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The Determinants of Corporate Cash Holdings

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Executive Summary

In turbulent times and highly volatile equity and debt markets, the efficient management of corporate liquidity suddenly becomes a major focus of corporate finance practitioners, sometimes even being critical for a firm's survival. Traditionally, corporate cash levels have been managed close to specific target levels and were thought to be rarely influenced by other firm-specific variables. However, differences in cash levels across firms can be observed and scientific argumentation of what causes these differences is based on two major theories: the transaction cost theory, and the financing hierarchy hypothesis. Previous empirical research could not yet pinpoint what are the predominant drivers of cash levels and whether there are other factors that affect corporate liquidity. Recent studies also began to examine corporate governance effects on corporate cash levels. That leads to the research question of this thesis: What determinants cause a cross-sectional variation in the level of corporate cash holdings and how do national frameworks of corporate governance affect the significance of these determinants?

This thesis applies descriptive statistics and a static panel data model with fixed effects estimated by OLS using data samples from German and Swedish companies between 2000 and 2008. The explanatory variables used in this study are *growth, size, ZScore, leverage, debt maturity, cash flow, liquidity, dividends,* and *opportunity cost.* As dependent variables two different proxies are used, i.e. *Cash1* and *Cash2.* When analyzing the distribution of the two data samples significant differences between the countries are found in nearly every explanatory variable, using ordinary mean-difference tests. However, when it comes to determining differences between Swedish and German firms in the panel data model, no clear distinction can be made regarding the prevalence of either of the two presented theories. While cash flow to total assets is positively related to cash holdings for Swedish firms, thereby suggesting support for the financing hierarchy model and possibly a precautionary motive, there is a negative sign of the same variable for German firms, which is in line with the trade-off model. Thus, it can be argued that cross-country effects due to different national corporate governance frameworks and levels of investor protection do have a significant impact on corporate cash holdings and can be more effective in explaining why some companies hold more cash than others.

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1. Introduction

1.1 Problem Background

Under the pressure of weak equity markets, rising financing costs, liquidity problems in all industries, and record-high volatility in all markets, many companies proceed to rethink the way a firm's capital structure is managed. BMW, the German car manufacturer, recently stated in a corporate announcement that in 2009 the company's main focus is to increase its position in liquid asset holdings (BMW Group, 2009). Regardless of a firm's profitability, in times of increasing liquidity problems, cash management and optimal financial policy-making are critical to a firm's success and, sometimes, survival. The elements of a financial policy must be well aligned with each other and their impact must be fully understood in order to comprehend the mechanisms of a firm's key figures and the environment within which the company performs.

"*Practitioners tend to make their decisions based on target credit ratings and other factors, albeit with modest consideration to financial theory.*" (Pettit, 2007, p. 143)

In scientific literature holding liquid assets has traditionally been justified by transaction motives, i.e. to meet the needs associated with running operating activities, and precautionary motives, i.e. to meet cash needs during times of cash flow shortfalls. The two views are derived from the financial *trade-off theory* of capital structure. The trade-off theory, also referred to as the transaction cost model, suggests that costs and benefits of holding cash are considered in determining the optimal cash level. There is an incentive to hold cash due to the costs associated with rising external financing, e.g. costs of financial distress and agency conflicts. At the same time, there are costs associated with holding cash, which is for instance demonstrated by the overinvestment problem introduced by Jensen (1986). There is also another theory that explains variety in cash holdings. The *pecking order theory* introduced by Myers and Majluf (1984) suggests that there is no optimal level of cash. Firms want to avoid the costs of raising external capital, and thus debt decreases and cash increases, as the firm has higher cash flows. As a result, the cash level simply varies with the profitability of the firm. Opler et al. (1999) study the determinants of cash on U.S. firms and find considerable support for the trade-off model. They also find evidence of a precautionary motive within firms. The same conclusion is drawn

by Kim et al. (1998). Ozkan and Ozkan (2004) examine the influence of firms' corporate governance policies on cash holdings. They introduce board structure and ownership variables and find that cash levels increase when managerial ownership is between 25% and 64%. In a cross-country analysis, Dittmar et al. (2003) find support for the trade-off theory. Moreover, they also find evidence of relationships between agency problems and cash holdings. Specifically, they notice that the significance of dependency on external financing increases with the level of a country's investor protection.

The literature on corporate cash holdings has only slowly been developed in recent years and the complete picture of the determinants on cash holdings has yet to be found. The recent studies of Ozkan and Ozkan (2004) and Dittmar et al. (2003) are steps in the right direction and provide interesting hypotheses that can be further built upon. However, it seems as though more empirical evidence has to be found in order to reach a consensus on the issue. For instance, how are cash holdings determined in other European markets? Are there systematic differences in the determinants between markets and, if so, how might these differences be explained? The study of Dittmar et al. (2003) provides a starting point. However, the notions provided in this study need to be extended in a more detailed manner.

1.2 Purpose and Contribution

Despite some recent studies conducted on corporate cash holdings, most of the empirical work done focuses on the US market. Since the Anglo-American regulatory approach is quite different from both the German and the Swedish systems, empirical findings on one market cannot simply be applied to other markets. By applying a detailed empirical study to two distinct countries, different corporate governance approaches and their impact on cash holdings can be analyzed. Moreover, by looking at firm-specific variables this study employs different financial theories in order to test which approach is more significant in determining the amount of cash held by a company. The underlying research questions are: *What are the determinants, both firm-specific and on a regulatory level, that drive firms to hold a certain amount of cash on their balance sheet? Furthermore, is there a difference between Swedish and German companies?*

In addition to being the first study that examines the Swedish market and puts it into the wider context of the largest European economy, this study also contributes to the corporate finance literature in two other ways. Firstly, it provides empirical insight into which financial theory dominates the decision-making process of corporate financial managers. Secondly, this thesis can be a helpful instrument for financial officers, as well as active shareholders, to understand the mechanisms and drivers of cash holdings in order to manage and govern a firm's assets more efficiently.

1.3 Thesis Outline

Chapter 2 highlights the underlying financial theory and the characteristics of the two distinct markets, i.e. Sweden and Germany. Special emphasis lies on the trade-off theory, which includes the transaction cost model and the agency theory, the financial hierarchy model, and corporate governance issues in the two respective countries. Finally, an empirical literature review is presented to pinpoint the recent developments in empirical findings on cash holdings and their relation to the theories used in this thesis.

Chapter 3 presents the data sample and variables used in this analysis. A detailed description of each variable used is given, in addition to an explanation regarding the applicability of the chosen variables to this study. This should provide a deeper insight into how the empirical model is created so that future studies can replicate the used framework more easily.

Chapter 4 introduces the methodology used in this thesis. Since the data sample includes multiple periods, a static panel data study is used to provide further insight into the mechanisms of corporate cash holdings. For this reason, the features of panel data are presented first, followed by the methodology of estimating regressions using panel data (including fixed effects).

Chapter 5 presents the empirical findings of the models used in this study. It starts with a presentation of the results of descriptive statistics in order to give the reader an impression of the dynamics of the two distinct data samples. In the second part the results from the panel data analysis are presented and discussed. Each explanatory variable is explained and put into the theoretical context as well as compared to other studies individually.

Chapter 6 draws a final conclusion on the empirical results of this study. This chapter stresses the managerial implications in the area of cash holdings for different firm characteristics and under different regulatory environments. Finally, suggestions for further research are provided.

2. Theoretical Framework

The following chapter introduces the underlying financial theory that is commonly used to explain the costs and benefits of holding cash on a balance sheet. After a brief introduction to the theory of the irrelevance of capital structure under perfect assumptions, the two dominating financial theories are presented, i.e. the trade-off theory and the financing hierarchy theory. Furthermore, the German and Swedish markets are presented and differences in regulation, investor protection, and corporate governance standards are highlighted. Finally, a brief summary of relevant empirical literature in the field of corporate cash holdings research is presented to impart the significance of this study and why this thesis is another step in explaining why companies hold different amounts of cash on their balance sheets.

2.1 Introduction

If market imperfections did not exist, financial policies would have no effect on the valuation of a firm (Stiglitz, 1974). However, this hypothesis only holds under strong assumptions, while in reality financial managers put great efforts into managing companies at an optimal capital structure. The quest for optimal capital structure is expanding to include items other than just debt and equity. In a world of rising capital costs and the related importance of opportunity cost of having excess cash, liquid assets have become a key focus on a company's balance sheet in the optimal capital allocation problem (Pettit, 2007). In reality, similar companies with significantly different cash levels can be observed, indicating that optimal cash holdings are dependent on various factors. However, corporate finance practitioners tend to make their decisions regarding financial policy and capital structure based on targeted credit ratings and other similar factors, with only little focus on financial theory (Pettit, 2007). In this chapter, the main theories on capital structure and the role of cash are presented, i.e. the trade off theory (transaction cost motive and agency problems) and the financing hierarchy theory. Moreover, we present macro factors that can have an impact on a company's balance sheet and thus lead to different cash allocations in different markets. Here the focus lies on differences between Swedish and German regulations. Furthermore, the characteristics of firms that were found to be empirically relevant to the level of cash holdings in previous studies are introduced.

2.2 Cash in a Frictionless World

In a frictionless world, keeping liquid financial assets is irrelevant to the firm's value. Such an environment is often described as ideal capital market or perfect capital market. In such a world of perfect capital markets, holdings of cash and cash equivalents are irrelevant, any amount of cash needed to invest in projects with a positive net present value (NPV) or to balance temporary cash shortfalls could be obtained without hindrance and at a reasonable price (Garcia-Teruel & Martinez-Solano, 2008). Since there is no liquidity premium, holdings of cash have no opportunity cost and shareholder wealth, i.e. the market value of the company, remains unchanged in spite of changing cash holdings (Opler, Pinkowitz, & Stulz, 1999). This environment is characterized by a set of five assumptions, which restrict behaviour on security trading and the scope of a firm's investment and financing decisions (Odgen, Jen, & O'Connor, 2003). These assumptions describe complete and perfect capital markets. Based on these assumptions, Modigliani and Miller (1958) developed the groundbreaking theory that the market value of a firm remains constant regardless of the capital structure (M&M Proposition I), and that the expected return on a firm's equity is an increasing function of the firm's leverage due to the addition of equity risk (M&M Proposition II) (Modigliani & Miller, 1958):

M&M Proposition I: $$V_L = V_U \quad \Rightarrow \quad D + E_L = E_U$$

M&M Proposition II: $$r_{LE} = r_A + \left[\frac{D}{E_L}\right](r_A - r_D)$$

1. Frictionless Capital Markets
   - No transaction costs & taxes. No trading restrictions (e.g. on short selling), no costs on issuing or retiring securities. No cost of financial distress. Equal borrowing costs of firms and individuals
2. Homogenous Expectations
   - All relevant information is instantly and costlessly available to all participants. Rational behaviour.
3. Atomistic Participants
   - No single participant can influence market price of securities via trade
4. Disclosure of Company's Investment Program
   - All assets, operations, strategies are fixed and known by all investors
5. Fixed Capital Structure
   - Once chosen, the company's capital structure is fixed

Figure 1: Assumptions for Perfect Capital Market (Odgen et al., 2004)

The assumptions underlying the Modigliani Miller theorem are rather strong and are in reality never fulfilled. Hence, the important implication of this theorem lies in the violation of the assumptions and the conclusion that when such a violation takes place the capital structure of a firm does indeed have an impact on the firm value. Kraus and Litzenberger (1973) have shown that when, for instance, including tax in the MM theorem, the optimal capital structure of a firm changes significantly towards a higher leverage. However, with increasing leverage, the marginal advantages of debt simultaneously decrease. The optimum changes again when penalty costs related to bankruptcy are added. Thus, we can define the optimal capital structure of a firm as a trade-off between costs and benefits of debt, equity, and financial distress. Thinking one step further, optimal cash holdings are also a trade-off between costs and benefits of holding liquid assets on a firm's balance sheet.

