ties up unnecessary capital in inventories which could be used elsewhere more profitably. They conclude, as does Deloof, that managers can create shareholder value if they optimize levels of inventory, accounts payable and accounts receivable and thus reducing the cash conversion cycle to an optimal level.

3.6. Industry effect on working capital

Working capital management can be very different across industries as the needs and policies vary heavily from industry to industry. For example Weinraub and Visscher (1998) study the different strategies employed by companies to manage their working

capital (aggressive, moderate or conservative, see section 2.5) across different industries. Their purpose is to find out if industries that tend to have aggressive investment policies also follow aggressive financing strategies. They also study the stability of working capital policies over time.

The results of Weinraub and Visscher (1998) show that different industries follow significantly different strategies (aggressive/conservative) in their working capital management, and that these strategies remain stable relative to each other over time. There is also a strong leaning towards that companies that are more aggressive in some areas are more conservative in others.

Another study, conducted by Filbeck and Krueger (2005) uses the annual reports of working capital management by *CFO* magazine to analyze whether there are differences of managing working capital across industries. They discover that there are significant differences between industries in working capital measures across time. They also find that the same measures can change significantly over time within the industry (contrary to Weinraub and Visscher). Filbecks and Kruegers study probes that working capital performance changes over time, depending mostly on macroeconomic factors such as interest rates, rate of innovation and competition.

The main point studied in the article by Filbeck and Krueger, though, is how the industry of the company affects working capital. The authors point out that many scholarly articles and books discuss working capital management and liquidity without taking into account the industry in which the company operates in, which is, according to the authors, a very important determinant in working capital. Their study shows how different industries have different working capital needs and how the different metrics of working capital differ from industry to industry.

The study conducted by Hawawini, Viallet and Vora (1986) studies the investment needed in working capital per industry. They use the working capital requirement (WCR) as a measure (see part 3.2) for the investment in working capital. They find significant industry differences in working capital needs. For example, the airline industry has a *negative* WCR which means that they actually make money from their investment in working capital. In the other end is the computer manufacturing industry, which binds almost 36 cents per dollar in sales into working capital.

The authors also conduct a cluster study, where they study how different industries cluster together in terms of working capital requirements in proportion to sales. They find that there are 11 distinct clusters for industries, which coincides greatly with the companies' US SIC codes. (Hawawini;Viallet;& Vora, 1986)

3.7. Summary of prior research

This chapter outlined the general level of knowledge in the field. The purpose of this chapter was to give this study a base for research. The chapter discusses different metrics of working capital management from an academic point of view and how working capital efficiency can be determined. Also, prior studies in how working capital affects liquidity were also discussed briefly to lay the foundations of the noticeable effects of working capital management.

The most important part, which relates to this study, was the effect of working capital management on profitability. Different articles on how academics have researched this question were presented. Researchers mostly use either cash conversion cycle and/or net trade cycle to denominate working capital efficiency. As profitability measures, researchers tend to use ROA minus financial assets.

This thesis will use methodologies used by Deloof (2003) and Shin & Soenen (1998). The research part will incorporate both measures for working capital efficiency – the cash conversion cycle and the net trade cycle. The statistical tests done on the sample data are derived from both studies. This study will also study the correlation industry-wise, for a more in-depth analysis of working capital effects on profitability.

Research around the effect of a company's industry was also presented. The purpose of this is to point out that the environment that the company is active within plays a big role in how much working capital is needed by the company. The industries of the companies will also be addressed in this study.

4 RESEARCH DESCRIPTION

4.1. Introduction

This chapter introduces the research questions, method, data and descriptive statistics of this thesis. The first part lays out the research questions. The research questions are mostly based on previous studies, but do take into account the sample's uniqueness as it is collected from different industries and countries. In the second part, the used data, variables and descriptive statistics of the data are presented. These lay out a foundation for the continued research in Chapter 5. Lastly, the methods used in the study are presented.

4.2. Research questions

The purpose of this study is to test the correlation between working capital management and company profitability. Other aspects that will be taken into account in this study are the industry of the company, yearly variations on profitability and other ratios such as current ratio and financial debt ratio.

The first hypothesis of this study is to find out if working capital management can increase company profitability.

H1: Efficient working capital management increases company profitability

This hypothesis will be tested along the lines of Deloof's (2003) and Shin & Soenen's study (2000). Working capital management efficiency will be defined as the cash conversion cycle and net trade cycle. The cash conversion cycle will also be split into its' components, which are the DSO, DPO and DIO in order to see which of these affects profitability the most.

The second hypothesis is that there is a significant difference between Finnish and Swedish companies' working capital efficiency, as Swedish companies have a longer history in a deregulated, industrialized, market. (Blomström & Kokko, 2006)

H2: There is a difference in working capital efficiency between Finnish and Swedish companies

The third hypothesis is that there is a correlation between the industry which the firm is active in and the investment in working capital.

H3: Working capital effects on profitability are industry-specific

This hypothesis will be tested using the industry codes for each company in the sample database.

The fourth hypothesis follows Deloof's (2003) study's conclusion that more profitable companies will have *shorter* days payables (DPO) than less profitable companies, even though the theory of working capital management would say otherwise.

H4: More profitable companies have shorter days payables outstanding (DPO)

4.3. Data, variables and descriptive statistics

The data sample is collected from the Bureau van Dijk "Orbis" -database. The criteria used for the data is:

1) Public company
2) Finnish or Swedish
3) All industries except financial and utilities
4) Years 2002-2010 (9 years)

All companies with unavailable data for any year were disqualified from the sample. Different ratios and key financial figures were collected from the database. Some ratios were predefined within Orbis, such as days sales outstanding and days payables outstanding. Days inventory outstanding was calculated manually, as was the cash conversion cycle and the net trade cycle. Other ratios that were calculated from the figures in the database are gross operating profit ratio, which is defined as (sales – COGS + depreciations & amortizations) / (total assets – financial assets). Also, as control variables, I have chosen sales, defined as the natural logarithm of sales, sales growth and the financial debt ratio.

The data was collected into a balanced panel data set. Each company contributed to the data with nine years of figures. The amount of listed companies for the chosen years

was initially 612, which gave a set of 5508 company years. Because of missing values or non-applicable industries, the final balanced set consists of 1789 company years. The data was balanced by taking out the outlying values in the cash conversion cycle, net trade cycle, DIO, DPO and DSO. Outliers were defined as having less than -500 days or more than 500 days of each parameter. As can be seen from Figures 4 and 5, the CCC and NTC now follow roughly a normal (or Gaussian) distribution.

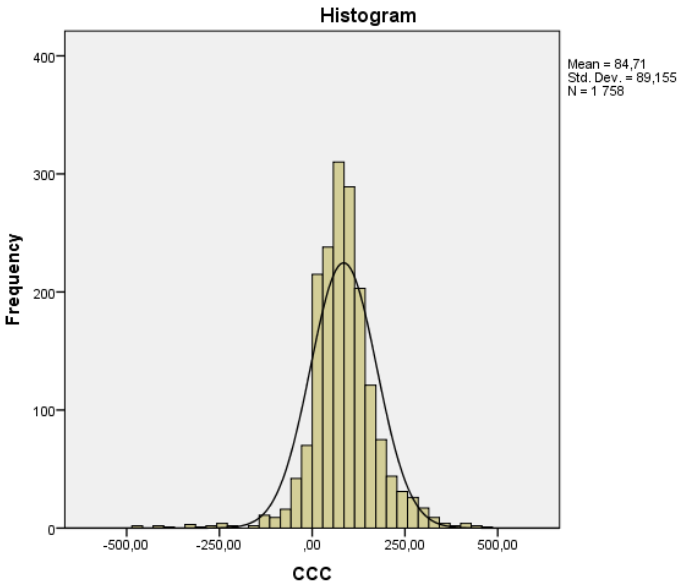

Figure 3 Cash Conversion Cycle distribution

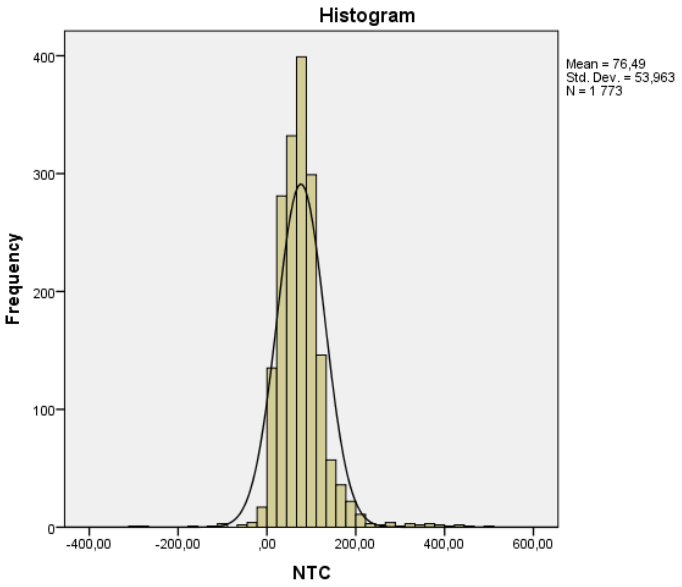

Figure 4 Net Trade Cycle distribution

There were all together 13 industries. The BvD (Bureau van Dijk) industry classification was used, as this was the most purposeful for the dataset used. The industries can be seen in Table 3. As can be seen, some industries such as Education,

Health and Primary Sector, have limited observations to be reliable in this study. The main focus lies in the manufacturing companies, such as the Machinery, equipment, furniture, recycling and Wood, cork, paper industries.

Industry	*Count*
Chemicals, rubber, plastics, non-metallic products	82
Construction	54
Education, Health	9
Food, beverages, tobacco	72
Machinery, equipment, furniture, recycling	638
Metals & metal products	145
Other services	300
Primary sector	18
Publishing, printing	103
Textiles, wearing apparel, leather	45
Transport	39
Wholesale & retail trade	168
Wood, cork, paper	116

Table 3 Companies per industry

The different variables can be seen in Table 4. The number of observations in DSO, DPO, DIO, the net trade cycle and the cash conversion cycle differ from the rest because outlying, extreme, cases have been dismissed. Gross operating profit is given as a ratio where

Gross Operating Profit = (Sales – COGS + Depreciations & Amortizations) / (Total Assets – Financial assets).

The net operating profit is essentially the same as gross operating profit, bar the depreciations and amortizations. The financial debt ratio is financial assets divided by total assets. The fixed financial asset ratio describes how much a company has financial assets invested in long-lasting partnerships or subsidiaries, which cannot be seen as normal financial assets readily available as cash. The natural logarithm of sales rectifies the fact that the sales differ dramatically from company to company, making the numbers more comparable. Sales growth is defined as (current year's sales – previous year's sales) / previous year's sales.

