# THE IMPACT OF WORKING CAPITAL MANAGEMENT

# ON CASH HOLDINGS

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# A Quantitative Study of Swedish Manufacturing SMEs

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# Abstract

This study examines the impact of working capital management on cash holdings of small and medium-sized manufacturing enterprises in Sweden. The aim of this work is to theoretically derive significant factors related to working capital management which have an influence on the cash level of SMEs and test these in a large sample of Swedish manufacturing SMEs. The theoretical framework for this study consists of a treatise of motives for holding cash, working capital management and cash level. From these theoretical findings, two hypotheses are deduced:

- H1: Cash holdings are negatively related to the presence of cash substitutes
- H2: Cash holdings are positively related to working capital management efficiency

The quantitative investigation consists of the statistical analysis – namely comparison of means and correlation analysis – of key figures which are calculated from the financial statements of a large sample of firms. The dataset contains 13,287 Swedish manufacturing SMEs of the legal form 'Aktiebolag'. Both hypotheses are confirmed by the results. Empirical evidence is presented which substantiates the supposition that the presence of cash substitutes – namely inventory and accounts receivable – entails lower cash holdings. Furthermore, it is confirmed that working capital management efficiency – measured by the cash conversion cycle – is positively related to cash level. The discussion of the empirical findings pays regard to the different subordinate components of both cash substitutes and working capital management efficiency. Implications of the detected findings are highlighted with respect to their potential utility for the achievement and maintenance of a firm's target cash level.

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# List of abbreviations

DPO:     Days Payable Outstanding

DSI:     Days Sales of Inventory

DSO:     Days Sales Outstanding

EBIT:    Earnings Before Interests and Taxes

EOQ:     Economic Order Quantity

EU:      European Union

EUR:     Euro

OECD:    Organisation for Economic Co-operation and Development

SEK:     Swedish Krona

SME:     Small and Medium-sized Enterprises

SNI:     Svensk Näringsgrensindelning (=Swedish Standard Industrial Classification)

# 1   Introduction

SMEs being a "key source of dynamism, innovation and flexibility in advanced industrialised countries, as well as in emerging and developing economies" [1] , their well-being and continuity are crucial to the macroeconomic development of any country around the globe. The financing problems that SMEs frequently have to face[2] reflect the need to study the financial conditions of this enormous and significant[3] size class of enterprises. Hence, this introductory section aims at further revealing the significance of this work's topic and afterwards introducing the basic conception of this study.

## 1.1   Importance of the topic

In the following, the high significance of the topic is being illustrated. For this purpose the significance of SMEs for the European as well as the Swedish economy is displayed. Afterwards, current financial problems that SMEs face are presented.

### 1.1.1   Significance of SMEs

According to data from 2004 collected by the 'Statistical Office of the European Communities' which analyzes structural business statistics from the EU-27 countries, SMEs constitute 99.8% of the total amount of enterprises in the non-financial business sector. 56.9% of the value added is generated by SMEs and they account for 66.7% of the European workforce employment.[4]
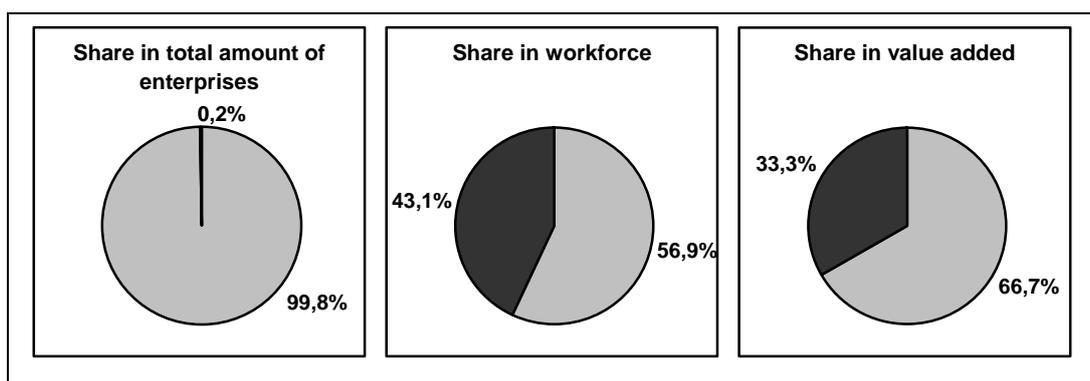


**Figure 1:** Repartition of SMEs (grey) and large enterprises (black) in the EU-27

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[1] OECD (2006), "The SME Financing Gap (Volume I) – Theory and Evidence", p. 9
[2] cp. section 1.1.2
[3] cp. section 1.1.1
[4] cp.
http://epp.eurostat.ec.europa.eu/portal/page?_pageid=2293,59872848,2293_68195655&_dad=portal&_schema=PORTAL#smes1

Besides their quantitative prevalence, SMEs also have a significant qualitative input to the European economy regarding innovative development. A 1996 survey conducted by the European Commission points out that 51% of the European SMEs can be considered as innovative, i.e. "enterprises that introduced technologically new or improved products, processes or services during the reference period".[1] This figure needs to be considered under the assumption that "[t]he larger an enterprise, the more likely it is to capitalize on innovation"[2], meaning that larger firms are more likely to be innovative than small ones. Furthermore, SMEs have an immense impact on the global employment development. According to a 2000 OECD report, "SMEs will be […] the major source of jobs" "surpassing larger firms in net job creation".[3]

In Sweden, there is a significant number of SMEs. According to structural business statistics from the 'Official Statistics of Sweden' using data from the year 2005[4], SMEs make up for 99.9% of the Swedish enterprises and employ 61.7% of the Swedish workforce, i.e. 1,398,994 people. 57.6% of the Swedish value added is produced by SMEs.
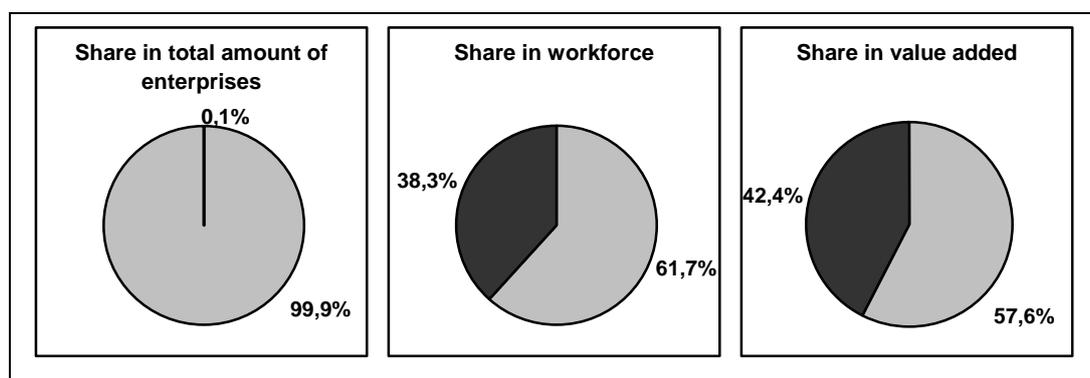


**Figure 2:** Repartition of SMEs (grey) and large enterprises (black) in Sweden

The following table recapitulates the absolute numbers[5] which constitute the basis for the above illustrated repartition between SMEs and large enterprises in Sweden. These figures should allow for a more detailed insight into the Swedish structural business statistics.

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[1] European Communities (2002), "SMEs in Europe – Competitiveness, innovation and the knowledge-driven society", p. 30
[2] The Gallup Organization (2007), "Observatory of European SMEs – Summary", p. 2
[3] OECD (2000), "OECD Small and Medium Enterprise Outlook – Enterprise, Industry and Services", p. 9
[4] cp. http://www.ssd.scb.se/databaser/makro/produkt.asp?produktid=nv0109&lang=2
[5] cp. ibid.

| Size class | No. of employees | Enterprises | Σ by size class | Employees | Σ by size class | Value added (m SEK) | Σ by size class |
|---|---|---|---|---|---|---|---|
| SME | 0 - 19 | 806,690 | | 722,063 | | 462,787 | |
| | 20 - 49 | 9,116 | 819,979 | 270,636 | 1,398,994 | 154,619 | 872,422 |
| | 50 - 99 | 2,707 | | 185,929 | | 109,843 | |
| | 100 - 249 | 1,466 | | 220,366 | | 145,173 | |
| Large enterprise | > 250 | 886 | 886 | 867,367 | 867,367 | 640,930 | 640,930 |
| Total | | | 820,865 | | 2,266,361 | | 1,513,352 |

**Table 1:** Detailed figures on SMEs and large enterprises in Sweden

Seemingly, SMEs constitute an important element of both the European and the Swedish economy. They employ approximately two thirds of the workforce and contribute considerably to the value added. Nevertheless, SMEs exhibit significant exit rates. According to an OECD report, about 20% of newly created enterprises do not survive their first year.[1] It should be noted that the data refer to the total amount of exits. It therefore contains deliberate as well as involuntary endings. In Sweden, the total amount of bankruptcies, i.e. involuntary exits, has decreased since 2003.[2] In 2006, the 'Official Statistics of Sweden' totalled 6,160 enterprise bankruptcies.[3] In the same year, the number of newly registered businesses was 59,613[4], accounting for an entry rate of roughly 7%. Taking into consideration the significant prevalence of SMEs on the Swedish market, the share of large companies in these figures can be assumed to be negligible.

### 1.1.2 Financial constraints of SMEs

Obviously, SMEs are of vital importance to the Swedish economy and the above mentioned data indicate that the entry rate significantly exceeds the exit rate, evidence which is supported by the findings of the OECD.[5] Clearly, this leads to a strong increase of Swedish SMEs in quantity and therefore significance as well. Nevertheless, the number of liquidations is still considerable and displays the importance of studying SMEs with regard to financial aspects. This is also supported by the factors which lead to SME bankruptcy. Many authors have studied these reasons for SME failure.[6] The results indicate that one issue is widespread among the

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[1] cp. OECD (2005), "SME and Entrepreneurship Outlook", p. 22
[2] cp. Statistics Sweden (2008), "Statistical Yearbook of Sweden 2008", p. 188
[3] cp. ibid.
[4] cp. ibid. at p. 190
[5] cp. OECD (2005), p. 23
[6] cp. Peterson, R.; Kozmetsky, G.; Ridgway, N. (1983), "Perceived Causes of Small Business Failure: A Research Note", American Journal of Small Business, Vol. 8, Issue 1, pp. 15-19; cp. Hall, G. (1992), "Reasons for Insolvency Amongst Small Firms – A Review and Fresh Evidence", Small Business Economics, Vol. 4, Issue 3, pp. 237-250

factors which lead to SME bankruptcy: Lack of capital.[1] OECD analysts agree that access to finance is one of the most significant hindrances for the establishment and development of SMEs.[2] Among the most important start-up difficulties detected within a 2005 survey published by the 'Statistical Office of the European Communities' are 'Financing', 'Outstanding invoices' and 'Finding suppliers'[3], all of which are closely related to working capital management. According to a 2006 survey published by the European Commission, about every fifth European SME has encountered difficulties related to limited access to finance.[4] Furthermore 44% of the respondents claimed that this constraint had increased during the two years preceding the survey.[5] The OECD refers to this problem as the 'SME financing gap' and has devoted a global conference to this issue.[6] According to the conference's report, SMEs display "significant gaps in information and skills needed to access external finance".[7] Although financing gaps are more current in emerging than in developed markets, they are nevertheless existent in OECD countries, especially regarding innovative SMEs.[8]

Seemingly, SMEs are challenged by several financial constraints which can partly be connected to working capital management. Therefore, the topic of working capital management is of great importance for SMEs in order to avoid financial bottlenecks since the availability of external funds can be rather low.[9]

## *1.2  Introduction to this study*

The following section aims at giving a precise impression of this work's conception. In order to achieve this, the exact problem is formulated and delimited. Thereafter, the objectives are presented and lastly, the disposition section displays the structure of the work.

### 1.2.1  Problem formulation

Despite the immense and increasing importance of SMEs for the European and Swedish economy and their prevailing financial problems described in the previous section, not much financial management theory

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[1] cp. Peterson, R. et al. (1983), p. 18; cp. Hall, G. (1992), p. 245
[2] cp. OECD (2004a), "OECD Compendium II on SME and Entrepreneurship Related Activities", p. 75
[3] cp. Schrör, H. (2006), "The profile of the successful entrepreneur – Results of the survey 'Factors of Business Success'", p. 8
[4] cp. The Gallup Organization (2007), p. 8
[5] cp. ibid. at p. 9
[6] "Better Financing for Entrepreneurship and SME Growth" (Brasilia, 27th – 30th March 2006)
[7] OECD (2006), p. 13
[8] cp. ibid.
[9] cp. ibid. at p. 9

exists with special regards to SMEs. Most theory in this field of study is related to corporate financial management. This also applies to empirical studies which are mainly conducted in large enterprises.[1] Obviously, financial management in SMEs and large enterprises bear strong similarities. However, there is a significant disparity which substantiates the study of financial management in SMEs. Since smaller firms experience difficulties in accessing external finance, they rely more strongly on internally generated funds than large firms.[2] Working capital management thus plays an important role in the financing of SMEs. This assumption is confirmed by the fact that working capital related problems are cited among the most significant reasons for the failure of SMEs. As working capital management is related to short-term financial planning and cash level or liquidity in general represents a significant indicator for short-term performance, the impact of the first on the latter – which constitutes this study's topic – should be of crucial importance.

### 1.2.2 Delimitation

This work studies the impact of working capital management on cash holdings in Swedish manufacturing SMEs. In this respect, a delimitation has been undertaken in that only Swedish manufacturing firms of a certain size are included in the dataset. The theoretical section presents aspects which are not strictly delimited to a certain size class, country or industry. However, a focus on the SME size class is given by discussing the relevance of several aspects for SMEs.

### 1.2.3 Objectives

The objectives of the paper are being presented in the following part. First, the purpose of the study is discussed. Afterwards, the targeted readership is defined and formulated.

The purpose of this study is to analyze the impact of working capital management on the level of cash held by Swedish manufacturing SMEs. The aim of the theoretical section is to present a detailed discussion of the concepts and theories which constitute the basis for the empirical analysis. This theoretical knowledge is condensed in the hypotheses which are subsequently tested in the context of Swedish manufacturing SMEs. The aim of the empirical section is to find statistical evidence which is

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[1] cp. section 2.4.2
[2] cp. Weston, J. & Copeland, T. (1986), "Managerial finance", Eighth Edition, Hinsdale: The Dryden Press, p. 277

significant enough to confirm or reject the hypotheses and afterwards discuss the results so as to add new aspects to the existing research.

The targeted readership is composed of practitioners as well as academics. Decision-makers from SMEs, financial service providers as well as policy makers should be interested in the results as they should lead to an enhanced understanding of cash level and its determinants in SMEs, not only of the manufacturing sector. Academics could benefit from this work in that they should discover an alternative theoretic approach to explaining cash holding decisions in SMEs.

### 1.2.4 Disposition

The structure of this work is basically divided into a theoretical, a methodological and an empirical section. The theoretical framework consists of a treatise of motives for holding cash which have been formulated by John Maynard Keynes, a presentation of working capital management and all of its components and a discussion of cash level including determinants which impact cash holdings. On the basis of the theoretical treatise, two hypotheses are formulated. The methodology section describes and justifies the methodological approach which has been used in order to test the hypotheses. Subsequently, the empirical part first describes and then analyzes the results which have been extracted from the dataset. Finally, after having recapitulated the thesis, the concluding discussion deals with the issue whether the aims and purposes of this work have been fulfilled. On this basis, recommendations for future research are made.

# 2 Theoretical background

In the following, the theoretical background will be presented. It consists of five parts. The first part aims at defining key terms and concepts. The motives for holding cash are dealt with in the second section. The third part is dedicated to working capital management. The aspect of cash level is discussed in the fourth section and finally, the fifth part acts as a summary of the whole theoretical background by formulating the hypotheses which are based on the theoretical findings and which will be tested in the empirical section.

## 2.1 Definition of key terms and concepts

This section provides a clear definition of terms and concepts that are used in this work. It aims at avoiding misunderstandings and should help the reader understand the basic conceptions on which this paper is based.

### 2.1.1 SME

There is no unique definition of SME. In 2000, the 'Official Statistics of Sweden' defined SMEs as "enterprises with less than 50 employees".[1] The German 'Institut für Mittelstandsforschung' defines SMEs as companies with less than 500 employees or a turnover of less than 50 m EUR.[2] By reason of the discrepancy of its member states' definitions, the European Union has provided a standardized definition which Sweden and the other EU member states have subsequently adopted.[3] The official EU definition[4] which is used in this work can be summarized by the following table:

| Enterprise size | No. of Employees | | Turnover (m EUR) [m SEK] | | Balance sheet (m EUR) [m SEK] |
|---|---|---|---|---|---|
| Medium-sized enterprise | < 250 | and | ≤ 50 [~472] | or | ≤ 43 [~406] |
| Small enterprise | < 50 | and | ≤ 10 [~94] | or | ≤ 10 [~94] |
| Microenterprise | < 10 | and | ≤ 2 [~19] | or | ≤ 2 [~19] |

**Table 2:** Definition of Medium-sized, Small and Microenterprises

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[1] Statistics Sweden (2000), "The environment industry in Sweden 2000 – Employment and economic data for enterprises primarily producing environmental goods and services", p. 49
[2] cp. http://www.ifm-bonn.org/index.php?id=89
[3] cp. OECD (2004b), "SME Statistics: Towards a More Systematic Statistical Measurement of SME Behaviour", p. 147
[4] cp. The Commission of the European Communities (2003), "Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises", Official Journal of the European Union L124, Vol. 46, pp. 36-41, p. 39

### 2.1.2 Cash

The term cash refers to the "most liquid of assets".[1] According to Weston & Copeland cash includes "demand deposits and money market accounts as well as currency holdings".[2] It should be noted that in this work, cash shall be defined as cash plus cash equivalents, i.e. highly liquid short-term investments such as marketable securities. This assumption is due to the fact that this broad definition of cash forms the basis for the subsequent theory. Additionally, the characteristics of the empirical data for this study do not allow for a differentiation between cash and cash equivalents. Obviously, the broad definition does not apply to the section on the cash management model[3] which explicitly requires a strict distinction between cash and marketable securities.