2.3 The Trade-Off Theory

2.3.1 The Transaction Costs Model

If it is costly for a company to be short of cash or other liquid assets there is automatically an optimal level of cash holdings that maximizes the company value. In optimum, the marginal cost of holding liquid assets equals the marginal benefits of holding those assets. The marginal benefits can also be described as the marginal cost of liquid asset shortage. Simultaneously, financial managers have to address the question of why it is more beneficial to hold an additional unit of liquid assets instead of cutting back on cash holdings (Opler, Pinkowitz, & Stulz, 1999).

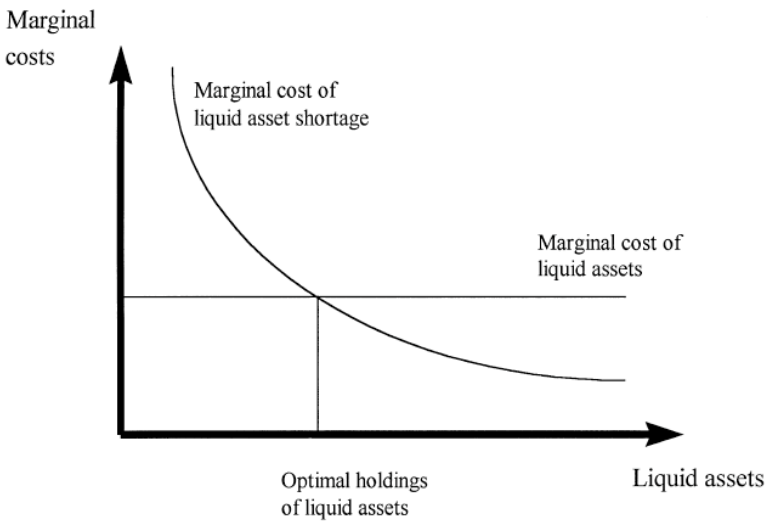


Figure 2: Optimal Level of Cash Holdings (Opler et al., 1999)

Initially introduced by Keynes in 1936, the transaction motive for holding liquid assets originates from the costs related to converting non-cash assets into cash. Raising liquid funds by selling assets, issuing new debt or equity, or cutting back on dividends involves costs that have both fixed and variable components. If it is further assumed that liquidating non-cash assets is related to significant costs higher than raising capital externally, firms prefer using capital markets to liquidate assets tied in operational activities. However, the fixed portion of the transaction cost makes the company raise external funds infrequently and holding cash and cash equivalents becomes a buffer that is valuable to the firm (Opler, Pinkowitz, & Stulz, 1999). Furthermore, working capital, such as inventory and accounts receivable, can be seen as cash substitutes that can be easily transformed into cash when needed. Companies with a larger amount of working capital can be expected to hold less cash since a transformation is relatively cheap and easy. This is called the substitution effect of working capital (Koller & Goedhart, 2005). Accordingly, it can be expected that companies that face higher transaction costs, i.e. firms with assets that cannot be converted into liquid assets easily and as a result have a higher marginal benefit of cash, will hold greater amounts of cash on their balance sheet (Ozkan & Ozkan, 2004).

"Cash provides an important buffer against operating volatility and unexpected cash flow shortfalls, to lower the probability of financial distress and to ensure self-sufficiency and the ability to invest in growth through difficult quarters. Excess cash balances may be used as a buffer against uninsurable shortfalls." (Pettit, 2007)

It is empirically shown that the probability of financial distress increases ceteris paribus with the level of growth opportunities due to the intangible and uncertain nature of future growth (Shleifer & Vishny, 1992; Ozkan & Ozkan, 2004). Moreover, cash holdings can also be described as *dry powder,* i.e. growth capital for future expansion and prospects (Pettit, 2007). Hence, the marginal benefit of cash holdings and the related financial flexibility, i.e. the marginal costs of liquidity shortage, increases alongside a firm's growth opportunities. In times of cash shortage, a firm with strong profitable investment opportunities would have to give up higher valued projects than others. In other words, a suboptimal capital structure can lead to

suboptimal investment strategies that do not maximize firm value but instead only benefit particular stakeholders. Holding cash for these reasons is generally referred to as *precautionary motives* (Han & Qiu, 2007). In total, Opler et al. (1999) pinpoint seven firm-specific variables that affect marginal costs and benefits of being short of liquid funds:

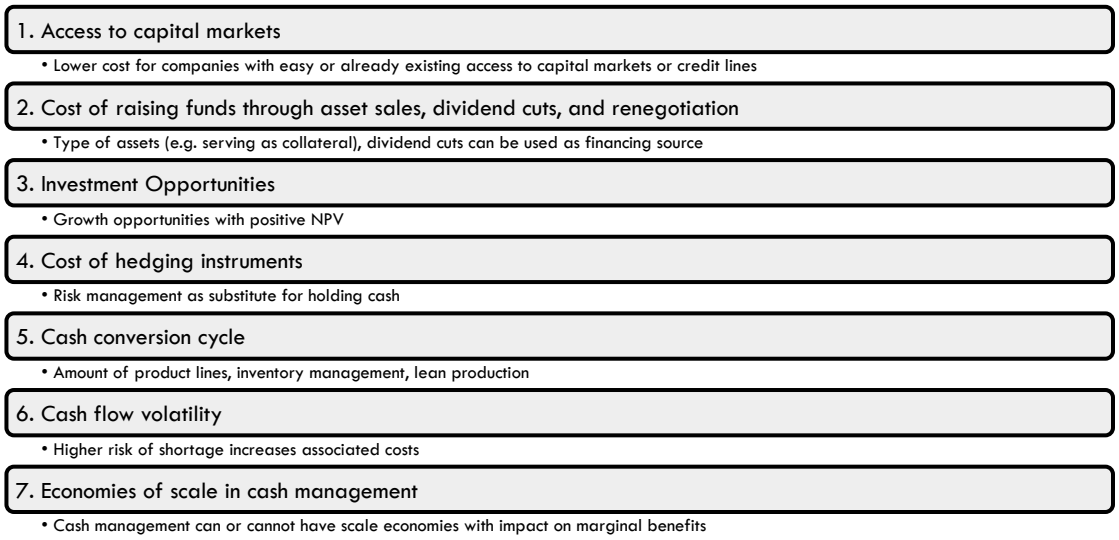


Figure 3: Transaction Cost Model Variables (Opler et al., 1999)

2.3.2 Agency Problems

The incentive to maximize equity value is not always in line with the incentive to maximize the firm value (La Rocca, Cariola, & La Rocca, 2008). Thus, a suboptimal level of cash holdings eventually leads to conflicts between managers, shareholders, and creditors. In particular, there are two categories of agency problems, i.e. the principal agent problem between owners and managers and the agency problem between managers and creditors. Related to investment strategies, the problems can be categorized into overinvestment and underinvestment problems.

Overinvestment problems

Overinvestment problems appear in various forms. The most common form is that managers tend to set investment strategies above the optimal level to grow beyond the optimal firm size since growth increases managers' power by increasing the resources under control (Jensen, 1986). This is often referred to as *empire building*. Murphy (1985) also finds empirical evidence for the relationship between managerial compensation and sales growth, supporting managers' tendency to increase firm size

beyond optimal levels. Jensen (1986) relates this agency problem to free cash flow, which he defines as excess cash flow of projects with a positive NPV. However, since excess liquidity is simply cumulated historical free cash flow, the two variables are interrelated. According to La Rocca et al. (2008), other sources of overinvestment lie in managerial overconfidence and management entrenchment. In all three cases, the addition of debt or paying out cash as dividends can reduce overinvestment problems. Paying interest and/or dividends reduces the amount of cash managers have at hand.[1] Thus, leverage and dividends are important tools in reducing agency problems related to cash holdings between shareholders and managers.

Underinvestment problems

Underinvestment problems are also called *debt-overhang problems* and are related to agency problems between shareholders and debtholders. Assuming that a firm's managers are agents of the shareholders, they also tend to act in the owners interest rather than in favour of creditors. In the presence of so-called risky debt, i.e. debt whose market value differs from the nominal value, managers tend to make suboptimal decisions by rejecting investment opportunities with a positive net present value that would mostly benefit the holders of risky debt[2] (La Rocca, Cariola, & La Rocca, 2008). However, from an ex-post perspective this suboptimal decision-making, i.e. underinvestment problems, can lead to lost growth opportunities and eventually lower equity value (Myers, 1977). To reduce potential risk-shifting, debtholders often add covenants to their given credit. Covenants can limit a firm's ability to raise additional debt or might require a minimum amount of liquidity held. If no covenants can be applied, creditors may ex-ante raise interest rates as a premium to take possible underinvestment problems into account.

The connection between capital structure and investment strategies creates a situation where strong or weak cash holdings can affect a firm's ability to make optimal use of growth opportunities that may arise. It has also been shown that a suboptimal capital structure can be caused by agency problems between shareholders, managers, and creditors. An important factor, that also influences agency problems and consequently

[1] If cash holdings are seen as negative debt as in Opler et al. (1999), the addition of debt is equal to a reduction of cash holdings. Also see John, T. A. (1993). Accounting Measures of Corporate Liquidity, Leverage and Costs of Financial Distress. *Journal of Financial Management , 22*, 91-100.
[2] According to La Rocca et al. (2008) this is the case when the NPV of an investment opportunity is positive but smaller than the nominal value of the firm's risky debt.

the capital structure, is the debt structure, i.e. different maturity and seniority classes and a firm's growth opportunities.

2.4 The Financing Hierarchy Model

The financing hierarchy model was first developed by Donaldson (1961) and then extended by Myers & Majluf (1984) who set the model in the context of rational expectations. This model presents a different way of looking at investment decisions by considering how the investment is financed. According to Modigliani and Miller (1958) the firm should evaluate the investment opportunity as though it already had the funds to finance it. This view rests on the assumption that capital markets are efficient, i.e. that securities can always be sold at a fair price and thus, the decision-rule is to undertake every investment with a positive net present value. However, it is reasonable to assume that managers often have better information than investors with regards to the investment opportunity set and therefore, due to this information asymmetry, there are costs embedded into every issue of new securities.

