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**Is cash still king? – A study of the firm characteristics that determine the cash holding levels of Swedish corporations and the impact of the 2008 financial crisis on corporate cash policies**

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I wish everyone who reads this paper a pleasant reading experience!

Robert Kinnunen,

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## Abstract

- Title:** Is cash still king? – A study of the firm characteristics that determine the cash holding levels of Swedish corporations and the impact of the 2008 financial crisis on corporate cash policies
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- Key words:** Cash holdings, free cash flow theory, GMM estimation, dynamic panel regressions, pecking order hypothesis
- Purpose:** The purpose of the thesis is to identify the key determinants of corporate liquidity in Swedish firms and whether these have changed in the wake of the 2008 financial crisis. For these means, data obtained from companies listed on the Swedish NASDAQ OMX Stockholm stock exchange are used to estimate a number of dynamic panel regression models in E-Views. The ambition is that the insights gained will help managers to make wise decisions about their cash policies and also to further the understanding about how a financial crisis can influence the need for corporate liquidity.
- Methodology:** This research work uses a deductive approach. Data has been obtained from sources deemed reliable and the methodology applied is of a quantitative nature, using mainly a panel regression frame work. The empirical results are analyzed in respect to relevant theory and the findings are also reviewed in the light of other research work.
- Theoretical foundation:** A number of applicable theories and previous studies are used as the foundation for identifying suitable drivers of corporate liquidity. Many of the major studies considered are based on US companies, but research for Europe as well as Asia and the rest of the world is also taken into consideration.
- Empirical foundation:** Companies listed on the Swedish NASDAQ OMX Stockholm stock exchange during the years 1985 - 2014 are used as the basis for the empirical investigation.
- Conclusions:** A set of key factors influencing the cash holding levels are identified lending support to the pecking order hypothesis, trade-off model, agency theories, and the precautionary motive. The crisis of 2008 – 2009 has not had any major effect on which factors determine the cash holdings policies of Swedish corporations. Also, support is found for a target cash ratio adjustment process in Swedish firms.

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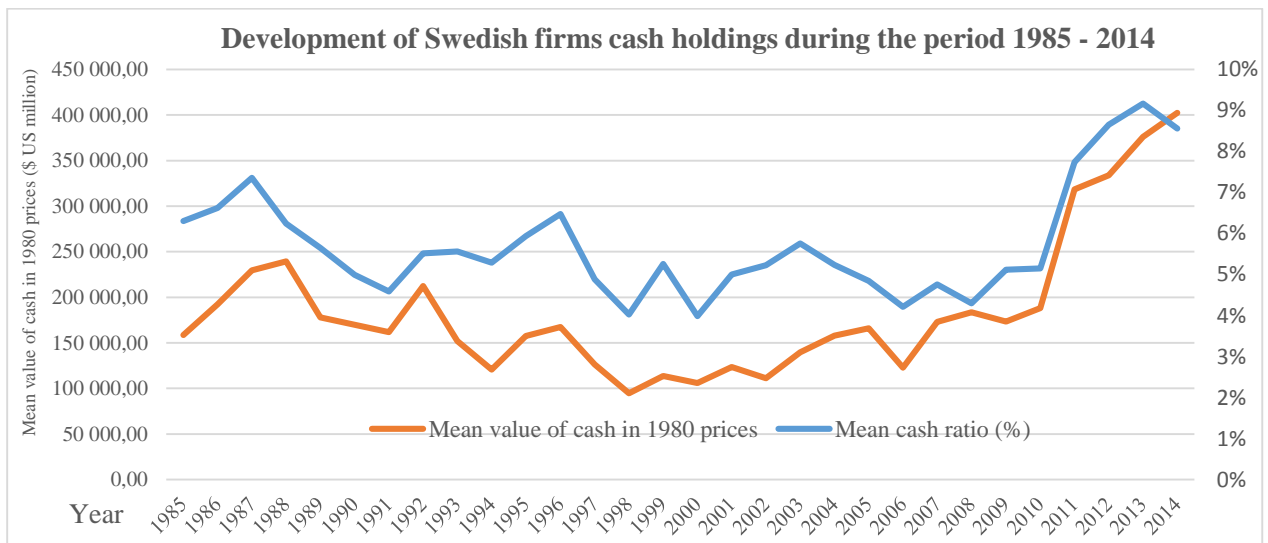
## 1. Introduction

The introductory chapter starts off by providing some background information about the area of corporate cash holdings, and proceeds by discussing the purpose and limitations of the study. The research questions that this dissertation seeks to answer are also presented.

### 1.1 Background

The issue of how much cash a firm should keep is a timeless one. Throughout history, managers have been concerned with finding an optimal level of liquid assets to hold on their firms balance sheets. On the one hand, there are costs associated with holding cash and its equivalents, such as tax costs and lower rate of return. On the other hand, cash can often constitute a vital ingredient in a firm's business strategy as it represents the most liquid asset that firms dispose of. As such, cash lends itself to quickly being able to finance new business ideas and investments. In times of crises, cash is usually the emergency plan that enables companies to pay their outstanding obligations. This phenomenon is especially apparent in the aftermath of the burst of the American housing bubble, as the need for liquidity showed that the credit markets can be very costly and restrictive at times when demand for funding peaks (Tang et al., 2011). As is well known, the American recession of 2007-2009 quickly spread to Europe. A number of European countries had to be bailed out by the so called 'troika', and although Sweden was not one of the countries that had to receive huge tax-payer based grants to help its banks survive through the crisis, the country was still hit by a recession (Riksbanken, 2008).

**Figure 1: Cash holdings in Swedish companies**



Source: Thomson Reuters Datastream

In figure 1 one above, the amount of cash and the ratio of cash to total assets that Swedish non-financial firms have held is displayed. As is evident from the graph, there has been a drastic increase in the amount of liquid assets held by corporations residing in Sweden in the

years following the European financial crisis of 2008-2009. This bears witness to the notion that cash constitutes a key factor when assessing the quality of the financial performance of corporations. In the following work, the motives and drivers that affect cash holding policies of Swedish firms will be scrutinized and a model that seeks to capture the dynamics of these policies will be identified.