### 2.1.3 Working capital

In corporate annual reports, working capital is mostly defined as follows: Current assets minus current liabilities.[4] Hence, it "represents the firm's investment in cash, marketable securities, accounts receivable, and inventories less the current liabilities used to finance the current assets".[5] Some authors may refer to working capital as the sum of current assets and current liabilities and define the difference (current assets minus current liabilities) as 'net working capital'.[6] However, in the following, the term working capital will be used as determined in the first definition. The expression 'Net Working Capital' will be used as a variable in the empirical part to designate the ratio of working capital less cash to assets.

### 2.1.4 Marketable securities

Weston & Copeland refer to marketable securities as a "portfolio of highly liquid, near-cash assets which serves as a backup to the cash account".[7] There are several types of marketable securities, such as 'Treasury securities', 'Repurchase agreements', 'Agency securities' or 'Commercial papers'.[8] Marketable securities with a maturity of less than three months are referred to as 'cash equivalents' on the balance sheet, those with a longer maturity as 'short-term investments'.[9]

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[1] Van Horne, J. (1995), "Financial management and policy", Tenth Edition, Englewood Cliffs: Prentice Hall, p. 359
[2] Weston, J. & Copeland, T. (1986), p. 289
[3] cp. section 2.3.2.1
[4] cp. Weston, J. & Copeland, T. (1986), p. 277
[5] ibid.
[6] cp. Brealey, R. & Myers, S. (2003), "Principles of Corporate Finance", Seventh Edition, New York: McGraw-Hill, p. 851
[7] Weston, J. & Copeland, T. (1986), p. 289
[8] cp. Van Horne, J. (1995), pp. 390-394
[9] cp. ibid. at p. 388

### 2.1.5 Days sales outstanding

Days sales outstanding (DSO) is a key figure which measures the average amount of time that a company holds its accounts receivable. It is calculated by the following equation: [1]

DSO = Accounts Receivable / Turnover * 365

### 2.1.6 Days sales of inventory

Days sales of inventory (DSI) is a key figure which measures the average amount of time that a company holds its inventory. It is calculated by the following equation: [2]

DSI = Inventory / Costs of goods sold * 365

### 2.1.7 Days payable outstanding

Days payable outstanding (DPO) is a key figure which measures the average amount of time that a company holds its accounts payable. It is calculated by the following equation: [3]

DPO = Accounts Payable / Costs of goods sold * 365

### 2.1.8 Cash conversion cycle

The 'Bloomsbury Business Library - Business & Management Dictionary' defines the cash conversion cycle as "the time between the acquisition of a raw material and the receipt of payment for the finished product".[4] Thus, a firm's average cash conversion cycle is calculated by adding DSO to DSI and subtracting DPO.[5] The cash conversion cycle is a measure for the efficiency of working capital management as it indicates how quickly current assets are converted into cash.[6]

## *2.2 Keynesian motives for holding cash*

In his influential work "The General Theory of Employment, Interest and Money" first published in the year 1936, John Maynard Keynes devotes one chapter to "The Psychological and Business Incentives to Liquidity" in which he elaborates on the motives for holding cash.[7] He distinguishes between three different but interrelated motives: The 'transactions-motive', the 'precautionary-motive' and the 'speculative-motive'.

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[1] cp. Ross, S.; Westerfield, R.; Jaffe, J.; Jordan, B. (2008), "Modern Financial Management", Eighth Edition, New York: McGraw-Hill, p. 51
[2] cp. ibid. at p. 50
[3] cp. ibid. at p. 51
[4] Bloomsbury Business Library - Business & Management Dictionary (2007), p. 1383
[5] cp. Ross, S. et al. (2008), pp. 750-751
[6] cp. Deloof, M. (2003), "Does Working Capital Management Affect Profitability of Belgian Firms?", Journal of Business Finance & Accounting, Vol. 30, Issue 3/4, pp. 573-587, p. 574
[7] cp. Keynes, J. (1973), "The collected writings of John Maynard Keynes – Vol. 7: The general theory of employment interest and money", Fourteenth Edition, London: Macmillan, pp. 194-209

### 2.2.1 The transactions-motive

The 'transactions-motive' deals with bridging the gap between cash collections and disbursements. In this regard, Keynes differentiates between the 'income-motive' and the 'business-motive' which are subordinate motives to the 'transactions-motive'.[1] Both motives are based on a very similar principle but while the 'income-motive' deals with an individual's cash holding behaviour, the 'business-motive' describes an enterprise's motives. For the purpose of this work, only the latter is of importance. According to Keynes, companies hold cash in order to "bridge the interval between the time of incurring business costs and that of the receipt of the sale-proceeds".[2] In other words: Companies hold a certain amount of cash in order to meet the regular expenses of their activity. Therefore, the higher the firm's ability to schedule its cash flows – depending on their predictability – the weaker the 'transactions-motive' for holding cash will be.[3]

### 2.2.2 The precautionary-motive

Keynes' second motive, the 'precautionary-motive', pays regard to a company's need to provide for unsuspected expenses and "unforeseen opportunities of advantageous purchases".[4] The strength of the 'precautionary-motive' is determined by the risk of a sudden contingency and the probability of a profitable acquisition. Thus, if a firm operates in a highly volatile sector of activity, its precautionary cash holding will be higher than that of firms which act in a less risky environment.

### 2.2.3 The speculative-motive

Keynes' third motive refers to the holding of cash for the purpose of speculation. The 'speculative-motive' is based on the assumption that rising interest rates induce decreasing prices of securities and vice versa. Therefore, a firm will invest its idle cash in securities when interest rates are expected to decrease.[5] This generates benefits for the firm because the prices of the acquired securities will rise as a consequence of the anticipated interest rate drop. Van Horne claims that companies do not hold cash for this kind of speculative purpose[6] and it can be assumed that this estimation is valid especially for SMEs which usually do not have the

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[1] cp. Keynes, J. (1973), p. 195
[2] ibid.
[3] cp. Weston, J. & Copeland, T. (1986), p. 290
[4] Keynes, J. (1973), p. 196
[5] cp. Van Horne, J. (1995), p. 372
[6] cp. ibid.

resources to make such complex financial decisions. Therefore the significance of Keynes' 'speculative-motive' is negligible for this work.

### 2.2.4 Strength of the Keynesian motives

The transactions- and precautionary-motives share one common ground. Their strength is dependent on the accessibility of cash and the cost of acquiring it when needed.[1] Costs of running out of cash, i.e. shortage costs, are therefore an important factor which influence the strength of the two first Keynesian motives. In the extreme case of maximum ease of access and no costs associated, i.e. no shortage costs of running out of cash, a company would not hold any cash at all. In the event of an emerging expense, it would simply retrieve the required amount from its portfolio of short-term investments.[2]

Additionally, a firm's demand for cash depends on the "relative cost"[3] of holding cash. In this context, Keynes mentions the example of "forgoing the purchase of a profitable asset"[4] in order to be able to hold on to a certain amount of cash. This 'relative cost' will weaken the firm's motive for holding cash and lead to a lower cash holding[5] in order for the company to be able to make profitable acquisitions when these occur.

Yet, another factor which strengthens the two first Keynesian motives is the aspect of bank charges which could be avoided by holding cash.[6] Obviously, if reducing bank deposits diminishes the associated costs, firms will tend to hold a larger amount of cash.

### 2.2.5 Relevance of the Keynesian motives

The Keynesian motives for holding cash are frequently referred to and further developed or slightly modified in relevant literature.[7] In their discussion on firms' reasons for holding cash and marketable securities[8], Weston & Copeland add two further motives to the Keynesian 'transactions' and 'precautionary' motives. They claim that the level of liquid funds, i.e. cash plus marketable securities, will rise significantly if a firm is envisaging important investments in the near future.[9] The second

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[1] cp. Keynes, J. (1973), p. 196
[2] cp. Van Horne, J. (1995), p. 382
[3] Keynes, J. (1973), p. 196
[4] ibid.
[5] cp. ibid.
[6] cp. ibid.
[7] cp. Van Horne, J. (1995), p. 372; cp. Weston, J. & Copeland, T. (1986), pp. 289-291; cp. Ross, S. et al. (2008), p. 771
[8] cp. Weston, J. & Copeland, T. (1986), p. 289-291
[9] cp. ibid. at p. 290

reason for holding cash that the authors include is "compensating balance requirements"[1] which refer to the minimum balance that a bank requests its professional customers to preserve in their current account. This aspect is not an inherent motive but rather an extrinsic obligation which serves as an assurance to the bank.[2] In this regard, the compensating balance is also mentioned by Ross et al. as one of the authors' two main reasons for cash holding, the other one being the 'transactions-motive'.[3]

Keynes' motives are a very widespread approach in financial theory in order to explain cash holding behaviours of companies[4] and they also constitute the basis for a great deal of cash management models which will be discussed later on. As already pointed out, the third motive is irrelevant when studying the cash holding behaviour of SMEs because of its complexity. However, the 'transactions-motive' and 'precautionary-motive' represent a very basic approach to illustrating the cash holding behaviour of firms. Therefore, they should be particularly applicable to SMEs, assuming that these manage their finance in a less complex manner than large enterprises.

## 2.3  Working capital management

Working capital management implicates the administration of current assets as well as current liabilities.[5] It is the main part of a firm's short-term financial planning since it encompasses the management of cash, inventory and accounts receivable.[6] These three components and the way in which they are managed determine some of a company's most vital financial ratios, e.g. the 'inventory turnover', the 'average collection period' and the 'quick ratio'.[7] Hence, working capital management reflects a firm's short-term financial performance. Given that current assets usually account for more than half of a company's total assets[8] – an average 66% of the total assets of this study's sample firms – and owing to the fact that "this investment tends to be relatively volatile"[9], the study of working capital management deserves special attention. According to Weston & Copeland, working capital management is of great importance especially

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[1] Weston, J. & Copeland, T. (1986), p. 290
[2] cp. ibid.
[3] cp. Ross, S. et al. (2008), pp. 771-772
[4] cp. Van Horne, J. (1995), p. 372; cp. Weston, J. & Copeland, T. (1986), pp. 289-291; cp. Ross, S. et al. (2008), p. 771
[5] cp. section 2.1.3
[6] cp. Van Horne, J. (1995), pp. 372-430
[7] cp. Weston, J. & Copeland, T. (1986), pp. 180 and 183-185
[8] cp. ibid. at p. 277
[9] ibid. at p. 277

to small firms.[1] This is due to most small firms' large amount of current liabilities resulting from restricted access to long-term capital. [2] Furthermore, Weston & Copeland claim that current assets represent a major investment for small firms because they can not be avoided in the same way as investments in fixed assets can be prevented by renting or leasing, for instance.[3]

In the following, the three components of working capital management, i.e. inventory management, cash management and credit management will be discussed. Thereafter the concept of working capital policy will be presented.

### 2.3.1   Inventory management

The inventory of a firm can be divided into three groups: 'raw materials', 'work in process' and 'finished goods'.[4] The inventory of 'work in process' can only be reduced to a certain level by "speeding up the manufacturing process"[5] but it can not be completely avoided. The other two types of inventory, however, are not unavoidable[6] and therefore they are subject to the company's decision. It should be noted that inventory size is obviously not completely in the firm's sphere of influence but rather considerably determined by its output and by the product's manufacturing process and attributes.[7] Thus, the average level of inventory can vary significantly between different industry sectors. [8] However, the conveniences and disadvantages of relatively large inventories are always similar:

Large inventories allow the company to produce and purchase economically by avoiding production stoppages and taking advantage of decreased ordering costs. Furthermore, the firm can easily adapt to customers' demands and satisfy these.[9] The firm's enhanced flexibility thus is the main advantage of large inventory.[10]

The downside of large inventory comprises several aspects. Besides the apparent cost of handling and storage, there is also the relative cost of

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[1] cp. Weston, J. & Copeland, T. (1986), p. 277
[2] cp. ibid.
[3] cp. ibid.
[4] cp. Van Horne, J. (1995), p. 421
[5] Weston, J. & Copeland, T. (1986), p. 321
[6] cp. Van Horne, J. (1995), p. 421
[7] cp. Weston, J. & Copeland, T. (1986), p. 322
[8] cp. ibid.
[9] cp. Van Horne, J. (1995), p. 421
[10] cp. ibid.

capital tie-up and the threat of obsolescence[1]. In this regard, the decision maker's task is to strike a balance between the above mentioned benefits and costs of inventory in order to find the optimal inventory size.

Although inventory management is not within the typical field of responsibility of a financial manager[2], the 'economic order quantity' (EOQ) model which is a simple concept for determining a company's optimal inventory level and order size will be introduced. It is mentioned in a great deal of relevant literature[3] and can also be applied to cash management.[4] An understanding of the EOQ model will therefore facilitate the comprehension of the cash management model as well as the basic issue of working capital management. Since a discussion of the complete EOQ model would go beyond the scope of this work, only the first step, namely the decision on inventory level, shall be examined. The second stage which deals with order size and inventory usage is not of importance for the achievement of this paper's purpose.

### 2.3.1.1    Optimal inventory size

The EOQ model can be applied to all kinds of inventory, i.e. raw materials, work in process as well as finished goods.[5] In order to ensure the applicability of the EOQ model, several assumptions must be taken into consideration. First, the usage of the stored product is assumed to be steady.[6] Second, ordering costs are assumed to be constant, i.e. the same amount has to be paid for any order size.[7] Finally, the carrying costs of inventory which are composed of costs of storage, handling and insurance "are assumed to be constant per unit of inventory, per unit of time".[8] The EOQ model in its simplest conception therefore merely takes variable costs into consideration[9], although it can easily be extended so as to include fixed costs.[10]

In order to spare the algebraic deduction, the EOQ shall be determined graphically. The following graph illustrates the relationship between order size and associated costs for the purpose of determining the EOQ, i.e. the optimal order size:

[1] cp. Van Horne, J. (1995), p. 421
[2] cp. ibid. at p. 428
[3] cp. Van Horne, J. at pp. 422-428; cp. Weston, J. & Copeland, T. (1986), pp. 325-336
[4] cp. Baumol, W. (1952), "The Transactions Demand for Cash: An Inventory Theoretic Approach", Quarterly Journal of Economics, Vol. 66, Issue 4, pp. 545-556
[5] cp. Van Horne, J. (1995), p. 422
[6] cp. ibid.
[7] cp. ibid.
[8] ibid.
[9] cp. Weston, J. & Copeland, T. (1986), p. 326
[10] cp. ibid. at p. 328
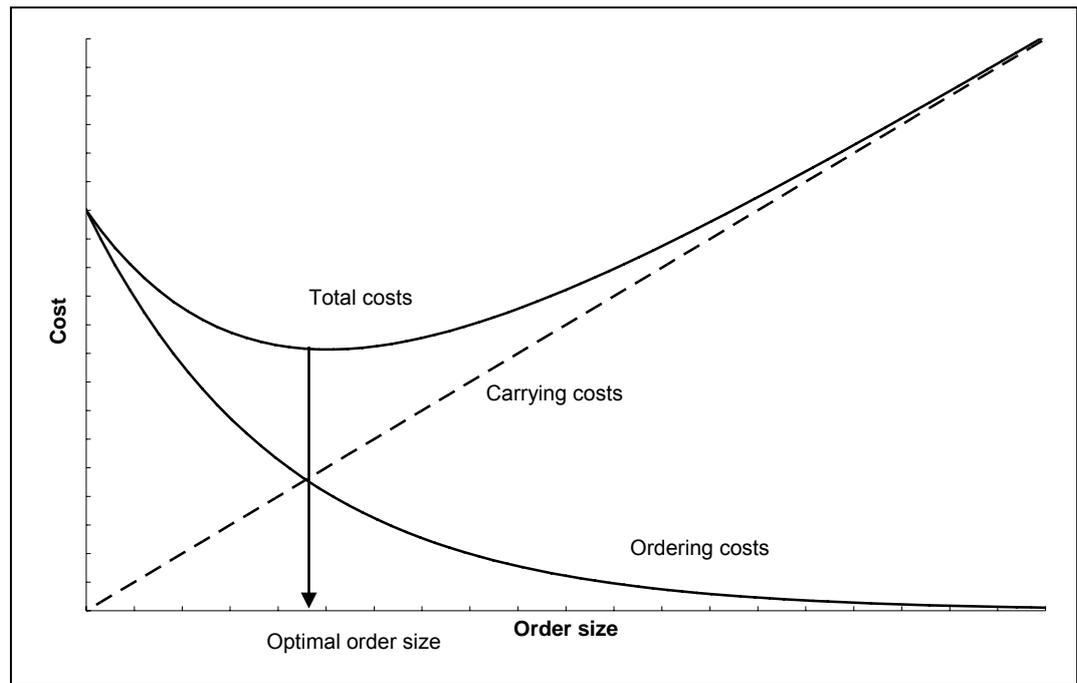
**Figure 3:** Graphic determination of the optimal size of inventory (draft)[1]

Self-evidently, the optimal inventory size can be found at the global minimum of the total costs graph. It is also the point of intersection between the carrying and ordering costs curves.[2] Fixed inventory costs which are not contained in this diagram can easily be taken into consideration by including a linear function and adding the data to the total costs graph.[3] However, the addition of fixed costs does not have an impact on the EOQ; it merely increases the total costs of inventory and its corresponding curve by a certain constant amount.[4]

### 2.3.1.2 Significance of the inventory model

The EOQ model is a very simple approach and it certainly has strict limitations as many more related costs could be imagined, but it exemplifies the trade off between the risk of running out of inventory and the profits earned by keeping the level of inventory low and thus minimizing its costs. As will be shown later on, this trade off between risk and earnings is common to all three components of working capital management. Therefore, the basics of the EOQ model can be applied to all current assets.