Myers and Majluf (1984) argue that firms tend to follow a hierarchy of financial policies when faced with decisions to invest. This financing hierarchy, which is based on the information asymmetry problem, is also referred to as the *pecking order hypothesis*:

1. Firms prefer to finance investments through the use of internally generated funds rather than externally raised capital.
2. Due to "sticky" dividends, cutting dividends is not used as means to finance investments, i.e. changes in net cash will show up as changes in external financing.
3. If external capital is needed, the firm will always prefer the safest security among the alternatives available to the firm, i.e. work down the pecking order starting with debt. Rather than repurchasing equity, the firm will pay down debt if the internally generated cash flow is greater than capital expenditures
4. The leverage of the firm will thus reflect the cumulative need for future external financing.

Managers often justify not issuing equity by arguing that it is not appropriate to issue when the firm is undervalued. The logical solution to eliminate some of the information asymmetry costs would be to only issue stock when the firm is

overvalued. But, as the firm wants to take advantage of every positive net present value project while simultaneously avoiding raising funds at an unfavourable price, financial slack is needed. If the firm has large enough cash holdings and investors know that issuing equity is not needed in order for the firm to invest, an issue would send a strong negative signal to investors. Debt also contains information asymmetry costs, although these are less severe than in the case of equity. As Myers (2001) argues, debt is a more senior claim compared to equity, and debtholders are therefore less exposed to errors in the valuation of the firm. Moreover, the information advantage that managers have is reduced when debt is issued. A debt issue reveals to investors that the firm considers debt to be a cheaper alternative over equity and thus signals a certain level of firm value. Optimistic managers will therefore prefer to issue debt over equity. Only pessimistic managers, who believe that their firm is overvalued, will consider equity as their best alternative. However, equity will be issued, even for firms with optimistic managers, when the firm is worried about the substantial costs of financial distress, which consequently makes debt too costly. To conclude, financial slack circumvents the costs associated with external financing.

The pecking order model puts forward a motive for holding cash since external financing should be avoided. The main difference from the trade-off model is that in this case the cost of external finance plays a larger role. With this view, there is no optimal level of cash holdings since it is assumed that there is no optimal level of net debt. Cash balances are simply the outcome of the financing decisions as suggested by Myers and Majluf's (1984) pecking order model. If the firm does not have funds that satisfy its investment needs, the firm will raise debt. When resources are sufficient and exceed the amount required for investments, the firm will pay dividends, pay debt when it becomes due, and will otherwise accumulate cash (Dittmar, Mahrt-Smith, & Servaes, 2003; Opler, Pinkowitz, & Stulz, 1999).

2.5 Investor Protection, Corporate Governance and Financial Markets

It is well known that the size and structure of capital markets vary a great deal across countries. Why is it that the UK and US have relatively large equity markets while France and Germany have much smaller ones? Why do Germany and Japan have much more extensive banking systems in comparison to other developed economies? It turns out, as argued by La Porta et al. (1998), that a fair amount of the differences in

the structure and effectiveness of financial systems among countries can be traced back to the respective legal protection of investors' interests as reflected in the countries' judicial systems. This is because the ability of a firm to raise external financing depends to a great extent on which terms can be obtained. Thus, an effective legal environment protects investors against expropriation by managers, increases the likelihood that an investor will provide financing, and hence increases the scope of capital markets.

"For academia and experts in corporate governance, we suggest that the inclusion of the legal and institutional setting could significantly improve the validity of the research." (Lopez-de-Foronda, Lopez-Iturriage, & Santamaria-Mariscal, 2007, p. 1131)

There are two main legal systems in the world; common law, made by rulings incorporated into legislature, and civil law, which dates back to Roman law and is part of a scholar and legislator-made tradition. La Porta et al. (1998) conclude that English common law provides the best investor protection while the worst protection for investors is found in countries with French civil law. Countries using Scandinavian civil law and German civil law fall somewhere in between.

2.5.1 Germany vs. Sweden

Shareholder rights

La Porta et al. (1998) analyze countries' respective shareholder protection by investigating a number of variables. Germany and Sweden have many similarities in their protection of shareholder interests but also a few differences. Neither of the two countries have the one share, one vote principle. This means that non-voting shares, low- and high-voting shares, founders' shares with high-voting shares, and shares whose voting rights increase with the time of holding are allowed. Neither country allows for proxy votes to be mailed, which means that some shareholders have difficulties exercising their votes. Neither cumulative voting for directors nor proportional voting, i.e. that minority shareholders are given the power to put their representatives on the board of directors, is allowed. Furthermore, minority shareholders are given no legal mechanisms against perceived oppression of directors, which, if there were such mechanisms, could include the right to challenge directors' decision in court. However, Sweden, in contrary to Germany, grants shareholders pre-

emptive rights to buy new issues of stock, which protect existing shareholders from dilution. Moreover, German law requires that shareholders' shares are deposited within the company or a financial intermediary several days prior and after a shareholder meeting. This mechanism prevents investors from trading the shares during this time. Thus, shareholders in Sweden are more protected by law than shareholders in Germany. It is common among all major economies to include a requirement of having a certain percentage of share capital in order to be able to call an extraordinary shareholder meeting. In Sweden and Germany this percentage is set to 10 percent and 5 percent, respectively.

Creditor rights

An evaluation with regards to whether creditors are better off with certain rules and regulations is more ambiguous than an evaluation of shareholder rights. Firstly, it is more challenging to satisfy many different creditors' interests at once due to subordination of credits and the resulting different credit tranches. Secondly, a country that gives limited rights with respect to the liquidation procedure of a defaulting firm but has a perfect reorganisation process does not necessarily mean that creditor rights are compromised. In this case, the creditors may still have some power in the form of votes in the decision of how to reorganise the firm.

As with shareholder rights, there are some similarities between creditor rights in Germany and Sweden. Both countries preclude management from unilaterally seeking court protection against creditors when filing for reorganisation without creditors' consent. Moreover, the right that secured creditors are paid first in case of liquidation applies to both Sweden and Germany. Yet another similarity is that there is no dismissal of managers during a reorganisation procedure. Sweden, however, has a slightly weaker overall protection of creditors due to the fact that creditors cannot repossess collateral assets from the firm in the case of a reorganisation procedure. La Porta et al. (1998) argue that Germany has very good creditor protection by recognising this issue. Although Germany does allow managers to remain on duty during a reorganisation, creditors here are less dependent on reorganisation procedures of distressed firms because liquidation is made easier. Thus, having strong creditor rights when it comes to the reorganisation procedure does not serve much purpose.

Discussion

Indeed, as could be expected, the differences in shareholder and creditor rights affect the level of development of debt and equity markets. La Porta et al. (1997) show that there is a positive relationship between countries with German civil law and their ratio of debt to GNP. However, this finding is not statistically significant. Surprisingly, Scandinavian origin countries have a much lower ratio of debt to GNP. The aggregate debt as a share of GNP is 97% for countries with German civil law and 54% for countries with Scandinavian civil law. However, Krishnan and Moyer (1996) study the capital structure determinants of large corporations and find that German firms generally have lower leverage than firms from the US, but make greater use of short-term debt, which is consistent with the idea that firms in Germany have close relationships with banks. Furthermore, as noted by La Porta et al. (1998), Germany has a relatively high degree of ownership concentration: the three largest shareholders own 48 percent on average. Ownership concentration in Sweden is significantly lower with 28 percent on average. This supports the notion that a higher ownership concentration is a consequence of easier bank borrowing which in turn leads to firms financing investments with debt rather than equity.

2.6 Empirical Literature Review

Kim et al. (1998) were the first to deliver empirical results for the trade-off theory and corporate cash holdings. In their empirical analysis of 915 US industrial firms with data from 1975 until 1994, the researchers look at both the costs and benefits of holding liquid assets by doing both cross-sectional regressions and pooled time-series cross-sectional regressions. They find that firms with more volatile earnings face higher external financing costs and, as a result, hold a higher amount of liquid assets relative to the firms' total assets. Firms with higher growth opportunities, measured by market-to-book ratios, have also got significantly larger cash positions. Moreover, firm size seems to be negatively related to cash holdings, although findings are not always significant. Since access to capital markets is positively related to firm size these findings are consistent with the transaction cost model. Another strong finding is the relation between cash and potential investment opportunities in the future. Here the authors find a positive relationship between cash and measures of future economic conditions, where the logarithmic growth rate of the index of leading economic indicators is used as proxy (Kim, Mauer, & Sherman, 1998).

Opler et al. did another essential study on cash holdings in 1999, where the theoretical assumptions of the financing hierarchy model were added and compared to the transaction cost theory. Using a sample size of at least 1048 US firms and an extensive time frame from 1971 to 1994, the researchers look at how firms change their cash holdings over time with respect to firm size, growth opportunities, cash flow volatility, capital expenditures, M&A activity, and dividends. In a single-period cross sectional regression the authors also include a credit quality measure in the form of Altman's Z-Score. As anticipated, firms with a higher credit quality tend to hold fewer liquid assets. Moreover, the other empirical findings on the determinants of cash holdings are consistent with Kim et al. (1998) and support the trade-off model. They also find that increases in excess cash holdings rarely lead to a proportional increase in capital expenditures, acquisitions, and dividend payouts. Firms that experience such an increase tend to retain excess cash, supporting management's tendency to accumulate cash beyond optimal levels. However, Opler et al. (1999) do not find a significant connection between liquid asset holdings and the used proxies for agency costs and therefore make a suggestion for further research in this area.

In a more recent study, Ozkan and Ozkan (2004) firstly examine the empirical determinants of cash holdings for firms in the UK over the period 1984-1999 using a dynamic panel data regression and a generalized method of moments (GMM) to estimate the coefficients. The authors' reasons for this decision pertain to the potential delays in the capital structure adjustment process to the target cash structure, and they finally find evidence for dynamic effects in the determination of cash holdings. Although being closer to the US than to other European markets, the UK has distinct corporate governance features, which add further importance to this study. By including managerial ownership variables as well as board structure variables, which measure the ratio of executive and non-executive board members, the authors show that there is a significant relationship between a firm's corporate governance policy and its level of cash holdings. By using a non-linear model they show that the connection of managerial ownership and cash holdings is non-monotonic, with cash holdings falling as managerial ownership increases up to 24%, increasing cash levels up to 64%, and again decreasing cash holdings for managerial ownership greater than 64%. However, the authors fail to deliver an explanation of why managers would change their cash policy again at high levels of ownership (Ozkan & Ozkan, 2004).

Compared to Ozkan and Ozkan (2004), other studies that focus on managerial ownership and US firms found no or only little evidence for a significant impact on cash levels. A possible reason for this difference is that shareholders in the US enjoy good protection (Dittmar, Mahrt-Smith, & Servaes, 2003; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2002).