## 1.2 Problem discussion

Numerous studies have been done on the firm characteristics that seem to play a role when it comes to the level of corporate liquidity. For instance, Chudson (1945) identifies the industry in which the firm operates as an important factor to consider when it comes to the level of expected cash holdings. Vogel and Maddala (1967) identify firm size as another attribute that seems to play a role, as their findings suggest that larger firms have lower cash-to-assets and cash-to-sales ratios as compared to smaller counterparts. In the study by Opler et al. (1999), almost a dozen different firm characteristics are considered to potentially affect the proportion of cash to overall assets in a large sample (circa 87 000) of US-based publicly traded firms. Opler et al. (1999) conclude that there is evidence in support of the target adjustment model, but find the static tradeoff model insufficient in explaining the sometimes huge amounts of cash that is stocked up by very successful corporations.

Gao et al. (2013) point to corporations holding cash as a way of reducing transaction costs and regulating the effects of underinvestment in cases of revenue shortages. Kalcheva and Lins (2007) argue that it is less costly to convert cash reserves into private benefits as compared to liquidating other corporate assets for managerial private benefit. As a consequence, uncertainty about future cash flows is taken as a reason to holding on to cash.

Seeking to put a European perspective on the determinants of cash holdings, the authors Ferreira and Vilela (2004) used a sample of 6 387 firm-year observations of EMU companies between 1987 and 2000. In accordance with Opler et al. (1999) they conclude that EMU companies' cash holdings are positively influenced by the investment opportunity set whilst negatively influenced by a company's leverage, size and asset liquidity. Furthermore, they found evidence that stronger investor protection and ownership concentration also had a negative impact on cash holdings.

As is evident from the discussion above, the topic of corporate cash holdings is one that has attracted the attention of scholars for many decades and is still a current question that warrants further investigation. In the aftermath of the sub-prime mortgage crisis, it is also interesting to study whether the economic conditions have had an impact on corporate cash policies. This is especially the case in a European context, as the aftermath of the crisis has

had its most profound impact on this market. As a consequence, the determinants of cash holdings and their relative importance may have been affected.

There exists a vast literature on the topic of corporate cash holdings for the American market and the UK (e.g. Bates et al. (2009); Faulkender and Wang (2006); Opler et al. (1999); Ozkan and Ozkan (2004)). A number of studies focusing on comparing country specific attributes have also been undertaken by utilizing a large sample of countries (e.g. Ferreira and Vilela (2004); Guney et al. (2007); Haw et al. (2011); Huang et al. (2013); Kalcheva and Lins (2007); Pinkowitz et al. (2006)). When reviewing the literature on the subject, it is apparent that little research has been done which has focused on the Swedish market. As none of the existing previous studies have their attention entirely devoted to the Swedish market, and also considering that the Anglo-American regulatory system is set up in another manner as compared to Sweden, it is hard to tell whether those findings are applicable in a Swedish context. There hence exists a knowledge gap when it comes to the drivers of corporate liquidity amongst Swedish firms. Considering that the Swedish market constitutes the largest such in northern Europe, it is warranted to investigate whether there exists any discrepancies with regards to the attributes that are decisive for Swedish corporate cash holdings. Consequently, the intention is to examine the determinants of corporate cash holdings from a Swedish perspective before and after the sub-prime mortgage crisis of 2008.

### 1.3 Research contribution

This thesis will expand upon the knowledge gained in prior research and contribute to the existing literature by focusing entirely on the Swedish market. As relatively little attention has previously been paid to Swedish firms, it is warranted to identify the determinants of Swedish corporate cash holdings. Further, this paper provides an additional dimension to the issue of Swedish corporate liquidity management by studying if the underlying drivers have changed in the wake of the financial crisis, which to the best of my knowledge constitutes the first study of its kind. In this way, the thesis seeks to widen the insights about what impact the great financial liquidity crises of 2008-2009 had on Swedish corporate cash policies.

This piece of research will also look into the question relating to whether Swedish firms exhibit a target cash ratio level and whether there is an adjustment process underpinning this supposedly optimal level of cash holdings. As far as I know, previous research has not previously considered this aspect in a Swedish setting.



## 1.4 Formulation of research questions

Based on the previous discussion, three major research questions are identified that this thesis seeks to answer:

1. Which are the factors that drive the need for corporate liquidity in Swedish firms?
2. Did the 2008-2009 financial crisis have an impact on the determinants of corporate cash holdings amongst Swedish firms?
3. Is there a target cash ratio adjustment process amongst Swedish firms?

## 1.5 Purpose and limitations

This thesis seeks to find the main drivers of corporate cash holdings for major Swedish firms. These may be active in an international setting as well as, but the main requirement for all companies included in this study is that they must be listed on the Swedish stock exchange Nasdaq OMX Stockholm. For the purposes of this thesis a quantitative research approach involving dynamic panel regression models is applied and a set of independent variables are identified which according to financial theory should be influential upon the level of cash that companies deem necessary to keep. In order to perform the statistical analysis, data has been collected from Thomson Reuters DataStream, provided by the Lund University finance society LINC. Due to data limitations, such as missing observations, and problems with time invariant factors, some variables used in other studies have had to be dropped. The bulk of the material referenced in this work consists of research articles published in academic journals.

As a sum, this piece of writing has the aim of helping investors in finding Swedish companies that exhibit misallocations in cash asset ratios as compared to what the identified models suggest. The results may also serve as a guideline to managers who want to decide upon what would be a suitable level of cash given their particular firm characteristics.

## 1.6 Disposition of thesis

The work is organized as follows. In chapter two, literature on the subject of the determinants of corporate liquidity is analyzed and a number of theories are identified which can help to explain why certain firm and market characteristics should play a role for corporate cash holdings. The independent variables (i.e. determinants) that are chosen for the empirical investigation are listed and hypothesis about the expected relationship with the dependent variable cash holdings are formulated. In chapter three, the statistical considerations and the underlying research methodology is explained. The results of the statistical regression models is then presented in chapter four and the analysis of the results obtained is reported in chapter five. The sixth and final chapter summarizes and concludes with reflections upon the gained insights and some suggestions for further research is also presented.

## 2. Theoretical frame of reference and empirical hypothesis

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In this section theories that are applicable to explain the rationale behind cash holding policies are accounted for. After that, using the before mentioned theories, a set of explanatory variables are identified which should be able to explain the ratio of corporate cash holdings. Also, a hypothesis regarding the effect on the cash ratio is presented for each variable.

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### 2.1 Applicable theories

There exists a solid amount of literature on the topic of corporate cash holdings. When reviewing research articles on the subject, it becomes clear that a number of theories and motives exist that are applicable when trying to explain why firms choose a certain level of cash holdings. These theories and motives include the agency theory, the pecking order hypothesis, the trade-off model as well as the precautionary motive. In the following section, these four different models that seek to explain the rationale for firms keeping cash and motives are introduced.