	N	Minimum	Maximum	Mean	Std. Deviation
DSO	1784	0,00	470,00	56,88	34,07
DPO	1762	3,00	491,00	64,07	53,19
DIO	1773	0,00	498,26	93,10	73,61
NTC	1773	-290,32	499,25	76,49	53,96
CCC	1758	-469,48	478,76	84,71	89,16
Gross Operating Profitability	1789	-1,94	3,55	0,69	0,49
Net Operating Profitability	1789	-2,08	3,36	0,62	0,48
Financial Debt ratio	1789	0,00	0,44	0,07	0,06
Fixed Financial Asset Ratio	1789	0,00	0,82	0,01	0,05
Natural logarithm of sales	1789	2,83	18,18	12,52	2,23
Sales Growth	1586	-0,91	16,35	0,02	0,57

Table 4 Descriptive statistics of the whole sample

Another aspect that is of interest is how the cash conversion cycle and net trade cycle have changed throughout the time scale. In Figure 5, we can see the trends of the CCC, NTC and gross operating profit. As can be seen, there is a slight correlation between the working capital management metrics and gross operating profit. For example, in year 2004, when the average NTC and CCC dropped, gross operating profit improved dramatically. The effects of the financial crisis can be seen from year 2007 onward. Most likely causes in the increase of the cash conversion cycle is that it took longer for clients to pay their invoices and companies were left with high inventory levels due to lower sales. After the financial crisis, though, we can see a sharp drop in cash conversion cycles. This could be a result of either increased sales or better working capital management. If we consider that usually increased sales bind *more* capital into working capital (see section 2.6, NTC), we could make a very careful assumption that companies improved their working capital efficiency in search for liquidity after the financial turmoil.

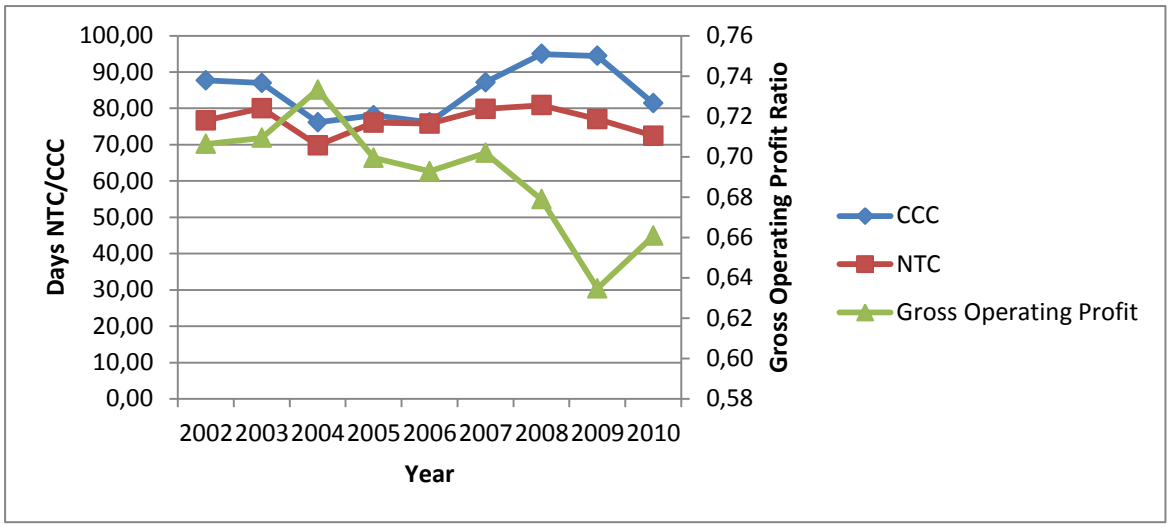

Figure 5 The average trend of CCC, NTC and Gross Operating Profit throughout the observed time

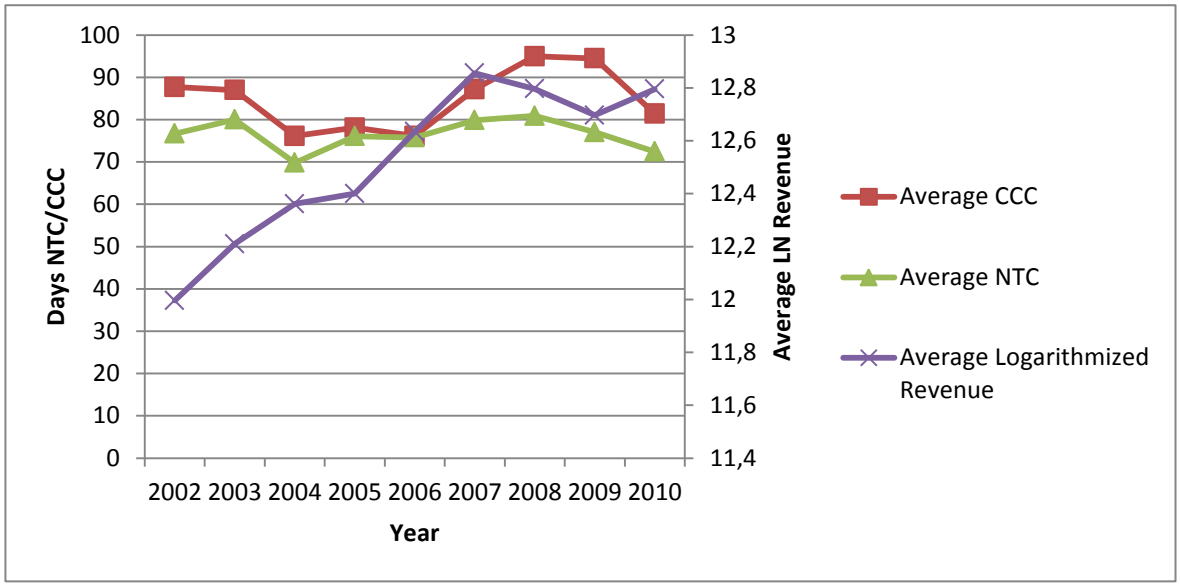

Figure 6 Average trend of CCC, NTC and revenue

Figure 6 shows the connection between revenue and working capital. The substantial differences in revenues have been standardized by using the natural logarithm and by thus making the figures more comparable. As can be seen before the financial crisis, the rise in sales also had a slight effect on working capital, as the NTC and CCC increased a bit. After the financial crisis, though, we can see an increase in sales but a decrease in CCC and NTC. This could mean that companies have started to search for liquidity by optimizing their working capital. This, however, has not been statistically tested and is merely a hypothesis for a future study.

4.4. Method

The method used in this thesis is purely quantitative. The data that was gathered was rendered into a panel set of company years, as used by Deloof (2003) and Shin and Soenen (1998). Panel data is a very effective way to study quantitative data as it allows for more "variation in the micro data to be used in constructing parameter estimates, as well as permitting the use of relatively simple econometric techniques" (Bond, 2002). In this case, as the data is constructed into a panel data set, we can control for industry and yearly effects on profitability. Also, we can use simple techniques such as correlation analyses and ordinary least squares regressions to test our hypotheses.

A study of the whole sample was made to test for statistical validity. Then, a study of correlations between the different variables was done. Lastly, an OLS (Ordinary Least Squares) regression was done to see how much working capital management affected profitability.

To make the study more feasible, the data had to be grouped. Firstly, the companies were split into 13 different industries. Secondly, each industry was split into quartiles using the gross operating profitability as a factor. SPSS Modeller was used to split the different industries into quartiles; the modeller automatically calculated the cut-points for each quartile by industry, and placed a dummy variable from 1 to 4 for each observation (1 being the lowest quartile and 4 being the highest). Note that this was done industry-wise to take into account industry-specific conditions for profitability. Thus, we can see the best and the worst performing companies per industry, and whether or not working capital management has an effect on profitability in that industry. Table 5 shows the different measures of NTC and CCC per quartile. As can be seen already, the lowest performing quartile has higher NTC and CCC figures than the highest performing quartile. The quartiles are *industry-specific* meaning that each industry has its own "highest quartile" and "lowest quartile". The average profitability for the whole sample was not used. The numbers below are aggregated results for each quartile.

Profitability Quartiles		*NTC*	*CCC*
Lowest 25% (Q1)	Mean	86,0520	89,3534
	N	430	427
25-50% (Q2)	Mean	74,1358	82,3761
	N	446	445
50-75% (Q3)	Mean	78,2191	89,3362
	N	445	443
Highest 25% (Q4)	Mean	68,0074	77,9652
	N	452	443

Table 5 NTC and CCC per quartiles

4.5. Chapter Summary

The purpose of this chapter was to lay out a foundation for the next chapter which will statistically test the research questions. The research questions are formulated in a manner that allows for holistic and robust results. The method used has been proven in several previous studies, such as Deloof (2003) and Shin & Soenen (1998). As can be seen from the descriptive statistics, the data gathered will hopefully give the research part a good foundation for statistically valid results. It can also been seen that there are clearly differences in working capital efficiency measures in different profitability quartiles. There is though still interest in whether the correlations are statistically valid, and how much working capital management in fact can affect profitability. Likewise, there is a need to study the correlations industry-wise, otherwise the results would not be generally usable.

5 RESEARCH RESULTS AND CONCLUSIONS

5.1. Introduction

The purpose of this chapter is to test the hypotheses defined in the last chapter. First, a test of statistical validity of the sample is made. Then, the sample is tested for differences between Finnish and Swedish companies. The study then continues to test for correlations in the whole sample and industry-wise. To find out the impact of working capital management on profitability, regression models have also been made. Lastly, a check for heteroscedasticity is made before drawing final conclusions.

5.2. Statistical validity

A test of means (independent samples t-test) was also performed to see if the data was statistically valid. The test shows that when testing the lowest and the highest quartiles against each other at 1 % significance, the NTC is significant while the CCC has a significance value of 0,075. These results show that the data is sufficiently valid to give a good starting point for further study of correlations and regressions. The results of the independent samples t-tests are also summarized in Appendix 1.

5.3. Differences between Finnish and Swedish companies

To test for differences between Finnish and Swedish companies working capital efficiency, an independent samples t-test has been done to test the means of different working capital metrics. These results are summarized in Table 6.

		Mean	*Std. Error Mean*	*t-test 2-tailed sig.*
CCC	FI	84,3090	3,74740	,872
	SE	85,0036	2,47213	,877
NTC	FI	76,5302	1,93394	,978
	SE	76,4586	1,70874	,978
Days Sales Outstanding	FI	56,18	1,449	,465
	SE	57,38	,922	,486
Days Payables Outstanding	FI	67,63	2,054	,018
	SE	61,53	1,598	,019
Days Inventory Outstanding	FI	96,2638	2,84763	,125
	SE	90,8281	2,19857	,131

Table 6 Test of means between Finnish and Swedish companies

As we can see from Table 6, the means of all the different components of working capital are not significantly different between Finland and Sweden on a 5 % significance level, except days payables outstanding. In section 5.5.2 this will be studied more in depth – Finnish companies tend to follow the optimal working capital strategy more than their Swedish counterparts. These results could be interpreted in a way that global economy has its pressure on both countries and significant efforts are being made to maximize shareholder value in both countries. These results show that the second hypothesis (H2) as defined in Chapter 4 cannot be fully supported.

5.4. Study of correlations

To study the correlation between working capital management and profitability, we need to take into account the industry in which the company operates. A company that operates in e.g. retail will have completely different working capital requirements than a company that works in manufacturing. Thus, the correlation analyses have been made industry-wise, with only the industries with a sufficient *n* and significance in the independent t-tests will be tested. Below, in Table 7, we can see the correlations between the variables for the lowest performing quartile (Q1) and the best performing quartile (Q4). The significant correlations are marked with an asterisk (*), with one asterisk meaning a correlation significant on the 0.05 level and two asterisks meaning that the correlation is significant on the 0.01 level.

As we can see from Table 7, both the cash conversion cycle and the net trade cycle are negatively correlated to gross operating profitability. We can already now draw cautious conclusions that a lower cash conversion cycle or net trade cycle will affect positively on a company's profitability. Further tests are though needed, as we need to take into account industry effects and a regression analysis to find out how much working capital management in fact has an effect on profitability compared to other factors. These results would indicate that the first hypothesis (H1) is true.