Most of the studies that have examined the financing hierarchy theory have used samples of US firms. In a recent cross-country study, Seifert and Gonenc (2008) attempt to ascertain how well pecking order behaviour applies to companies in the US, the UK, Germany, and Japan. Whereas the researchers find only no or only little significant evidence for pecking order behaviour for the first three countries, the evidence is favourable for Japanese firms. From these results one can conclude that a country's regulatory system can influence the impact of financial theory on firms' capital structure.

Thus, with respect to international corporate governance and corporate cash holdings, Dittmar et al. (2003) deliver interesting empirical findings. For a single-year sample of more than 11,000 companies from 45 countries, the researchers find a significant negative connection between regulatory shareholder protection and firms' cash holdings. Moreover, the importance of other, more traditional factors, e.g. agency problems, growth opportunities etc., decreases with lower shareholder protection. They also find empirical support for the trade-off theory and the positive correlation of growth and cash holdings. Moreover, they argue for a substitution effect of working capital and cash. When it comes to access to capital markets, Dittmar et al. (2003) find decreasing significance with regards to dependence on external finance variables when shareholder protection is low. This finding contradicts the transaction cost motive since external financing costs are expected to increase with poor investor protection. However, a weakening significance is then a further indicator of agency motive for corporate cash holdings (Dittmar, Mahrt-Smith, & Servaes, 2003).

In a study of SME cash holdings in Spain, Garcia-Teruel and Martinez-Solano (2008) find empirical evidence for the fact that companies have a certain target level of cash holdings, which they attempt to converge. In their study of 860 small and medium-sized manufacturing firms over 6 years (1996-2001), the researchers apply a dynamic panel study and the GMM estimation technique to capture converging effects which

are found to be higher for SMEs than for larger firms. The authors argue that the quicker conversion to target levels is caused by higher information asymmetries and agency problems for smaller firms and related higher costs when deviating from the optimal cash level. Although only little evidence for the impact of leverage on cash holdings is found, the authors find a significant relationship between debt maturity structure and cash holdings. Firms with a high short-term debt ratio tend to hold more liquid assets. Here the authors argue that firms with short-term debt are likely to have greater information asymmetry (Garcia-Teruel & Martinez-Solano, 2008).

As it can be seen, there are several competing variables when it comes to cash holdings. Varying approaches in financial theory lead to different expected signs of the coefficients. As more recent studies have shown, a country's regulatory environment has a strong impact on the level of cash held by a firm and on its capital structure (Ferreira & Vilela, 2004). However, there has been no study conducted so far that focuses on a detailed cross-country comparison between only two countries to pinpoint potential specific differences in a regulatory framework and their impact on cash holdings. Moreover, there are only very few studies conducted within the European Union, with none of them focusing on Germany or Sweden.

3. Data and Variables

This chapter introduces the data and variables used in this empirical study. This is of particular importance when attempting to replicate this study to apply it to countries other than Germany or Sweden. Firstly, the acquisition of data and its sources are described. Secondly, the variables that are used in the descriptive statistics and the empirical model are presented. For each variable the expected direction of the impact is given according to the underlying theory.

3.1 Data Sample

To investigate the research questions, firm specific data from the Thomson *Datastream* database for Swedish and German firms between the years 2000 and 2008 has been collected. Data from 174 Swedish firms and 546 German firms has been obtained, comprising a total of 1,017 and 2,795 observations for the Swedish and German markets, respectively. In order to determine the nationality of firms the country name is used as search criteria under the search option "Market" and any firm that does not have their primary listing in either Sweden or Germany is excluded. Moreover, banks and financial firms are excluded with the help of the industry categorisation used by Thomson Datastream. This is done because marketable securities and cash are part of these firms' business and because of their need to meet specific regulatory capital requirements (Opler, Pinkowitz, & Stulz, 1999). Finally, monthly data on interest rates during the period 2000-2008 has been collected for Sweden from the Thomson *Datastream* database. Monthly interest rates for German treasury bills (Bubills) have been obtained from the European Central Bank[3]. The translation of interest rates into annual rates is conducted by taking the yearly average of the monthly observations.

In line with the study by Dittmar et al. (2003), the bottom and top one percent of the observations of all variables are eliminated to remove potentially disturbing outlier effects. Thus, the number of observations is reduced to 825 and 2,458 for the Swedish and German markets, respectively. When first differences of the variables are specified in the later sections, the data sample is further reduced since year 2000 observations then are excluded from the data sample.

[3] http://www.ecb.int/stats/monetary/rates/html/index.en.html

3.2 Variables

The choice of variables that could have an impact on corporate cash holdings and are therefore used in this empirical study are based on variables included in previous scientific studies that are discussed in chapter 2.6. Furthermore, motivations of why and how these variables should correlate with cash holdings are given in the following section.

The dependent variable in this thesis, *cash*, can be measured in different ways. Opler et al. (1999) use cash plus marketable securities over net assets, i.e. total assets less cash and marketable securities. The underlying reason is that a company's ability to generate future profit streams is dependent on its net assets in place. Ozkan and Ozkan (2004), on the other hand, only use the ratio of total cash and equivalent items to total assets. To capture potential differences in this thesis, both measures are used separately and empirical results are compared. This approach can be compared to the one used by Garcia-Tereul et al. (2008).

Growth opportunities are measured differently in previous studies, depending to a great extent on data availability. For their study on Spanish SMEs, Garcia-Tereul et al. (2007) use the ratio $sales_t / sales_{t-1}$ as a proxy for growth. However, if more data is available, the market-to-book ratio is a commonly used measure of growth opportunities (Chen & Zhao, 2006). Hence, this measure also finds application in this thesis. As discussed in Chapter 2, the expected correlation of growth and cash holdings is positive according to the transaction costs model. However, the financing hierarchy model predicts a negative correlation due to the primary use of internal financial resources (Dittmar, Mahrt-Smith, & Servaes, 2003). Hence, our expectations of the sign of the coefficient are ambiguous.

To take into account the *firm size,* the natural logarithm of the firm's total assets is used. Although Ozkan and Ozkan (2004) and Opler et al. (1999) measure total assets in real terms, nominal values are used in this study, which is in line with Garcia-Tereul et al. (2008) as well as Ben and Yuanjian (2007). As already discussed, larger firms tend to hold relatively less cash due to potential economies of scale in cash management, smaller information asymmetries, and fewer agency problems. Thus, the expected impact of firm size is negative.

When it comes to measuring the *likelihood of financial distress,* there is a greater variety of proxies used in the scientific literature. Opler et al. (1999) use R&D expenditures to sales as a proxy since they argue that firms with a higher R&D ratio tend to be riskier due to uncertainty in the R&D process. Garcia-Tereul et al. (2008) use a re-estimated Z-Score model originally developed by Altman (1968); Kim et al. (1998) use the inverse of Altman's original Z-Score. Moreover, there is also controversy regarding the direction of the impact. Whereas Ozkan and Ozkan (2004) and Ferreira and Vilela (2004) expect a positive correlation based on the transaction costs model, Kim et al. (1998) expect firms with a greater likelihood of financial distress to have lower levels of liquidity due to the underinvestment problem (Myers, 1977). In this thesis, the original Z-Score model is used to estimate the likelihood of financial distress. However, in contrast to Altman's original model this study uses the book value of total liabilities as proxy for debt and not the book value of total debt. This choice is consistent with Altman's (2000) model. However, the expected correlation with cash holdings is ambiguous (Altman, 2000).

$$ZScore = 1.2 \cdot X_1 + 1.4 \cdot X_2 + 3.3 \cdot X_3 + 0.6 \cdot X_4 + 1.0 \cdot X_5$$

where X_1 = Working capital / Total assets

X_2 = Retained earnings / Total assets

X_3 = EBIT / Total assets

X_4 = Market value of equity / Book value of total liabilities

X_5 = Sales / Total assets

When it comes to *leverage,* empirical studies deliver more consistent findings in line with theoretical implications, namely a negative correlation between leverage and cash holdings. Although different studies use slightly different proxies for leverage, total liabilities over total assets is a common measure and is therefore used as a measure of leverage in this thesis, too.

As previously discussed, Garcia-Teruel and Martinez-Solano (2008) argue that a firm's *debt maturity structure* can have significant impact on cash holdings. In this thesis, the ratio of short-term debt and current portion of long-term debt over total debt is used. Firms that use more long-term debt i.e. have a lower debt maturity ratio, face less variety in refinancing costs and also less information asymmetry. Hence,

theory implies a positive correlation between the ratio used and the level of cash holdings.

As presented, a firm's cash holdings can be seen as accumulated historical *cash flow*. If moderate cash flow volatility is assumed, high present cash flow is an indicator of relatively high cash holdings, thus there is a positive expected correlation. Also, as interpreted by Dittmar et al. (2003), a positive correlation indicates support for the financing hierarchy as firms then accumulate cash. However, if cash flows are regarded as a source of financing future investments, one can argue that stable cash flows reduce the need of cash holdings, thus indicating a negative relationship. Opler et al. (1999) use earnings after interest, dividends, taxes plus depreciation over net assets as cash flow proxy. Ozkan and Ozkan (2004) use pre-tax profits plus depreciation over total assets as a measure of cash flow. Since the variables chosen for this thesis also include dividends, it is appropriate to compute cash flow as pre-tax profits plus depreciation minus dividends over total assets.

Beyond cash flow measures, other *non-cash liquid assets* can determine firms' cash holdings. Ferreira and Vilela (2004) and Garcia-Teruel and Martinez-Solano (2008) use the net working capital to assets as a proxy for liquid asset substitutes that can be easily and relatively cost-efficient when transferred into cash holdings. In line with these previous studies the same proxy for liquidity is used and according to the transaction cost theory's substitution effect a negative relation can be expected.

Another variable that may affect the cash level is the amount a firm pays as *dividends*. Cash holdings can be connected with agency problems, as argued by Jensen (1986), i.e. that an overinvestment problem may arise. One way to mitigate this problem is to pay dividends. Thus, to the extent that firms are exposed to the overinvestment problem, cash holdings should be negatively related to dividends. Moreover, Ozkan and Ozkan (2004) argue that dividends can be viewed as negative equity and to the extent a firm can raise funds by cutting dividends there should be a negative relationship between cash and dividends. The authors also put forward the possibility that a dividend paying firm can allow themselves to have higher cash levels relative to a non-dividend paying firm in order to avoid a situation where the cash level is not high enough to support dividend payments. In this case, there will be a positive relationship between dividends and cash holdings. Opler et al. (1999) include a

dummy variable for dividend payments while Ozkan and Ozkan define the same variable as dividend payments over total assets. It can be argued that defining the variable as an actual number will add precision to the empirical model and thus, the dividend variable is defined in the same manner as in Ozkan and Ozkan (2004).