#### 2.1.1 The agency motive (Jensen's free cash flow theory)

Jensen (1986) argues that the motives of managers are typically not aligned with those of shareholders and if managers have plenty of cash at their disposal, they will use these assets to gain personal benefits rather than increase the value of the firm. Therefore, in the model by Jensen and Meckling (1976), managers have an agenda of accumulating assets in order to gain discretionary control over the firm's investment decisions. In this setting, the management of the firm decides whether cash is held by the firm or paid to its shareholders. In order for managers to pursue their own interests, cash constitutes the most suitable form of financing, as having to raise external funds usually requires that the firm provides the lender with insights into how the money is going to be used. According to Kalcheva (2007), the safest way of managing cash is by separating it from operating revenue followed by a separate valuation of the cash. Most managers prefer to retain cash rather than increase shareholder pay-outs when the organization lacks good investment opportunities. Jensen (1986) found evidence suggesting that firms in countries with greater agency problems tend to hold more cash than firms located in countries where there are less pronounced principal-agent problems. Furthermore, Jensen (1986) established that entrenched managers have a high likelihood of building excess cash balances even though they also spend cash quickly.

#### 2.1.2 The Pecking order theory

In their seminal paper, Myers and Majluf (1984) laid the foundation for one of cornerstones of corporate finance theory, namely the pecking order theory. The foundation of this theory is the need to reduce the costs of asymmetric information, as well as other financing costs

(Myers and Majluf, 1984). According to the pecking order hypothesis, firms should choose to use retained earnings as their first source of financing in order to minimize the costs of information asymmetry and other financing costs. This source of funding is followed by safe and risky debt respectively, and if no other source of financing is available, the firm may resort to issuing equity (Myers and Majluf, 1984). The reason that equity is seen as the least favorable financing option according to the pecking order theory is that offering new equity is very expensive for firms due to information asymmetry (Pinkowitz et al., 2006). This offers an explanation as to why organizations opt to depend on retained earnings as a source of financing their investments, followed by debt financing, and finally equity. When a company goes bankrupt, the debtors are the first to be considered in terms of reimbursement of their money followed by shareholders. Information asymmetry exists when one party during a transaction process lacks information as compared to the other party. This discrepancy in terms of business knowledge is the result of market inefficiencies as market participants do not have access to all information that might be influential in decision-making. Opler et al. (1999) identify the pecking order theory, also dubbed financing hierarchy model as the opposite of the trade-off model. The pecking order theory does not adopt an optimal level of cash holdings and postulates that large cash reserves in profitable firms lead to financial slack (Faulkender and Wang, 2006). Further, cash is perceived as a buffer between investment needs and retained cash (Ferreira and Vilela, 2004). When retained earnings are insufficient with regard to financing new investments, organizations use cash holdings and new debt respectively. Just as with the trade-off model, a number of firm characteristics that influence the level of cash holdings can be identified using the perspective of the pecking order theory.

### 2.1.3 The precautionary motive

In today's modern world, unforeseen incidents can bring along expenses which require an immediate source of financing. This view is supported by numerous researchers, for instance Kalcheva and Lins (2007), La Porta et al. (2002) as well as Ferreira (2004) argue that the cash holdings of firms serve the purpose of financing investments in situations when other sources of financing would be extremely costly or nonexistent. According to Ferreira (2004), business organizations hold on to cash as a way of increasing their capital by investing in future projects. This form of cash holding is only viable when the capital markets are efficient, and the cost of holding cash is almost negligible. In the real business environment, firms face numerous costs and constraints when attempting to access capital markets. These constraints inhibit the ability of corporations to raise money needed to fund good investments. Due to such constraints, firms opt to hold on to cash that can be used for future investment needs.

Failure to hold on to sufficient cash reserves exposes organizations to the risk of failing to capture worthwhile investments (Pinkowitz et al., 2006).

Ferreira (2004) states that the need for firms to keep large cash reserves is particularly pronounced in times of financial unrest as cash acts as a guarantee that the firm is able to continue its operations. Gao et al. (2013) also mention that unstable economies exposes firms to potential shocks that forces the organizations to hold on to large reserves of cash. In times of economic recession, the need for cash is upped further as the cost of keeping it is reduced. Since other forms of investment are undesirable during times of financial instability, the opportunity cost of liquidity is then particularly low, as pointed out by Faulkender and Wang (2006).

According to Kim (1998), the process of liquidating assets is less costly and easier in a stable economy, which is due to accessibility of the capital markets. This study also established that the opportunity cost of cash is higher due to a high premium on liquidity. Pinkowitz et al. (2006) identifies the existence of strong competition in the market as another common reason that motivates business organizations to keep large cash holdings. Another motive for holding cash is to enable the firm to survive in times of great financial strain. In this context, organizations perceive cash as a tactical weapon that can be used to take advantage of future opportunities in the market (Ozkan and Ozkan, 2004). As much as such opportunities may never arise in the near future, research has demonstrated that corporations consider this a rational decision to hold on to cash (Bates et al., 2009). Consequently, holding on to cash is more advantageous in situations where capital markets are closed or inaccessible or when cash is generally scarce. This form of cash holding is generally referred to as strategic cash holding (Pinkowitz et al., 2006).

#### 2.1.4 The Trade-off model

The trade-off model is often used as a way of determining the optimum level of cash that a firm should keep (Ozkan and Ozkan, 2004). The marginal cost of cash holdings stems from the opportunity cost of capital as a result of low returns on liquid assets as compared to other investments with similar levels of risk (Gao et al., 2013). From a shareholder point of view, as pointed out by Harford (1999), empire building and managerial perks might also be a concern when directors have access to a large pool of internal funds. The marginal benefits of cash holdings include minimizing the possibility of financial distress, promoting optimal investment policy for an organization and avoiding the costs associated with liquidating existing assets or accessing external financing (Pinkowitz et al., 2006). In analogy with debt, cash holdings generate benefits and costs, and being able to finance investments is essential

for a firm to grow. Based on the trade-off model, an organization is able to effectively identify the optimum cash holding level by striking a balance between marginal benefits and marginal costs of cash holding (Opler et al., 1999). Given the fact that organizations require cash to manage their current expenses, capital markets or liquidation of assets are the most common sources of funds. However, as the financial market is imperfect due to asymmetrical information, firms often face difficulties in accessing capital markets and may have to endure a significant financial cost. In the setting of the trade-off model, cash holdings is seen as a buffer between the firm's uses and sources of funds.