	Days Sales Outstanding	*Days Inventory Outstanding*	*Days Payables Outstanding*	*CCC*	*NTC*	*LN(Revenue)*	*Revenue Growth*	*Financial Debt Ratio*	*Fixed financial asset ratio*
Gross Operating Profitability	-,075*	-,076*	,233**	-,229**	-,206**	-,106**	,028	-,174**	-,057
Days Sales Outstanding		,190**	,289**	,260**	,554**	-,205**	-,086*	-,102**	-,062
Days Inventory Outstanding			,161**	,768**	,612**	-,092**	-,097**	-,080*	-,089**
Days Payables Outstanding				-,351**	-,001	-,221**	-,050	-,104**	,065
CCC					,715**	-,019	-,073*	-,036	-,130**
NTC						-,154**	-,159**	-,086*	-,085*
LN(Revenue)							-,045	,398**	,046
Revenue Growth								-,054	-,039
Financial Debt Ratio									,000

Table 7 Pearson correlations between each tested variable over whole sample

5.4.1. Correlations industry-wise

A correlation analysis of the variables must also be done industry-wise to find out how the industry affects the correlation of working capital management and profitability. For example retail industry is very different in terms of working capital to e.g. manufacturing industries. For this study, the chosen industries represent the ones with the most significant statistical values (independent t-tests) and the ones with the highest *n* value. The chosen industries are listed below, with descriptive statistics for each industry. Table 8 shows the different metrics according to profitability quartile, Q1 being the lowest and Q4 the highest.

	Average DSO		*Average DPO*		*Average DIO*		*Average CCC*		*Average NTC*	
Industry	**Q1**	**Q4**	**Q1**	**Q4**	**Q1**	**Q4**	**Q1**	**Q4**	**Q1**	**Q4**
1. Chemicals, rubber, plastics, non-metallic products	46,65	48,24	15031	50,62	122,34	146,07	89,82	143,68	18,49	80,02
5. Machinery, equipment, furniture, recycling	67,04	58,52	86,93	80,77	147,24	129,10	110,34	104,00	114,83	76,65
6. Metals & metal products	45,97	42,86	44,58	46,16	157,36	103,06	113,66	99,68	97,56	68,37
7. Other services	71,31	64,73	67,75	141,47	76,88	65,81	80,46	16,58	80,59	63,31
9. Publishing, printing	56,52	72,27	51,08	173,77	32,25	23,79	37,59	-27,08	48,57	64,67
12. Wholesale & retail trade	53,86	37,88	43,83	47,29	92,28	85,07	102,26	75,63	85,13	55,05
13. Wood, cork, paper	44,28	46,14	46,83	65,79	89,20	97,87	86,60	78,20	78,29	64,92

Table 8 Industry-wise averages (bottom and top quartiles)

The industry-wise Pearson correlations of the cash conversion cycle, net trade cycle and gross operating profit can be seen in whole in Appendix 2. The method used, is again, to compare the bottom and top profit quartiles with each other. Table 9 summarizes the results of the Pearson correlation tests for each parameter compared to gross operating profitability. Significant correlations are bolded.

As can be seen from Table 9, in most cases the cash conversion cycle and the net trade cycle has a significant, negative, correlation to gross operating profitability. This means that by lowering the cash conversion cycle or net trade cycle, the company can increase its gross operating profitability. Interestingly, the Chemicals, rubber, plastics and non-metallic products business has the direct opposite reaction than the other industries, with its higher DSO and DIO actually contributing to a better profit, while a higher DPO reduces profitability. This correlation directly conflicts with the theory that working capital management can increase company profitability. In this case, the results can depend on several different things. Firstly, it might be that the industry is extremely

profitable, meaning that the working capital does not impact its profitability as in other industries. A closer look at the control variables shows that this is not the case, as revenue growth and other variables are not significantly affecting gross operating profit. On the other hand, the industry itself might be of a character where not much working capital is bound in operations, and that it actually can make money of its working capital such as the airline industry (Hawawini;Viallet;& Vora, 1986). By looking at the data collected, we can see that the median net working capital ratio (working capital to revenue) is approximately 17,7% in this industry, while for the rest of the sample it is around 20%. This is not a major difference taking into account the standard deviation.

The most interesting group for this thesis, though, is industry 5: Machinery, equipment, furniture and recycling. This group has the highest number of observations and is also very capital intensive (Hawawini;Viallet;& Vora, 1986). As can be seen, the cash conversion cycle and, according to Shin and Soenen (1998) more importantly, the net trade cycle are negatively correlated to gross operating profit. We can also conclude from the statistical analysis that the CCC and NTC are the only significant variables that affect gross operating profitability, when taking into account the control variables chosen (see Appendix 2).

	Correlation to Gross Operating Profitability				
Industry	**DSO**	**DIO**	**DPO**	**CCC**	**NTC**
1. Chemicals, rubber, plastics, non-metallic products	0,071	**0,486**	**-0,401**	**0,608**	**0,516**
5. Machinery, equipment, furniture, recycling	**-0,138**	0,003	**0,185**	**-0,144**	**-0,356**
6. Metals & metal products	**-0,235**	**-0,299**	0,033	**-0,362**	**-0,513**
7. Other services	**-0,187**	-0,77	**0,247**	**-0,283**	**-0,211**
9. Publishing, printing	0,153	-0,272	**0,723**	**-0,726**	0,192
12. Wholesale & retail trade	**-0,397**	-0,098	-0,087	**-0,220**	**-0,317**
13. Wood, cork, paper	0,014	0,199	0,183	0,034	-0,174

Table 9 Industry-wise working capital management correlations to profitability

By now, the first hypothesis (H1) can be confirmed. It seems that working capital management has a significant effect on profitability, but it is more dramatic in others. Also, some industries such as the chemical industry seem to have a *positive* correlation. This is also somewhat supported by Hawawini et al (1986) study.

5.5. Regressions

In the previous section, we could see that working capital management does correlate with profitability. The question now is how much does it impact profitability and is it the working capital management solely that contributes to the increased profitability or can we find other variables that impact profitability? The method used in this section is an OLS regression. The whole sample is now used and no longer is split into four different profitability quartiles.

To begin with, I have studied the regressions of the whole sample with the net trade cycle in mind. As control variables, I have chosen the natural logarithm of sales, revenue growth, current ratio and financial debt ratio. The model also includes dummy variables for the chosen 7 industries and for all 9 years. The dummy variables should make my model robust, as industry and yearly effects are accounted for. The regression model can be defined as:

$$\begin{aligned} Profitability = {} & b_0 + b_1(NTC) + b_2\big(Ln(rev)\big) + b_3(RevGrowth) + b_4(CR) \\ & + b_5(FinDebt) + b_6(ID1) + b_7(ID5) + b_8(ID6) + b_9(ID7) \\ & + b_{10}(ID9) + b_{11}(ID12) + b_{12}(ID13) + b_{13}(YD02) + b_{14}(YD03) \\ & + b_{15}(YD04) + b_{16}(YD05) + b_{17}(YD06) + b_{18}(YD07) + b_{19}(YD08) \\ & + b_{20}(YD09) + b_{21}(YD10) \end{aligned}$$

The regression model constitutes of five independent variables and 16 dummy variables. The independent variables are the net trade cycle (NTC) divided by 100, the natural logarithm of revenue (Ln(rev)), the revenue growth (RevGrowth), the current ratio (CR) and the financial debt ratio (FinDebt). The dummy variables are the seven industries with the most observations (labelled ID1-ID13) and the years the data was gathered from (labelled YD02-YD10).

The model now accounts for different industry effects on the whole sample's average profitability, as the industries with most observations are in the regression model. Also, yearly economic variances (e.g. the financial crisis of the late 2000's) are taken into account in the model.

The results of the linear regression model can be seen in Table 10. The model itself has an R value of 0,435 and an R^2 value of 0,190, which signals that this model is able to

explain sufficiently the effect of the chosen variables on profitability. Even though the model could have been more significant, a 0.19 R^2 value is good compared to previous studies in the area.

	Unstandardized Coefficients	*Standardized Coefficients*	*Sig.*
	B	**Beta**	
Constant	,824		,000
NTC (/100)	-,119	-,135	,000
LN(Revenue)	-,009	-,039	,155
Revenue Growth	,011	,012	,599
Current ratio	,019	,066	,010
Financial Debt Ratio	-,820	-,105	,000
IndDum1	-,051	-,022	,403
IndDum5	,065	,064	,081
IndDum6	-,072	-,040	,150
IndDum7	,251	,192	,000
IndDum9	,620	,295	,000
IndDum12	,193	,115	,000
IndDum13	-,133	-,068	,013
YearDum02	-,118	-,065	,020
YearDum03	-,010	-,007	,829
YearDum05	-,007	-,005	,869
YearDum06	-,016	-,011	,710
YearDum07	,005	,003	,913
YearDum08	-,011	-,008	,802
YearDum09	-,054	-,036	,230
YearDum10	,030	,013	,610

Table 10 Results of linear regression over whole sample (NTC)

As can be seen from Table 10, the net trade cycle has a significant negative effect on profitability. Along with the financial debt ratio, it has the largest significance to profitability. We can also see a major industry effect on the average sample profitability, where industries 7 and 9 (Other Services and Publishing & Printing) have a significant positive effect on sample profitability and industry 13 (Wood, cork, paper) a negative impact.

It has to be born in mind though, that the unstandardized coefficients have major variance differences even though the natural logarithm was used on revenue and the net trade cycle was divided by 100. Thus, if we have a look at the standardized coefficients, we can see an even larger significance on the net trade cycle's effect on profitability according to the model.

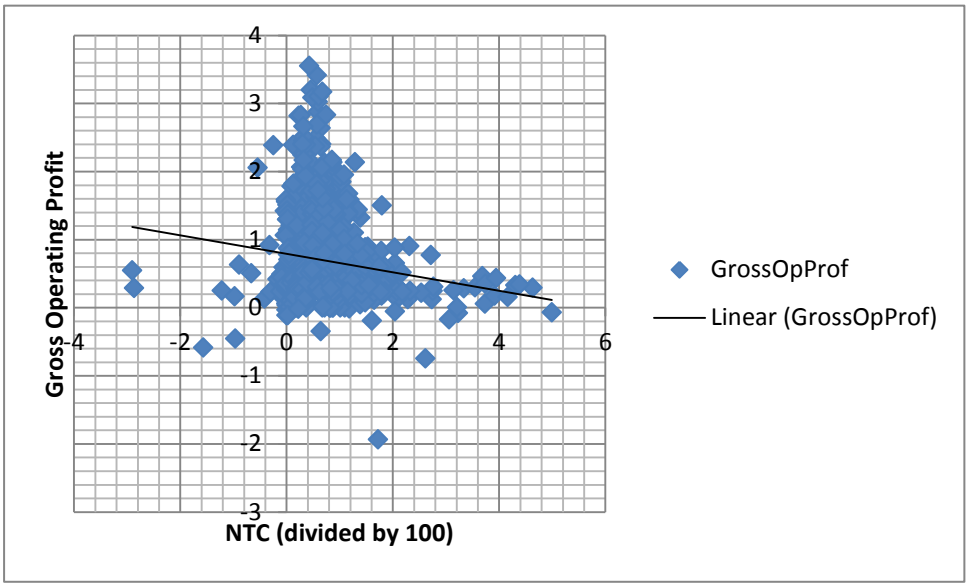

Figure 7 Linear correlation between Gross Operating Profitability and Net Trade Cycle

Figure 7 shows the linear correlation between the gross operating profit and the net trade cycle graphically. As can be seen, the higher the net trade cycle is, the lower the gross operating profitability tends to be.