The relative attractiveness of investing in production versus investing in liquid assets may have an effect on cash holdings. Kim et al. (1998) show that investments in cash holdings are negatively related to the current return on assets and positively related to the return on cash, i.e. a risk-free rate. In accordance with Kim et al. (1998) and Garcia-Teruel and Martinez-Solano (2008) the *opportunity cost of capital* is measured as the difference between the return on assets and the return on short-term Treasury bills. This negative relation clearly confirms the trade-off theory where the opportunity cost is equivalent to the marginal costs of cash holdings.

Variable	Definition
Cash1	Cash & Cash Equivalents / Total Assets
Cash2	Cash & Cash Equivalents / Total Assets less Cash & Cash Equivalents
Growth	Market-to-Book Ratio
Size	ln(Total Assets)
ZScore	Altman's original ZScore
Leverage	Total Liabilities / Total Assets
DebtMaturity	(Current portion of long term debt + short term debt) / Total Liabilities
CashFlow	Pre-Tax Profits plus Depreciation / Total Assets
Liquidity	(Working Capital less Cash) / Total Assets
Dividend	Dividends / Total Assets
OppCost	(EBIT / Total Assets) - Gov.Bond Interest Rate

Figure 4: Description of Variables

4. Methodology

4.1 Panel Data

In order to test the impact of the possible cash determinants on the level of cash holdings, the least squares method is employed on panel data. Panel data sets contain a number of cross-sectional observations collected over time. As such they contain both time and cross-section effects and consequently the data sets are typically larger than for pure cross-section or time-series data sets. Because of the larger sample size and the fact that explanatory variables vary over two dimensions, the estimators based on panel data are generally more accurate than for other sources. Even if sample sizes are identical, parameter estimators tend to be more efficient. The standard form of a panel data model can be described as

$$y_{i,t} = \alpha + \beta x_{i,t} + u_{i,t}$$

where $y_{i,t}$ is the dependent variable, α is the intercept term, β is a $k \times 1$ vector of parameters to be estimated on the independent variables using the ordinary least squares (OLS) method, and $x_{i,t}$ is a $k \times 1$ vector of observations on the independent variables with $t = 1,...,T; \quad i = 1,...,N$ (Brooks, 2008).

Firstly, panel data may ease the problem of distinguishing true state dependence from spurious state dependence. Spurious state dependence assumes that unobserved characteristics of individuals may influence the probability of individuals being dependent on a parameter when they in fact are not affected by the parameter. Employing panel data will reduce this problem by taking individual characteristics into account and thereby allow for easier identification of individual dynamics, i.e. identification of true state dependence. Secondly, panel data can reduce the effects of omitted variables. Omitted variable bias arises when a variable that is correlated with the included variables is excluded from the model. Furthermore, to get the equivalent explanatory power using pure time series models generally would require an extensive range of observation periods to obtain a sufficient number of observations for meaningful hypothesis testing. On the contrary, panel data combines both time and cross-sectional dimensions simultaneously (Brooks, 2008; Campbell, Lo, & MacKinlay, 1997).

When it comes to the data sample and importing it into any statistics software[4], a first distinction must be drawn between *balanced panel data* and *unbalanced panel data*. A balanced panel has a constant number of time-series observations for each cross-sectional unit whereas unbalanced data exhibits different amounts of observations at different points of time. Since only cross-sectional units with at least five consecutive observations are used in this data sample and most of the statistics programs balance missing data automatically, the data set in this study can be seen as balanced.

Fixed effects, sometimes also referred to as *least squares dummy variable model*, can be included to capture the effect of all observable and unobservable variables that do not vary over individual units. As such, panel data estimators may be more robust to an incomplete model specification. Finally, endogeneity problems, i.e. if regressors are correlated with the error terms, may be mitigated using a panel data specification. More specifically, applying a fixed effects assumption removes the part of the error term that is correlated with the regressors and thus allows for heterogeneity (Verbeek, 2004). Due to the nature of panel data, fixed effect models are of either cross-sectional or time-series nature. Cross-sectional fixed effects decompose the error term, $u_{i,t}$, into an individual specific effect, μ_i, and a new error term, $\upsilon_{i,t}$, that again varies over time and entities (Brooks, 2008).

$$u_{i,t} = \mu_i + \upsilon_{i,t}$$

Time-series fixed effects are used when it can be assumed that the average value of the dependent variable, $y_{i,t}$, changes over time. A time-series fixed effect model is defined as

$$y_{i,t} = \alpha + \beta_i x_{i,t} + \lambda_t + \upsilon_{i,t}$$

where λ_t is a time-varying intercept that captures effects influencing the dependent variable over time but are constant for all entities. Both fixed-effects can also be combined if necessary (Brooks, 2008). Both models can be tested for significance using a joint *F*-test of the fixed effects, i.e. a redundancy test of fixed effects.

4.2 Using a Static Linear Panel Data Model

The used model is a static linear OLS model and, in this study, has cross-sectional fixed effects in which the intercept varies over the individual units *i*:

[4] EViews 6.0 is used in this thesis

$$Cash_{i,t} = \alpha_i + \beta_1 Growth_{i,t} + \beta_2 Size_{i,t} + \beta_3 ZScore_{i,t} + \beta_4 Leverage_{i,t} + \beta_5 DebtMaturity_{i,t}$$
$$+\beta_6 CashFlow_{i,t} + \beta_7 Liquidity_{i,t} + \beta_8 Dividend_{i,t} + \beta_9 OppCost_{i,t} + \upsilon_{i,t}$$

where the error terms are distributed

$$\upsilon_{i,t} \sim IID\left(0, \sigma_\upsilon^2\right)$$

This approach considers the distribution of the dependent variable given α_i, which allows for α_i to be estimated (Verbeek, 2004). For the two data samples, the redundancy tests for each fixed-effects model show that the null hypothesis of redundant time-fixed effects cannot be rejected, i.e. the average value of the dependent variable does not change over time. When the corresponding tests for cross-section fixed effects are performed the null hypothesis is rejected, i.e. entities show individual effects that do not vary over time. Hence, the two samples, Germany and Sweden, require the use of a cross-section fixed effects model. This specification means that the intercept is allowed to vary among entities but not over time.[5]

However, even if problems with heteroskedasticity are mitigated with fixed effects, autocorrelation remains a potential source of problems. For this reason, a generalized Durbin-Watson test for first-order autocorrelation in the residuals of panel data was developed by Bhargava et al. in 1982. Bhargava et al. (1982) argue that with an increasing number of entities similar tests, e.g. the Berenblut-Webb test, become equivalent and thus in practice only the Durbin-Watson test needs to be applied. The researchers also provide tables with related test statistics that are used to test the Durbin-Watson results for significant autocorrelation since the confidence intervals depend on the length of the balanced panel, the number of regressors, and the number of entities. For both samples the Durbin-Watson test statistic cannot reject the null hypothesis that there are no problems with autocorrelation. Since cross-sectional fixed effects estimators are employed, a possible time-invariant component in α_i that is correlated with the explanatory variables is already removed (Verbeek, 2004). Moreover, White's correction of the standard errors, which is robust to serial correlation and time-varying differences in disturbances, is used. This will allow for correct inferences even though autocorrelation remains.

[5] See Appendix for redundancy test results

Another test for robustness is the fact that two regressions on the same data sample are run, using both the *Cash1* and *Cash2* variable. This approach is based on the study of Spanish SMEs by Garcia-Teruel and Martinez-Solano (2008). Both regressions deliver consistent results. Furthermore, regressions of first differences on both dependent variables and on both data sets are run.[6] For the first differences regressions the Durbin-Watson test statistic indicates no problems with autocorrelation and thus the results are used to compare and validate the previously autocorrelated regressions (Bhargava, Franzini, & Narendranathan, 1982).

[6] First differences on all variables are used. Since many variables have negative ratios using first differences is an appropriate substitute for taking the natural logarithm

5. Empirical Results

5.1 Descriptive Statistics

In order to get a first impression about the data sample and to characterize the firms of the sample, descriptive statistics are an important first step to present and analyze the data sample as well as to pinpoint possible differences between Swedish and German firms. This section starts with presenting and discussing the correlation matrix of both data panels and continues with a more qualitative approach by presenting the time-varying means of the variables in graphical form. Moreover, the mean-difference test, i.e. *t*-test, is used to test for statistically significant differences between the two economies (Thomas, 2005).

	GERMANY						SWEDEN				
	25% Q	MEAN	MEDIAN	75% Q	Std Dev.		25% Q	MEAN	MEDIAN	75% Q	Std. Dev.
Cash1	0.028	0.117	0.070	0.156	0.128	*	0.039	0.127	0.081	0.165	0.129
Cash2	0.029	0.170	0.075	0.185	0.285		0.041	0.184	0.088	0.198	0.281
Growth	1.013	2.268	1.630	2.600	2.770	***	1.310	2.677	1.990	3.260	2.285
Size	11.061	12.433	12.077	13.514	2.110	***	12.870	14.390	14.194	15.805	2.127
ZScore	1.590	2.800	2.397	3.472	2.386	***	1.817	3.344	2.778	3.993	3.090
Leverage	0.483	0.605	0.617	0.734	0.195	***	0.426	0.548	0.574	0.676	0.169
DebtMaturity	0.034	0.155	0.108	0.232	0.155	***	0.015	0.110	0.076	0.181	0.112
CashFlow	0.029	0.057	0.073	0.115	0.113	***	0.013	0.039	0.066	0.111	0.129
Liquidity	-0.049	0.068	0.070	0.190	0.187		-0.027	0.069	0.060	0.174	0.145
Dividend	0.000	0.014	0.006	0.018	0.036	***	0.000	0.021	0.013	0.027	0.031
OppCost	0.001	0.025	0.040	0.080	0.114	***	-0.029	-0.003	0.034	0.090	0.188
Observations	***2,458***						***825***				

** = mean-difference significant at 10% level, *** at 1% level*

Table 1: Descriptive Statistics

Table 1 reports the descriptive statistics of the variables used as well as the results from the mean-difference test. The sample comprises all complete observations from 2000 and 2001. It can be seen that Swedish corporate cash holding ratios are generally higher than German equivalents, regardless of the variable used, i.e. *Cash1* or *Cash2*. However, *Cash2* ratios are not significantly different from each other. Since *Size* is measured in Euro and Swedish kronor, direct implications on the distribution of firm size cannot be drawn. However, when using an average exchange rate of 9.2974 EUR/SEK[7] the average sizes of German and Swedish firms are EUR 251mn and EUR 191mn, respectively. This can be explained by the larger German economy in general and the higher amount of German-based multinational companies in particular.

[7] Source: Thomson Datastream, average historical exchange rate EUR/SEK from 2000 until 2008

Swedish companies indicate significantly higher Market-to-Book ratios, which are used as proxy for growth opportunities. Moreover, Swedish firms exhibit a significantly lower gearing, i.e. *Leverage,* and a higher credit quality, measured as *ZScore*. These findings are in line with the discussion of leverage of Swedish and German companies in chapter 2.5. The *Liquidity* variable and the *OppCost* variable are not clearly different in all quartiles between the countries, whereas the latter exhibits a higher spread for Swedish firms and vice versa. For Swedish companies, the average opportunity costs are even slightly negative. When it comes to *CashFlow*, German companies exhibit significantly higher cash flow ratios than their Swedish counterparts.