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[1] adapted from: Keown, A.; Martin, J.; Petty, J.; Scott, Jr., D. (2006), "Foundations of Finance", Fifth Edition, Upper Saddle River: Pearson Education, p. 514
[2] cp. Weston, J. & Copeland, T. (1986), p. 325
[3] cp. ibid. at p. 328
[4] cp. ibid. at p. 327

### 2.3.2 Cash management

Due to Weston & Copeland, cash management has emerged from "the relatively high level of interest rates on short-term investments [*which*] has raised the opportunity cost of holding cash".[1] Van Horne states that "cash management involves managing the monies of the firm in order to maximize cash availability and interest income on any idle funds".[2] In order to achieve this, cash management encompasses the following functions, as established by Van Horne: Managing Collections, Control of Disbursements, Electronic Funds transfers, Balancing Cash and Marketable Securities and Investment in Marketable Securities.[3] Cash budgeting – although not being a part of cash management but rather an element of short-term planning[4] – constitutes the starting-point for all cash management activities as it represents the forecast of cash in- and outflows[5] and therefore reflects the firm's expected availability and need for cash.[6]

In the following, merely the element of cash management which deals with the problem of determining the optimal investment in cash shall be discussed. For this purpose a cash management model which is based on the EOQ model will be presented. It should be noted that for this purpose, a distinction between cash and cash equivalents, i.e. marketable securities is crucial. Similarly to the previous section on inventory decisions, merely the first step, i.e. the decision on the optimal cash level, i.e. the balance between cash and marketable securities, will be treated. The other functions of cash management are not of significance for the achievement of this work's objective and a discussion of these would go beyond its scope.

#### 2.3.2.1 Optimal cash level

The EOQ model for inventory can be applied to cash management so as to explain a firm's demand for cash and find a balance between investment in marketable securities and holding of cash. In 1952, William Baumol was the first researcher to present such a cash management model.[7] The procedure is very similar to the EOQ model for inventory size

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[1] Weston, J. & Copeland, T. (1986), p. 289
[2] Van Horne, J. (1995), p. 372
[3] cp. ibid. at pp. 372-396
[4] cp. Weston, J. & Copeland, T. (1986), p. 223; cp. Van Horne, J. (1995), p. 373; cp. Brealey, R. & Myers, S. (2003), p. 859
[5] cp. ibid. at pp. 859-862
[6] cp. Sherman, W. and Associates (1993), "Cash Budgeting", in: Rachlin, R. & Sweeny, H. (eds.) (1993), "Handbook of Budgeting", Third Edition, New York: John Wiley & Sons, p. 4
[7] cp. Baumol, W. (1952)

but it deals with different variables.[1] It is assumed that the firm holds a portfolio of marketable securities which can easily be converted into cash. In the Baumol model, the financial manager has to decide on the repartition of liquid funds between cash and marketable securities. Once again, there is a trade-off which constitutes the basis for the calculation. Yet, this trade-off is related to the opportunity costs of holding cash which increase along with the cash level and the trading costs which incur with every transaction and which decrease when the cash level increases.[2] The opportunity costs represent the interests foregone for funds which are held in cash instead of being invested.[3] The trading costs correspond to fixed costs which incur when a company decides to either buy or sell marketable securities.[4] If a company decides to maintain a low cash level it will have to carry out many transactions leading to high trading costs but low opportunity costs because there are little idle cash funds.[5] If it maintains a high level of cash, the firm's opportunity costs will be higher due to the relatively large amount of uninvested cash but the trading costs will decrease since only few transactions will be necessary.[6] In line with the EOQ model for inventory, the graph for determining the optimal level of cash will appear as follows:

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[1] cp. Brealey, R. & Myers, S. (2003), p. 891
[2] cp. Ross, S. et al. (2008), p. 772
[3] cp. ibid. at pp. 773-774
[4] cp. ibid. at p. 774
[5] cp. ibid. at p. 772
[6] cp. ibid. at p. 774
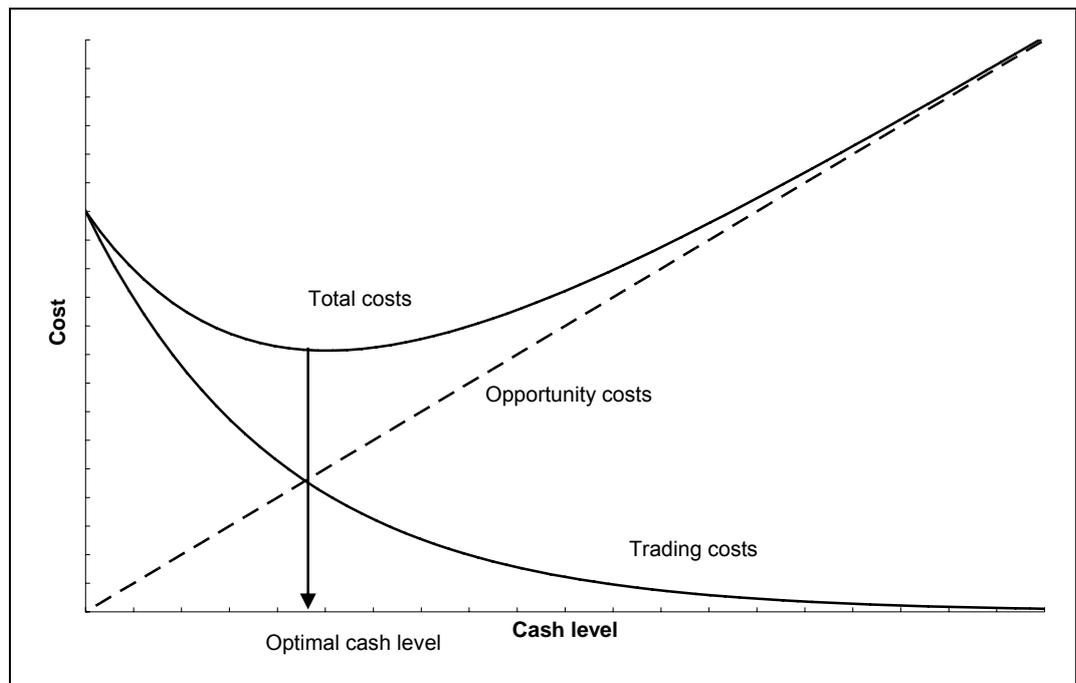
**Figure 4:** Graphic determination of the optimal cash level (draft)[1]

The optimal cash level has been determined graphically by identifying the minimum point of the total costs curve which again is defined by the addition of the opportunity costs and trading costs. This point can also be determined algebraically by differentiating the total costs equation which is defined as the addition of the two costs equations.[2]

### 2.3.2.2 Significance of the cash management model

The Baumol model presents an approach for determining the optimal balance between cash and marketable securities. Therefore, it can be useful in order to illustrate the crucial elements of the issue of cash management. This issue consists in finding a balance between a firm's cash holdings and the investment in marketable securities in order to optimize the availability of cash while maximizing the interest income for idle cash.

As it basically deals with the decision on the repartition of funds between investments of different liquidities, the model can be applied to the decision on the overall cash level, i.e. including cash equivalents. The associated costs would be similar, but a decision would have to be made between the investment in cash including cash equivalents and less liquid investments. Opportunity costs would be the same only that the foregone

[1] adapted from: Ross, S. et al. (2008), p. 772
[2] cp. Baumol, W. (1952), p. 548

returns would be related to any form of investment, with the exception of cash equivalents such as marketable securities. Trading costs would also be similar and would have to be generalized so as to contain all kinds of costs which occur when it is decided to liquidate an asset in order to generate cash.

### 2.3.3  Credit management

Credit management deals with the firm's decision on whether to grant credit to its customers and if so to determine the credit policy as well as the collection policy.[1] In this respect, decisions regarding credit management will have an impact on the selling firm's level of accounts receivable. This is due to the fact that the terms of credit have an impact on its customers' with less generous terms leading to decreased payment delays and thus augmented investment in accounts receivable and vice versa.[2]

#### 2.3.3.1  Credit policy

Credit policies can vary significantly depending on the industry sector[3], the country of origin[4] or the business' seasonality.[5] The terms of sale feature the due date for net payment and an optional cash discount for payments within a certain period.[6] For instance, terms of sale stated as '2/10, net 30' imply that either a 2 percent cash discount can be taken advantage of by the buyer if payment occurs within 10 days from the invoice date or net payment should occur within 30 days.[7] The longer the payment target and the higher the cash discount, the more generous the terms of sale. The terms of sale therefore reflect the selling firm's credit policy and its generosity. The selling firm's motivation for granting cash discount in this respect is to accelerate collections in order to optimize cash availability.[8]

#### 2.3.3.2  Optimal credit policy

Granting credit will have a positive impact on the firm's turnover by stimulating sales but it will also generate costs of holding accounts receivable and create the risk of losses due to bad debts.[9] The more generous the credit policy, the stronger the positive impacts on the firm's

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[1] cp. Brealey, R. & Myers, S. (2003), p. 909
[2] cp. Ross, S. et al. (2008), p. 797
[3] cp. Brealey, R. & Myers, S. (2003), p. 909
[4] cp. Intrum Justitia (2005), "European Payment Index – Spring 2005"
[5] cp. Ross, S. et al. (2008), p. 795
[6] cp. Brealey, R. & Myers, S. (2003), p. 910
[7] cp. ibid.
[8] cp. Ross, S. et al. (2008), p. 796
[9] cp. ibid. at p. 802

sales as well as on the associated costs.[1] Therefore, the financial manager's task is to find the optimal credit policy which minimizes the total costs of credit. The total costs of credit are defined as the addition of opportunity costs which arise from lost sales and carrying costs of accounts receivable.[2] Opportunity costs decrease when credit is extended to customers as more and more customers are attracted to the company which generate increasing sales and therefore decrease opportunity costs of foregone sales.[3] Carrying costs, however, increase in line with the credit extension since these costs incur due to the cash collection delay, the relative cost of capital tie-up, the increased probability of bad debt losses and the costs of managing credit, all of which are positively related to credit extension.[4] In this respect, the EOQ model is applicable to credit management by relating credit policy to associated costs.[5] Similarly to the model for inventory, the illustration shows decreasing opportunity costs and increasing carrying costs for increasing level of credit policy generosity.[6] The optimal credit policy can be found at the minimum point of the total costs curve.[7] The following graph illustrates this relationship in a way similar to the models for inventory and cash:
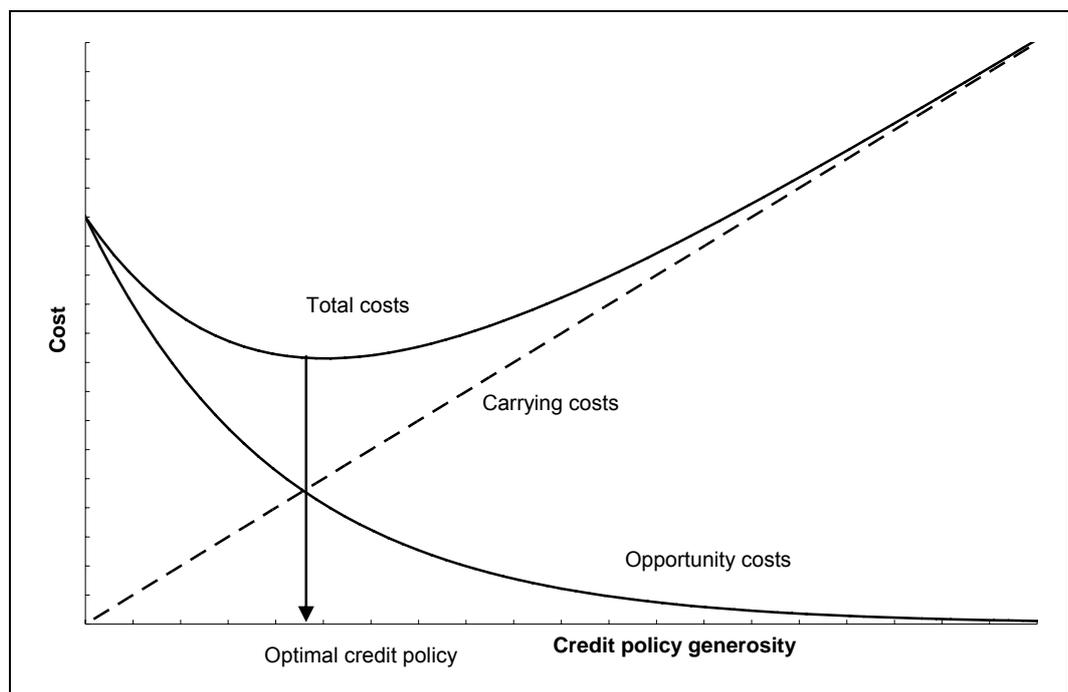


**Figure 5:** Graphic determination of the optimal credit policy (draft)[8]

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[1] cp. Ross, S. et al. (2008), p. 802
[2] cp. ibid.
[3] cp. ibid.
[4] cp. ibid.
[5] cp. ibid.
[6] cp. ibid.
[7] cp. ibid.
[8] adapted from: Ross, S. et al. (2008), p. 802

This graph demonstrates the basic relationship between credit policy generosity and associated costs which once again reflects the trade-off between risk and return which is common to all three types of current asset which are administered in working capital management. It should be noted that credit policy can influence several aspects of working capital management which are not contained in this simplified model and that the actual interrelation between the different variables is far more complex[1] than this model suggests. Different more elaborate models which can incorporate many more aspects are at the disposal of the financial manager in order to decide on the firm's optimal credit policy.[2] However, the purpose of the above illustration is merely to demonstrate the basic effect of credit policy on the associated carrying and opportunity costs and hereby establish a relationship between these costs.

### 2.3.3.3 Collection policy

Collection policy deals with the issue of collecting overdue receivables.[3] This aspect copes with monitoring receivables and taking appropriate actions when the account is overdue.[4] If a firm has an effective collection policy, this will reduce the probability of bad debts and decrease the cash collection period, hence decreasing the carrying costs of accounts receivable.[5] This again will have an impact on the optimal credit policy. In other words, if the firm collects its accounts receivable efficiently, it can resort to a more profitable credit policy.[6] The 'average collection period' or 'days sales outstanding' is a financial ratio which reflects the collection policy effectiveness by measuring "the average amount of time required to collect an account receivable".[7] By comparing the average collection period to the terms of sale the firm can keep track of its collection policy.[8]

## 2.3.4 Working capital policy

The overall way of managing working capital can differ significantly from firm to firm. Weston & Copeland refer to a company's approach as "working capital policy".[9] Working capital policy involves the decision on the level of current assets held by a company[10] as well as the decision on how these current assets ought to be financed.[11] The latter will not be

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[1] cp. Weston, J. & Copeland, T. (1986), pp. 345-346
[2] cp. ibid. at p. 346
[3] cp. Ross, S. et al. (2008), p. 804
[4] cp. ibid. at pp. 805-806
[5] cp. Ross, S. et al. (2008), p. 806
[6] cp. ibid.
[7] ibid. at p. 804
[8] cp. ibid. at p. 805
[9] Weston, J. & Copeland, T. (1986), pp. 277-285
[10] cp. ibid. at pp. 278-280
[11] cp. ibid. at p. 280-283

treated in this section as it is not of importance to the topic. Merely the investment in current assets and the optimal policy concerning the level of current assets will therefore be discussed in this section.

### 2.3.4.1 Investment in current assets

As shown above, the three components of working capital management imply separate yet similar associated costs and benefits. Therefore, it is evident that the level of current assets has an impact on the firm's profitability. For instance, a large inventory ties up capital but it prevents the company from detrimental production stoppages due to stock-out. A high level of current assets therefore means less risk to the company but also lower earnings due to capital tie-up.[1] Weston & Copeland refer to this interrelation as the "Risk-Return Tradeoff for Current Asset Investments".[2]

Tables 3 and 4 excerpt from Weston & Copeland's "Managerial Finance" ought to exemplify how different approaches to working capital management can influence a firm's profitability. It shows figures resulting from three different policies, namely 'conservative', 'middle-ground' and 'aggressive' in two settings which are characterized by different assumptions.[3] In this respect, the 'conservative' policy implies a higher ratio of current assets to sales while the 'aggressive' policy is characterized by a lower ratio of current assets to sales. The 'middle-ground' policy lies in between these two extremes. In Setting A, it is assumed that the working capital policy does not affect the EBIT rate as opposed to the situation in Setting B. Also, the working capital policies' impact on sales is stronger in Setting B than in Setting A.

| Setting A | Conservative | Middle-Ground | Aggressive |
|---|---|---|---|
| Sales | 110,000,000 | 105,000,000 | 100,000,000 |
| EBIT (rate: 15%) | 16,500,000 | 15,750,000 | 15,000,000 |
| Current assets | 70,000,000 | 55,000,000 | 40,000,000 |
| Fixed assets | 50,000,000 | 50,000,000 | 50,000,000 |
| Total assets | 120,000,000 | 105,000,000 | 90,000,000 |
| Return on assets | 13.75% | 15.00% | 16.67% |

**Table 3:** Different working capital policies and impacts on return on assets (setting A)[4]

In Setting A, the aggressive policy would lead to the most profitable result in terms of return on assets. This is due to the fact that the negative impact on sales is less significant than the positive impact on asset

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[1] cp. Weston, J. & Copeland, T. (1986), p. 278
[2] ibid.
[3] cp. Weston, J. & Copeland, T. (1986), p. 279
[4] excerpt from Weston, J. & Copeland, T. (1986), p. 279, Table 11.1

structure, i.e. reducing current assets. However, as Setting B shows, this does not mean that the most aggressive policy is always optimal.

| Setting B | Conservative | Middle-Ground | Aggressive |
|---|---|---|---|
| Sales | 115,000,000 | 105,000,000 | 80,000,000 |
| EBIT rate | 0.15 | 0.15 | 0.12 |
| EBIT | 17,250,000 | 15,750,000 | 9,600,000 |
| Total assets | 120,000,000 | 105,000,000 | 90,000,000 |
| Return on assets | 14.38% | 15.00% | 10.67% |

**Table 4:** Different working capital policies and impacts on return on assets (setting B)[1]

In this case, the aggressive policy considerably reduces sales and also has a negative impact on the EBIT rate. The authors do not elaborate on the reasons for the fact that the EBIT rate is affected by the firm's working capital policy. Presumably, the operating expenses increase significantly which could be due to uneconomic production stoppages caused by too little inventory, for instance. These increased costs again lower the EBIT. In Setting B, the decreased sales combined with the lower EBIT rate make the aggressive policy the least profitable one in terms of return on assets.