In my second model, I study the cash conversion cycles effect on company profitability. The other independent variables stay the same. The regression model thus is:

$$\begin{aligned} Profitability = b_0 + b_1(CCC) + b_2\big(Ln(rev)\big) + b_3(RevGrowth) + b_4(CR) \\ + b_5(FinDebt) + b_6(ID1) + b_7(ID5) + b_8(ID6) + b_9(ID7) \\ + b_{10}(ID9) + b_{11}(ID12) + b_{12}(ID13) + b_{13}(YD02) + b_{14}(YD03) \\ + b_{15}(YD04) + b_{16}(YD05) + b_{17}(YD06) + b_{18}(YD07) + b_{19}(YD08) \\ + b_{20}(YD09) + b_{21}(YD10) \end{aligned}$$

The results of the cash conversion cycle regression can be seen in Table 11. As with the net trade cycle, the cash conversion cycle has been divided by 100 to standardize the variable for the model.

	Unstandardized Coefficients	*Standardized Coefficients*	*Sig.*
	B	**Beta**	
Constant (Gross Op Prof)	,776		,000
CCC (/100)	-,069	-,128	,000
LN(Revenue)	-,006	-,030	,283
Revenue Growth	,017	,020	,385
Current ratio	,018	,064	,012
Financial Debt Ratio	-,808	-,103	,000
IndDum1	-,024	-,010	,697
IndDum5	,057	,055	,127
IndDum6	-,075	-,042	,131
IndDum7	,229	,175	,000
IndDum9	,579	,276	,000
IndDum12	,199	,119	,000
IndDum13	-,140	-,071	,009
YearDum02	-,119	-,066	,019
YearDum03	-,014	-,010	,747
YearDum05	-,012	-,008	,789
YearDum06	-,024	-,016	,582
YearDum07	-,002	-,001	,971
YearDum08	-,012	-,008	,781
YearDum09	-,050	-,033	,264
YearDum10	,023	,010	,696

Table 11 Results of linear regression on whole sample (CCC)

Though the difference is more subtle, we can still see a significant effect of the cash conversion cycle on profitability. The unstandardized B value is -0,069 while the standardized beta value is -0,128. As the variables differ somewhat from each other, the standardized coefficients might give us a more realistic view of how the different variables affect company profitability. The model has an R value of 0,433 and an R^2 value of 0,187, making the model slightly less reliable than the previous one.

These models give a general indication on how the different chosen variables affect profitability. They don't however take into account how much working capital management can affect profitability *within* an industry. Next, the effects of net working capital and the cash conversion cycle will be studied industry-wise.

5.5.1. Industry-wise regressions

In this section, industry-wise effects of working capital management will be studied through linear regressions. The regression model slightly differs from the one used for the whole sample, as the industry dummy variables no longer add any value to the model. Thus the new model can be defined as:

$$Profitability = b_0 + b_1(NTC) + b_2\big(Ln(rev)\big) + b_3(RevGrowth) + b_4(CR) + b_5(FinDebt) + b_6(YD02) + b_7(YD03) + b_8(YD04) + b_9(YD05) + b_{10}(YD06) + b_{11}(YD07) + b_{12}(YD08) + b_{13}(YD09) + b_{14}(YD10)$$

	Adjusted NTC		*Current ratio*		*FinDebtRat*		*LNRev*		*RevGrowth*	
Row Labels	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**
Chemicals, rubber, plastics, non-metallic products	0,310	0,097	-0,022	0,905	-0,090	0,563	0,116	0,549	0,035	0,797
Machinery, equipment, furniture, recycling	-0,276	0,000	-0,093	0,042	-0,067	0,137	-0,148	0,002	-0,004	0,921
Metals & metal products	-0,245	0,004	0,445	0,000	-0,182	0,024	-0,076	0,422	0,143	0,063
Other services	-0,148	0,026	0,121	0,074	-0,053	0,428	0,000	0,994	0,034	0,596
Publishing, printing	0,011	0,902	0,595	0,000	-0,085	0,332	-0,171	0,088	0,090	0,368
Wholesale & retail trade	-0,543	0,000	0,660	0,000	-0,059	0,423	0,037	0,625	-0,027	0,721
Wood, cork, paper	-0,030	0,822	-0,179	0,182	-0,204	0,121	0,163	0,242	-0,109	0,350

Table 12 Industry-wise linear regressions (NTC)

In Table 12, we can see the results of the industry-wise regressions. The dummy variables have been left out in this table, but the complete test results can be found in Appendix 3. Surprisingly, in the Wood, cork and paper industry, which could be seen as very working capital intensive, the NTC does not affect profitability very significantly. On the other hand, we can see that in wholesale and retail trade there is a significant effect of the net trade cycle on profitability. Other industries where the effect is significant are the Machinery and Metal industries. In many industries the effect of financial leverage can be seen a significant factor contributing negatively to gross operating profitability.

Table 13 shows the industry-wise regressions using the cash conversion cycle as a measure for working capital management efficiency. The OLS regression model is the same as above, with NTC changed for CCC. The table shows that the cash conversion cycle also has a significant impact on corporate profitability, with the largest impact on wholesale and retail. Also the machinery and metal businesses have a significant negative correlation between the cash conversion cycle and profitability.

	Adjusted CCC		*Current ratio*		*FinDebtRat*		*LNRev*		*RevGrowth*	
Industry	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**
Chemicals, rubber, plastics, non-metallic products	0,393	0,003	-0,109	0,501	-0,067	0,651	0,144	0,402	0,037	0,775
Machinery, equipment, furniture, recycling	-0,101	0,017	-0,127	0,007	-0,063	0,175	-0,119	0,016	0,024	0,574
Metals & metal products	-0,133	0,088	0,426	0,000	-0,183	0,028	-0,162	0,073	0,160	0,042
Other services	-0,216	0,001	0,094	0,145	-0,035	0,595	0,020	0,758	0,047	0,463
Publishing, printing	-0,293	0,001	0,571	0,000	0,049	0,588	-0,135	0,136	0,097	0,294
Wholesale & retail trade	-0,415	0,000	0,603	0,000	-0,099	0,211	0,082	0,307	-0,005	0,948
Wood, cork, paper	0,176	0,165	-0,268	0,039	-0,257	0,046	0,255	0,061	-0,079	0,491

Table 13 Industry-wise linear regressions (CCC)

We can conclude in this part that the industry in which the company is active has a significant effect on working capital management and its effect on profitability. We can thus confirm the third hypothesis (H3) that working capital management is industry specific.

5.5.2. Variable-wise regressions

After studying the effect of the net trade cycle and the cash conversion cycle on corporate profitability, the question arises that how the different components of these variables affect profitability. In this section, the days sales outstanding (DSO), days inventory outstanding (DIO) and days payables outstanding (DPO) will be studied using similar models as in the previous parts. For this model, the industry dummy variables will be added to account for industry effects on the total average profitability. The model can be defined as:

$$\begin{aligned} Profitability = {} & b_0 + b_1(DXO) + b_2\big(Ln(rev)\big) + b_3(RevGrowth) + b_4(CR) \\ & + b_5(FinDebt) + b_6(ID1) + b_7(ID5) + b_8(ID6) + b_9(ID7) \\ & + b_{10}(ID9) + b_{11}(ID12) + b_{12}(ID13) + b_{13}(YD02) + b_{14}(YD03) \\ & + b_{15}(YD04) + b_{16}(YD05) + b_{17}(YD06) + b_{18}(YD07) + b_{19}(YD08) \\ & + b_{20}(YD09) + b_{21}(YD10) \end{aligned}$$

where DXO stands for the variable studied (either DSO, DIO or DPO). The same yearly dummy variables that were used in the previous models are also included to test for yearly changes such as economic down- and upturns.

	Unstandardized Coefficients	*Standardized Coefficients*	*Sig.*
	B	Beta	
Dependent	,846		,000
DSO (/100)	-,143	-,101	,000
LNRev	-,007	-,031	,275
RevGrowth	,020	,023	,315
Current ratio	,019	,065	,011
FinDebtRat	-,763	-,098	,000

Table 14 Linear regression: Effect of DSO on profitability

Table 14 shows the results of the regression of DSO on profitability. DSO has been divided by 100 to standardize the coefficients. As can be seen from the table, DSO has a significant negative correlation with profitability. This means that by reducing the days credit that is given to customers, a company can increase their profitability. This, though, is very industry specific as can be seen from the full results in Appendix 4. Yearly variations have little or no effect in the model. The R value of the model is 0,443 and the R^2 value is 0,196, making the model fairly reliable.

	Unstandardized Coefficients	*Standardized Coefficients*	*Sig.*
	B	Beta	
Dependent	,752		,000
DIO (/100)	-,004	-,006	,803
LNRev	-,006	-,026	,371
RevGrowth	,025	,029	,220
Current ratio	,016	,057	,029
FinDebtRat	-,739	-,095	,000

Table 15 Linear regression: Effect of DIO on profitability

In Table 15 we can see the effect of DIO on profitability. Very surprisingly, the days inventory outstanding does not seem to have a significant effect on corporate profitability. This might be due to the fact that the sample consists of several different industries, and several of those industries do not invest heavily on inventory. If we look at the dummy variables, we can see that the industry dummy variables have a very significant effect on the dependent variable (see Appendix 4). Thus, further tests need to be done to see in which industries the days inventory outstanding actually has an effect on profitability.

	Adjusted DIO		*Current ratio*		*FinDebtRat*		*LNRev*		*RevGrowth*	
Industry	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**
Chemicals, rubber, plastics, non-metallic products	0,308	0,017	-0,116	0,486	-0,107	0,479	0,208	0,233	0,041	0,763
Machinery, equipment, furniture, recycling	-0,049	0,255	-0,126	0,008	-0,060	0,200	-0,124	0,014	0,031	0,464
Metals & metal products	-0,047	0,536	0,418	0,000	-0,168	0,045	-0,206	0,020	0,174	0,029
Other services	-0,072	0,258	0,081	0,214	-0,053	0,427	0,016	0,809	0,044	0,494
Publishing, printing	0,043	0,618	0,603	0,000	-0,092	0,300	-0,174	0,070	0,102	0,315
Wholesale & retail trade	-0,220	0,009	0,477	0,000	-0,106	0,208	0,109	0,196	-0,011	0,900
Wood, cork, paper	0,247	0,025	-0,235	0,045	-0,272	0,031	0,262	0,040	-0,050	0,661

Table 16 Linear regression: Industry-wise effect of DIO on profitability

In Table 16 we can see the summarized results of an industry-wise regression of DIO on profitability. As can be seen, the only significant effect can be noticed in the wholesale and retail industry. In the capital intensive industries of machinery and wood, though, the DIO does not seem to have a significant effect on profitability, or the correlation is positive.

Table 17 shows the results of the effects of days payables outstanding on profitability. As can be seen, the DPO correlates positively with profitability, meaning that by prolonging the time in what suppliers are paid, a company can increase its profitability. The model itself is fairly reliable with an R value of 0,445 and an R^2 value of 0,185.