## 2.2 Review of literature

Having reviewed a substantial amount of literature on the subject, a number of research fields emerge as particularly useful for understanding the underlying logic of corporate cash holding strategies, in addition to the theories outlined in the previous section. The different strategies depend on factors such as the institutional framework, the geographical location, the social and cultural context in which the firm operates as well as tactical considerations in the form of tax shield optimization. In the following section, literature that has focused on different aspects and perspectives are analyzed in order to gain a fuller picture of what firms need to consider when deciding upon an optimal allocation of liquid assets.

### 2.2.1 The institutional framework

The influence of institutional development with regards to the policies for cash holdings is considered in a recent study by Kusnadi et al. (2015), who investigates whether the degree of external business control influences the level of corporate cash holdings. For these means Kusnadi et al. (2015) examine the degree of institutional development and state ownership in Chinese companies. They find that businesses that are established in provinces with a higher degree of institutional development (i.e. non-state-controlled) tend to hold more cash than businesses located in regions that are controlled by the state (lower degree of institutional development). This positive relationship between institutional development and liquid assets holds up to an even greater extent for non-government controlled firms (Kusnadi et al., 2015). Based on these results, the authors conclude that there is a political dimension, at least in the case of China, that influences the corporate cash holding strategies. Non-government controlled firms are also found to exhibit a lower degree of correlation between cash holdings and institutional development when the firms have many political connections. Further, Kusnadi et al. (2015) conclude that the degree of political control acts as a determinant of corporate cash holdings. This relationship is deemed to be so strong that the authors recommend Chinese regulators to initiate reforms with the aim of improving corporate

disclosure policies in order to come to terms with the issue of political extraction. Such measures, according to Kusnadi et al. (2015), would serve the purpose of letting firms allocate their liquid assets (amongst others) in a more market efficient manner.

### 2.2.2 The legal environment

Another potential determiner that has been put forward by researchers includes the influence of shareholders. For instance, Al-Najjar (2013) argues that the legal environment or more specifically, the degree of shareholder protection stipulated by law, has an impact on the level of liquid asset holdings. Al-Najjar (2013) studies this relationship for a number of developing countries in the emerging markets and conjectures that in places where there are few legal policies protecting the rights of shareholders, cash holdings will be relatively high. One reasoning put forward by Al-Najjar (2013) is that firms operating in such environments need to accumulate cash due to the undeveloped capital markets. Another mentioned explanation is the one by Dittmar et al. (2003) who suggest that shareholders of firms in emerging markets have little influence on cash allocation policies. That is, when there is good legal protection for the shareholders, they are able to decide which level of cash holdings they find suitable for the firm and if necessary force managers to adjust the cash ratio downward. On the other hand, in legal environments where shareholders have little influence over management, cash can be hoarded to suit the needs of managers. The results of Al-Najjar (2013) indicates that companies situated in countries that have a similar degree of economic and financial development seem to have the same drivers of corporate liquidity. Al-Najjar (2013) was able to draw these conclusions by comparing the management system of corporations located in the UK and United States with that of firms situated in nations which are in a developing phase. However, the results of Al-Najjar (2013) are not unambiguous as there is evidently a certain degree of variation with regards to the significance of some of the explanatory variables (these were dividend payout, firm size, leverage, liquidity, and profitability) across countries and the overall impact is also not that high for some of the variables, such as profitability and liquidity.

### 2.2.3 The precautionary motive

One of the foremost reasons commonly suggested by researches as to why firms need to keep cash is when there is little to none incentive or possibility of obtaining credit as a means of financing. For instance, in a study by Arslan et al. (2006), the authors focus on determining the role that the investment opportunity set of firms plays when it comes to deciding upon cash holdings. In their study, the authors find that there is a significant degree of correlation between the amount of accumulated cash and the accessibility of external credit financing.

Arslan et al. (2006) hence find empirical support for the notion that cash holdings serves the purpose of a hedging strategy where the aim is to protect the firm against major fluctuations in cash flows in times of economic and financial unrest. Arslan et al. (2006) conclude that institutional capital expenses are determined by the availability of positive net present value (NPV) investment opportunities, and that firms that cannot respond to such projects are punished by the capital markets. Regardless of firm profitability, cash holdings serve the purpose of increasing the capacity of the firm to respond to positive NPV investment opportunities. This especially holds true for corporations that are active in markets where there are few borrowing opportunities. These findings are in line with those of Bigelli and Sanchez-Vidal (2012) who also noted that relatively cash rich firms tend to make more short and medium term investments as compared to companies who had less readily available funds. Additionally, Bigelli and Sanchez-Vidal (2012) made the observation that the size of the firm also plays a vital role for determining the cash to asset ratio as they conclude that, *ceteris paribus*, small firms tend to hold more cash than larger firms.

In another study, by Al-Najjar (2013), the aspect of industry specific variation in cash holdings is scrutinized. One key finding is that differences in cash holding levels can be attributed to institutional or structural features, such as the ability to access the funds of financial institutions. Namely, Al-Najjar (2013) finds evidence of correlation between the ease with which companies can access the capital markets and how much liquid assets they keep. Lending further support to the work of Bigelli and Sanchez-Vidal (2012), Al-Najjar (2013) also identify the debt ratio (leverage) and firm size as major determinants of cash holdings.

Like the study by Al-Najjar (2013), Arslan et al. (2006) base their results on firms located in the growing economies and they hence do not consider the potential impact of the more developed nations of the world. The hypothesis tested is that cash plays a pivotal hedging role in markets where there are more information asymmetries and the cost of external financing is extremely high as compared to markets with greater investor transparency and lower costs of credit financing. The results of Arslan et al. (2006) bear witness to the conception that firms who face information and credit constraints are more susceptible to variations in cash flows than their less constrained peers. Additionally, the authors also find strong evidence for the precautionary motive of cash holdings due to reasons such as credit and liquidity. Overall, these findings confirm the results of a number of other papers that have investigated the variables in question.

## 2.3 Theoretical foundations of the determinants of cash holdings

As can be seen from the above analysis of literature, there exist a number of theories and motives which seem to play a significant role when it comes to determining the cash holding levels of corporations. These different theories lend support to a number of explanatory variables that can be used to test the various motives discussed above. In the following section, the independent variables are listed which financial theory predicts to be potential drivers of corporate liquid asset holdings. Hypothesis regarding the supposed relationship between cash holdings and the potential determinants are also formulated. Due to a lack of proper data, the institutional framework and legal environment viewpoints are not specifically incorporated in the shape of any custom made variables, and are therefore not elaborated on any further in this work.