This example shows that working capital management can have a considerable effect on profitability which is confirmed by quantitative studies.[2] It also demonstrates that decision-makers should pay careful attention to the choice of policy since the negative effects of an aggressive policy can quickly outplay the positive ones.[3]

### 2.3.4.2 Optimal working capital policy

In order to determine the optimal policy, Ross et al. propose to integrate the different costs which are associated with the level of current assets in a model which then features carrying costs as well as shortage costs.[4] Carrying costs are those costs which augment analogically with the level of current assets, e.g. opportunity costs.[5] Shortage costs are those costs which decrease when the level of current assets increases, i.e. costs which incur when current assets level is low, e.g. costs of running out of cash or inventory.[6] If integrated in a diagram, these costs form curves which are similar to those in the above discussed models.[7] The optimal

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[1] excerpt from Weston, J. & Copeland, T. (1986), p. 279, Table 11.1
[2] cp. Deloof, M. (2003), pp. 573-587; cp. Shin, H-H. & Soenen, L. (1998), "Efficiency of Working Capital Management and Corporate Profitability", Financial Practice and Education, Vol. 8, Issue 2, pp. 37-45
[3] cp. Weston, J. & Copeland, T. (1986), p. 279
[4] cp. Ross, S. et al. (2008), p. 752
[5] cp. ibid.
[6] cp. ibid. at p. 753
[7] cp. Ross, S. et al. (2008), p. 754

investment in current assets can be found at the minimum point of the total costs graph.[1] Evidently, if "carrying costs are low or shortage costs are high"[2], the optimal level of current assets will be higher than in the opposite case.[3] The following illustrations demonstrate this relationship:
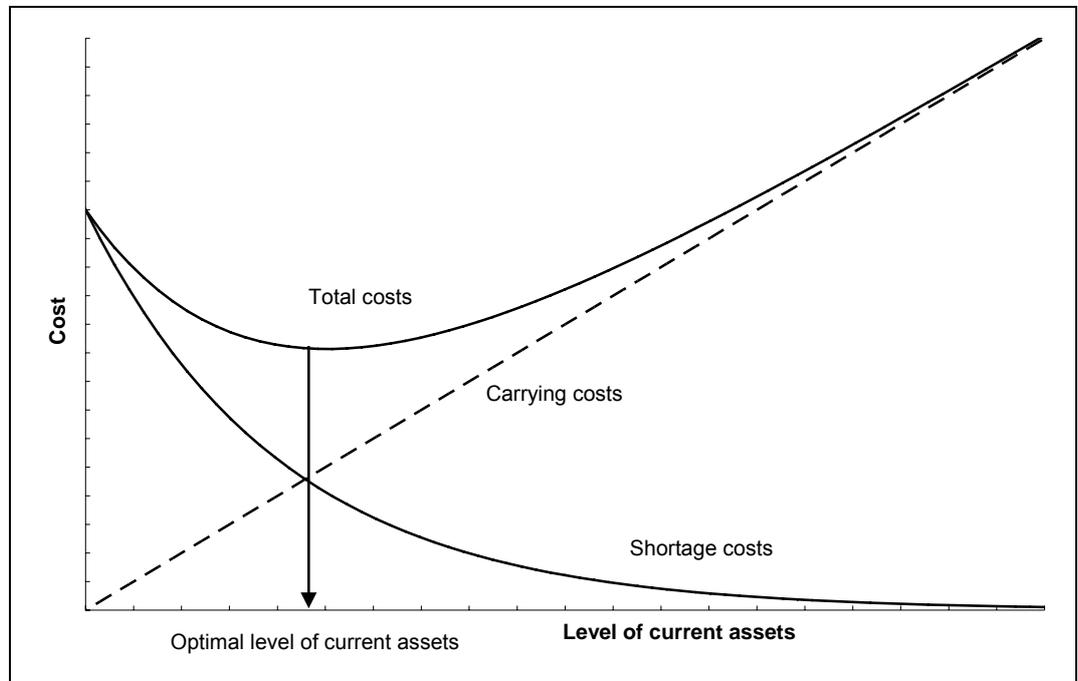


**Figure 6:** Graphic determination of the optimal level of current assets (draft)[4]

The following figure displays the same relationship. However, the carrying costs are considerably lower than in figure 6:

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[1] cp. ibid. at p. 752 and p. 754
[2] ibid. at p. 753
[3] cp. ibid. at p. 753
[4] adapted from: Ross, S. et al. (2008), p. 754
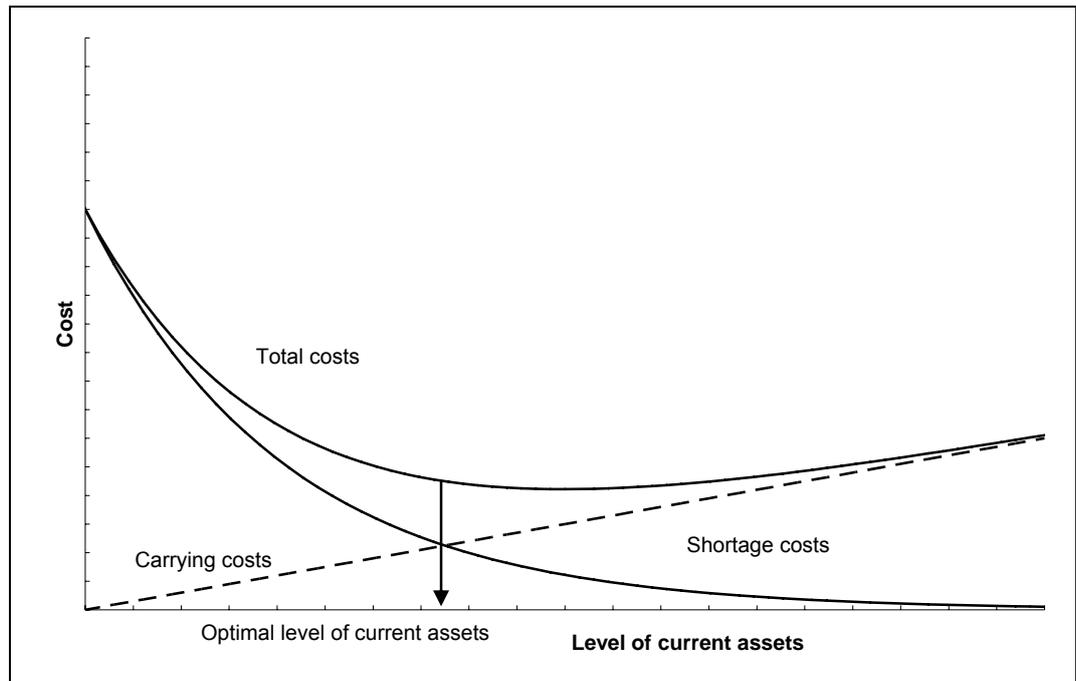
**Figure 7:** Graphic determination of the optimal level of current assets with decreased carrying costs (draft)[1]

The decreased carrying costs lead to a higher optimal level of current assets as predicted by Ross et al. A similar increase of the optimal level of current assets would occur in case of an augmentation in shortage costs.

This model can be consulted when the financial manager has to decide on the optimal investment in current assets.[2] Yet, it does not contain all relevant aspects. There are many more elements and interrelations which influence the profitability of a working capital policy[3], some of which are hardly measurable such as the impact of credit management on credit rating[4], for instance. These aspects are definitely beyond the scope of this work. However, the basic relationships which have been described in this section ought to suffice for its aim which is to show the determinants and implications of a firm's current assets level.

## *2.4 Cash level*

The following section aims at discussing cash level. For this purpose, the advantages and disadvantages are treated, potential determinants are discussed and a viewpoint on SMEs' cash holdings is presented.

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[1] adapted from: Ross, S. et al. (2008), p. 754
[2] cp. Ross, S. et al. (2008), p. 752
[3] cp. Weston, J. & Copeland, T. (1986), p. 280
[4] cp. Keown, A. et al. (2006), p. 478

### 2.4.1 Advantages & disadvantages of cash holding

The advantages of high cash level are numerous. The Keynesian motives which have been discussed in section 2.2 represent the basic reasons for holding cash.[1] In this respect, these motives characterize the fundamental advantages of cash. A high level of cash allows the firm to easily carry out the regular expenses of its ordinary business activity and it also permits the company to pay for unforeseen expenses.[2] If the cash level was too low and such an unexpected outflow occurred, the firm would have to either borrow the funds or forego the opportunity. Both alternatives obviously bring about significant costs. Short-term borrowing of funds can be extremely costly, e.g. trade credit financing[3], and foregoing the opportunity results in opportunity costs which represent the lost return of the rejected investment. Another advantage of high cash level which shall be mentioned is the aspect of creditworthiness. The cash related financial ratios are a crucial element of credit rating and therefore a high level of cash will result in good creditworthiness.[4] A strong credit standing will allow the firm to establish and maintain sound relationships with its suppliers and financial institutions, leading to advantageous benefits such as generous terms of purchase, for instance.[5]

The main disadvantage of a high cash level is the fact that it results in a significant capital tie-up. This is due to the fact that the funds that are used to maintain the cash holding at a high level can not be invested profitably.[6] Hence, a disadvantage of a high cash level is the aspect of foregone longer-term investments which create opportunity costs.[7] For instance, if a company pursues a policy of high cash level with a high safety stock of liquid funds, this can lead to unprofitable investment decisions if a potential longer-term investment is rejected in favour of the maintenance of cash.[8]

### 2.4.2 The determinants of cash level

Several studies have been conducted in order to detect determinants of cash level, i.e. factors which influence the amount of cash that is held by a firm. The issue has been a matter of interest for a long time with Frazer's

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[1] cp. Keynes, J. (1973), pp. 195-196
[2] cp. Ross, S. et al. (2008), p. 771
[3] cp. Van Horne, J. (1995), pp. 448-449
[4] cp. Weston, J. & Copeland, T. (1986), p. 292
[5] cp. ibid.
[6] cp. Keynes, J. (1973), p. 196
[7] cp. Ross, S. et al. (2008), p. 752
[8] cp. Keynes, J. (1973), p. 196

study[1] dating back to the year 1964. The aim of the following section is to present the theoretical view on the determinants of cash level by discussing relevant studies which have been conducted in this field.

The articles which have been analyzed investigated corporate cash holdings by means of quantitative studies which share a similar methodology, namely the analysis of financial information of a large sample of firms. Obviously, in the examined articles, cash level has been measured by a ratio – relative to total assets[2], for instance – and not as an absolute figure. Based on the methodology and the scientific background, the results can be evaluated as reliable. This is further confirmed by the fact that there are considerable congruencies among the different researchers' findings.

In order to simplify matters, the following tables recapitulate the main findings of these relevant scientific articles. The purpose of the tables is to give a brief overview of previous research in the field of cash level determinants in a compiled form. Presenting the numerous theoretical foundations in detail or discussing each single study's findings would clearly go beyond the scope of this work. The tables merely take factors into consideration which have been confirmed by more than one empirical study. This approach should allow the identification of the most important factors since many more could be imagined and have been analyzed by the mentioned authors.

First, factors which are positively related to cash level, i.e. factors which increase the cash level when their intensity is enhanced, are being presented.

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[1] cp. Frazer, W. (1964), "The Financial Structure of Manufacturing Corporations and the Demand for Money: Some Empirical Findings", The Journal of Political Economy, Vol. 72, Issue 2, pp. 176-183
[2] cp. Opler, T.; Pinkowitz, L.; Stulz, R.; Williamson, R. (1999), "The determinants and implications of corporate cash holdings", Journal of Financial Economics, Vol. 52, Issue 1, pp. 3-46, p. 17

| Factors that are positively related to cash level | Explanation |
|---|---|
| growth/investment opportunities[1] | - cash is held in order to finance upcoming investments[2]<br>- higher external financing costs due to information asymmetry[3]<br>- higher cash shortage costs when investment opportunities are ample[4] |
| cash flow magnitude[5] | - hierarchy theory[6]: firms primarily resort to internal financial resources for funding, thus high cash flows result in a high cash balance[7] |
| cash flow risk[8] | - risky cash flows lead to uncertainty[9] and therefore the 'precautionary-motive' is enhanced |
| cost of external finance[10] | - cash is held in order to minimize external financing needs[11] |

**Table 5:** Factors that are positively related to cash level

The second table illustrates those factors which are negatively related to cash holdings, i.e. factors which lead to decreasing cash holdings when the factors themselves are increasing in intensity.

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[1] cp. Opler, T. et al. (1999), p. 44; cp. García-Teruel, P. & Martínez-Solano, P. (2008), "On the Determinants of SME Cash Holdings: Evidence from Spain", Journal of Business Finance & Accounting, Vol. 35, Issue 1/2, pp. 127-149, p. 146; cp. Ferreira, M. & Vilela, A. (2004), "Why Do Firms Hold Cash? Evidence from EMU Countries", European Financial Management, Vol. 10, Issue 2, pp. 295-319, p. 317; cp. Colquitt, L.; Sommer, D.; Godwin, N. (1999), "Determinants of Cash Holdings by Property-Liability Insurers", The Journal of Risk and Insurance, Vol. 66, Issue 3, pp. 401-415, p. 413; cp. Kim, C.-S.; Mauer, D.; Sherman, A. (1998), "The Determinants of Corporate Liquidity: Theory and Evidence", Journal of Financial and Quantitative Analysis, Vol. 33, Issue 3, pp. 335-359, p. 355

[2] cp. García-Teruel, P. & Martínez-Solano, P. (2008), p. 130

[3] cp. ibid.

[4] cp. Ferreira, M. & Vilela, A. (2004), p. 299

[5] cp. Ferreira, M. & Vilela, A. (2004), p. 318; cp. García-Teruel, P. & Martínez-Solano, P. (2008), p. 146

[6] cp. Myers, S. & Majluf, N. (1983), "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have"

[7] cp. García-Teruel, P. & Martínez-Solano, P. (2008), p. 132

[8] cp. Opler, T. et al. (1999), p. 44; cp. Kim, C.-S. et al. (1998), p. 355; cp. Colquitt, L. et al. (1999), p. 413

[9] cp. Opler, T. et al. (1999), p. 9

[10] cp. Kim, C.-S. et al. (1998), p. 355; cp. Opler, T. et al. (1999), p. 44

[11] cp. Kim, C.-S. et al. (1998), p. 355

| Factors that are negatively related to cash level | Explanation |
|---|---|
| company size[1] | <ul><li>economies of scale in cash management[2]</li><li>raising external funds is less expensive for larger firms due to fixed costs of borrowing[3]</li><li>larger firms are less likely to get into financial distress situations due to increased diversification[4]</li></ul> |
| creditworthiness[5] | <ul><li>better access to external finance[6] and therefore lower costs of running out of cash</li></ul> |
| liquidity of assets[7] | <ul><li>presence of liquid assets such as accounts receivable or inventory can substitute for cash holding[8]</li></ul> |
| leverage[9] | <ul><li>a high level of leverage implies increased monitoring of the firm which leads to a stronger urge towards the firm's managers to reduce excess cash[10]</li></ul> |
| investor protection[11] | <ul><li>Good investor protection in a country leads to increased shareholder influence who will insist on minimizing idle cash in order to maximize earnings as opposed to the managers of a firm who will tend to accumulate cash[12]</li></ul> |

**Table 6:** Factors that are negatively related to cash level

Obviously, the above-mentioned relationships also allow for reverse conclusions. That is to say that a positive factor which is decreasing in intensity will have a negative effect on cash holdings and vice versa. It can be observed that the explanations which back the factors can be subsumed into three basic aspects which influence a firm's cash holding: The cost of running out of cash, the holding of cash as secure investment funds and the aspect of monitoring of the firm.

As the costs of running out of cash – which are composed of cost of and access to external finance, cost of financial distress and presence or lack of liquid assets as cash substitutes – increase, the firm will tend to hold

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[1] cp. Frazer, W. (1964), p. 183; cp. Opler, T. et al. (1999), p. 44; cp. Mulligan, C. (1997), "Scale Economies, the Value of Time, and the Demand for Money: Longitudinal Evidence from Firms", The Journal of Political Economy, Vol. 105, Issue 5, pp. 1061-1079, p. 1075 ; cp. Colquitt, L. et al. (1999), p. 413; cp. Lotti, F. & Marcucci, J. (2007), "Revisiting the empirical evidence on firms' money demand", Journal of Economics & Business, Vol. 59, Issue 1, pp. 51-73, p. 72; cp. Ferreira, M. & Vilela, A. (2004), pp. 317-318
[2] cp. Mulligan, C. (1997), p. 1075
[3] cp. Ferreira, M. & Vilela, A. (2004), p. 299
[4] cp. ibid.
[5] cp. Opler, T. et al. (1999), p. 44; cp. Ferreira, M. & Vilela, A. (2004), p. 318
[6] cp. Opler, T. et al. (1999), p. 9
[7] cp. Ferreira, M. & Vilela, A. (2004), p. 317; cp. García-Teruel, P. & Martínez-Solano, P. (2008), p. 146
[8] cp. García-Teruel, P. & Martínez-Solano, P. (2008), p. 132
[9] cp. Ferreira, M. & Vilela, A. (2004), p. 317; cp. Colquitt, L. et al. (1999), p. 413
[10] cp. Colquitt, L. et al. (1999), p. 407
[11] cp. Ferreira, M. & Vilela, A. (2004), p. 318; cp. Dittmar, A.; Mahrt-Smith, J.; Servaes, H. (2003), "International Corporate Governance and Corporate Cash Holdings", Journal of Financial and Quantitative Analysis, Vol. 38, Issue 1, pp. 111-133, p. 132
[12] cp. Dittmar, A. et al. (2003), pp. 116-117

more cash. This relationship is consistent with the risk return trade-off theory of working capital management which claims that cash holdings augment with increasing shortage costs.[1]

The holding of cash as secure investment funds can be explained by the Keynesian 'precautionary-motive'. As the likelihood of unsuspected expenses and revenues increases, such as in the environment of strong growth or highly risky cash flows, a company's cash holdings will be extended as well due to an increase in intensity of Keynes' 'precautionary-motive'.[2]

The aspect of monitoring is based on the assumptions of the 'agency problem' theory which claims that a company's management will not always act in the best interest of its ownership.[3] In the context of cash management, this means that managers will tend to hold unprofitable high cash balances if they are "less concerned with shareholder wealth"[4] because "[c]ash reduces the pressure to perform well".[5] Therefore, if the shareholders' influence increases – by better investor protection or increased leverage, for instance – and therefore the company is more closely monitored, the urge to reduce cash balances is enhanced.[6]

### 2.4.3 Cash level in SMEs

Little empirical research has been conducted in the specific field of cash holding determinants with regards to SMEs. However, although most of the above findings which are mainly based on studies of large firms can be applied to SMEs, some discrepancies have been detected by researchers who have studied the cash holdings of SMEs.