	Unstandardized Coefficients	*Standardized Coefficients*	*Sig.*
	B	Beta	
Dependent	,632		,000
DPO (/100)	,101	,112	,000
LNRev	-,002	-,010	,724
RevGrowth	,028	,032	,167
Current ratio	,017	,059	,022
FinDebtRat	-,670	-,086	,001

Table 17 Linear regression: Effect of DPO on profitability

The hypothesis put out by e.g. Deloof (2003), though, is that more profitable companies will have a *shorter* DPO, even though the theory of working capital management would suggest otherwise. To test this, the regression is done by quartiles, with the first quartile including 25% of the poorest performing companies per industry and the last quartile including the best performing 25%. The results of the test can be seen in Table 18.

	Adjusted DPO		*Current ratio*		*FinDebtRat*		*LNRev*		*RevGrowth*	
Quartiles	**B**	**Beta**	**B**	**Beta**	**B**	**Beta**	**B**	**Beta**	**B**	**Beta**
Lowest 25%	0,012	0,019	-0,002	0,004	-0,094	0,140	0,021	0,004	0,011	0,009
25-50%	0,003	0,008	-0,010	0,005	0,117	0,067	-0,006	0,002	0,014	0,012
50-75%	0,000	0,011	-0,010	0,005	-0,097	0,088	-0,013	0,003	-0,030	0,017
Highest 25%	0,122	0,031	0,038	0,012	-0,029	0,432	0,013	0,012	0,054	0,048

Table 18 Linear regression: Effect of DPO on profitability by profitability quartiles

The results show that there is no evidence to support the hypothesis (H4). The effect of the DPO is clearly larger on more profitable companies than on less profitable. Also, the independent samples t-test shows that the lowest performing quartile has a mean of 58.46 days payable while the highest performing quartile has a mean of 71.20 days payables. The two-tailed significance of this test is 0,001 which means that the test is significant within a 99% confidence interval. This supports the traditional theory of working capital management where more profitable companies delay their payables as much as possible to increase the net present value of their cash flows.

5.5.3. Test for heteroscedasticity

A test for heteroscedasticity is made to test for variances in residuals in the model used. It should be remembered, though, that heteroscedasticity does not result in biased parameter estimates, but merely the standard error of estimate might be skewed. Previous studies such as Deloof (2003) and Shin & Soenen (1998) have used White's test for heteroscedasticity. In this study I will merely check for heteroscedasticity with visual comparisons.

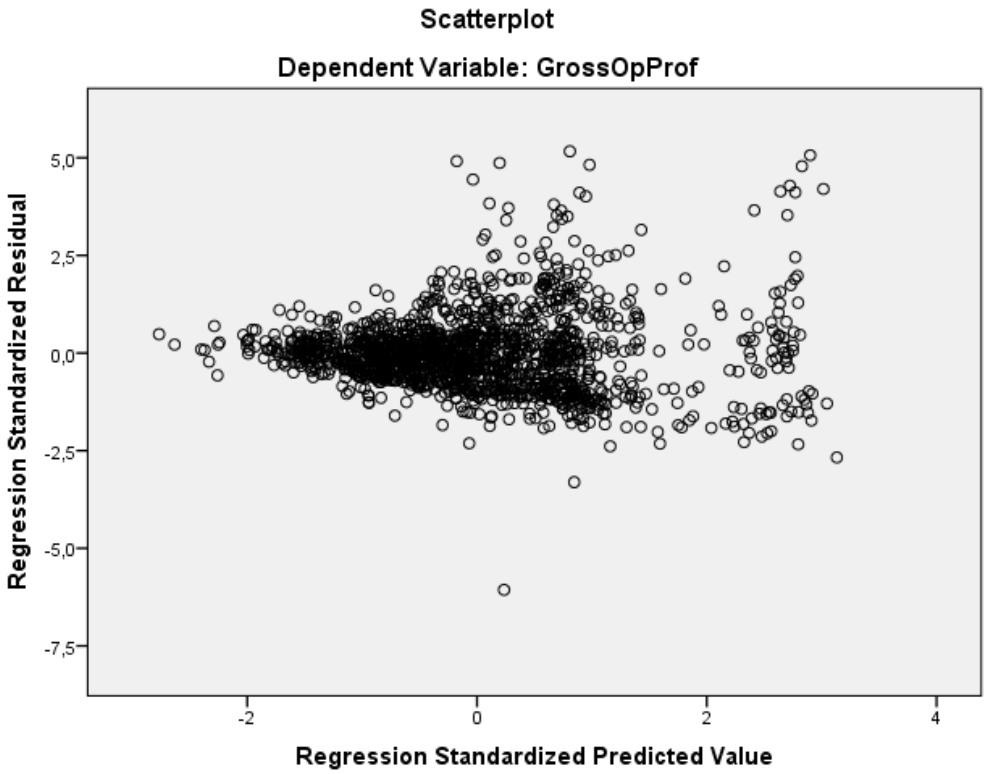

Figure 8 Heteroscedasticity in the whole sample regression model (NTC)

We can see from Figure 8 that there is some heteroscedasticity observed in the regression analysis. The heteroscedasticity scatter shows a clear scatter plot and this means that the standard deviations of the residuals are not reliable. But, it should be noted, as can be stated by Fox (1997) "unequal error variance is worth correcting only when the problem is severe". Thus, we can conclude that even though some heteroscedasticity is apparent, the models still represent a realistic view of working capital management effect on profitability. The heteroscedasticity in the other models are similar to the ones shown in Figure 8.

5.6. Conclusions

The tests performed give a statistically significant conclusion that working capital management does in fact affect corporate profitability (H1). The correlation between the net trade cycle and profitability is clearly negative, as it is with the cash conversion cycle and profitability. The independent t-tests show that our data is statistically valid, and the correlations between the different variables are along the lines of the hypotheses laid out in the first part of the chapter. The second hypothesis (H2) is not supported by my study, as Finnish and Swedish companies do not statistically differ in terms of working capital management.

The industry-wise correlations (H3) are also interesting, somewhat because we can see that the correlation is *positive* in some industries. This would mean that by prolonging the net trade cycle and the cash conversion cycle, companies in the selected industries could actually improve profitability. This, however, would need further studies to actually conclude that the working capital is increasing profitability in those industries. Otherwise, the industries which are very working capital intensive such as retail, machinery and wood products seem to have a negative correlation between the working capital management efficiency variables and profitability. This leads to the conclusion that many companies can substantially increase profitability by effectively managing their working capital, such as accounts receivable, inventories and accounts payables. By analysing each component of working capital (DSO, DIO and DPO) separately, we can see that in Finnish and Swedish companies DSO and DPO seem to have the largest effect on corporate profitability. It cannot, however, be completely disregarded that industry differences are very significant, and in some industries DIO plays a big part in working capital management. The fourth hypothesis (H4), that more profitable companies will have a shorter DPO than less profitable, is not supported by this study.

6 DISCUSSION

6.1. Main results from research

The purpose of this study was to find out whether or not effective working capital management can improve corporate profitability in Finnish and Swedish companies. The study was also made industry-wise to find out which industries are most affected by differences in working capital. The results show that there is a significant effect of working capital management on corporate profitability. The net trade cycle and the cash conversion cycle were used as determinants of working capital management efficiency and gross operating profitability as the profitability variable. The results also yield that there are major differences from industry to industry in terms of working capital. A careful conclusion could be made that some industries can use their investment in working capital to actually increase profitability. In most industries, though, such as machinery, retail and wood products, the correlation between the NTC and CCC to profitability is negative. This would indicate that Finnish and Swedish corporations in these industries could significantly increase profitability by more effectively managing their working capital.

The study also tested for differences between working capital levels of Finnish and Swedish companies. According to the data, there seems to be no statistically significant differences in working capital levels in Finnish and Swedish companies.

Compared to prior research my findings are along the lines of Deloof (2003), Shin & Soenen (1998) and Lazaridis & Tryfonidis (2006). Differences were also found. For example, Deloof (2003) finds that more profitable companies have a shorter days payable outstanding than less profitable. My study concludes the complete opposite; which is along the lines of the theory of working capital management. The previous studies have not made a significant contribution to industry-wise correlations in working capital management which my study has made. Also, I have specifically chosen publically listed companies to ensure that the companies chosen have an effective ownership structure which encourages companies to improve effectiveness of their operations.

6.2. Restrictions

Although I have tried to take into account as many variables as possible in my research, the results are restricted. The sample size only encompassed publically listed companies, which means that they are more under scrutiny from their owners than non-listed companies. This leads to the fact that listed companies might try to improve efficiency to match investor expectations on corporate value. Non-listed companies might behave differently because of more slack corporate ownership.

Also, some variables that affect profitability have been excluded. As can be seen from the regression models, the profitability is not completely defined by the chosen variables. We cannot thus rule out the possibility that some other metrics or drivers affect profitability to a much larger extent which would minimize the effect of working capital management on profitability. Even the heteroscedasticity in the regression model has an effect on the standard error of residuals, making the standard errors somewhat unreliable.

6.3. Suggestions on continued research

There are several different research areas that were identified during the making of this study. One research area is to focus on the financing of working capital and how corporations can optimize the capital mix to ensure maximal liquidity. Optimal financing of working capital could improve liquidity and also reduce potential financial risk exposures and effectively decrease a company's interest liabilities and make it easier to find financing.

One aspect that was not studied in this thesis that would be of interest is to study non-listed companies, such as family-owned companies, that might not have as great pressure on maximizing their share value. These companies might have much more room for working capital management effectiveness which could easily lead to greater profitability and liquidity. Also, a more detailed study in some of the industries mentioned in this thesis could add value, because of the industry-specific nature of working capital. Industries that might be of interest are capital intensive industries such as manufacturing, machinery and forestry, or inventory and transaction heavy industries such as retail and wholesale.

SVENSK SAMMANFATTNING

Inledning

Avsikten av denna avhandling är att studera rörelsekapitalets påverkan på företagets lönsamhet. Att studera rörelsekapitalet är aktuellt i och med den finansiella krisen som började i slutet av 2000-talet och satt tryck på företag att hållas likvida. Forskningsfrågan är dock att kan en effektiv rörelsekapitalsförvaltning öka lönsamheten i ett företag, inte bara likviditeten?

Rörelsekapitalbinding är ett bransch specifikt mått. Att bara minska på rörelsekapitalet är inte ett svar för många företag, eftersom rörelsekapital behövs för t.ex. försäljningsflexibilitet. Genom att öka kredittider för kunder, kan företaget nå konkurrensfördelar, men däremot förlorar de på rörelsekapitalsbindningen. Vissa företag kan använda höga inventarienivåer för att uppnå kundtillfredställelse, men detta kostar också i och med lagerbindning. Denna avhandling kommer att ta i beaktande det bransch specifika aspekten av rörelsekapitalbindning.

Avhandlingen presenterar hur rörelsekapitalet och nettorörelsekapitalet tas upp i balansräkningen. Även finansiering av rörelsekapitalet behandlas. Rörelsekapitalet kan finansieras med någondera kortfristig eller långfristig finansiering.

Syfte

Syftet med avhandlingen är att forska ifall det finns en korrelation mellan effektiv rörelsekapitalshantering och företagets lönsamhet. Det här görs mellan finska och svenska företag och även differenser mellan branscher testas. De olika delarna av rörelsekapitalseffektivitetsmåtten testas skilt för sig.

Rörelsekapital och olika mått

Rörelsekapital kan delas grovt in i två delar. Ena delen är bruttorörelsekapital och andra nettorörelsekapital. Bruttorörelsekapitalet är investeringen som företaget måste göra i sina kortfristiga tillgångar, det vill säga kundfodringar, inventarier och finansiella tillgångar. Nettorörelsekapitalet beaktar de kortfristiga skulderna, dvs. leverantörsskulder och andra kortfristiga lån. Dessa subtraheras från bruttorörelsekapitalet för att få nettorörelsekapitalet.