Table 2, provided at the end of this chapter, presents the means of the explanatory variables over time and highlights peaks and lows in the respective years. It can be seen that the means vary significantly over time and show a different development across the countries. In the following, selected variables are explained in depth whereas the remaining graphs can be found in the appendix.

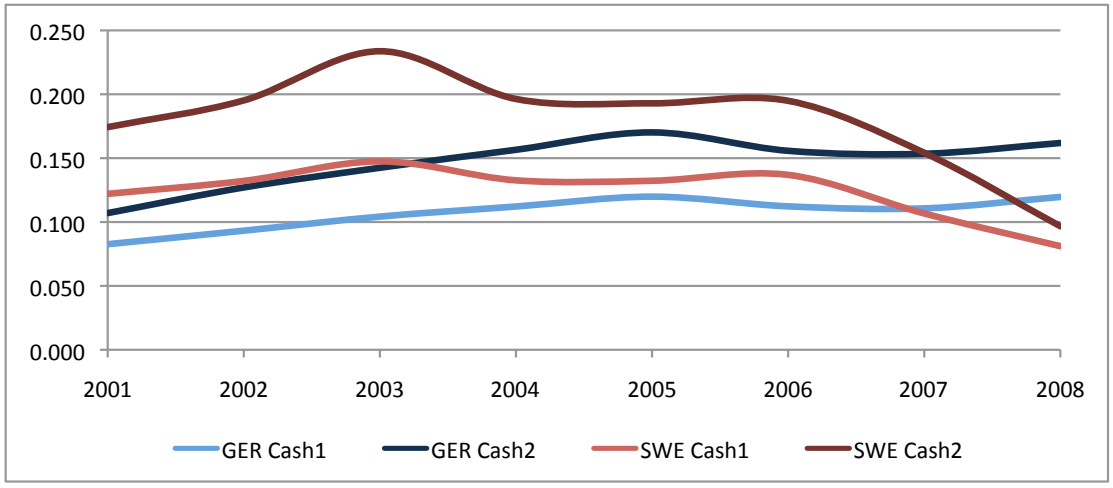


Figure 5: Swedish and German Cash Holdings Means over Time

Figure 5 presents the evolution over time of the different cash ratios of the firms analysed.[8] It can be seen that the development of Swedish and German cash holdings is distinct from each other. Whereas German cash holdings reached their peak in 2005 and 2008 with a Cash to Total Assets (*Cash1*) ratio of 12%, Swedish companies held the highest level of cash in 2003 at a 14.7% level with stagnating ratios ever since. In

[8] Time period starts here in 2001 since the data sample with first difference variables (i.e. excluding the first year) is used

2007, Swedish cash levels were for the first time below cash levels of German firms. This trend also persisted in 2008. Due to the nature of the two measures for cash levels, the gap between the two ratios also decreased with decreasing absolute cash holdings, which can be seen in the latter years of Swedish firms.

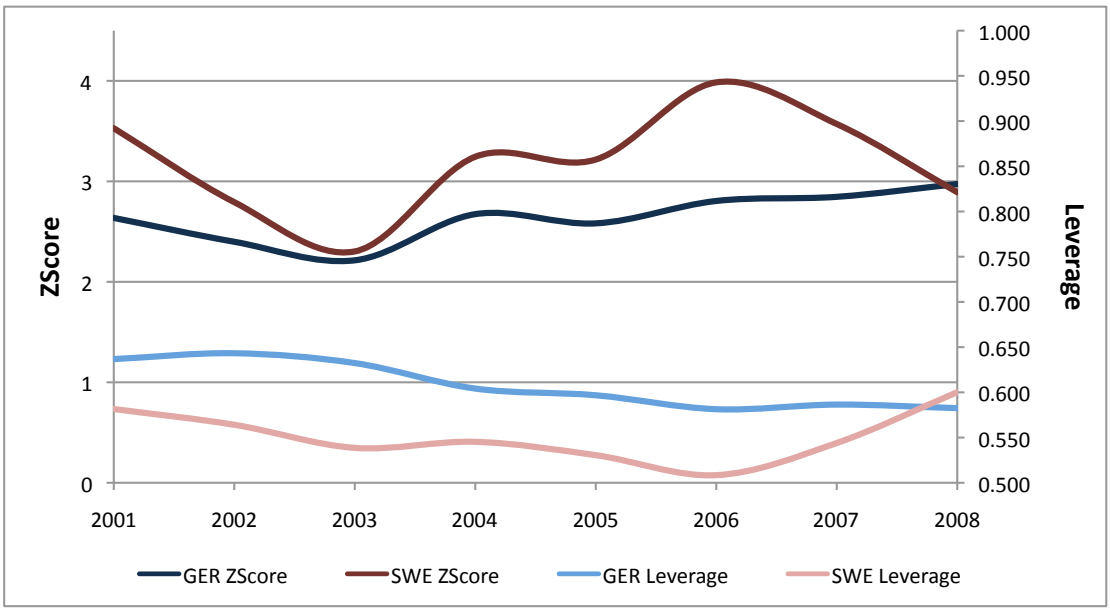


Figure 6: ZScore and Leverage Means of Swedish and German Companies over Time

Figure 6 shows the development of the firms' probability of financial distress, measured as average Altman's Z-Score, and average financial leverage. Although German firms exhibit generally lower Z-Scores, i.e. show a higher probability of financial distress, the development of the German score is less volatile. Whereas Z-Scores of Swedish companies peak in 2006 at an average score of 3.99 (Germany: 2.81), the Swedish scores are for the first time lower than their German counterparts in 2008. A similar development can be observed in financial leverage. Here, financial gearing of Swedish firms exceeds German leverage for the first time in 2008 and simultaneously reaches the maximum observed in the data sample. The graphical presentation of the different developments of the remaining variables over time can be found in the appendix. Other variables show similar developments. Hence, it can be said that German and Swedish companies exhibit distinct characteristics and that these characteristics also vary differently over time. This leads to the next section of this chapter, where the different variables are analyzed in a regression analysis using panel data.

Variable Means	2001	2002	2003	2004	2005	2006	2007	2008	
GER Cash1	0.08	0.09	0.10	0.11	0.12	0.11	0.11	0.12	
GER Cash2	0.11	0.13	0.14	0.16	0.17	0.16	0.15	0.16	
GER Growth	2.28	2.13	1.43	1.94	1.80	2.14	2.49	2.24	GERMANY
GER Size	12.62	12.22	12.21	12.14	12.24	12.27	12.39	13.82	
GER ZScore	2.64	2.40	2.21	2.67	2.58	2.80	2.85	2.97	
GER Leverage	0.64	0.64	0.63	0.60	0.60	0.58	0.59	0.58	
GER DebtMaturity	0.18	0.18	0.16	0.14	0.14	0.15	0.13	0.13	
GER CashFlow	0.05	0.03	0.05	0.07	0.07	0.06	0.07	0.07	
GER Liquidity	0.08	0.06	0.07	0.07	0.04	0.05	0.06	0.07	
GER Dividend	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	
GER OppCost	0.01	-0.01	0.03	0.05	0.06	0.05	0.05	0.07	
SWE Cash1	0.12	0.13	0.15	0.13	0.13	0.14	0.11	0.08	SWEDEN
SWE Cash2	0.17	0.20	0.23	0.20	0.19	0.19	0.15	0.10	
SWE Growth	2.76	2.70	1.64	2.42	2.35	2.90	2.96	2.18	
SWE Size	15.01	14.33	13.87	14.08	14.30	14.29	14.61	15.71	
SWE ZScore	3.53	2.79	2.30	3.25	3.22	3.99	3.57	2.89	
SWE Leverage	0.58	0.56	0.54	0.55	0.53	0.51	0.54	0.60	
SWE DebtMaturity	0.09	0.08	0.11	0.11	0.13	0.12	0.12	0.12	
SWE CashFlow	0.01	-0.01	0.00	0.05	0.06	0.07	0.06	0.05	
SWE Liquidity	0.08	0.08	0.06	0.07	0.07	0.07	0.07	0.06	
SWE Dividend	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	
SWE OppCost	-0.04	-0.08	-0.07	-0.01	0.02	0.04	0.04	0.03	

Table 2: Variable Means over Time

5.2 Panel Data Study

Table 3 presents the results of the panel data regressions on both dependent variables and also on the first differences. Furthermore, regression coefficients in the form of R^2 and adjusted R^2 are given as well as significance levels for all explanatory variables. Moreover, the Durbin-Watson test statistic is given for each regression to analyze potential autocorrelation problems. The results of the analysis indicate mostly favourable R^2 and adjusted R^2 values, even when we control for autocorrelation. Furthermore, coefficients of the first differences regressions are generally consistent with the original data regressions, indicating robust results. However, the results of the regression of first differences on the *Cash2* variable using German data differ from the rest with an insignificant F-statistic and low regression coefficients. Hence, results of this single regression should be treated with care when it comes to analyzing the impact of each determinant on cash holdings.

Growth

The measure for growth opportunities, i.e. market-to-book ratio, has mostly negative coefficients, thus implying that firms with an abundance of investment opportunities face higher costs of holding liquid assets due to forgone opportunities. This result would support the financing hierarchy model rather than the transaction cost theory

where cash holdings have a higher marginal benefit for firms with high growth opportunities. However, none but one of the coefficients are significant, indicating a low impact of growth opportunities on cash holdings. Furthermore, since results are homogenous across the two countries, no impact of corporate governance on this variable can be found.

Size

The coefficients of the size variable show ambiguous results. For the original data sample and *Cash1* regressions the coefficients are significant and negative, which is in line with the transaction cost model and previous research of Opler et al. (1999), Ozkan and Ozkan (2004), as well as Garcia-Teruel and Martinez-Solano (2008), indicating scale economies of cash holdings according to the transaction cost model. The negative correlation also implies that it is relatively easier and cheaper for larger companies with good track records to raise external funds when needed. However, for regressions of Swedish companies on the *Cash2* variable significantly positive relations are found. This would instead support the financing hierarchy model where larger companies are assumed to have been more successful in the past and therefore have accumulated relatively more cash than smaller firms. This could also be interpreted as a sign of stronger agency problems between managers and shareholders, potentially due to empire building. This result is not supported by the notion of stronger shareholder protection that prevails in Sweden as presented earlier. However, as the empirical results on the size coefficient are contradictory in signs and insignificant in many cases, no definite conclusion on the effect of size can be drawn.