Faulkender as well as García-Teruel & Martínez-Solano find that there is a positive relationship between leverage and cash holdings[7]; a finding which contradicts the above result in table 6. Faulkender explains this outcome by declaring that SMEs "perceive greater benefits from stockpiling cash than they do from using the cash to reduce their debt".[8] Furthermore, the author states that working capital management has a different effect on

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[1] cp. section 2.3.4.2
[2] cp. Keynes, J. (1973), p. 196
[3] cp. Ross, S. et al. (2008), pp. 13-15
[4] Dittmar, A. et al. (2003), p. 116
[5] Ferreira, M. & Vilela, A. (2004), p. 296
[6] cp. ibid. at p. 301
[7] cp. García-Teruel, P. & Martínez-Solano, P. (2008), p. 144; cp. Faulkender, M. (2004), "Cash Holdings Among Small Businesses", p. 11
[8] Faulkender, M. (2004), p. 3

cash level for small firms than for larger ones.[1] He detects ambiguous results concerning the effect of working capital on cash level which do not confirm findings which have been made for larger firms.[2] Therefore, he calls for further research in this specific field of study.[3] This circumstance enhances my motivation for studying the effect of working capital management on cash holdings which was initially based on the significance of working capital management for SMEs.

## *2.5   Hypotheses*

This section is dedicated to the formulation and theoretical argumentation of the main and subordinate hypotheses which shall be analyzed in the subsequent empirical part of this work. As shown above, working capital management is especially significant to SMEs for several reasons. Since access to external finance is likely to be restricted[4], small and medium-sized firms have to rely on the funds which are generated internally, i.e. cash flow. These funds depend heavily on the quality of working capital management as it deals with the management of current assets in order to maximize availability while reducing costs. The costs of running out of cash can be extremely severe for SMEs as credit worthiness can be affected when accounts payable are stretched due to lack of external finance. A damaged creditworthiness can put the whole enterprise at risk.

For these reasons, I believe that an SME's management of working capital should have the greatest impact on its cash level. The following hypotheses aim at illustrating the relationship between cash level and the other elements of working capital which are expected from the theoretical foundations which have been discussed in the previous sections.

### 2.5.1   Hypothesis 1

As shown in section 2.3.4.2, the level of current assets is influenced by carrying costs as well as shortage costs. In this respect, the optimal cash level was determined by opportunity costs of holding cash and the costs which are associated with running out of cash. The opportunity costs will not be discussed as they are related to interest rates and other external factors the treatise of which would clearly go beyond the scope of this paper. However, shortage costs can be approached from a working capital perspective and therefore constitute an interesting potential determinant of

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[1] cp. Faulkender, M. (2004), p. 12
[2] cp. Opler, T. et al. (1999), p. 24
[3] cp. Faulkender, M. (2004), p. 4
[4] cp. section 1.1.2

cash level. Keynes mentions the significance of this type of costs claiming that increased shortage costs should lead to the strengthening of his two first motives for holdings cash, thus leading to augmented cash holdings.[1] Section 2.4.2 discussed previous comparable studies and also highlighted the importance of shortage costs.

Shortage costs are obviously composed of several aspects such as access to external finance and cost of financial distress. One of these aspects, namely the presence or lack of cash substitutes shall be of interest for the first hypothesis as it can be interpreted from a working capital perspective. Inventory and accounts receivable as liquid assets represent such substitutes for cash. The presence of cash substitutes ought to diminish cash holdings because cash substitutes decrease shortage costs. If highly liquid cash substitutes are present, less cash per se needs to be held. From this point of view, no concrete prediction can be made with regard to the influence of short-term liabilities on cash level. However, it could be argued that short-term liabilities represent the opposite of a cash substitute and should therefore tend to increase cash holdings. All in all, cash levels are expected to decrease with increasing presence of cash substitutes:

- H1: Cash holdings are negatively related to the presence of cash substitutes, i.e. negatively related to the level of working capital net of cash
    - H1a: Cash holdings are negatively related to the level of inventory
    - H1b: Cash holdings are negatively related to the level of accounts receivable
    - H1c: Cash holdings are positively related to the level of short-term liabilities

The subordinate hypotheses ought to give a more detailed insight into the issue in order to differentiate between the components of working capital. This will allow finding out which of these components has the strongest influence on cash level.

### 2.5.2 Hypothesis 2

The cash conversion cycle is a concept which demonstrates working capital management efficiency as it illustrates how quickly a firm converts

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[1] cp. section 2.2.4

its current assets, namely inventory and accounts receivable, into cash. In this respect, a short cash conversion cycle indicates a strong efficiency of working capital management and vice versa. A strongly efficient working capital management thus implies that inventory and accounts receivable are quickly converted to cash. This aspect can be related to the previous quantitative studies which are presented in section 2.4.2 in that improved working capital management efficiency leads to increased cash flows. Cash flow magnitude has been shown to be positively related to cash holdings.

Obviously, emphasis is placed on the asset side of working capital, i.e. DSO and DSI. However, DPO is also a component of the cash conversion cycle and it is expected that there will be a positive relationship to cash because stretching accounts payable will lead to a decreased cash conversion cycle and therefore to increased cash availability. As shown above, a short cash conversion cycle should lead to increased cash holdings and the second hypothesis thus reads as follows:

- H2: Cash holdings are positively related to working capital management efficiency, i.e. negatively related to the cash conversion cycle
    - H2a: Cash holdings are negatively related to DSI
    - H2b: Cash holdings are negatively related to DSO
    - H2c: Cash holdings are positively related to DPO

The three subordinate hypotheses which contain the components of the cash conversion cycle ought to provide a more detailed insight into the effect of the cash conversion cycle on cash holdings. Once again a differentiation will allow detecting the impact of the individual components of the cash conversion cycle.

# 3   Methodology

This section describes and justifies the methodological approach that has been employed. Afterwards, this study's research quality as well as strengths and limitations are discussed.

## 3.1   Research aim

The purpose of this research is to find relevant working capital management related determinants of cash level in Swedish manufacturing SMEs. The research is based on the statistical analysis of companies' financial information. The results will either confirm or reject the hypotheses which are based on theoretical foundations. Therefore, the detection of statistical relationships between different variables which allow for a reliable evaluation of the hypotheses is the primary research aim.

## 3.2   Research design

The above described research aim clearly calls for a quantitative research design. According to Creswell, the knowledge claim of this work is a 'postpositivist' one, i.e. there is a need to investigate cause-effect relationships.[1] In this particular case, the effect is the company's cash level and the research is targeted at identifying significant causes, i.e. determinants of cash level related to working capital management.

The approach of measuring certain characteristics and their interrelation is labelled as "descriptive research"[2] by Hair as opposed to "exploratory research"[3] which aims at discovering new knowledge in a field of study for which relatively little information exists. In this respect, a lot of studies have been conducted in the field of cash level and an alternative approach which is based on existing knowledge has been developed. This alternative approach will be tested in the specific environment of Swedish manufacturing SMEs. The research method is based on numeric data which shall be analyzed with statistical procedures[4], namely comparison of means and correlation analysis.

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[1] cp. Creswell, J. (2003), "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches", Second Edition, Thousand Oaks: Sage Publications, pp. 6-8
[2] Hair, J.; Babin, B.; Money, A.; Samouel, P. (2003), "Essentials of Business Research Methods", New York: Wiley, p. 60
[3] ibid. at p. 57
[4] cp. Creswell, J. (2003), p. 19

The test of hypotheses clearly demands a descriptive research with its "confirmatory"[1] approach which is proclaimed by Hair. He distinguishes between "cross-sectional studies"[2], i.e. data are gathered at one single point in time, and "longitudinal studies"[3], i.e. analyzing data from a certain period of time. Although data from at least four years are available, a longitudinal study has not been envisaged because the research problem does not imply a comparison of different periods or a temporal development. The accounting year 2006 has been chosen as the period of reference. This is due to the fact that more data from this period were available than for 2007.

## *3.3   Sampling*

This section first describes the motivation for the selection of the sample firms. Afterwards, the sampling procedure which has been employed in order to obtain the dataset is described.

### 3.3.1   Choice of sample

The decision to focus on manufacturing companies is based on two aspects. First, manufacturing companies represent an appropriate sample in order to analyze working capital management because all three components usually play an important role in the manufacturing sector and therefore comparability of the sample companies is enhanced. Service companies, for instance, will most probably hold much less inventory and accounts receivable and thus represent a less reliable source of information for this paper's specific field of study. Second, manufacturing companies are an important sector for the Swedish economy and the legal form of 'Aktiebolag' is prevalent among manufacturing firms.[4] This aspect should increase the results' significance and external validity.[5]

### 3.3.2   Sampling procedure

The sample contains SMEs of the Swedish legal form 'Aktiebolag', i.e. joint stock company [6], which are featured in the Swedish business database 'Affärsdata'. This is due to the fact that their data are easily achievable and complete. The sample companies have been selected and filtered according to the European Commission's definition of SMEs, i.e. companies with less than 250 employees and an annual turnover of

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[1] Hair, J. et al. (2003), p. 60
[2] ibid. at p. 61
[3] ibid. at p. 62
[4] cp. Statistics Sweden (2008), p. 181
[5] cp. section 3.6
[6] translation: cp. Statistics Sweden (2008), p. 181

maximum EUR 50m (ca. SEK 472m) or a balance sheet total of less than EUR 43m (ca. SEK 406m).[1] [2] The Swedish industry sector codes (SNI codes) 10-33 which represent the manufacturing sector[3] have been applied to the search process.

The search engine's output contained 22,363 active manufacturing SMEs for the accounting year 2006. The dataset nevertheless comprised firms with a turnover of SEK 0. These companies were excluded since it can be assumed that they were not active during the inspected period of time. In order to be able to calculate the required variables, all companies which displayed inadequate values, such as 0 or missing value, in the necessary fields were excluded.

Given the fact that working capital management constitutes the basis for this paper, companies with 0 or missing value for one of the components of working capital have been excluded. A truncation has been applied to the resulting dataset in order to remove outliers. The cash conversion cycle has been chosen as the variable of reference for this procedure because it illustrates a firm's working capital management in a compiled form and therefore represents an appropriate variable for the detection of outliers with regard to working capital. Ordered by cash conversion cycle, the bottom and top 5% companies have been deleted from the dataset. Appendix B contains the exact procedure of sampling and exclusion which ultimately led to the final sample containing 13,287 Swedish manufacturing SMEs.

## *3.4 Variables*

The hypothesis section already mentioned the determinants which ought to be analyzed. The following part aims at defining and explaining the variables which have been used in order to measure these determinants. A detailed description of the variables and their calculation can be found in Appendix A.

Cash level has been calculated as the ratio of cash to total assets. It should be remembered in this context that cash equals cash plus cash equivalents. This ratio therefore reflects the relative holding of highly liquid assets of the firm. This variable has been denominated as 'Cash'.

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[1] cp. section 2.1.1
[2] A conversion rate of SEK/EUR 9.44 has been applied.
[3] cp. http://www.sni2007.scb.se/snihierarki2007.asp?sniniva=A&snikod=C

The ratio of working capital net of cash to total assets is a variable which measures the presence of cash substitutes in that it calculates the existence of liquid assets other than cash diminished by short-term liabilities. The subordinate variables are also divided by total assets and are examined separately in order to allow for a differentiated analysis. This variable has been denominated as 'NWC'. Its subordinate components have been tagged as 'INV' (inventory / assets), 'A/R' (accounts receivable / assets) and 'STL' (short-term liabilities / assets).

The cash conversion cycle has been calculated in the same way as it has been defined in section 2.1.8. Its subordinate components have been denominated as described in sections 2.1.5 – 2.1.7: 'DSI', 'DSO' and 'DPO'. The variable name for the cash conversion cycle is 'CCC'.

In this study, the cash to assets ratio is the dependent variable. In this respect, the aim of the empirical part of this paper is to analyze the impact of the independent variables, i.e. working capital net of cash ratio and the cash conversion cycle, including their subordinate components, on the dependent variable.

## 3.5 Statistical methods

The empirical results have been achieved by two kinds of statistical methods, namely univariate and bivariate analysis. This decision is based on the fact that the methods that have been employed present simple but significant tools in order to describe and analyze statistical relationships between the dependent variable and the independent variables. A similar procedure has been carried out by some of the empirical studies[1] that have been presented in section 2.4.2. The analysis of results consists of the interpretation of the two tables which feature the univariate and bivariate results.

The univariate analysis is based on the comparison of the inspected variables' means by cash level quartile. This comparison is achieved by ordering the dataset ascending by the variable 'Cash' and afterwards dividing it into four equally sized segments, i.e. quartiles. The first quartile therefore contains the 3,322 companies with the lowest cash to assets ratios. Subsequently, the means of the independent variables are calculated for each quartile. The results are presented in form of a table.[2]

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[1] cp. García-Teruel, P. & Martínez-Solano, P. (2008); cp. Opler, T. et al. (1999); cp. Ferreira, M. & Vilela, A. (2004)
[2] cp. table 9 in section 4.3

The bivariate analysis consists of a correlation analysis. The Pearson correlation coefficients for the different variables are computed and presented in form of a correlation table[1] which features the correlation coefficients as well as a measure of significance. The Pearson correlation coefficients have been calculated for all possible combinations of variables although not all of the figures will be needed for the analysis.

## 3.6 Research quality

The following part aims at confirming the research quality by discussing the main threats to validity. According to Creswell, there are four different types of threat to validity when doing quantitative research[2]: Threats to 'internal', 'external', 'statistical conclusion' and 'construct' validity.

Internal validity threats can arise when "inadequate procedures"[3] are being used or if the participants' responses are somehow affected by changed opinion, for instance.[4] In this case, there are no actual participants, only measurements of the sample companies' financial performance. In this respect, the latter issue can be neglected. The first threat, however, could occur within this research. Therefore, it has been ensured that the internal validity threat is kept at a low level by making sure that the methods of measurement such as the financial ratios are adequately calculated and not modified during the measurement process. The exact definition and mathematical derivation of the variables are explained in Appendix A.

External validity threats result from drawing false conclusions from the measured data by extending the results to different settings.[5] Evidently, the sample only contains Swedish SMEs and therefore the results are not definitely applicable to any company from a different country or size class. In order to avoid the threat to external validity, it has been made sure that the sample represents the population in the best possible way by selecting a rather large sample and by delimiting the population as well as the sample to companies from the manufacturing sector. The sample is briefly described in section 4.1 of this work. Due to its significant size it can be

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[1] cp. table 10 in section 4.4
[2] cp. Creswell, J. (2003), p. 171
[3] ibid.
[4] cp. ibid.
[5] cp. ibid.

assumed that the sample appropriately reflects reality in the corresponding population and therefore external validity should be at a high level. [1]

Statistical conclusion validity is violated if the researcher uses "inadequate statistical power"[2] or infringes statistical assumptions.[3] This threat has been avoided by justifying and explaining the statistical methods, that is comparison of means and correlation analysis. Furthermore, the calculation of significance levels[4] for the correlation analysis should reduce the emergence of potential threats to statistical conclusion validity.

Threats to construct validity appear when "investigators use inadequate definitions and measures of variables".[5] Obviously, there are many approaches to defining a variable which is supposed to measure a certain characteristic. Hence, this threat has been avoided by clearly defining the variables. Furthermore, their use has been justified and the theoretical foundation has been discussed extensively.

## *3.7 Strengths*

The major strength of this study is its potential external validity, i.e. the possibility to generalize the results of the sample to its population. This strength stems from the large size of the sample. With its 13,287 companies, the survey sample features more than half of the survey population, i.e. Swedish manufacturing SMEs of the legal form 'Aktiebolag', which add up to 22,363 for the year 2006. The survey population again can be assumed to represent a significant portion of the total population (Swedish manufacturing SMEs) as 'Aktiebolag' firms are the most recurrent legal form in the manufacturing sector with a 46% share.[6] From these figures, a very considerable empirical significance of the achieved results can be deduced.

The empirical data are quite recent, dating back to the year 2006. Furthermore, there are no erroneous of falsified data because the dataset consists of figures stemming from the official annual financial statements. Outliers and erroneous data have been excluded from the dataset.[7] This should further enhance the empirical study's significance.

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[1] cp. section 3.7
[2] Creswell, J. (2003), p. 171
[3] cp. ibid.
[4] cp. Watsham, T. & Parramore, K. (1997), "Quantitative Methods in Finance", First Edition, London: Thomson Learning, p. 171
[5] Creswell, J. (2003), p. 171
[6] cp. Statistics Sweden (2008), p. 181
[7] cp. Appendix B

## 3.8   Limitations

A potential limitation could be the fact that only manufacturing SMEs of one legal form, namely 'Aktiebolag' are contained in the dataset. It could be possible that these companies exhibit features which are considerably different from other legal forms. If these differences exist and they have a significant impact on the results in that they influence working capital management or cash holdings, the study's external validity could be affected. However, this issue has been discussed in the previous section and it seems that it is negligible as 'Aktiebolag' companies are prevalent in the manufacturing sector.

The second limitation deals with the interpretation of the inquired results. As the dataset contains merely numerical data, its analysis could be restricted due to the lack of qualitative elements. It has been attempted to limit this weakness by selecting unambiguous variables which are clearly based on theoretical foundations. Furthermore, the analysis of results will be considerate of several alternative explanations in order not to merely present a one-sided approach.

# 4 Presentation of empirical data

This section is dedicated to the presentation of the empirical data which have been collected. First of all, the dataset will be described and afterwards the variables which are under consideration will be treated. For this purpose, the descriptive statistics will first be presented after which the presentation of the univariate as well as bivariate results will follow.

## 4.1 Description of dataset

The definition of the European Commission has been implemented in order to arrive at the sample. That is to say, the dataset consists of Swedish manufacturing companies of the legal form 'Aktiebolag' with less than 250 employees and an annual turnover of maximum EUR 50m (SEK 472m) or a balance sheet total of maximum EUR 43m (SEK 406m). The following section aims at giving a brief overview of the sample firms' basic characteristics. The figures which are featured are of no significance for the research but they ought to provide a concise and compiled picture of the sample companies.