Ett företag kan minimera investeringen i rörelsekapital genom att driva in kundfodringar snabbare, minska på inventarier genom t.ex. Just-in-Time (JIT) –system eller genom att förlänga betalningen på sina leverantörsskulder.

Det finns ett antal olika mått för att mäta effektiviteten av rörelsekapital. Till dessa hör bland annat omloppshastigheten av kundfodringar (DSO), inventarier (DIO) och betalningar (DPO). Ett centralt begrepp är den s.k. *cash conversion cycle*, fritt översatt kassaflödescykeln. Den mäter hur länge det tar för ett företag från att köpa råvaror till att få kapital in i kassan. Även *net trade cycle* (fritt översatt nettohandelscykeln) är ett bra sätt att mäta effektiviteten av rörelsekapitalet.

En minskining i rörelsekapitalet borde öka på lönsamheten eftersom balansen blir mindre samt nuvärdet av kassaflöden blir större. Då ett företag maximerar sin likviditet genom att inte binda kapital i rörelsekapital, kan de använda kapitalet till mera nyttiga investeringar. Samtidigt behöver inte företaget ta upp så mycket i balansen vilket förbättrar flera nyckeltal.

Tidigare forskning inom ämnet

Den tidigare forskningen har koncentrerat sig på att mäta hur kassaflödescykeln och andra mått för rörelsekapital påverkar företagets likviditet och lönsamhet. Dessa studier har gjorts bland annat av Deloof (2003) som testade kassaflödescykelns påverkan på lönsamhet bland belgiska företag. Han fann att kassaflödescykeln har en signifikant negativ korrelation med lönsamhet. Deloof påpekar dock att mer lönsamma företag har *kortare* betalningstider (DPO) än mindre lönsamma, som strider mot teorin om effektiv rörelsekapitalshantering.

Shin & Soenen (1998) studerade ifall nettohandelscykeln (net trade cycle, NTC) har en påverkan på lönsamhet bland amerikanska företag. De fann att det finns en signifikant negativ korrelation mellan NTC och lönsamhet. De testade även för branschmässiga skillnader, och kom fram med att branschen spelar en stor roll för rörelsekapitalet.

Hawawini et al (1986) studerade branschmässiga skillnader i rörelsekapitalbindning. De fann att i vissa branscher kan rörelsekapitalbinding till och med öka lönsamhet, fastän teorin för röreslekapitalsbindning skulle visa motsatsen. De fann även att det finns

”branschkluster” där rörelsekapitalsbindningen är liknande, och kan hanteras på liknande sätt.

Forskning

Denna avhandling baserar sig på tidigare forskning där rörelsekapitalets påverkan på lönsamhet studeras. Forskningen baserar sig på att se hur rörelsekapitalet påverkar lönsamheten hos börslistade företag i Finland och Sverige. Bransch- och årsspecifika skillnader har beaktats med dummyvariabler. Denna studie studerar även påverkan av rörelsekapitalet på lönsamheten per bransch.

Första forskningsfrågan är om huruvida rörelsekapitals effektiviteten påverkar resultatet. Den andra forskningsfrågan är att det finns en skillnad mellan finska och svenska företags rörelsekapitaleffektivitet. Den tredje forskningsfrågan är att rörelsekapitalbidning och dess effekt på lönsamhet är branschspecifikt. Den fjärde, och sista, forskningsfrågan är taget från Deloof (2003) och frågar ifall mer lönsamma företag har *de facto* kortare betalningstider än mindre lönsamma.

Data är samlat ur Obis-databasen för åren 2002-2010. Metoden var att först testa data med t-test för att testa för statistisk signifikans. Sedan testades korrelationer mellan olika rörelsekapitalsmått och lönsamhet. Till sist gjordes regressionsanalyser för att se hur mycket de olika måtten påverkar lönsamheten. Även heteroskedasticitet i regressionen testas grafiskt för att validera regressionsmodellen.

Resultat

Resultatet av studien är att net trade cycle och cash conversion cycle påverkar signifikant lönsamheten med en negativ korrelation. I vissa brancher, så som i kemikaliebranschen, finns det dock antydningar på att en *förlängning* av net trade cycle skulle öka lönsamheten. I största delen av branscher, så som maskinbranschen, finns det klar negativ korrelation mellan cash conversion cycle och net trade cycle gentemot lönsamheten. Dessa resultat ger konkret bevis på att företag kan maximera sitt resultat och maximera aktieägarnas värde genom att minimera rörelsekapitalet och effektivera omloppshastigheten.

Den andra hypotesen, det vill säga att det finns skillnader mellan finska och svenska företags rörelsekapitaleffektivitet, stödes inte av studien. Det finns inga signifikanta

skillnader mellan effektivitetsmåtten mellan finska och svenska företag. Däremot den tredje hypotesen stöds av forskningen, eftersom det finns klara branschmässiga skillnader i omploppshastigheterna och deras påverkan på företagets lönsamhet. Den fjärde hypotesen, som Deloof (2003) lade ut, stöds inte av studien. Forskningen påvisar att de lönsamma finska och svenska företagen förlänger sina betalningar för att uppnå mindre bindning i nettorörelsekapital.

Slutsatser samt diskussion

Avhandlingen påvisar hur rörelsekapitalet är en viktig del då företag försöker maximera likviditet samt lönsamhet. Branschmässiga skillnader har beaktats, och vi kan se hur mycket de olika rörelsekapitalseffektivetsmåtten påverkar företagets resultat.

Avhandlingens resultat är i samma linje med tidigare forskning. Genom att effektivera kassaflödescykeln och nettohandelscykeln kan flesta företag signifikant förbättra lönsamhet. Däremot Deloofs (2003) fynd att lönsamma företag skulle ha kortare betalningstider (DPO) stödes inte av studien.

Vi måste dock komma ihåg att studien inte är heltäckande och innehåller bara listade företag. Det här kan betyda att dessa företag har en stor satsning på optimering av processer och rörelsekapital på grund av investerarnas krav. Ett intressant ämne att studera är att studera företag som inte är börslistade. Då skulle man även kunna se ifall det finns rum för optimering av rörelsekapitalet.

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APPENDIX 1

Independent Samples Test

Results for independent samples t-test. The lowest and highest quartiles were compared to each other.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	99% Confidence Interval of the Difference	
									Lower	Upper
NTC	Equal variances assumed	78,181	,000	4,757	880	,000	18,04465	3,79291	8,25354	27,83577
	Equal variances not assumed			4,676	573,852	,000	18,04465	3,85907	8,07119	28,01812
CCC	Equal variances assumed	2,272	,132	1,780	868	,075	11,38818	6,39912	-5,13119	27,90755
	Equal variances not assumed			1,782	866,317	,075	11,38818	6,38961	-5,10670	27,88306

APPENDIX 2

Industry-wise Pearson Correlations

Industry correlation tables for the chosen industries (see 5.4.1 for list of chosen industries). CCC stands for Cash Conversion Cycle, NTC for Net Trade Cycle, LNRev for the natural logarithm of sales, RevGrowth for the annual revenue growth, FinDebtRat for the financial debt ratio and FixFinAssRat for the ratio of fixed financial assets (long-term investments in associated companies)

1. Chemicals, rubber, plastics, non-metallic products

	Days Sales Outstanding	Days Inventory Outstanding	Days Payables Outstanding	CCC	NTC	LNRev	RevGrowth	FinDebtRat	FixFinAssRat
GrossOpProf	,071	,486**	-,401*	,608**	,516**	,375*	-,027	,155	-,146
Days Sales Outstanding		,084	,554**	,520**	,368*	,014	-,279	,090	,160
Days Inventory Outstanding			,303	,945**	,677**	,487**	-,236	,542**	-,330*
Days Payables Outstanding				,044	,106	,312	-,299	,388*	,109
CCC					,826**	,232	-,111	,313	,147
NTC						,765**	-,360*	,571**	-,492**
LNRev							-,267	,705**	-,521**
RevGrowth								-,419*	,054
FinDebtRat									-,344*

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

5. Machinery, equipment, furniture, recycling

	Days Sales Outstanding	Days Inventory Outstanding	Days Payables Outstanding	CCC	NTC	LNRev	RevGrowth	FinDebtRat	FixFinAssRat
GrossOpProf	-,138*	,003	,185**	-,144*	-,356**	-,056	,040	-,065	-,037
Days Sales Outstanding		,304**	,189**	,357**	,571**	-,115*	-,065	-,083	,085
Days Inventory Outstanding			,330**	,741**	,604**	-,197**	-,100	-,077	-,024
Days Payables Outstanding				-,200**	-,008	-,236**	,000	-,088	,027
CCC					,737**	-,055	-,123*	-,018	-,031
NTC						-,230**	-,164**	-,085	-,010
LNRev							-,049	,358**	-,033
RevGrowth								-,073	-,041
FinDebtRat									-,022

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

6. Metals & metal products

	Days Sales Outstanding	Days Inventory Outstanding	Days Payables Outstanding	CCC	NTC	LNRev	RevGrowth	FinDebtRat	FixFinAssRat
GrossOpProf	-,235*	-,299*	,033	-,362**	-,513**	-,442**	,173	-,419**	-,060
Days Sales Outstanding		,466**	-,253*	,712**	,828**	,305**	-,162	,172	,145
Days Inventory Outstanding			,169	,888**	,706**	,106	-,306*	,063	,224
Days Payables Outstanding				-,234*	-,264*	-,251*	-,125	,175	,046
CCC					,897**	,148	-,285*	,013	,200
NTC						,422**	-,293*	,190	,143
LNRev							-,015	,587**	,092
RevGrowth								-,047	-,047
FinDebtRat									-,012

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed)

7. Other services

	Days Sales Outstanding	Days Inventory Outstanding	Days Payables Outstanding	CCC	NTC	LNRev	RevGrowth	FinDebtRat	FixFinAssRat
GrossOpProf	-,187*	-,077	,247**	-,283**	-,211**	,030	,105	-,095	-,057
Days Sales Outstanding		,199*	,193*	,281**	,593**	-,224**	-,203*	-,189*	-,201*
Days Inventory Outstanding			,083	,700**	,596**	,005	-,135	-,098	-,175*
Days Payables Outstanding				-,569**	-,048	-,140	-,215*	-,159	,325**
CCC					,603**	,041	-,004	-,029	-,369**
NTC						-,167*	-,125	-,189*	-,227**
LNRev							,029	,603**	,226**
RevGrowth								-,094	-,115
FinDebtRat									,146

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

9. Publishing, printing

	Days Sales Outstanding	Days Inventory Outstanding	Days Payables Outstanding	CCC	NTC	LNRev	RevGrowth	FinDebtRat	FixFinAssRat
GrossOpProf	,153	-,272	,723**	-,726**	,192	-,626**	,110	-,449**	-,228
Days Sales Outstanding		,163	,421**	-,009	,984**	-,419**	,120	,001	-,369**
Days Inventory Outstanding			-,478**	,634**	,193	,231	-,287	,220	-,093
Days Payables Outstanding				-,881**	,426**	-,444**	,284	-,461**	-,220
CCC					-,006	,392**	-,156	,614**	,003
NTC						-,437**	,187	-,025	-,365**
LNRev							,054	,309*	-,090
RevGrowth								-,046	-,106
FinDebtRat									-,168