Z-Score

The transaction cost model implies that firms with a higher credit rating, i.e. higher Z-Score, hold less cash whereas the financing hierarchy theory implies the opposite, since high-quality firms have less debt and, ceteris paribus, a higher credit rating. The empirical results of the regressions support this theory with all but one coefficient being positive. However, only significant coefficients are found for *Cash1* regressions on the German data sample. Since this result is robust as shown by the first-differences regression, it can be argued that credit quality has a stronger impact on cash holdings for German firms. This is of particular interest since German companies generally have lower Z-Scores as shown in the previous section. Thus, it can be argued that the impact of a credit rating on cash holdings becomes stronger with

lower ratings. From a corporate governance perspective it can be said that in a country with lower creditor protection a firm's average credit quality increases and, at the same time, leverage decreases to satisfy creditors' requirements. A lower leverage also decreases the need of covenants or other restrictions, thus having less impact on a firm's liquid asset holdings. Hence, the results for the Swedish sample are consistent with the transaction cost model and the findings that Swedish companies face lower creditor protection.

Leverage

As shown earlier, high debt levels can increase the probability of financial distress and therefore should be positively correlated with cash if the precautionary motive holds. However, leverage is found to be negatively related to cash holdings as was expected according to the trade-off theory with respect to the substitution effect. This result is also consistent with many previous studies and suggests that adding debt to a firm's capital structure reduces financial slack associated with agency problems. Moreover, nearly all regressions indicate a significant impact, thus showing that leverage has a strong influence on a firm's cash holdings in both countries. This indicates that firms can use borrowing as a substitute for holding cash (Ozkan & Ozkan, 2004).

Debt Maturity

The debt maturity coefficient delivers very consistent and significant results. In all regressions that were conducted, debt maturity has a significantly negative impact on corporate cash holdings, which contradicts the expected outcome. Hence, a higher variety in refinancing costs of short-term debt does not increase a firm's cash holdings. It can more accurately be argued that firms use short-term debt rather than long-term debt as a substitute for cash, thus the findings are consistent with the discussion of leverage above, even though it was not expected. Moreover, since the findings are consistent with the empirical results for the leverage variable for both countries, no significant differences in corporate governance effects can be pinpointed.

	Original data				First differences data			
	SWEDEN		**GERMANY**		**SWEDEN**		**GERMANY**	
Dependent variable:	*Cash1*	*Cash2*	*Cash1*	*Cash2*	*Cash1*	*Cash2*	*Cash1*	*Cash2*
Independent variables:								
Growth	-0.0006	-0.0078	-0.0001	-0.0002	0.0004	-0.0039	-0.0001	-0.0002*
	(0.0005)	(0.0049)	(0.0001)	(0.0002)	(0.0004)	(0.0049)	(0.0001)	(0.0001)
Size	-0.0272***	0.1371*	-0.0214***	-0.0186	0.0421	1.3187***	-0.0093	0.0566
	(0.0077)	(0.0823)	(0.0053)	(0.0201)	(0.0286)	(0.5312)	(0.0084)	(0.0533)
ZScore	0.0007	-0.0029	0.0013***	0.0006	0.0007	0.0439	0.0008*	0.0011
	(0.0009)	(0.0176)	(0.0003)	(0.0018)	(0.0007)	(0.0299)	(0.0004)	(0.0012)
Leverage	-0.3191***	-0.1490	-0.2065***	-0.5185***	-0.3753***	-0.7694	-0.2049***	-0.4288***
	(0.0386)	(0.1504)	(0.0169)	(0.0431)	(0.0589)	(0.4745)	(0.0233)	(0.1095)
DebtMaturity	-0.1890***	-0.7466***	-0.1291***	-0.4659***	-0.2111***	-1.0362***	-0.1232***	-0.2967***
	(0.0243)	(0.2072)	(0.0150)	(0.1573)	(0.0192)	(0.3945)	(0.0122)	(0.0466)
CashFlow	0.0709***	3.9008***	0.0093	-0.7955	0.0022	3.0689***	0.0285	-0.5777**
	(0.0169)	(0.5851)	(0.0369)	(0.5196)	(0.0507)	(0.9398)	(0.0269)	(0.2454)
Liquidity	-0.3663***	-1.1566***	-0.2277***	-0.6292***	-0.4163***	-1.0303***	-0.2620***	-0.7668***
	(0.0326)	(0.2867)	(0.0182)	(0.0746)	(0.0623)	(0.3729)	(0.0177)	(0.0455)
Dividend	0.1082	3.2453***	0.0072	-0.7993	-0.0889	3.3868***	0.0249	-0.5949**
	(0.0739)	(0.4708)	(0.0379)	(0.5179)	(0.1132)	(1.4504)	(0.0300)	(0.2503)
OppCost	-0.0671***	-2.0787***	0.0254	0.7777*	-0.0302***	-1.6007***	0.0187	0.6746***
	(0.0134)	(0.2337)	(0.0249)	(0.4398)	(0.0124)	(0.4429)	(0.0137)	(0.2205)
Intercept	0.7515***	-1.6422	0.5379***	0.8826***	-0.0073***	-0.1339***	-0.0006	-0.0115
	(0.1088)	(1.1804)	(0.0699)	(0.2375)	(0.0027)	(0.0591)	(0.0022)	(0.0094)
R^2	0.8870	0.7705	0.7916	0.7198	0.2761	0.2866	0.2751	0.1426
$Adj.\ R^2$	0.8656	0.7271	0.7562	0.6721	0.1078	0.1206	0.1272	-0.0324
DW-statistic	1.6072	2.3674	1.3298	1.6309	2.8645	2.6148	2.7562	3.0083
F-statistic	41.4693	17.7387	22.3322	15.1017	1.6398	1.7266	1.8596	0.8150
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000	0.9881
Number of observations	*780*	*780*	*2154*	*2154*	*658*	*658*	*1848*	*1848*

*Note: ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively*

Table 3: Regression Results of Fixed-Effects Static Panel Data Model (OLS)

Cash flow

For the Swedish sample all coefficients estimated show positive signs. Only the coefficient in the model estimated using first differences where *Cash1* is used as dependent variable is not significant. The remaining coefficients are significant at the 1%-level of significance. These results are consistent with the financing hierarchy model suggesting that firms with high cash flows pay off debt, pay dividends and accumulate cash. Furthermore, this can be interpreted as firms taking precautionary actions against future cash shortfalls or the costs that would be faced if external capital would have to be raised in order to meet future investment needs. In contrast to these results, the sign of *CashFlow* in the *Cash2* regressions of German data using both original data and first differences data is negative. The coefficient in the latter specification is significant at the 5%-level of significance. This suggests that, in line with the interpretation of Dittmar et al. (2003) regarding the trade-off theory's prediction, if cash flows are high, firms do not need to hold high levels of cash in order to meet future investment needs. Thus, provided all else is equal, the marginal cost outweighs the marginal benefit of holding cash. However, as mentioned above, the results from this regression may have to be treated with care; hence drawing a more conservative conclusion regarding this particular variable with this specification would be preferable. The fact that positive and significant variables are found for the Swedish sample may be indicative of the lower degree of creditor protection.

Liquidity

As mentioned in chapter 3.2, the variable *Liquidity* is a proxy for other non-cash liquid assets that can easily and cost-effectively be transferred into cash holdings. The coefficient in all specifications for both samples is negative and significant at the 1%-level of significant, suggesting a substitution effect between cash and other liquid assets. This result is consistent with the results of, among others, Opler et al. (1999) and Ozkan and Ozkan (2004) and also in line with the expected outcome according to the trade-off theory.

Dividend

The variable *Dividend* measures dividend payments to total assets. The coefficient is positive and significant at the 1% level for the Swedish sample with *Cash2* as the dependent variable in both the specification with original data and first differences data. This suggests that, in line with one of the arguments by Ozkan and Ozkan

(2004), firms have higher cash levels in order to avoid a situation where dividend payments might not be supported. Thus, a precautionary motive for cash holdings may be apparent for Swedish firms. The coefficient for the variable *Dividend* in the German sample is negative and significant the 5% level in the model specification with first differences data and *Cash2* and dependent variable. This result supports the argument that German firms pay dividends in order to mitigate overinvestment problems. Thus, these firms do not have high levels of cash holdings. This may also imply, as put forward in chapter 3.2, that firms indirectly raise external capital by cutting dividends, i.e. dividends are not as "sticky" as in Sweden. Again, the differences in this determinant between Swedish and German firms may be explained by the different degrees of investor protection and consequently the development of the respective capital markets. It seems that Swedish firms take precautionary actions in an attempt to avoid having to cut dividends, possibly indicating a stronger focus on pleasing shareholders, which is a consequence of the stronger shareholder rights. German firms might cut dividends to finance investments which might be one way to mitigate some of the higher costs of equity associated with raising capital in a market where shareholder protection is weaker. On the other hand, paying dividends and therefore mitigating possible overinvestment problems may already be a way to lower the cost of equity.

Opportunity cost

For the Swedish sample the coefficient of the variable *OppCost* shows a negative sign and is significant at the 1%-level in all model specifications. Kim et al. (1998) argue that the marginal benefit of holding cash decreases as the return on alternative investments increases. As the results show, this would imply a negative relationship between opportunity cost and cash holdings. However, for German firms the coefficient shows a positive sign in all model specifications and is significant on the 10% and 1% level in both models with *Cash2* as the dependent variable. This may be explained by the fact that the variable is defined as the return on assets less cash and equivalents subtracted by the short-term interest rate, thus capturing the profitability of firms. In addition this variable is not based on forward-looking data, which may add weight to the latter interpretation. If this interpretation was applied to explain the sign of the variable, the conclusion would be that, in accordance to the financing hierarchy model, firms that are profitable accumulate cash. The lower shareholder

protection in Germany brings explanatory power to this result in the sense that firms may have easier access to debt financing, thereby decreasing the cost of holding excess cash. Moreover, the corporate environment in Germany may be less oriented towards shareholders.

As can be seen in Figure 7, the two countries show similar features in the variables *Growth, Leverage, DebtMaturity, and Liquidity*. Significant and opposite signs are found in the opportunity cost variable. The different levels of shareholder and creditor protection in both countries may explain these differences. Thus, it can be concluded that national corporate governance frameworks do have a possible impact on companies' levels of cash holdings. Furthermore, there is no single theory that satisfactorily explains the impact of these determinants, implying that these theories may not be mutually exclusive or exhaustive.

	Expected sign	Empirical Findings	
		SWEDEN	GERMANY
Growth	+/-	-	-
Size	-	vague	-
ZScore	+/-	vague	+
Leverage	-	-	-
DebtMaturity	+/-	-	-
CashFlow	+/-	+	vague
Liquidity	-	-	-
Dividend	+/-	+	vague
OppCost	-	-	+

Figure 7: Expected and Actual Signs of Coefficients

6. Conclusions

6.1 Summary

The purpose of this thesis is to study the determinants of cash holdings of companies with their home market in either Sweden or Germany. Furthermore, differences in the behaviour of explanatory variables between Swedish and German companies can possibly be explained by the differences in investor protection for the two countries. The purpose is achieved by describing key features of the data collected and running four different specifications of panel least squares regressions for Swedish and German companies separately, with cash holdings as dependent variable.