The sample companies are located all over Sweden. The 'län', i.e. Swedish county, which is represented by the most companies is 'Västra götalands län' with 18% of the sample firms. 'Stockholms län' (13.7%) and 'Skåne län' (12.5%) also stand out by comprising a considerable amount of manufacturing SMEs while each of the remaining 18 läns represent inferior figures ranging between 0.5 and 8% of the Swedish manufacturing SMEs. Apart from the fabricated metal products sector which represents 23.2% of the sample companies, there is no particular sector which stands out significantly. These numbers indicate that the sample depicts an appropriate representation of the Swedish manufacturing sector with regard to SMEs since population and economic contribution of the different läns [1] as well as the different activity sectors within the manufacturing sector is reflected in these figures.[2] Appendix C contains detailed tables and figures on these aspects.

The following table ought to give a concise impression of the sample companies. It illustrates the descriptive statistics of different relevant features, namely number of employees, company age, turnover and

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[1] cp. Statistics Sweden (2008), p. 184
[2] cp. ibid. at p. 179

annual result. All following features are available for the totality of the 13,287 observations.

| | Mean | Std. Deviation | 1st quartile | Median | 3rd quartile | Min. | Max. |
|---|---|---|---|---|---|---|---|
| No. of Employees | 16 | 28 | 3 | 7 | 17 | 0 | 248 |
| Age [years] | 23 | 16 | 12 | 19 | 28 | 2 | 111 |
| Turnover [k SEK] | 30,316 | 59,894 | 3,053 | 8,370 | 25,931 | 7 | 471,994 |
| Annual Result [k SEK] | 1,040 | 7,760 | 19 | 187 | 818 | -633,046 | 153,517 |

**Table 7:** Descriptive statistics of relevant sample features

The following graphs illustrate the repartition of the sample companies according to their number of employees and turnover in form of histograms. The diagrams should give an impression of the enterprise size class which is prevalent in the sample.
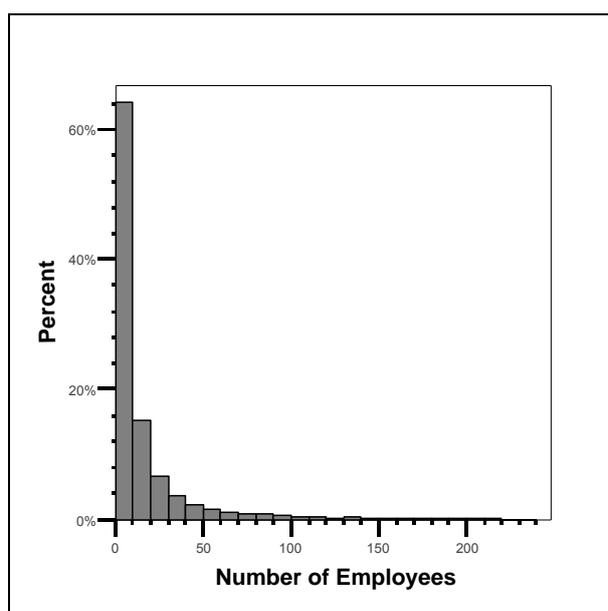


**Figure 8:** Histogram featuring number of employees

The histogram illustrates that companies with very few employees are in the majority. The following figure displays a histogram featuring turnover:
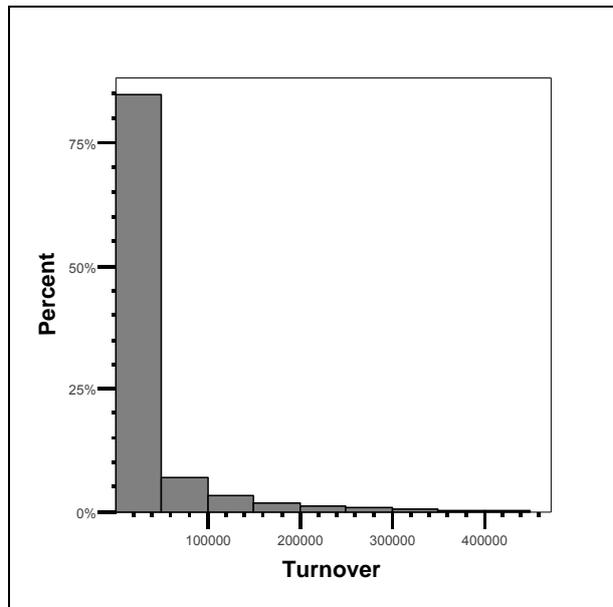
**Figure 9:** Histogram featuring turnover (k SEK)

The illustrations suggest that very small or 'Micro' enterprises represent the majority of the dataset. The following chart depicts the repartition between Micro, Small and Medium-sized enterprises according to the EU definition.
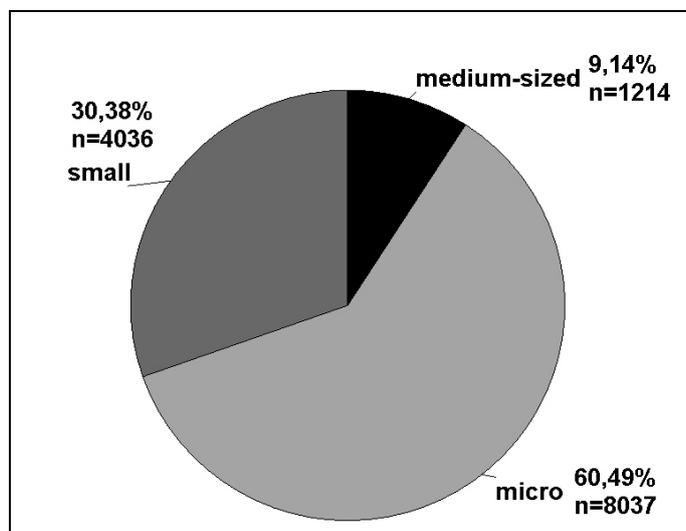


**Figure 10:** Repartition of micro, small and medium-sized enterprises among the sample firms

In fact, micro enterprises represent the largest subgroup in the sample with over 60% followed by small enterprises with 30%. The dataset contains merely 1,214 medium-sized companies, a share of approximately 9%.

The following section presents the empirical results which have been extracted from the dataset. First, the descriptive statistics of the employed variables will be presented. Afterwards, the univariate analysis and lastly the bivariate analysis will be presented. Appearing discrepancies between the main variables and the total of their components are due to rounding errors as the main variables have been computed using the exact data from the sample. All following calculations were achievable for each sample company. Therefore there is not one missing value for any of the variables and statistics which are displayed in the following three tables.

## 4.2 Descriptive statistics

The following table recapitulates the descriptive statistics for the variables which constitute the basis for the empirical analysis. The main variables are in bold typeset and its subordinate components, i.e. secondary variables, are listed below their respective main variable. In this context, it ought to be referred to Appendix A which contains the exact procedure for the calculation of these variables.

|  | Mean | Std. Deviation | Min. | 1$^{st}$ quartile | Median | 3$^{rd}$ quartile | Max. | Observations |
|---|---|---|---|---|---|---|---|---|
| **Cash** | **0.1501** | **0.1727** | **0.0000** | **0.0123** | **0.0852** | **0.2313** | **0.9370** | **13,287** |
| **NWC** | **0.0345** | **0.2266** | **-3.7115** | **-0.0881** | **0.0346** | **0.1755** | **0.8682** | **13,287** |
| INV | 0.2137 | 0.1684 | 0.0002 | 0.0763 | 0.1787 | 0.3128 | 0.9535 | 13,287 |
| A/R | 0.2443 | 0.1519 | 0.0001 | 0.1306 | 0.2220 | 0.3345 | 0.9293 | 13,287 |
| STL | 0.4235 | 0.2176 | 0.0000 | 0.2675 | 0.3936 | 0.5500 | 3.8899 | 13,287 |
| **CCC** | **64.29** | **38.31** | **0.92** | **35.36** | **58.01** | **87.09** | **182.64** | **13,287** |
| DSI | 46.74 | 38.53 | 0.06 | 16.89 | 37.64 | 66.41 | 495.06 | 13,287 |
| DSO | 46.19 | 25.32 | 0.01 | 29.99 | 44.13 | 59.01 | 322.58 | 13,287 |
| DPO | 28.64 | 22.09 | 0.02 | 14.75 | 24.55 | 36.56 | 425.60 | 13,287 |

**Table 8:** Descriptive statistics of variables

The variable 'Cash' designates the ratio of cash to assets. In this respect, cash includes marketable securities or other highly liquid assets which are listed as cash equivalents in the annual report. The range comprises all kinds of different cash holdings from 0 to nearly 94% of assets. The median indicates that the mean is a little inflated due to the upper extremes and outliers. The standard deviation is rather significant thus indicating that the dataset contains a very broad sample of companies with different cash holdings.

'NWC' designates the ratio of working capital net of cash to assets. In the following, it will be referred to as 'Net Working Capital' ('NWC'). The subordinate components of 'NWC' are the inventory to assets ratio ('INV'),

the accounts receivable to assets ratio ('A/R') and the short-term liabilities to assets ratio ('STL'). 'NWC' measures the repartition between current assets other than cash and current or short-term liabilities. A negative value indicates that liabilities outweigh assets and vice versa. 'NWC' exhibits a very significant standard deviation.

'CCC' designates the cash conversion cycle. Its subordinate components are listed below, namely the days sales of inventory ('DSI'), the days sales outstanding ('DSO') and the days payable outstanding ('DPO'). The unit of measurement is days. Thus, the mean 'CCC' of roughly 64 days signifies that the sample companies' average time gap between payment for inventory and receivables collection amounts to 64 days. 'DPO' is inferior to 'DSO', meaning that the sample companies averagely take longer to collect their bills than to pay their bills. The 'DSI' values indicate that inventory is held for an average of 47 days. Similarly to cash holdings, the rather significant standard deviation alludes to a broad variety of approaches to managing inventory.

## *4.3  Univariate results*

The following table illustrates the results of a univariate analysis, namely the comparison of means. The independent variables' means have been calculated for each quartile of the dependent variable's mean. The 1st quartile therefore features companies which hold very low cash levels with cash to assets ratios spanning from 0 to 0.0123 and a mean of 0.0036 while the 4th quartile exhibits firms with very considerable cash holdings with an average of 0.4025 and a range of 0.2313 to 0.9370. The independent variables including subordinate components are listed below.

|  | 1st quartile | 2nd quartile | 3rd quartile | 4th quartile |
|---|---|---|---|---|
| **Cash** | **0.0036** | **0.0433** | **0.1512** | **0.4025** |
| Minimum | 0.0000 | 0.0123 | 0.0853 | 0.2313 |
| Maximum | 0.0123 | 0.0852 | 0.2313 | 0.9370 |
| **NWC** | **0.0734** | **0.0640** | **0.0352** | **-0.0346** |
| INV | 0.2791 | 0.2462 | 0.1937 | 0.1357 |
| A/R | 0.2626 | 0.2621 | 0.2503 | 0.2021 |
| STL | 0.4684 | 0.4442 | 0.4088 | 0.3724 |
| **CCC** | **74.83** | **68.14** | **61.05** | **53.13** |
| DSI | 59.56 | 51.7 | 41.55 | 34.14 |
| DSO | 49.54 | 48.05 | 46.44 | 40.72 |
| DPO | 34.27 | 31.62 | 26.93 | 21.73 |

**Table 9:** Comparison of means

It can be observed that firms with rather low cash holdings exhibit a considerable amount of inventory and accounts receivable but also rather significant short-term liabilities. The 4th quartile which contains companies with very high cash levels features a negative net working capital, i.e. the short-term liabilities outbalance the sum of inventory and accounts receivable. While an apparent steady negative relation exists between all three components of net working capital, the impact of inventory seems to be the most significant one, decreasing by nearly 50% from the 1st to the 4th quartile. The decrease in accounts receivable is clearly weaker with only roughly 23% from the 1st to the 4th quartile. Short-term liabilities also show a constant negative development with increasing cash levels. However, since they only decrease by ca. 20%, the impact on NWC is not strong enough to hinder the overall negative relationship between net working capital and cash level which amounts to a total decrease of 0.108 points.

The analysis of the cash conversion cycle bears similarities to the above net working capital results which is comprehensible as both variables are intertwined. The cash conversion cycle for firms with very low cash levels amounts to an average of 74.83 days while very cash intensive companies exhibit a mean 'CCC' of 53.13 days. The results for the 2nd and 3rd quartile are consistent with the general negative development which adds up to a decrease of approximately 29% from the 1st to the 4th quartile. A rather weak decrease of days sales outstanding can be observed with roughly 18%. Days payable outstanding exhibit a much more significant decline from 34.27 days in very low cash holding firms to 21.73 in cash intensive companies, resulting in a drop of ca. 37%. The average period of inventory holding constitutes 59.56 days for firms which hold very little cash and 34.14 days for those with very large cash holdings. The percentage drop adds up to nearly 43%. Similarly to the net working capital analysis, the figures which are related to inventory are the most significant ones.

All in all, the univariate comparison of means presents strong evidence for a negative relationship between cash holdings and both net working capital and the cash conversion cycle. The impact of inventory and its related variables ('INV' and 'DSI') is considerable. Accounts receivable also seem to bear an overall negative relationship with cash holdings which however is much less stronger than that of inventory. It should be noted that there is only a very weak negative development for the accounts receivable related variables ('A/R' and 'DSO') between the 1st

and 3$^{rd}$ quartiles (ca. 5% for 'A/R' and ca. 6% for 'DSO') while there is a considerable drop from the 3$^{rd}$ to the 4$^{th}$ quartile (ca. 19% for 'A/R' and ca. 12% for 'DSO').

## *4.4 Bivariate results*

The following illustration depicts a correlation table which includes all variables. The Pearson correlation coefficient has been calculated for any possible pair of variables and a two-tailed test of significance has been applied. The results indicate that all but two results are significant at the 0.01 level. The statistically significant correlation coefficients are highlighted with an asterisk.

|      | Cash    | NWC     | INV     | A/R     | STL     | CCC     | DSI     | DSO    | DPO |
|------|---------|---------|---------|---------|---------|---------|---------|--------|-----|
| **Cash** | 1   |         |         |         |         |         |         |        |     |
| **NWC**  | -0.208* | 1   |         |         |         |         |         |        |     |
| INV  | -0.327* | 0.499*  | 1       |         |         |         |         |        |     |
| A/R  | -0.205* | 0.221*  | -0.042* | 1       |         |         |         |        |     |
| STL  | -0.180* | -0.501* | 0.225*  | 0.436*  | 1       |         |         |        |     |
| **CCC**  | -0.212* | 0.541*  | 0.507*  | 0.062*  | -0.127* | 1       |         |        |     |
| DSI  | -0.235* | 0.409*  | 0.747*  | -0.282* | -0.044* | 0.745*  | 1       |        |     |
| DSO  | -0.152* | 0.188*  | -0.198* | 0.632*  | 0.093*  | 0.393*  | -0.074* | 1      |     |
| DPO  | -0.218* | -0.009  | 0.196*  | 0.125*  | 0.249*  | 0.015   | 0.368*  | 0.336* | 1   |

**Table 10:** Correlation table (* = significant at the 0.01 level)

The correlation of -0.208 indicates that there is a negative correlation between cash holdings and net working capital. However, due to the relatively low absolute value, it has to be assumed that this correlation is rather weak. The components of net working capital are all negatively related to cash holdings as the correlation coefficients suggest. Among the subordinate variables, the correlation between inventory and cash is the strongest with a coefficient of -0.327 although it is also a rather low absolute value.

The relationship between cash conversion cycle and cash holdings is negative as the correlation coefficient of -0.212 implies. Once again, inventory represented by 'DSI' seems to have the strongest impact on cash holdings with a coefficient of -0.235. The variable 'DSO' presents a rather weak correlation while 'DPO' is a bit stronger negatively related to cash holdings.

Due to the rather low absolute values that have been calculated for the relevant correlation coefficients, the issue of correlation strength emerges. Although the coefficients which are of importance for the upcoming

analysis are all below 0.4, they can nevertheless be considered as quite significant. This is due to the fact that in order to measure the strength of correlations, the coefficients ought to be compared to previous similar studies.[1] In this respect, the coefficients can be considered as significant because a similar study which also analyzed SME cash holdings has detected comparable correlation coefficients in terms of absolute values.[2]

Most other results are not of great importance for the analysis. However, there are some figures which might be interesting and which will be treated in the subsequent analysis. First of all, there is a considerable positive correlation between 'NWC' and 'CCC' with a value of 0.541. Also, a significant positive correlation exists between 'INV' and 'DSI' as well as 'A/R' and 'DSO'.

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[1] cp. Pallant, J. (2005), "SPSS survival manual: a step by step guide to data analysis using SPSS version 12", Second Edition, Buckingham: Open University Press, p. 116
[2] cp. García-Teruel, P. & Martínez-Solano, P. (2008), p. 137

# 5 Analysis of results

In this section, the results that have been described in the previous part will be analyzed. In order to achieve this, first the hypothesis results will merely be presented. Afterwards, these results will be discussed. The implications which follow from the analytical findings will be treated in the subsequent section.

## 5.1 Hypothesis results

The following part is dedicated to the hypothesis results. For this purpose, the empirical results that have been presented in the previous section will be used in order to formally confirm or reject the hypotheses.

### 5.1.1 Hypothesis 1

Hypothesis 1 predicted that cash holdings are negatively affected by the presence of cash substitutes, i.e. negatively related to the variable 'NWC'. The univariate analysis of this study's sample clearly indicates that a firm's 'NWC' decreases with increasing cash level since a clear negative development of 'NWC' can be observed in the four quartiles. The bivariate analysis confirms this observation as the correlation coefficient for the variables 'Cash' and 'NWC' is negative. Therefore, the first major hypothesis can be confirmed. There is a negative relationship between cash holdings and the presence of cash substitutes.

The subordinate hypotheses were developed in order to give a more detailed insight into the issue. In this respect, Hypothesis 1a can be confirmed as the level of inventory has an unambiguously negative impact on cash levels, according to both the univariate and bivariate analyses. Hypothesis 1b can also be confirmed because there is statistically significant evidence that cash holdings are negatively related to accounts receivable. Hypothesis 1c however needs to be rejected because the univariate as well as the bivariate analyses suggest that there is not a positive but a negative correlation between cash level and short-term liabilities.