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

12. Wholesale & retail trade

	Days Sales Outstanding	Days Inventory Outstanding	Days Payables Outstanding	CCC	NTC	LNRev	RevGrowth	FinDebtRat	FixFinAssRat
GrossOpProf	-,397**	-,098	-,087	-,220*	-,317**	-,051	-,127	-,185	-,237*
Days Sales Outstanding		,206	,470**	,439**	,588**	-,431**	,010	,062	,066
Days Inventory Outstanding			,051	,927**	,819**	,138	-,226*	-,119	-,190
Days Payables Outstanding				-,078	-,037	-,245*	-,073	-,045	-,109
CCC					,956**	,019	-,165	-,063	-,102
NTC						-,096	-,137	-,004	-,022
LNRev							-,043	,026	,161
RevGrowth								,546**	-,036
FinDebtRat									,096

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

13. Wood, cork, paper

	Days Sales Outstanding	Days Inventory Outstanding	Days Payables Outstanding	CCC	NTC	LNRev	RevGrowth	FinDebtRat	FixFinAssRat
GrossOpProf	,014	,199	,183	,034	-,174	,172	-,072	-,050	,102
Days Sales Outstanding		-,112	,546**	-,182	-,012	,594**	-,057	,489**	,098
Days Inventory Outstanding			,283*	,687**	,661**	-,047	-,219	,159	,093
Days Payables Outstanding				-,416**	-,296*	,715**	-,084	,622**	-,020
CCC					,937**	-,457**	-,167	-,209	,155
NTC						-,355**	-,139	-,104	,069
LNRev							,023	,623**	,348**
RevGrowth								-,137	-,194
FinDebtRat									,233

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 3

Industry-wise regressions

Regressions with profitability and the Net Trade Cycle:

	Adjusted NTC				Current ratio				FinDebtRat				LNRev				RevGrowth			
Row Labels	B	Beta	StdEr	Sig	B	Beta	StdEr	Sig	B	Beta	StdEr	Sig	B	Beta	StdEr	Sig	B	Beta	StdEr	Sig
Chemicals, rubber, plastics, non-metallic products	0,106	0,310	0,063	0,097	-0,002	-0,022	0,013	0,905	-0,623	-0,090	1,071	0,563	0,013	0,116	0,022	0,549	0,012	0,035	0,045	0,797
Machinery, equipment, furniture,	-0,184	-0,276	0,028	0,000	-0,021	-0,093	0,010	0,042	-0,382	-0,067	0,257	0,137	-0,023	-0,148	0,008	0,002	-0,002	-0,004	0,020	0,921
Metals & metal	-0,200	-0,245	0,067	0,004	0,111	0,445	0,018	0,000	-1,211	-0,182	0,531	0,024	-0,012	-0,076	0,015	0,422	0,069	0,143	0,037	0,063
Other services	-0,174	-0,148	0,077	0,026	0,039	0,121	0,022	0,074	-0,594	-0,053	0,748	0,428	0,000	0,000	0,019	0,994	0,053	0,034	0,100	0,596
Publishing, printing	0,028	0,011	0,228	0,902	0,518	0,595	0,093	0,000	-1,197	-0,085	1,226	0,332	-0,101	-0,171	0,059	0,088	0,352	0,090	0,388	0,368
Wholesale & retail	-0,635	-0,543	0,091	0,000	0,282	0,660	0,036	0,000	-0,593	-0,059	0,738	0,423	0,009	0,037	0,019	0,625	-0,042	-0,027	0,116	0,721
Wood, cork, paper	-0,018	-0,030	0,082	0,822	-0,056	-0,179	0,042	0,182	-0,473	-0,204	0,302	0,121	0,012	0,163	0,010	0,242	-0,072	-0,109	0,077	0,350

	YearDum02				YearDum03				YearDum04				YearDum05				YearDum06				YearDum07				YearDum08				YearDum09				YearDum10			
Row Labels	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig	B	Beta	Std Erro	Sig
Chemicals, rubber, plastics, non-metallic products	0,195	0,202	0,150	0,201	0,218	0,272	0,127	0,091	0,225	0,280	0,128	0,084	0,182	0,227	0,127	0,157	0,118	0,147	0,128	0,358	0,181	0,214	0,131	0,173	0,144	0,170	0,130	0,272					0,202	0,193	0,149	0,182
Machinery, equipment, furniture, recycling	-0,097	-0,069	0,069	0,163					0,011	0,009	0,060	0,862	-0,015	-0,013	0,061	0,800	0,028	0,024	0,061	0,645	0,066	0,057	0,061	0,282	0,030	0,025	0,061	0,630	0,011	0,010	0,061	0,857	0,100	0,055	0,084	0,232
Metals & metal products	-0,119	-0,115	0,094	0,208	0,047	0,053	0,082	0,571	0,093	0,106	0,081	0,256	0,118	0,135	0,083	0,160	0,113	0,129	0,081	0,169	0,094	0,108	0,080	0,240					-0,019	-0,021	0,083	0,824	-0,025	-0,018	0,108	0,816
Other services	-0,240	-0,118	0,158	0,130	0,003	0,002	0,146	0,984					-0,005	-0,003	0,147	0,972	-0,060	-0,033	0,147	0,686	-0,105	-0,058	0,149	0,480	-0,021	-0,011	0,148	0,889	-0,092	-0,049	0,151	0,544	0,054	0,019	0,201	0,790
Publishing, printing	0,284	0,072	0,385	0,464	-0,120	-0,051	0,245	0,625	0,209	0,088	0,244	0,394	0,211	0,086	0,274	0,443					0,032	0,014	0,240	0,893	0,379	0,148	0,264	0,155	0,225	0,088	0,266	0,400	0,285	0,101	0,281	0,314
Wholesale & retail trade	-0,052	-0,028	0,156	0,738	-0,173	-0,106	0,144	0,232	-0,204	-0,126	0,145	0,160					-0,003	-0,002	0,145	0,983	0,040	0,023	0,154	0,797	-0,018	-0,011	0,146	0,904	-0,112	-0,067	0,146	0,444	-0,106	-0,038	0,208	0,611
Wood, cork, paper	0,024	0,045	0,080	0,766	0,022	0,050	0,063	0,733	-0,017	-0,039	0,059	0,775	-0,059	-0,136	0,062	0,345	-0,014	-0,032	0,059	0,817					-0,057	-0,131	0,059	0,340	-0,058	-0,133	0,065	0,376	-0,006	-0,009	0,079	0,937

(Gross Operating Profitability = Constant)

Regressions with profitability and CCC:

	Adjusted CCC				Current ratio				FinDebtRat				LNRev				RevGrow th			
Industry	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig
Chemicals, rubber, plastics, non-metallic products	0,134	0,393	0,043	0,003	-0,008	-0,109	0,011	0,501	-0,462	-0,067	1,015	0,651	0,017	0,144	0,020	0,402	0,012	0,037	0,042	0,775
Machinery, equipment, furniture, recycling	-0,044	-0,101	0,018	0,017	-0,028	-0,127	0,010	0,007	-0,360	-0,063	0,265	0,175	-0,019	-0,119	0,008	0,016	0,012	0,024	0,021	0,574
Metals & metal products	-0,073	-0,133	0,043	0,088	0,106	0,426	0,019	0,000	-1,218	-0,183	0,546	0,028	-0,025	-0,162	0,014	0,073	0,077	0,160	0,038	0,042
Other services	-0,119	-0,216	0,034	0,001	0,031	0,094	0,021	0,145	-0,393	-0,035	0,737	0,595	0,006	0,020	0,019	0,758	0,072	0,047	0,098	0,463
Publishing, printing	-0,429	-0,293	0,128	0,001	0,498	0,571	0,087	0,000	0,692	0,049	1,271	0,588	-0,080	-0,135	0,053	0,136	0,382	0,097	0,362	0,294
Wholesale & retail trade	-0,337	-0,415	0,068	0,000	0,258	0,603	0,039	0,000	-0,993	-0,099	0,791	0,211	0,021	0,082	0,020	0,307	-0,008	-0,005	0,124	0,948
Wood, cork, paper	0,075	0,176	0,054	0,165	-0,084	-0,268	0,040	0,039	-0,595	-0,257	0,295	0,046	0,019	0,255	0,010	0,061	-0,053	-0,079	0,076	0,491

	YearDum02				YearDum03				YearDum04				YearDum05				YearDum06				YearDum07				YearDum08				YearDum09				YearDum10			
Industry	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig	B	Beta	StEr	Sig
Chemicals, rubber, plastics, non-metallic products	0,271	0,282	0,145	0,068	0,261	0,324	0,120	0,034	0,247	0,307	0,121	0,046	0,236	0,293	0,119	0,053	0,161	0,200	0,122	0,191	0,201	0,238	0,124	0,111	0,142	0,167	0,123	0,253					0,200	0,192	0,141	0,160
Machinery, equipment, furniture, recycling	-0,112	-0,080	0,071	0,119					0,026	0,023	0,062	0,680	-0,005	-0,004	0,063	0,936	0,025	0,022	0,063	0,688	0,052	0,045	0,063	0,411	0,024	0,021	0,063	0,707	0,018	0,016	0,064	0,772	0,107	0,059	0,087	0,218
Metals & metal products	-0,139	-0,135	0,096	0,149	0,036	0,041	0,084	0,670	0,080	0,092	0,083	0,333	0,111	0,127	0,085	0,195	0,105	0,120	0,083	0,209	0,092	0,105	0,082	0,265					-0,023	-0,026	0,085	0,788	-0,035	-0,026	0,110	0,751
Other services	-0,170	-0,083	0,158	0,283	0,032	0,018	0,147	0,825	0,021	0,012	0,145	0,886					-0,038	-0,021	0,147	0,799	-0,072	-0,040	0,151	0,632	0,025	0,014	0,148	0,864	-0,045	-0,024	0,150	0,766	0,037	0,013	0,201	0,855
Publishing, printing	0,477	0,122	0,352	0,180					0,271	0,114	0,226	0,234	0,242	0,098	0,254	0,343	-0,030	-0,013	0,233	0,897	0,093	0,039	0,229	0,684	0,437	0,170	0,250	0,084	0,285	0,111	0,251	0,259	0,287	0,101	0,267	0,286
Wholesale & retail trade	-0,020	-0,011	0,167	0,905	-0,158	-0,097	0,155	0,308	-0,188	-0,116	0,155	0,228					0,001	0,001	0,156	0,995	0,061	0,036	0,166	0,715	0,043	0,026	0,157	0,786	-0,075	-0,045	0,157	0,632	-0,074	-0,027	0,224	0,742
Wood, cork, paper	0,071	0,132	0,078	0,365	0,050	0,115	0,061	0,417	0,002	0,005	0,058	0,969	-0,046	-0,108	0,061	0,451	0,002	0,005	0,058	0,973					-0,042	-0,098	0,058	0,468	-0,027	-0,062	0,063	0,674	0,013	0,020	0,078	0,864

(Gross Operating Profitability = Constant)