### 2.3.1 Independent variable – Cash holdings

In the literature surveyed, a number of different definitions for cash holdings have been used. In this thesis, the dependent variable cash holdings is defined as the ratio of cash and marketable securities to total assets.

$$\text{Cash holdings} = \frac{\text{Cash} + \text{Marketable securities}}{\text{Total assets}} \quad (1)$$

### 2.3.2 Determinants of corporate cash holdings

#### 2.3.1.1 Bank debt

Ferreira and Vilela (2004) pointed out that organizations within the EMU have close relations with banking institutions. Further, banks within the EMU own a significant percentage of firms' stock. In addition, according to Faulkender and Wang (2006), companies in Europe rely heavily on bank debt rather than bonds as their sources of external funds. Additionally, the authors anticipate that corporations that depend on bank loans as their main source of financing are less likely to face asymmetric information and agency problems that are common when using other forms of debt financing (Jensen, 1986). This is mainly due to the fact that banking institutions are in a better position to evaluate a borrowing firm's credit worthiness and at the same time provide effective monitoring and control of the organization's financial policies (Ferreira and Vilela, 2004). According to Faulkender and Wang (2006), banks are in a position to minimize costs associated with access to information and at the same time they have access to information that is not publicly available. In other words, banks are in a position to screen the debtors' private information in a better way as compared to other lenders. Consequently, when a firm is provided with a loan from a bank, it is a clear indicator of a positive review of the financial performance of the firm. Thus,



companies that have bank debts have a low probability of facing financial distress, in turn implying that firms that can access bank debt do not need to keep as much cash as firms that do not have access to bank loans. It is hence hypothesized that there is a negative relationship.

*Hypothesis 1a:* In a trade-off model setting, the relationship between bank debt and cash holdings is negative.

Ferreira and Vilela (2004) postulated that bank debt should be negatively related to cash holdings due to precautionary reasons. Specifically, firms that can use bank loans as a source of financing stand a low risk of experiencing agency problems and issues pertaining to asymmetric information that exist for other kinds of debt financing (Jensen, 1986). This is due to the fact that banks are able to evaluate their borrowers' credit worthiness and ultimately provide effective monitoring and control of the financial policies of the firms. Ozkan and Ozkan (2004) illustrated that UK firms with more bank debt do not hold more cash. Consequently, firms with a capital structure built on bank debt have easier access to external funds and, therefore, in a pecking-order setting, should hold less cash (Ozkan and Ozkan, 2004).

*Hypothesis 1b:* According to the pecking order theory, the relationship between bank debt and cash holdings is negative.

$$\text{Bank debt} = \frac{\text{Bank borrowing}}{\text{Total debt}} \quad (2)$$

### 2.3.1.2 Capital expenditures

According to the pecking order hypothesis (Myers and Majluf, 1984), cash holdings should be negatively related to capital expenditures as internal forms of financing are the least costly.

*Hypothesis 2:* There is a negative relationship between cash holdings and capital expenditures.

$$\text{Capital expenditures} = \frac{\text{Capital expenditures}}{\text{Total assets}} \quad (3)$$

### 2.3.1.3 Cash flow

Based on the trade-off model, cash flow is a working source of liquidity in a firm. As cash flow provides an equally liquid form of financing as existent cash, the model implies that cash flow can be used as a substitute for holding cash (Kim et al., 1998). In the study by Ferreira and Vilela (2004), cash flow is calculated as published after tax profit with depreciation added. This hypothesis also held up in practice as Ferreira and Vilela (2004) demonstrated the existence of a negative relationship between cash holdings and cash flow, the explanation being that cash flow is a substitute source of organizational liquidity.

*Hypothesis 3a:* The relationship between cash holdings and cash flow is negative according to the trade-off model.

Large cash flows demonstrates effective operating activities, which in turn implies that the firm can invest more to promote growth, hereby prompting the company to hold more cash (Ferreira and Vilela, 2004). Moreover, organizations with high cash flows are expected to hold more cash because most firms prefer internal financing to external financing, according to the pecking-order of financing (Ozkan and Ozkan, 2004).

*Hypothesis 3b:* In a pecking order world, a positive relationship between cash holdings and cash flow is expected.

$$\text{Cash flow} = \text{Earnings} - \text{Interest} - \text{Taxes} + \text{Depreciation} \quad (4)$$

#### **2.3.1.4 Cash flow volatility**

Cash holdings are essential in firms that are exposed to reduced cash flow or worsening business conditions. In much of the existent literature a positive correlation between cash holdings and cash flow volatility is expected (Kalcheva and Lins, 2007; Pinkowitz et al., 2006). Specifically, companies that face high cash flow volatility hold more cash as a way of increasing their chances of remaining in the market during periods when they face diminishing profitability. In the UK, research has established a positive relationship between cash holdings and cash flow volatility (Faulkender and Wang, 2006; Ozkan and Ozkan, 2004). As volatility increases, firms are exposed to insufficient access to liquid assets. Further, a decision by a firm to dismiss a valuable opportunity for growth due to lack of cash has a negative implication for the organization. Therefore, corporations that experience high cash flow volatility are bound to hold more cash as a way of avoiding costs associated with liquidity constraints (Ozkan and Ozkan, 2004). This argument is also backed by Bates et al. (2008) who found evidence that supports the notion that organizations with high cash flow volatility tend to hold more cash. Ferreira and Vilela (2004) also hypothesized a positive relationship between cash holdings and cash flow volatility in EMU countries as firms that have higher volatility in their cash flows face higher risks of experiencing cash shortages as a result of unforeseen low (or negative) cash flows.

*Hypothesis 4:* The trade-off model suggests that cash flow volatility is positively related with cash holdings.

$$\text{Cash flow volatility} = \text{Standard deviation of } \frac{\text{Cash flow } (t) - \text{Cash flow } (t-1)}{\text{Total assets}} \quad (5)$$

### 2.3.1.5 Dividend payers

Firms that pay dividends are in a position to hold less cash, provided they are capable of raising funds when needed, which can be done by reducing dividends. According to trade-off theory, there should hence exist a negative correlation between cash holdings and dividend payments (Ozkan and Ozkan, 2004). However, companies that do not pay dividends can only raise funds through the capital markets prompting them to hold more cash (Ferreira and Vilela, 2004). According to signaling theory, however, dividend paying firms do not want to reduce their dividends as its shareholders are often dependent on the income from the payments.