### 5.1.2 Hypothesis 2

Hypothesis 2 stated that cash holdings should be positively related to working capital management efficiency which again is measured by the cash conversion cycle. The variable 'CCC' thus was assumed to be negatively related to the variable 'Cash'. The comparison of means reveals that there is a steady negative development of the cash

conversion cycle from the first to the fourth quartile. The bivariate analysis substantiates this finding by measuring a negative correlation coefficient. These results imply that cash level is positively related to working capital management efficiency and therefore the second major hypothesis can be confirmed.

Hypothesis 2a which ought to measure the impact of days sales of inventory can be confirmed since there is an apparent negative relationship between 'DSI' and 'Cash' which is backed by both the univariate and bivariate analyses. A negative correlation has also been calculated between days sales outstanding and cash holdings. Therefore, Hypothesis 2b can be confirmed, as well. Hypothesis 2c needs to be rejected as there is a clear negative relationship between cash level and days payable outstanding.

### 5.1.3   Recapitulation of hypothesis results

The following table recapitulates the hypotheses, their proposition and their result, i.e. whether empirical evidence led to their confirmation or rejection.

| Hypothesis | Proposition | Result |
|---|---|---|
| **H1** | **Cash holdings are negatively related to the presence of cash substitutes, i.e. negatively related to the level of working capital net of cash** | **confirmed** |
| H1a | Cash holdings are negatively related to the level of inventory | confirmed |
| H1b | Cash holdings are negatively related to the level of accounts receivable | confirmed |
| H1c | Cash holdings are positively related to the level of short-term liabilities | rejected |
| **H2** | **Cash holdings are positively related to working capital management efficiency, i.e. negatively related to the cash conversion cycle.** | **confirmed** |
| H2a | Cash holdings are negatively related to DSI | confirmed |
| H2b | Cash holdings are negatively related to DSO | confirmed |
| H2c | Cash holdings are positively related to DPO | rejected |

**Table 11:** Results of hypothesis testing

There is explicit empirical evidence which supports the decisions on the above described confirmations and rejections of hypotheses. All in all, the two major hypotheses can be confirmed although one hypothesis subordinate to each of these respectively has been rejected. The two hypotheses which have been rejected both deal with the liabilities side of

working capital but their impact is apparently not strong enough to obviate the confirmation of the two major hypotheses.

## *5.2   Discussion of results*

The discussion of results aims at interpreting the empirical data and the resulting hypothesis confirmation or rejection in order to present the significance of the empirical findings. For this purpose, first the hypothesis test significances are discussed. Afterwards, further issues that have been raised in the course of the empirical data presentation are being treated. Finally, the implications that result from the empirical findings are being discussed.

### 5.2.1   Significance of hypothesis results

The following section presents the significance that the hypothesis tests imply. First, the implications of the first main hypothesis that deals with cash substitutes are discussed. Afterwards, the second main hypothesis which tested the impact of working capital management efficiency is being treated.

#### 5.2.1.1    Cash substitutes

The empirical results confirm the theoretical hypotheses that inventory and accounts receivable represent substitutes for cash. This finding implies that SMEs which have significant amounts of inventory or accounts receivable need to hold less cash. This is due to the fact that inventory and accounts receivable constitute highly liquid assets, i.e. they can be quickly and easily converted into cash when necessary. Firms with very little inventory and few accounts receivable will tend to hold more cash because they possess less substitutes for cash which could be liquidated in case of a cash shortage. Those companies feature much higher shortage costs of running out of cash as they might have to resort to the sale of fixed assets or borrowing of external funds in order to meet their debt obligations. Apparently, inventory has a more significant impact than accounts receivable. This finding indicates that the different cash substitutes can be categorized by their intensity. Section 5.3.3 will deal with the issue of the intensity of cash substitutes.

In the theoretical section of this work, it has been hypothesized that short-term liabilities represent the opposite of cash substitutes due to the fact that they correspond to the opposed side of current assets, namely current liabilities. A positive correlation with cash level has therefore been

predicted. The empirical findings reject this assumption and – contrarily to the theoretical supposition – suggest a negative relationship with cash holdings. Thus, short-term liabilities do not constitute the opposite of cash substitutes. However, the negative correlation does not imply that short-term liabilities can substitute for cash as current assets do. The term 'substitute for cash' can only be employed for the asset side of the balance sheet. Different approaches can be imagined in order to explain the result which the dataset has generated. In the following, two simple explanations which elucidate the negative correlation which has been detected between short-term liabilities and cash holdings shall be presented.

If short-term liabilities are high, this implies that the firm receives generous credit terms from its suppliers or a great deal of short-term credits from its financiers. A company in this situation would not have to hold very much cash as it could easily get hold of short-term financial resources by borrowing from its investors or taking full advantage of its suppliers' credit terms. This situation would explain the negative correlation between cash and short-term liabilities.

A company which holds a lot of cash could be likely to exhibit low short-term liabilities due to two reasons. Because of its high liquidity, it is probable that the firm will tend to rapidly acquit its short-term obligations such as accounts payable. This effect is further enhanced if the company's suppliers provide incentives for early payment by offering trade discounts, for instance. Moreover, companies with significant cash holdings are less likely to require short-term loans such as credit lines. All in all, short-term liabilities which are mainly composed of accounts payable and short-term loans could therefore decrease with increasing liquidity of the firm.

The explanations which have been presented illustrate the issue of causality which deals with the identification of cause and effect. In this context, this means that it ought to be discussed whether a high cash level causes a low level of short-term liabilities or vice versa. The issue of causality is treated in section 5.2.2.

### 5.2.1.2    Cash conversion

The second main hypothesis which has also been confirmed predicted that working capital management efficiency – measured by the cash conversion cycle – should be positively related to cash holdings. Companies with high cash levels exhibit a shorter cash conversion cycle

than those with low cash levels. This finding implies that firms which have a short time lapse between payment for inventory and collection of sales have high cash holdings. This result can be explained by the fact that a short cash conversion cycle indicates that current assets are quickly converted into cash and therefore cash constitutes a more significant part of working capital as opposed to other current assets, namely inventory and accounts receivable. In other words: If the cash conversion cycle decreases, the repartition of working capital shifts from inventory or accounts receivable towards cash. Investment in cash is higher in firms with a low cash conversion cycle because the average holding of current assets is low due to the fact that they are quickly turned over into cash.

This assumption is further confirmed by the bivariate analysis in that it results in a considerable positive correlation between 'INV' and 'DSI' as well as 'A/R' and 'DSO'. The significant positive relationships which have been found imply that relatively low levels of inventory/accounts receivable come along with low days sales of inventory/days sales outstanding. Evidently, these results could have been predicted due to the nature of the variables with regard to their interweavement. Nevertheless, the finding suggests that the repartition of current assets between inventory, accounts receivable and cash depends on DSI and DSO and therefore on the firm's working capital management efficiency.

The issue of days payable outstanding deserves special attention since not only has the hypothesis been rejected but the findings imply an opposite relationship to the one that was predicted. According to the statistical evidence, 'DPO' is negatively related to 'Cash'. This seems to contradict the general finding of the second major hypothesis in that it suggests that although the variable 'DPO' has a decreasing impact on the cash conversion cycle it correlates negatively with cash holdings. In the theoretical background, it has been argued that a higher 'DPO' decreases the cash conversion cycle and therefore should increase cash holdings.

The detected positive relationship between 'DPO' and 'Cash' could be explained by the fact that less cash intensive, i.e. less liquid firms resort to trade credit as a source of finance. Due to their lack of liquid funds, these firms can not take advantage of cash discounts or even need to stretch their payables in order to acquit their obligations. Highly liquid firms on the other hand should always be capable of taking cash discounts from their suppliers thus decreasing their average period of accounts payable.

Therefore, a high level of cash could lead to a low 'DPO' and vice versa, thus explaining the negative correlation.

Another approach could be to consider 'DPO' as a measure of working capital management aggressiveness.[1] In this context, a high 'DPO' would indicate an aggressive policy as accounts payable are stretched. An aggressive policy would again imply that the firm should hold low levels of current assets and therefore also exhibit low cash holdings. An aggressive policy could even lead to sales drops due to production declines thus reducing cash flows and simultaneously cash holdings. This interrelation would also signify a negative correlation between 'DPO' and 'Cash'.

Seemingly, once again the issue of causality recurs as the statistical data do not reveal whether 'DPO' impacts 'Cash' or 'Cash' impacts 'DPO'. Therefore, the next section is dedicated to this problem.

### 5.2.2 Causality

As already discussed above, the issue of causality deals with the problem of interpreting the statistical data with regard to the cause and effect question of the analyzed variables. In this work, 'Cash' has been defined as the dependent variable. The aim of this study is to detect the independent variables' influence on this dependent variable. Obviously, this formulation suggests that the independent variables represent the causes and the dependent variable 'Cash' represents the effect. The hypotheses have been formulated with this causality in mind and the results confirm the major assumptions that have been devised. However, the issue of causality deserves to be discussed nevertheless. The aim of this discussion is to illustrate that there can be interrelations between the different variables and thereby present an extensive treatise of the topic. It also intends to show that different argumentations can be developed in order to explain the empirical results and that these are not necessarily mutually exclusive. The above discussion of 'STL' and 'DPO' which first raised this issue already contained examples of two different argumentations. Two more examples – one for each major hypothesis – ought to be discussed in order to clarify this issue.

Regarding the aspect of net working capital, the argumentation which constitutes the basis for the respective hypothesis is to view net working capital as a cash substitute. The presence of cash substitutes entails

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[1] cp. section 2.4.3.1

lower costs of running out of cash. An alternative argumentation would be to view cash as the independent variable and deduce the explication from this point of view. If liquidity is high, companies might consider cash as a substitute for inventory, for instance. If replenishment of stocks can take place quickly and holding costs of inventory are high, cash could be accumulated instead of inventory. In this sense, cash would act as a substitute for inventory as it would be converted into inventory whenever needed. Such a situation would define 'Cash' as the independent variable and 'INV' as a part of 'NWC' as the dependent variable. Obviously, this explanation can only be applied to special and rare situations in which holding costs are high and inventory replenishment can happen quickly. However, it illustrates the basic issue of causality and the subjectivity of the categorization of the variables into dependent and independent ones. The two argumentations are not mutually exclusive but the first one ought to be born in mind as it is clearly based on the hypothesis which has been derived from theory. Furthermore, the empirical analysis rests upon the assumption that 'Cash' represents the dependent variable while 'NWC' represents an independent variable.

When it comes to working capital management efficiency, it has been argued that the more efficient the management of current assets, the higher the cash holdings should be. This is due to the fact that higher working capital management efficiency entails a quicker conversion of current assets into cash and therefore the average holdings of inventory and accounts receivable are decreased in favour of cash. One alternative explanation could be to assume that very low cash holdings signify low earnings. In this context, SMEs with very low cash levels could attempt to augment earnings by carrying out a very generous credit policy in order to stimulate sales. A generous credit policy would entail a longer average collection period thus increasing DSO. Therefore, SMEs with very few cash would feature a long cash conversion cycle, thus explaining the positive relationship between cash holdings and working capital management efficiency. Once again, the two argumentations are not mutually exclusive and it ought to be remembered that the first explanation is the one which can be assumed as valid as it is theoretically derived and constitutes the underlying research problem. However, the explications illustrate that causality is an issue which needs to be discussed.

### 5.2.3     Net working capital and cash conversion cycle

Another aspect which ought to be discussed is the significant positive correlation between 'NWC' and 'CCC'. This figure illustrates that firms which exhibit low efficiency in managing working capital, i.e. which convert cash substitutes less quickly into cash, also display higher levels of these cash substitutes and therefore a higher 'NWC'. A similar issue has been addressed in section 5.2.1.2 with regards to 'DSI' and 'DSO'. Once again, the correlation is rather predictable due to the nature and interrelation of the variables. However, all in all, the detection of this negative relationship between the efficiency of the management of the different current assets and their occurrence – calculated by their relative holdings – confirms the general theoretical assumption. This general assumption is contained in the theoretical argumentation of the second major hypothesis as well as in its empirical analysis. It says that an efficient working capital management results in a rapid turnover of current assets into cash which again should result in lower holdings of current assets. In this context, the finding of this positive correlation is an indicator for the internal validity and construct validity of this study as it confirms the assumptions as well as the utilized variables.

### 5.2.4     Accounts receivable

While the bivariate analysis indicates that accounts receivable can unambiguously be viewed as cash substitutes, the univariate analysis suggests that this aspect needs to be closely revised. This is due to the fact that the comparison of means reveals that a significant drop in 'A/R' only takes place in the fourth quartile, i.e. very cash intensive firms. The first three quartiles exhibit merely slight decreases in 'A/R'. This finding gains in significance when compared to the univariate analysis of 'INV' which features steady decreases throughout the four cash quartiles. The results imply that very low, low and medium cash holding SMEs bear strong similarities when it comes to the presence of accounts receivable as cash substitutes, while very high cash holding firms feature considerably lower levels of accounts receivable. The following section aims at discussing possible explanations for this phenomenon.

The 'A/R' means in the first three quartiles are quite close to the overall average level of 'A/R' which amounts to 0.2443. The fourth quartile, however, exhibits an average level of 0.2021 which is considerably lower than the total mean. Therefore it may be assumed that accounts receivable do act as weak cash substitutes but their impact is significantly

stronger as a lack of cash substitute. In other words: The lack of accounts receivable or a very low level of accounts receivable seems to induce very high cash holdings. This finding could be influenced by many factors or situations. For instance, a company which carries out a very aggressive collection policy also features a low average level of accounts receivable. Such a firm can be assumed to operate in a rather risky environment with high risks of loss of sales due to bad debt, for example. This increased risk could lead to augmented cash holdings for security reasons.

Several other explanations for the considerable drop in accounts receivable in the fourth quartile are possible. Nevertheless, the main finding which validates accounts receivable as a substitute for cash is not challenged by this peculiarity. The overall negative correlation clearly confirms this initial assumption.

## *5.3 Implications*

The empirical analysis reveals that cash holdings are influenced by working capital management. Cash levels are impacted by both the level of net working capital and its components as cash substitutes, i.e. inventory, accounts receivable and short-term liabilities, as well as the way in which working capital is managed, represented by the cash conversion cycle. This means that cash level is partly in the SME's sphere of influence and can be controlled by its financial decision-makers using working capital management related measures. The following section describes the necessity to control cash levels in SMEs and subsequently discusses measures to which the financial manager can resort and which are deduced from this study's empirical findings.

### 5.3.1   Target cash level

The risk return trade off which applies to working capital management can also be employed to cash holdings in that it illustrates the need for companies to determine and maintain an appropriate cash level. An adequate balance ought to be struck between the risks of running out of cash and the lack of return on idle surplus cash. Therefore, decision-makers should develop a cash holding policy which devises a certain amount of cash that ought to be held and maintained. This optimal cash level needs to take into account the individual characteristics of the company and its environment so that risk and return are in a mutual optimum. Empirical evidence shows that target cash levels which

companies pursue do exist.[1] In order to be able to carry out cash level management most efficiently, financial managers ought to be aware of the different measures which can be employed in order to influence cash holdings. The procedures which are presented below are all based on the previous theoretical and empirical analyses and therefore only represent measures which are related to working capital management.

First of all, the target cash level ought to be determined. It depends mainly on the costs of holding cash and the costs of running out of cash. This issue has been addressed in section 2.3.2. A detailed discussion would go beyond the scope of this paper. For the following discussion, it should therefore be assumed that a target cash level has been calculated. The financial manager's task is to arrive at this specified level of cash and make sure that it is maintained.

As the empirical analysis shows, from a working capital management perspective, managers can influence their firm's cash level by handling cash substitutes as well as cash conversion. Therefore, once the target cash level has been determined, the management of working capital ought to be adjusted in order to adhere to the predetermined level of cash holdings.

### 5.3.2  The impact of cash conversion

Cash conversion can be influenced in order to directly impact average cash holdings. When current assets are more quickly converted into cash, cash flows and thus cash availability is increased leading to an augmented average cash level. Therefore, if the actual cash level is below the target level, the financial manager can undertake several measures in order to reduce the cash conversion cycle thereby increasing the actual cash level. The firm's collection policy, for instance, can be adapted in order to speed up the recovery of accounts receivable. The standby time of inventory can be reduced by optimizing production processes thus turning inventory over more quickly. Regarding accounts payable, decision-makers need to pay careful attention to whether increasing DPO by stretching accounts payable leads to increased cash holdings by reducing the cash conversion cycle or whether the adverse effects of increasing DPO outbalance the advantages. Adverse effects of increasing DPO could be the inability to take advantage of cash discounts or the affected supplier relations resulting in possible production declines. Due to these adverse effects, an

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[1] cp. Opler, T. et al. (1999)

increase in DPO by stretching payables is linked with certain risks and should therefore always be carried out with great caution. It should be noted that although the empirical data suggest a negative correlation between DPO and cash holdings, the actual implementation of an increase in DPO should lead to a decrease in the cash conversion cycle thus increasing cash availability. The reasons for the detected negative correlation have been developed in section 5.2.1.2. These reasons should not hinder the positive impact of increased DPO on cash since ample empirical evidence has been presented for the negative relationship between overall cash conversion and cash holdings.

Obviously, all above mentioned measures could also be implemented in the opposite direction in order to increase the cash conversion cycle and subsequently decrease cash holdings. This could, for instance, be the case when costs of holding cash are very high and hence it is decided to shift the investment in current assets from cash to other short-term investments such as inventory or accounts receivable. This aspect is taken on in the subsequent section which deals with cash substitutes.

### 5.3.3   The strength of substitutes for cash

The above discussion illustrates that working capital management efficiency can be adjusted so as to influence cash holdings in order to adhere to a certain target cash level. However, another decision which is within the sphere of influence of the financial manager is the balance between cash and cash substitutes. This decision deals with several aspects which are linked to substitutes for cash. The following section aims at discussing these aspects and explaining potential decisions that a firm might take. In order to simplify matters, it is assumed that the firm has determined its target cash level and the corresponding cash conversion policy. Subsequently a decision has to be made on the level of the individual current assets. In reality, obviously, both decisions are strongly intertwined and can not be viewed as separate and subsequent like it is assumed in this discussion.

The empirical evidence clearly indicates that inventory and accounts receivable are substitutes for cash. In this context, the presence or lack as well as the characteristics of the disposable cash substitutes have a significant impact on the decision on the investment in cash, inventory and accounts receivable.