APPENDIX 4

DSO, DIO and DPO regressions

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,846	,090		9,453	,000
	DSOAdj	-,143	,034	-,101	-4,205	,000
	LNRev	-,007	,006	-,031	-1,092	,275
	RevGrowth	,020	,020	,023	1,005	,315
	Current ratio	,019	,007	,065	2,530	,011
	FinDebtRat	-,763	,201	-,098	-3,798	,000
	IndDum1	-,088	,055	-,038	-1,590	,112
	IndDum2	-,148	,069	-,052	-2,147	,032
	IndDum3	,270	,161	,039	1,680	,093
	IndDum4	-,101	,059	-,041	-1,710	,088
	IndDum6	-,148	,044	-,083	-3,352	,001
	IndDum7	,227	,033	,173	6,862	,000
	IndDum8	-,278	,114	-,057	-2,432	,015
	IndDum9	,601	,050	,286	11,961	,000
	IndDum10	-,048	,072	-,015	-,663	,507
	IndDum11	,196	,079	,059	2,488	,013
	IndDum12	,129	,042	,077	3,086	,002
	IndDum13	-,204	,049	-,103	-4,193	,000
	YearDum02	-,113	,050	-,063	-2,247	,025
	YearDum03	-,018	,044	-,012	-,410	,682
	YearDum05	-,007	,044	-,005	-,164	,870
	YearDum06	-,018	,044	-,012	-,407	,684
	YearDum07	-,004	,045	-,003	-,093	,926
	YearDum08	-,023	,045	-,015	-,520	,603
	YearDum09	-,059	,045	-,039	-1,320	,187
	YearDum10	,026	,058	,012	,451	,652

DSO effect on profitability regression (Gross Operating Profitability = Constant)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,752	,091		8,312	,000
	Adjusted DIO	-,004	,017	-,006	-,250	,803
	LNRev	-,006	,006	-,026	-,895	,371
	RevGrowth	,025	,020	,029	1,227	,220
	Current ratio	,016	,007	,057	2,188	,029
	FinDebtRat	-,739	,203	-,095	-3,647	,000
	IndDum1	-,077	,056	-,033	-1,381	,167
	IndDum2	-,127	,070	-,044	-1,817	,069
	IndDum3	,318	,161	,046	1,974	,049
	IndDum4	-,080	,060	-,032	-1,347	,178
	IndDum6	-,132	,044	-,074	-2,978	,003
	IndDum7	,222	,035	,169	6,410	,000
	IndDum8	-,265	,115	-,054	-2,308	,021
	IndDum9	,597	,053	,284	11,307	,000
	IndDum10	-,047	,073	-,015	-,645	,519
	IndDum11	,246	,079	,074	3,115	,002
	IndDum12	,161	,041	,096	3,886	,000
	IndDum13	-,186	,049	-,094	-3,803	,000
	YearDum02	-,117	,051	-,064	-2,300	,022
	YearDum03	-,020	,044	-,013	-,446	,656
	YearDum05	-,011	,045	-,007	-,246	,806
	YearDum06	-,023	,044	-,016	-,518	,605
	YearDum07	-,010	,045	-,007	-,221	,825
	YearDum08	-,025	,045	-,016	-,548	,584
	YearDum09	-,060	,045	-,040	-1,340	,180
	YearDum10	,019	,058	,008	,317	,751

DIO effect on profitability regression (Gross Operating Profitability = Constant)

	(Constant)			Adjusted DIO				Current ratio				FinDebtRat				LNRev				RevGrowth			
Industry	**B**	**StdEr**	**Sig.**	**B**	**Beta**	**StdEr**	**Sig.**	**B**	**Beta**	**StdEr**	**Sig.**	**B**	**Beta**	**StdEr**	**Sig.**	**B**	**Beta**	**StdEr**	**Sig.**	**B**	**Beta**	**StdEr**	**Sig.**
Chemicals, rubber, plastics, non-metallic products	0,024	0,268	0,930	0,116	0,308	0,048	0,017	-0,008	-0,116	0,012	0,486	-0,741	-0,107	1,039	0,479	0,024	0,208	0,020	0,233	0,013	0,041	0,044	0,763
Machinery, equipment, furniture, recycling	0,973	0,117	0,000	-0,024	-0,049	0,021	0,255	-0,028	-0,126	0,011	0,008	-0,342	-0,060	0,266	0,200	-0,020	-0,124	0,008	0,014	0,015	0,031	0,021	0,464
Metals & metal products	0,799	0,191	0,000	-0,031	-0,047	0,050	0,536	0,104	0,418	0,019	0,000	-1,115	-0,168	0,549	0,045	-0,032	-0,206	0,013	0,020	0,084	0,174	0,038	0,029
Other services	0,899	0,254	0,000	-0,058	-0,072	0,051	0,258	0,027	0,081	0,021	0,214	-0,603	-0,053	0,758	0,427	0,005	0,016	0,019	0,809	0,069	0,044	0,100	0,494
Publishing, printing	1,590	0,793	0,048	0,156	0,043	0,312	0,618	0,525	0,603	0,093	0,000	-1,290	-0,092	1,237	0,300	-0,103	-0,174	0,056	0,070	0,402	0,102	0,397	0,315
Wholesale & retail trade	0,296	0,333	0,376	-0,196	-0,220	0,074	0,009	0,204	0,477	0,039	0,000	-1,065	-0,106	0,841	0,208	0,028	0,109	0,022	0,196	-0,017	-0,011	0,132	0,900
Wood, cork, paper	0,161	0,147	0,278	0,109	0,247	0,048	0,025	-0,073	-0,235	0,036	0,045	-0,630	-0,272	0,287	0,031	0,019	0,262	0,009	0,040	-0,033	-0,050	0,076	0,661

DIO effect on profitability per industry regression (Gross Operating Profitability = Constant)

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	,632	,090		7,060	,000
	Adjusted DPO	,101	,022	,112	4,658	,000
	LNRev	-,002	,006	-,010	-,354	,724
	RevGrowth	,028	,020	,032	1,382	,167
	Current ratio	,017	,007	,059	2,298	,022
	FinDebtRat	-,670	,201	-,086	-3,333	,001
	IndDum1	-,071	,055	-,030	-1,284	,199
	IndDum2	-,114	,069	-,040	-1,651	,099
	IndDum3	,324	,160	,047	2,024	,043
	IndDum4	-,067	,059	-,027	-1,137	,256
	IndDum6	-,121	,044	-,068	-2,749	,006
	IndDum7	,204	,033	,155	6,095	,000
	IndDum8	-,327	,115	-,067	-2,846	,004
	IndDum9	,579	,050	,276	11,494	,000
	IndDum10	-,057	,072	-,018	-,784	,433
	IndDum11	,265	,078	,080	3,410	,001
	IndDum12	,177	,041	,106	4,316	,000
	IndDum13	-,181	,048	-,092	-3,746	,000
	YearDum02	-,103	,050	-,057	-2,043	,041
	YearDum03	-,012	,044	-,008	-,279	,781
	YearDum05	-,014	,044	-,010	-,319	,750
	YearDum06	-,022	,044	-,015	-,494	,622
	YearDum07	-,008	,044	-,005	-,173	,862
	YearDum08	-,017	,045	-,011	-,376	,707
	YearDum09	-,053	,045	-,036	-1,191	,234
	YearDum10	,019	,058	,009	,326	,745

a. Dependent Variable: GrossOpProf

DPO effect on profitability regression (Gross Operating Profitability = Constant)

		Lowest 25%	*25-50%*	*50-75%*	*Highest 25%*
(Constant)	**B**	0,006	0,563	0,901	0,757
	beta	0,059	0,035	0,047	0,149
	sig	0,914	0,000	0,000	0,000
Adjusted DPO	**B**	0,012	0,003	0,000	0,122
	beta	0,019	0,008	0,011	0,031
	sig	0,515	0,743	0,991	0,000
Current ratio	**B**	-0,002	-0,010	-0,010	0,038
	beta	0,004	0,005	0,005	0,012
	sig	0,635	0,074	0,029	0,002
FinDebtRat	**B**	-0,094	0,117	-0,097	-0,029
	beta	0,140	0,067	0,088	0,432
	sig	0,505	0,084	0,269	0,946
IndDum1	**B**	0,021	0,015	-0,068	-0,230
	beta	0,041	0,018	0,024	0,092
	sig	0,607	0,426	0,006	0,013
IndDum10	**B**	-0,018	-0,174	-0,186	0,185
	beta	0,053	0,027	0,032	0,120
	sig	0,730	0,000	0,000	0,123
IndDum11	**B**	0,070	0,058	0,310	0,304
	beta	0,058	0,026	0,034	0,132
	sig	0,229	0,028	0,000	0,022
IndDum12	**B**	-0,007	0,068	0,125	0,370
	beta	0,030	0,014	0,018	0,070
	sig	0,818	0,000	0,000	0,000
IndDum13	**B**	-0,034	-0,153	-0,258	-0,517
	beta	0,035	0,016	0,023	0,083
	sig	0,324	0,000	0,000	0,000
IndDum2	**B**	-0,127	-0,215	-0,061	-0,301
	beta	0,053	0,022	0,031	0,116
	sig	0,017	0,000	0,046	0,010
IndDum3	**B**	0,498	0,411	0,467	0,309
	beta	0,116	0,057	0,070	0,264
	sig	0,000	0,000	0,000	0,243
IndDum4	**B**	0,006	0,028	-0,072	-0,385
	beta	0,043	0,020	0,025	0,105
	sig	0,894	0,164	0,003	0,000
IndDum6	**B**	-0,062	-0,103	-0,186	-0,298
	beta	0,032	0,015	0,020	0,072
	sig	0,052	0,000	0,000	0,000
IndDum7	**B**	0,005	0,038	0,258	0,516
	beta	0,023	0,012	0,015	0,056
	sig	0,822	0,001	0,000	0,000
IndDum8	**B**	-0,093	-0,301	-0,409	-0,720
	beta	0,081	0,041	0,051	0,189
	sig	0,256	0,000	0,000	0,000
IndDum9	**B**	0,114	0,338	0,645	1,183
	beta	0,036	0,018	0,023	0,083
	sig	0,002	0,000	0,000	0,000
LNRev	**B**	0,021	-0,006	-0,013	0,013
	beta	0,004	0,002	0,003	0,012
	sig	0,000	0,006	0,000	0,254
RevGrowth	**B**	0,011	0,014	-0,030	0,054
	beta	0,009	0,012	0,017	0,048
	sig	0,209	0,241	0,076	0,259
YearDum02	**B**	-0,075	0,011	-0,020	0,120
	beta	0,035	0,017	0,024	0,093
	sig	0,032	0,508	0,405	0,197
YearDum03	**B**	-0,015	0,023	0,001	0,036
	beta	0,031	0,016	0,018	0,068
	sig	0,618	0,145	0,951	0,599
YearDum04	**B**	0,016	0,010	-0,023	
	beta	0,031	0,016	0,019	
	sig	0,615	0,513	0,227	
YearDum05	**B**	0,000	0,004	-0,008	0,002
	beta	0,031	0,016	0,020	0,067
	sig	0,995	0,819	0,692	0,977
YearDum06	**B**	0,028	0,008		0,090
	beta	0,033	0,014		0,073
	sig	0,399	0,580		0,218
YearDum07	**B**	0,019		-0,012	0,127
	beta	0,033		0,019	0,071
	sig	0,565		0,535	0,074
YearDum08	**B**	0,014	0,025	-0,021	0,073
	beta	0,031	0,015	0,020	0,072
	sig	0,650	0,098	0,285	0,310
YearDum09	**B**		0,018	-0,028	0,003
	beta		0,016	0,019	0,074
	sig		0,249	0,150	0,963
YearDum10	**B**	0,023	0,030	0,013	0,058
	beta	0,048	0,019	0,025	0,090
	sig	0,634	0,114	0,602	0,520

DPO regressions per quartile (Gross Operating Profitability = Constant)