*Hypothesis 5:* A negative relationship between cash holdings and dividend paying firms is expected, according to the trade-off model.

$$\text{Dividend}_t = 1 \text{ if firm pays any dividend in year } t \quad (6)$$

### 2.3.1.6 Firm size

According to Kalcheva (2007), the demand for cash is lower in large firms due to economies of scale. A similar finding was presented by Pinkowitz et al. (2006), who demonstrated that larger firms have a lower demand for cash due to their better financial innovativeness, as compared to smaller firms. According to Ozkan and Ozkan (2004), it is less common for large organizations to experience borrowing constraints as compared to smaller firms. Furthermore, the cost of external financing is lower for large firms due to their economies of scales that are generated by the large charges incurred by fixed cost elements of security issuance (Bates et al., 2008). More so, Ferreira and Vilela (2004) iterates that small organizations that have stronger growth prospects with high business risks tend to hold more cash as it is more expensive for such organizations to raise funds through borrowing. Commonly, the transaction fee involved in raising funds is normally fixed and, therefore, raising the marginal costs for smaller firms. Moreover, most large firms are diversified which reduces the risk of them facing financial distress, in turn prompting them to hold less cash (Ferreira and Vilela, 2004).

*Hypothesis 6a:* According to the trade-off model, there is a negative relationship between firm size and the demand to hold cash.

Due to economies of scale, corporations that can produce larger quantities of goods are more successful relative to firms that are not able to produce as much, and hence require more cash after controlling for investment purposes (Bates et al., 2008). In a pecking-order world, this implies a positive correlation between cash holdings and firm size, measured as the logarithm

of total assets. However, Opler et al. (1999), as well as Ferreira and Vilela (2004) were unable to establish any evidence to support this relationship.

*Hypothesis 6b:* According to the pecking-order theory, the relationship between firm size and the cash to assets ratio should be positive.

$$\text{Firm size} = \log(\text{Total assets}) \quad (7)$$

### 2.3.1.7 Investment opportunities (Market to book ratio)

According to Ferreira and Vilela (2004), firms with greater investment opportunities face the risk of higher bankruptcy costs due to the disappearance of the positive NPV of such investments in case of insolvency. Consequently, in a trade-off model setting such firms hold more cash as a way of avoiding financial distress (Ferreira and Vilela, 2004). In this study, the investment opportunity set is proxied by the market value of assets divided by the book value of assets. Market value is estimated as the book value of assets minus the book value of equity plus the market value of equity. The motivation for this proxy is that market value is based on the firm's growth prospects whilst book value does not take this into account. Hence with greater relative opportunities for growth, the market to book ratio increases. (Ferreira and Vilela, 2004).

*Hypothesis 7a:* The relationship between cash holdings and investment opportunities is positive, according to trade-off model arguments.

According to Ozkan and Ozkan (2004), there is a positive relationship between cash holdings and investment opportunities. Using an investment opportunity allows a firm to increase its value. If an organization finds itself with insufficient cash, it may be forced to forego an investment opportunity and this is best avoided by holding more cash (Ozkan and Ozkan, 2004). Further, Ferreira and Vilela (2004) were able to establish a positive relationship between cash holdings and investment opportunities. Specifically, firms need to keep a large reserve of cash in case that a suddenly emerging investment opportunity arises. This way, firms can avoid costly external financing, which is a pecking-order line of reasoning (Ferreira and Vilela, 2004).

*Hypothesis 7b:* There should be a positive relationship between investment opportunities and the cash ratio according to the pecking-order.

$$\text{Market to Book} = \frac{\text{Market value of equity} - \text{Book value of equity} + \text{Book value of assets}}{\text{Book value of assets}} \quad (8)$$

### 2.3.1.8 Lag of cash holdings

Relatively few of the articles surveyed prior to this work have considered the potentially non-static nature of cash holdings. One of the first articles to consider this were Ozkan and Ozkan (2004), who note that market imperfections may have the effect that firms cannot immediately respond to changes in firm characteristics, such as leverage and market to book value. In other words, there might be adjustment and transaction costs that cause a delay between new market conditions and the response of firms in adjusting their cash ratio (Ozkan and Ozkan, 2004). The authors point out that in order for a static model to hold up, firms need to be able to instantaneously adopt to outside shocks and changes in balance sheet related performance measures. As one of the purposes of this thesis is to investigate the potential impact of the 2008 crisis on Swedish firms' cash policies, it is deemed warranted to adapt a dynamic approach similar to the one by Ozkan and Ozkan (2004). By incorporating a lagged value of cash holdings as an explanatory variable, the possibility of Swedish firms adjusting their cash ratios with a certain degree of delay can be explored. Hence, the potentially dynamic nature of the relationship between Swedish firm characteristics and the present value of the cash to asset ratio can be investigated. According to the view that firms adopt a target cash ratio (the target adjustment model), a positive relationship between the historical value of cash holdings and the present one should be expected.

*Hypothesis 8:* There is a positive relationship between the current and the lagged value of cash holdings.

$$\text{Lag of cash holdings} = \text{Cash holdings}_{t-1} \quad (9)$$

### 2.3.1.9 Leverage

The leverage ratio is used as a measure of the capacity of an organization to issue debt. According to Ferreira (2004), firms that have a higher capacity to increase the debt holds less cash while those companies that have a lower capacity to increase debt hold more cash. Further, organizations that have a high leverage require less cash holdings as a way of lowering the cost of keeping cash (Opler et al., 1999). This implies a negative relationship between cash holdings and leverage, according to the trade-off model. Generally, researchers have agreed that leverage enhances bankruptcy probability as a result of the increased financial stress created by amortization plans on a firm's capital management (Faulkender and Wang, 2006). To minimize the risk of financial distress, firms with higher leverage are also encouraged to hold more cash. In their results, Ferreira and Vilela (2004) were also able to establish a negative relation between cash holdings and leverage.

*Hypothesis 9a:* In a trade-off model world, there is a negative relationship between leverage and cash holdings, at least up to a certain threshold level.

Ferreira and Vilela (2004) argue that debt increases when investments costs exceed retained earnings and decreases when investment is lower than retained earnings. Cash holdings at the organizational level declines when investments are higher than retained earnings and increases when investments are lower than retained earnings. This line of reasoning suggests a negative relationship between cash holdings and leverage (Ferreira and Vilela, 2004). According to Opler et al. (1999), a firm's debt reacts to variations in its internal funds. An increase in the company's internal funds results in a reduction in its leverage. In most cases, corporations acquire internal funds rather than issuing new equity since this form of financing is costly due to hostile selection. As with internal funds, firms tend to spend more money than they make, resulting in a decline in cash holdings which raises the level of relative debt. This implies that variations in internal resources are a major driving force of changes in the level of cash holdings (Opler et al., 1999).