Since cash substitutes per se are supposed to act as a replacement for cash, their strength can be measured by the facility with which they can be converted into cash, i.e. their liquidity. Therefore, highly liquid inventory items should act as better substitutes for cash than inventory items with low liquidity. The liquidity of a cash substitute depends on several aspects. In the case of inventory, for instance, a firm which is the supplier of highly specialized goods for one single company should feature inventory items of rather low liquidity. This is due to the fact that the items can only be sold to the individual customer and therefore the market value is difficult or even impossible to compute. In case of cash shortage, the inventory can only be liquidated difficultly on a short notice. A firm which sells consumer goods in a very large market will feature highly liquid inventory items as these can easily be sold to any interested buyer in order to generate cash.

The same principle can be applied to accounts receivable. In this context, the liquidity of accounts receivable could be measured by the probability of fulfilment by the respective debtor. Therefore, an account receivable's 'quality' in this respect is determined by the debtor's general credit rating. If a debtor firm features a good credit rating, the probability of future payments is enhanced and therefore the account receivable which is held by the creditor firm is likely to be fulfilled. If a firm holds a portfolio of mostly accounts receivable of 'good quality', this portfolio can be considered as more liquid than a portfolio of accounts receivable related to bad debtors. This is due to the fact that the portfolio of good quality is more likely to feature no bad debts and thus more likely to be completely converted into cash. The bad quality portfolio, however, is more likely to feature bad debts and therefore might not be completely converted into cash and if so, payment delays which further decrease the accounts' liquidity are likely to take place. It should be noted in this context that it is possible to liquidate accounts receivable on a very short notice by taking advantage of short-term financial services which are made available by banks and other financial institutions. In this context, the portfolio of accounts receivable is used as collateral or – in the case of factoring – is sold to the financial service provider. In these cases, the quality of accounts receivable is also a significant factor for liquidity as it can influence the credit granting decision as well as the credit terms.[1]

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[1] cp. Weisel, J.; Harm, N.; Bradley, C. (2003), "The Cash Factor", Strategic Finance, Vol. 85, Issue 3, pp. 29-33, p. 32

The above discussion shows that accounts receivable as well as inventory can act as substitutes for cash but their ability as such needs to be judged on the basis of their potential liquidity. This liquidity can vary significantly and is influenced by their particular characteristics. Financial managers ought to be aware of this aspect when deciding on the repartition between cash and other current assets.

### 5.3.4   Conclusion

All in all, implemented changes in working capital management efficiency by influencing cash conversion can be effective in order to attain the targeted level of cash. Working capital policy which deals with the decision on the level of investment in current assets is impacted by the presence or lack and the attributes of substitutes for cash. Both decisions are strongly interrelated since cash conversion influences the level of investment in cash substitutes and vice versa. A decision in one area will influence the other one, as well. Therefore, it is important to monitor both aspects in order to detect the combined policy which leads to optimal results for the achievement and maintenance of the target cash level.

# 6 Concluding discussion

In this last section, the entire work is being recapitulated. Afterwards, it is discussed whether the objectives of the paper which had been formulated in the introduction have been achieved. Finally, on the basis of this study's significance for academic researchers, recommendations for future research are being made.

## *6.1 Recapitulation of the work*

This work studied the impact of working capital management on the cash holdings of Swedish manufacturing firms. For this purpose, a theoretical background has been developed which covered several aspects which are crucial to this topic. First of all, motives for holding cash have been discussed using the three motives which have been defined by Keynes. Subsequently, working capital management has been presented in detail. Each component of working capital management, namely inventory, cash and credit management as well as working capital policy, has been treated with a focus on the level of investment in the different components. The level of cash holdings has been analyzed in a separate section due to its significance to this work. Previous empirical studies on the determinants of cash level have been discussed. Being mentioned in all three theoretical subsections, costs of running out of cash, i.e. shortage costs, have been determined as a significant factor which influences cash holdings of firms. Another important aspect is the concept of the cash conversion cycle which constitutes a significant measure of working capital management efficiency as it contains all three of its components. Based on the theoretical findings and previous empirical data, two hypotheses have been formulated, one dealing with net working capital and its components, i.e. inventory, accounts receivable and short-term liabilities, as a cash substitute and one dealing with working capital management efficiency, measured by the cash conversion cycle. Both aspects were predicted to influence SMEs' cash holdings with net working capital being negatively related while working capital management efficiency being positively related to cash level. Subordinate hypotheses, containing the components of the two main variables, i.e. net working capital and the cash conversion cycle, have been formulated in order to give a detailed insight into the issue.

Afterwards, methodological aspects were discussed by describing the research design and explaining and justifying the basic methodological

decisions that have been taken. The precise data collection and analysis were illustrated as well. A quantitative approach has been conducted consisting of the statistical analysis of financial information, namely annual statements, of a large sample of Swedish manufacturing firms. Precisely 13,287 companies of the Swedish legal form 'Aktiebolag' have been included in the sample. The statistical analysis basically consisted of a univariate analysis, that is comparison of means, and a bivariate analysis, namely correlation coefficients.

The empirical results confirmed the basic assumptions in that statistical evidence has been presented for the negative relationships between the presence of net working capital and cash level as well as the cash conversion cycle and cash level. Two of the subordinate hypotheses were rejected.

The analysis of the results presented explanations for the confirmations of the hypotheses and possible explanations for the rejection of the two subordinate hypotheses which had been rejected. Net working capital has been confirmed as a cash substitute. The presence of inventory and accounts receivable reduces the need to hold cash as they diminish the relative costs of running out of cash. High efficiency in the management of working capital implies that current assets are quickly converted into cash, thus shifting the balance from average investments in inventory and accounts receivable to cash and leading to high cash holdings. Since the issue of causality had been raised during the discussion of the hypothesis results, this aspect was discussed arguing that alternative explanations are possible for the analysis of results. In the section on the practical implications of the obtained results, it has been argued and explained that working capital related measures can be used in order achieve and maintain a firm's target cash level.

## *6.2   Achievement of objectives*

The objectives of this paper had been addressed in the introductory part. In the following, the issue whether the purpose has been fulfilled is treated. Afterwards, the significance for the targeted readership is discussed.

The purpose of this work was to analyze the impact of working capital management on the level of cash held by Swedish manufacturing SMEs. In this respect, the purpose has been fulfilled since the impact of cash substitutes as well as cash conversion – both of which have been

theoretically derived and are strongly related to working capital management – has been illustrated. Significant statistical evidence has been produced and a thorough discussion of the results has been developed so as to add new aspects to the existing research on the determinants of cash level.

The targeted readership had been determined as consisting of both practitioners and academics. Decision-makers from SMEs can obviously benefit from the findings of this work in that an alternative approach to explaining cash holdings in SMEs is presented. Although the dataset is restricted to manufacturing firms, the basic implications of this thesis can be applied to any company which deals with working capital management, irrespective of its activity sector. The results should lead to increased knowledge and awareness about the significance of working capital management for the liquidity of the firm. These findings could also concern practitioners from banks, other financial institutions or consulting firms since the results are of crucial importance to the credit rating, survival and performance of their potential clients. Due to the same reasons, policy makers who are interested in the short-term financial conditions of SMEs could profit from the results that have been described and discussed in this work. Moreover, academics can benefit from this study in that existing research is brought into the context of working capital management. By this means, prior knowledge has been tested and extended, both in the environment of Swedish manufacturing SMEs. The findings of this study could for instance be used as a starting point for further investigation. Concrete recommendations for future research are therefore made in the subsequent section.

## *6.3   Recommendations for future research*

Researchers aiming at developing this field of study could conduct exploratory studies in order to detect qualitative data which reveal the concrete working capital management procedures which are employed by SMEs in order to attain their target cash level. As theory on the working capital management perspective on cash holdings is not very developed, such a research could further confirm and develop the analytical findings of this paper.

Another interesting approach could be to detect potential differences between SMEs and large enterprises. By this means, the assumption that SMEs are more dependent on their internally generated funds than large

enterprises could be tested. The impact of this supposition on cash holdings could constitute an important field of interest in this context.

Future researchers could compare the impact of working capital management as a cash level determinant to other determinants which have previously been studied. Such a study could be used to measure and classify the significance of the different determinants of cash level in order to give an overview of the factors which need to be considered when studying the cash holdings of firms.

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# Appendices

## *Appendix A: Calculation of variables*

The following table recapitulates all variables which have been used:

| Variable name | Significance | Calculation |
|---|---|---|
| 'Cash' | Relative cash holding | Liquid funds / Balance sheet total |
| 'NWC' | Net working capital | INV + A/R – STL |
| 'INV' | Relative inventory holding | Inventory / Balance sheet total |
| 'A/R' | Relative accounts receivable holding | Accounts receivable / Balance sheet total |
| 'STL' | Relative short-term liabilities holding | Short-term liabilities / Balance sheet total |
| 'CCC' | Cash conversion cycle | DSI + DSO – DPO |
| 'DSI' | Days sales of inventory | 365 / (Costs of goods sold / Inventory) |
| 'DSO' | Days sales outstanding | 365 / (Turnover / Accounts receivable) |
| 'DPO' | Days payable outstanding | 365 / (Costs of goods sold / Accounts payable) |

The costs of goods sold have been calculated as follows:

Costs of goods sold = Turnover – Earnings before amortization

## *Appendix B: Sampling procedure*

The Swedish business database 'Affärsdata' has been used. It has been searched for companies of the legal form 'Aktiebolag' the financial statements of which were available for the year 2006 and which operated in the manufacturing sector. The manufacturing sector in this context is designated by the 2007 SNI codes 10-33. The search resulted in 22,827 active companies. Subsequently, all companies with the following features have been eliminated from the dataset in order to obtain only SMEs:

- Number of employees ≥ 250 or n/a
- Turnover > SEK 472,000,000 or n/a and balance sheet total > SEK 406,000 or n/a

This procedure resulted in the survey population which consists of 22,363 manufacturing SMEs of the legal form 'Aktiebolag'. Thereafter, the sample companies exhibiting the following features have been excluded:

- Turnover = SEK 0 or n/a
- Liquid funds ≤ SEK 0 or n/a
- Accounts receivable ≤ SEK 0 or n/a
- Inventory ≤ SEK 0 or n/a
- Accounts payable ≤ SEK 0 or n/a
- Balance sheet total = n/a
- Earnings before amortization = n/a
- Costs of goods sold = SEK 0 or n/a

This procedure resulted in a dataset containing 14,763 companies. A truncation has subsequently been applied in order to remove outliers. For this purpose, the dataset has been assorted according to their cash conversion cycle (variable 'CCC'). The top and bottom 5%, i.e. the first 738 and the last 738 sample companies, have been excluded resulting in the final dataset of 13,287 enterprises.

## *Appendix C: Sample statistics*

The following tables illustrate the repartition of the sample companies between the 21 Swedish counties ('läns'):

| Län | Frequency | Percent |
|---|---|---|
| Blekinge län | 186 | 1.40 |
| Dalarnas län | 522 | 3.93 |
| Gävleborgs län | 423 | 3.18 |
| Gotlands län | 71 | 0.53 |
| Hallands län | 535 | 4.03 |
| Jämtlands län | 202 | 1.52 |
| Jönköpings län | 1,109 | 8.35 |
| Kalmar län | 449 | 3.38 |
| Kronobergs län | 418 | 3.15 |
| Norrbottens län | 341 | 2.57 |
| Örebro län | 430 | 3.24 |
| Östergötlands län | 599 | 4.51 |
| Skåne län | 1,666 | 12.54 |
| Södermanlands län | 386 | 2.91 |
| Stockholms län | 1,825 | 13.74 |
| Uppsala län | 286 | 2.15 |
| Värmlands län | 418 | 3.15 |
| Västerbottens län | 375 | 2.82 |
| Västernorrlands län | 288 | 2.17 |
| Västmanlands län | 364 | 2.74 |
| Västra götalands län | 2,394 | 18.02 |
| Total | 13,287 | 100.00 |
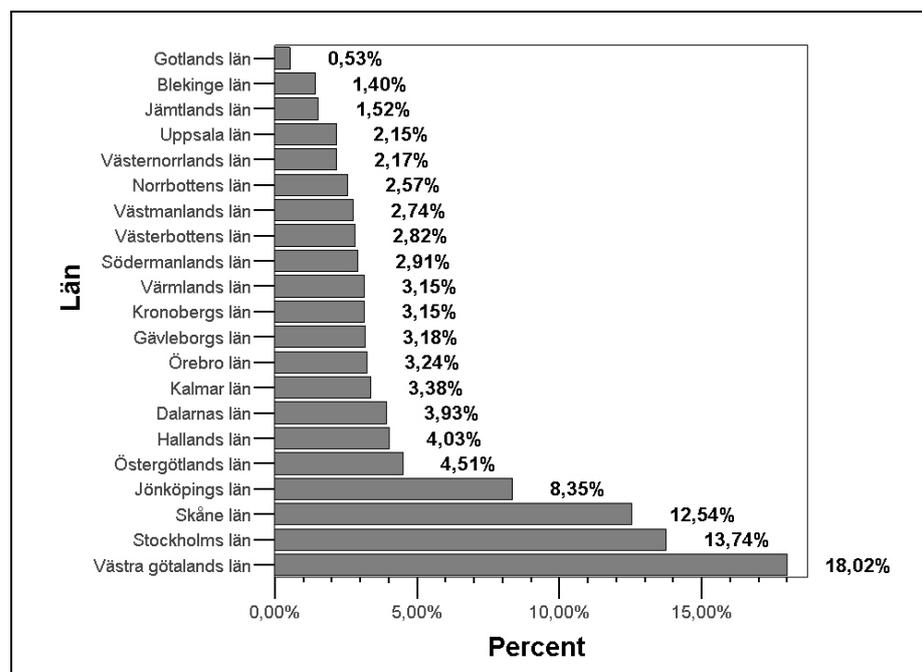
The following tables illustrate the repartition of the sample companies among the different activity sectors:

| Level 2 SNI code | Activity sector | Frequency | Percent |
|---|---|---|---|
| 10 | Manufacture of food products | 833 | 6.27 |
| 11 | Manufacture of beverages | 23 | 0.17 |
| 12 | Manufacture of tobacco products | 5 | 0.04 |
| 13 | Manufacture of textiles | 284 | 2.14 |
| 14 | Manufacture of wearing apparel | 91 | 0.68 |
| 15 | Manufacture of leather and related products | 62 | 0.47 |
| 16 | Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials | 1,024 | 7.71 |
| 17 | Manufacture of paper and paper products | 167 | 1.26 |
| 18 | Printing and reproduction of recorded media | 822 | 6.19 |
| 19 | Manufacture of coke and refined petroleum products | 12 | 0.09 |
| 20 | Manufacture of chemicals and chemical products | 233 | 1.75 |
| 21 | Manufacture of basic pharmaceutical products and pharmaceutical preparations | 42 | 0.32 |
| 22 | Manufacture of rubber and plastic products | 623 | 4.69 |
| 23 | Manufacture of other non-metallic mineral products | 351 | 2.64 |
| 24 | Manufacture of basic metals | 165 | 1.24 |
| 25 | Manufacture of fabricated metal products, except machinery and equipment | 3,087 | 23.23 |
| 26 | Manufacture of computer, electronic and optical products | 450 | 3.39 |
| 27 | Manufacture of electrical equipment | 350 | 2.63 |
| 28 | Manufacture of machinery and equipment n.e.c. | 1,129 | 8.50 |
| 29 | Manufacture of motor vehicles, trailers and semi-trailers | 324 | 2.44 |
| 30 | Manufacture of other transport equipment | 159 | 1.20 |
| 31 | Manufacture of furniture | 466 | 3.51 |
| 32 | Other manufacturing | 585 | 4.40 |
| 33 | Repair and installation of machinery and equipment | 764 | 5.75 |
| n/a | Other primary activity | 1,236 | 9.30 |
|  | Total | 13,287 | 100.00 |
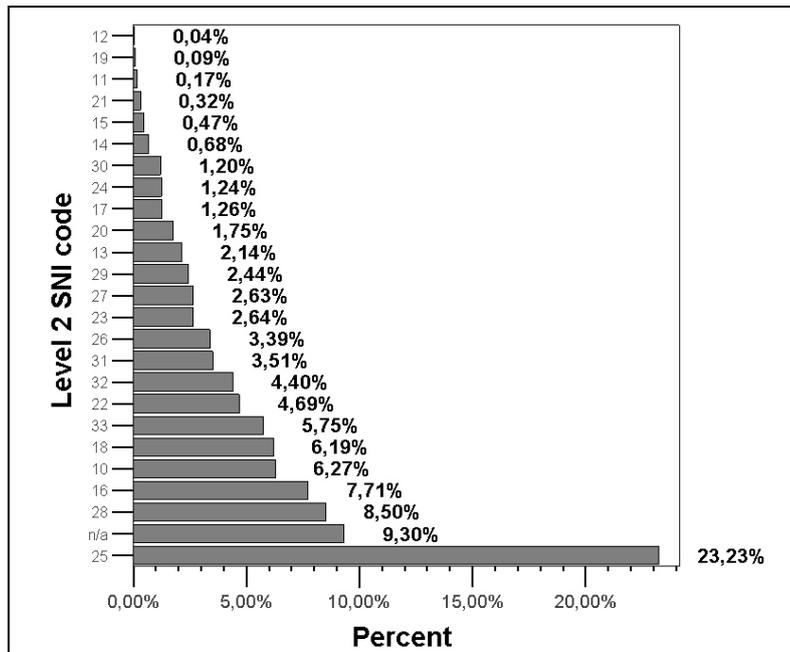
# Declaration of honour

I hereby declare that I composed this thesis without any help from a third party. I did not use any literature except for the indicated references. All literal or intellectual adoptions have been cited.

Ich erkläre hiermit, die vorgelegte Arbeit ohne fremde Hilfe verfasst zu haben. Ich habe keine andere als die angegebene Literatur verwendet. Alle wörtlichen oder gedanklichen Übernahmen sind zitiert.

Östersund, May 30<sup>th</sup>, 2008

_____

Signature

Ich bin damit einverstanden, dass mein Foto und mein Name als Absolvent der Fachhochschule Aachen zu Zwecken der Öffentlichkeitsarbeit (z.B. im Rahmen der Diplomfeier) von der FH-Aachen veröffentlicht werden können.

ja    nein

Östersund, den 30. Mai 2008

_____

Unterschrift

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