Swedish companies are found to have higher cash levels on average when measured as cash and cash equivalents over total assets. Also, leverage and the relative amount of short-term debt to total assets are found to be significantly higher for German firms. This supports previous studies' findings, which conclude that Germany generally has a more credit friendly environment and that German companies tend to have stronger banking relationships. Moreover, it is found that Swedish firms have a higher level of dividend payments to total assets, which may be explained by the better shareholder protection in Sweden.

The results from the panel data regressions are supportive of both the trade-off and financing hierarchy model with interesting differences between Swedish and German firms among the coefficients. However, the authors are aware that the results presented may have to be interpreted with caution since not all are robust to the different model specifications. The results for the impact of firm size on cash holdings are inconclusive as the coefficient shows different signs depending on the different model specifications. There is a negative impact of short-term debt, the *DebtMaturity* variable, and leverage on cash holdings for both samples which is consistent with the previously documented substitution effect on cash and the usage of leverage to reduce agency costs. The negative impact of liquid assets on cash holdings, which is consistent for both samples and all model specifications, adds weight to the substitution mechanism as a determinant. When it comes to determining differences between Swedish and German firms in the explanatory variables, some distinctions can be made regarding the prevalence of either theory. Cash flow to total assets is positively related to cash holdings for Swedish firms, suggesting support for the

financing hierarchy model and possibly a precautionary motive. The results for the German sample are less robust and thus rather ambiguous. The results may be explained by the weaker creditor protection present in Sweden, which consequently leads to firms being more dependent on internally generated funds. The weaker creditor protection in Sweden may also explain the results of the relationship between credit quality and cash holdings. It is argued that Swedish firms have higher credit quality on average as a consequence of more expensive external finance. For the Swedish sample, dividend payments are found to be positively related to cash holdings while the opposite is found to be true for German firms. Again this may indicate support for a precautionary motive among Swedish firms. Moreover, the possible prevalence of a precautionary motive for dividend payment among Swedish firms may be the result of stronger shareholder protection and shareholder orientation as suspected by the findings from the descriptive statistics. Opportunity costs of cash holdings have positive signs for German firms while Swedish firms experience a decrease in cash holdings as return on capital increases implying additional evidence on the significance of corporate governance effects on cash holdings.

6.2 Suggestions for Future Research

This study shows that market conditions and investor protection affect cash holdings and its determinants in an ambiguous fashion. It is also shown that there is no prevailing theory that causes companies to hold more, or less, cash and that corporate cash holdings significantly vary across countries. Cross-country studies including corporate governance variables as well as firm-specific variables are still scarce, especially for European economies. Thus, extending a similar approach, using panel data models, to other European markets where different market conditions may be more distinctive can provide additional insights to the mechanisms that determine firms' cash holdings. Additionally, firm-specific corporate governance variables, e.g. ownership structure, board structure, and management compensation, are not included in this study. An inclusion of these factors can provide a framework for a more thorough analysis of cash holdings. Finally, this study's results are not particularly robust to different model specifications, which may imply that a different estimation method than least squares might be more suitable in order to analyse panel data more accurately. The application of non-linear estimation techniques using a generalized method of moments approach (GMM) could be of particular pertinence. This could

prove to be useful in increasing robustness while simultaneously avoiding autocorrelation problems.

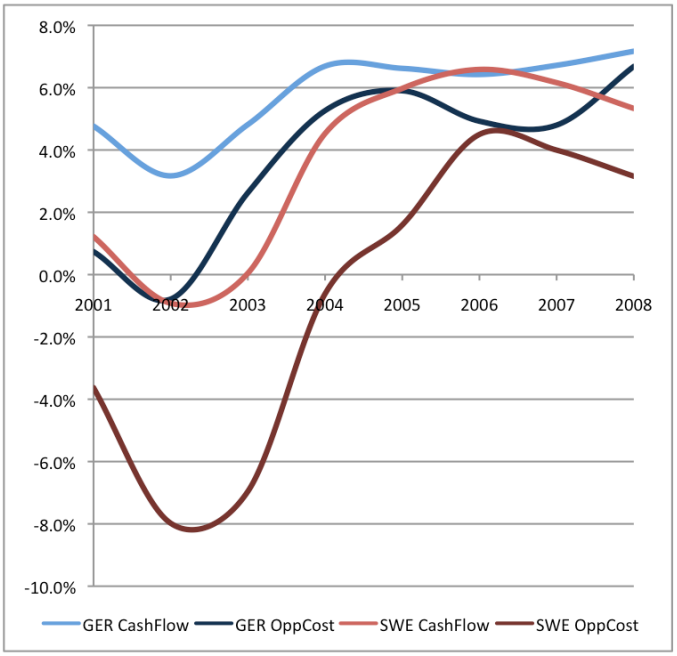
Appendix

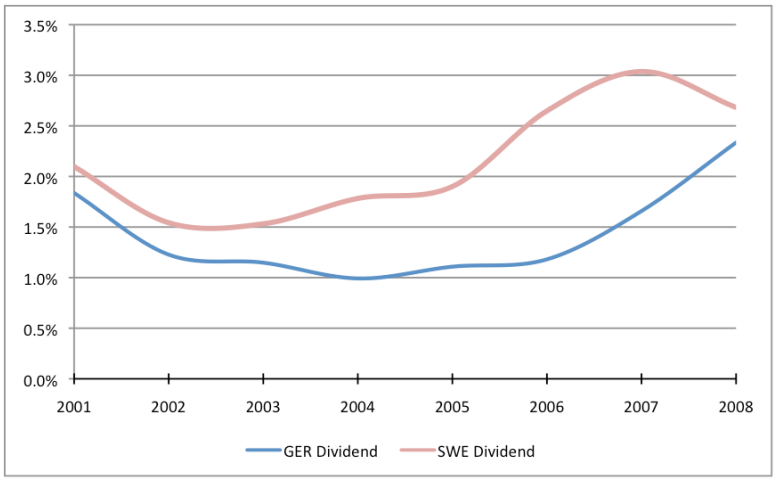
Correlation Matrix:

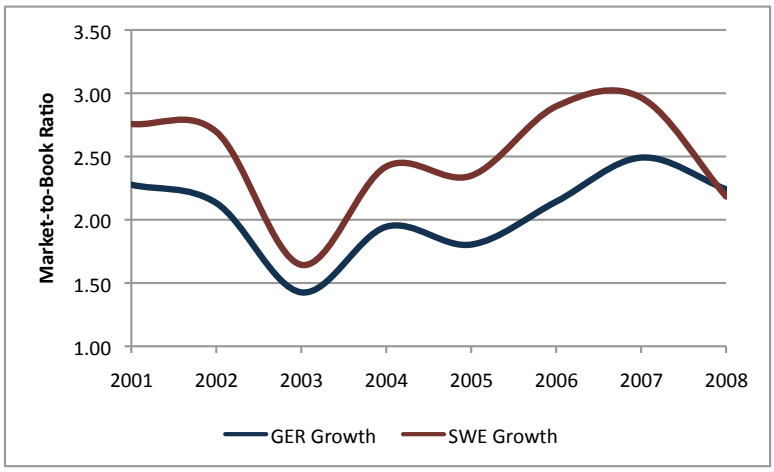
SWEDEN											
	Cash1	*Cash2*	*Growth*	*Size*	*ZScore*	*Leverage*	*DebtMaturity*	*CashFlow*	*Liquidity*	*Dividend*	*OppCost*
Cash1	1.0000										
Cash2	0.6349	1.0000									
Growth	0.1479	0.0422	1.0000								
Size	-0.3691	-0.1791	-0.0329	1.0000							
ZScore	0.4781	0.3345	0.2093	-0.1549	1.0000						
Leverage	-0.6318	-0.3605	-0.0797	0.3426	-0.4526	1.0000					
DebtMaturity	-0.3532	-0.1565	-0.0910	0.1245	-0.2062	0.2844	1.0000				
CashFlow	-0.3192	-0.2196	-0.0046	0.3295	0.0345	0.0837	0.0612	1.0000			
Liquidity	-0.1159	-0.0904	0.0512	0.0141	0.0868	-0.2148	-0.2230	0.2172	1.0000		
Dividend	0.0042	-0.0611	0.1105	0.2108	0.1622	-0.1241	-0.0797	0.2422	0.1927	1.0000	
OppCost	-0.5054	-0.7014	-0.0179	0.2606	-0.1155	0.2267	0.0968	0.7083	0.1577	0.2415	1.0000

GERMANY											
	Cash1	*Cash2*	*Growth*	*Size*	*ZScore*	*Leverage*	*DebtMaturity*	*CashFlow*	*Liquidity*	*Dividend*	*OppCost*
Cash1	1.0000										
Cash2	0.7437	1.0000									
Growth	0.0238	0.0102	1.0000								
Size	-0.2328	-0.1811	-0.0109	1.0000							
ZScore	0.1469	0.0699	0.0122	-0.0293	1.0000						
Leverage	-0.4175	-0.2796	0.0008	0.2046	-0.3221	1.0000					
DebtMaturity	-0.2301	-0.0873	0.0019	-0.0745	-0.0966	0.2253	1.0000				
CashFlow	0.0005	-0.0085	0.0049	0.1031	0.0808	-0.0891	-0.0909	1.0000			
Liquidity	-0.1607	-0.1184	-0.0211	0.0514	0.0874	-0.3785	-0.2215	0.1570	1.0000		
Dividend	-0.0014	0.0041	0.0052	-0.0319	0.0078	-0.0182	0.0521	-0.4711	-0.0365	1.0000	
OppCost	0.0106	0.0579	0.0208	0.1365	0.1967	-0.1768	-0.0663	0.4272	0.2113	0.0157	1.0000

Descriptive Statistics:







Mean-difference tests			
	Weighted average sample variance	Test Statistic	P-Value
Cash1	0.016	-1.947	0.052
Cash2	0.081	-1.228	0.220
Growth	7.059	-3.821	0.000
Size	4.469	-22.998	0.000
ZScore	6.661	-5.236	0.000
Leverage	0.036	7.564	0.000
DebtMaturity	0.021	7.609	0.000
CashFlow	0.014	3.852	0.000
Liquidity	0.032	-0.111	0.912
Dividend	0.001	-5.000	0.000
OppCost	0.019	5.154	0.000
Degrees of Freedom: 3,281			

Redundancy Tests for Fixed Effects:

	SWEDEN		GERMANY	
	Statistic	Prob.	Statistic	Prob.
Cross-section F	11.5060	0.0000	12.8911	0.0000
Cross-section Chi-square	862.1377	0.0000	2457.6725	0.0000
Period F	1.5543	0.1458	1.0233	0.4124
Period Chi-square	11.0442	0.1367	7.2083	0.4075

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