*Hypothesis 9b:* The relationship between cash holdings and leverage is negative in a pecking-order world.

$$\text{Leverage} = \frac{\text{Total debt}}{\text{Total assets}} \quad (10)$$

#### **2.3.1.10 Liquid assets (cash substitutes)**

Most corporations have, besides cash, some other forms of liquid assets and these are easily convertible into cash at a low cost. Common liquid assets include inventories and accounts receivable, representing the net working capital less cash. Liquid assets are substitutes for cash, and therefore theory predicts a negative correlation between cash holdings and liquid assets (Ferreira and Vilela, 2004). Opler et al. (1999) established that large organizations tend to hold liquid assets as a source of investment when outside funds are costly, and the cash flow is low.

*Hypothesis 10:* The relationship between cash holdings and liquid asset substitutes is negative.

$$\text{Liquid asset substitutes} = \frac{\text{Net current assets} - \text{cash equivalents}}{\text{Book value of total assets} - \text{total cash and equivalents}} \quad (11)$$

### 2.3.1.11 Profitability

Al-Najjar (2013) argues that profitable firms can accumulate more excess cash and do not have as high costs related to debt interest payments. In a pecking-order setting, less profitable firms should be reluctant to issue debt and instead rely more cash to finance its operating activities.

*Hypothesis 11:* There is a positive relationship between profitability and cash holdings according to the pecking-order hypothesis.

$$\text{Profitability} = \frac{EBITD}{\text{Total book value of assets}} \quad (12)$$

### 2.3.1.12 Square of leverage

Guney et al. (2007) propose the argument that the effect of leverage on corporate cash holdings may in fact be quadratic in shape, i.e. non-monotonic. In a state where firms have none or little debt, leverage has a substitution effect. However, as firms take on more leverage they need to guarantee their lenders that they do indeed possess the funds to pay back their loans. In this situation, the precautionary motive makes firms take on more cash. This leads to a parable shaped relationship between leverage and cash holdings which is initially downwards sloping and then turns upwards at some firm specific critical level of leverage. If this scenario holds true, the relationship between the square of leverage and cash holdings should be positive.

*Hypothesis 12:* There is a positive relation between the square of leverage and the cash ratio.

$$\text{Square of leverage} = \text{Leverage}^2 \quad (13)$$

## 2.4 List of independent variables

Based on the literature review and above analysis, there exists a relationship between organizations cash holding and its dividend payments, investment opportunities, liquid assets, cash flow volatility, cash flows, bank debt, leverage, and the size of the firm. Specifically, the trade-off theory establishes a positive relationship between cash holdings and investment opportunities and cash flows, whereas the relationship is negative for dividend payments, liquid assets, cash flows, bank debt, and firm size. On the other hand, the pecking order theory establishes a positive relationship between cash holdings and firm size, cash flows, and investment opportunities, whilst the relationship between cash holdings and bank debt as well as leverage is assumed to be negative.

In **table 1** below, an overview of the explanatory variables that will be used in the empirical investigation is displayed. The expected relationship between the regressors and cash holdings according to the prime theories discussed above is also listed.

**Table 1:** Summary list of explanatory variables

Variable	Expected relationship to Cash holdings
Dependent variable: Cash to total assets (Cash <sub>t</sub> )	Not applicable
<i>Explanatory variables:</i>	
1. Bank debt (BD)	Negative (Trade-off & Pecking-order theory)
2. Capital expenditures (CapEx)	Negative (Pecking-order)
3. Cash flow (CF)	Negative (Trade-off theory)   Positive (Pecking-order)
4. Cash flow volatility (CFVol)	Positive (Trade-off theory)
5. Dividend payments (Div)	Negative (Trade-off theory)
6. Firm size (Size)	Negative (Trade-off theory)   Positive (Pecking-order)
7. Investment opportunities (M/B)	Positive (Trade-off theory & Pecking-order)
8. Lag of cash (Cash <sub>t-1</sub> )	Positive (Target adjustment model)
9. Leverage (Lev)	Negative (Trade-off theory & Pecking-order)
10. Liquid asset substitutes (Liq)	Negative (Trade-off theory)
11. Profitability (Prof)	Positive (Pecking-order hypothesis)
12. Square of leverage (Lev <sup>2</sup> )	Positive (Trade-off theory)



### 3. Methodology and data considerations

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In this section of the study, the data and statistical framework used to model the relationship between cash holdings and the explanatory variables are presented.

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#### 3.1 Data considerations

To determine the factors that drive the demand for corporate liquidity amongst Swedish firms, the companies listed on the Small-, Mid- and Large Caps of the Nasdaq OMX stock exchange (originally 297 firms) are used as the sample population of firms. The time span for the data sample spans the years between 1985 and 2014, and is motivated by data being available for this time period. By not restricting the sample to years closest to the financial crisis, a longer series of data is obtained and more degrees of freedom are also gained. Financial (including banks) and utility firms are excluded due to their different capital structure and accounting practices, and the final data sample consists of 164 firms. To eliminate the effects of extreme values and errors in the data, all variables are winsorized for outliers at the top and bottom 1 % level. The sample contains missing observations for many of the variables and hence the panel is unbalanced. Thompson Reuters Datastream is used to obtain the raw data which consists of approximately 9 000 firm-year observations. Some additional information has been obtained from the web pages of Nasdaq OMX, Riksbanken and Statistics Sweden. Firms are allowed to drop in and out of the sample in order to avoid any survival bias, and only firms that feature at least three consecutive observations in the period considered are included. For comparative purposes, all values are denominated in US Dollars and converted to 1980 prices using the Swedish consumer price index. Microsoft Excel and the statistical software E-Views 8.1 is used when handling the raw data and performing the regression analysis. Robustness checks are performed to check if the classical OLS assumptions are valid, and all the assumptions are fulfilled. The normality assumption is checked using the Jarque-Bera test statistic, where the p-value exceeds 1% ( $p = 0,013$ ), implying that the null of normally distributed error terms cannot be rejected. White diagonal standard errors are used to correct for heteroscedasticity. Multicollinearity is tested for using the Variance Inflation Factor, which has a value of less than 10 for all variables used, which according to Gujarati (2003) implies that multicollinearity is not an issue. Neither does a check using the correlation matrix between all regressors indicate any issues with variables being overly correlated as none of the variables have a rho coefficient in excess of 0,80 (Brooks, 2014; Kennedy 2008).

#### 3.2 Panel data regression framework

The purpose of this study is to estimate a regression model for a number of Swedish firms using sample data for the period 1985-2014. For these means, a panel data analysis is

applicable as the method allows the estimation of a linear relationship between the cash holdings variable and the regressors utilizing the information contained in the both the firm level as well as the time dimension simultaneously (Westerlund, 2005; Wooldridge, 2013). One of the advantages of the panel regression framework is that it is suited to deal with the issue of omitted variable bias. That is, if the specified regression does not contain all explanatory variables that determine the regressand, this may affect the estimates of the model parameters, resulting in either an over- or underestimation of the effect of some of the regressors. As one can control for firm specific effects by using the panel data approach, the issue of omitted firm-specific variables can be handled (Baltagi, 2008; Brooks, 2014). A general form for a panel regression model is displayed below:

$$y_{it} = \alpha + \beta x_{it} + \mu_i + v_{it} \quad (1)$$

In specification (1) above,  $y_{it}$  is the dependent variable,  $\alpha$  is an intercept term,  $\beta$  is a  $k \times 1$  vector of model parameters to be estimated, and  $x_{it}$  is a  $1 \times k$  vector of observations on the independent variables,  $i = 1, \dots, N$ ; and  $t = 1, \dots, T$ .

Autocorrelation and cross-sectional correlation are issues that need to be considered when applying panel data. If firm-specific factors that do not vary over time are not identified in the model, the residual terms may suffer from autocorrelation. Cross-sectional correlation, on the other hand, occurs if error terms of firms are correlated within one period, for instance due to macroeconomic factors, which are not captured in the model (Judson and Owen, 1999). The consequence of cross-sectional correlation is that it leads to bias in coefficient estimates (Wooldridge, 2013). To adjust for this, one needs to identify whether a fixed-effects or a random effects model is more appropriate when estimating panel regressions (Wooldridge, 2013). In the former case, the intercept in the regression model is allowed to vary cross-sectionally but not over time. In the random effects model, the intercepts for each cross-sectional entity are assumed to have a common intercept (which is the same for all of the firms and constant throughout time), and with a random component term that varies across firms but remains constant over time. Both models have their strengths and weaknesses and usually a so called Hausman test is performed to determine which model should be adopted for the subsequent panel estimation (Brooks, 2014; Gujarati and Porter, 2010).

### 3.2.1 Dynamic panel model estimation

Ordinary panel regression models typically do not include a lagged value of the dependent variable on the right hand side of the regression equation. By introducing a lag of cash holdings as an explanatory variable, it is possible to investigate if there is an adjustment process for the level of Swedish corporate cash holdings. That is, there could be a delay

between fluctuations in the explanatory variables and the dependent variable. Indeed, in the context of studying the determinants of corporate cash holdings, it is reasonable to assume that firms are not able to adjust their cash levels instantaneously. This calls for the usage of a dynamic panel model, which can be estimated by controlling for fixed-effects using a first-difference transformation. However, as described in the article by Judson and Owen (1999), there are some estimation issues that need to be considered when adopting the dynamic model framework. The main issue at hand is endogeneity, i.e. that the lagged value of cash holdings is correlated with the intercept term, which does not vary with time. As noted by Ozkan and Ozkan (2004), the first-difference transformation used to eliminate the fixed effects creates correlation between the lag of cash and the differenced error terms. As a consequence, the usage of least squares dummy variables in a fixed-effects panel model generates biased parameter estimates. An alternative to applying the first-difference estimator would be to use the within transformation, but this approach also introduces correlation between the lagged term and the time-averaged idiosyncratic residual term (Anderson and Hsiao, 1981; Woolridge, 2013). Nickell (1981) and Chamberlain (1982) have shown that the bias only disappears when the time dimension approaches infinity and subsequently a number of instrumental variable (IV) procedures have been adopted to deal with the issue.

### 3.2.2 Instrumental variable estimation

As a lagged value of cash holdings is used as an independent variable in the dynamic panel data model, the potential issue of endogeneity arises. As noted by Ozkan and Ozkan (2004), observed relations between cash holdings and explanatory factors may in fact have a reversed causal effect on these factors. This implies that shocks that have an impact on the regressand also have an effect on the independent variables. That is, changes in cash holdings may actually influence the variables thought to be independent of the cash ratio. This implies that observable and unobservable shocks that have an effect on cash holdings can also impact upon firm-characteristics, such as profitability and firm size (Ozkan and Ozkan, 2004). This also implies that many of the studies done on corporate cash policies are subject to issues of endogeneity. Specifically, some of the independent variables may be determined within the model resulting in the explanatory variables being either predetermined or endogenous. If any of the independent variables are correlated with the current or prior error term residual terms (i.e. presence of endogeneity), the model will suffer from an overestimation of the autoregressive coefficient if the OLS procedure is applied (Judson and Owen, 1999). The result is that estimators are inconsistent and do not converge towards their true value as the sample size approaches infinity (Judson and Owen, 1999). To address these issues, an instrumental variables approach, such as GMM, needs to be adopted (Verbeek, 2012).

### 3.2.3 The GMM estimation procedure

The Generalized Method of Moments (GMM) is a form of instrumental variable approach which can be used to address the issue of endogeneity. For the purposes of this thesis, the GMM method is therefore adopted. There exist some different GMM estimating procedures, the Arellano-Bond (1991) and the Blundell-Bond (1998) are two such. The Blundell-Bond estimator is an extension of the Arellano-Bond (1991) and is better suited for models involving the use of relatively many instruments.

By employing the first lag of cash holdings as an instrument, as well as the rest of the regressors, consistent parameter estimates can be obtained. The choice of instruments is critical in order to obtain consistent estimates, and there must not be any higher-order serial correlation in the idiosyncratic part of the residual terms, otherwise the instruments will not serve their purpose (Ozkan and Ozkan, 2004). For this reason, a second-order serial correlation test for the absence of higher-order serial correlation in the idiosyncratic component in the error term is done. To test whether the instruments and error terms are independent of each, a Sargan test for over-identifying restrictions is also performed (Arellano and Bond, 1991).

The regression specification for the estimated dynamic panel model employed in this study is displayed below (time dummies are included as well):

$$\text{Cash}_{it} = \alpha_i + \alpha_t + \beta_1 \text{BankD}_{it} + \beta_2 \text{CapExp}_{it} + \beta_3 \text{Cash}_{it-2} + \beta_4 \text{CF}_{it} + \beta_5 \text{CFVol}_{it} + \beta_6 \text{Div}_{it} + \beta_7 \text{Size}_{it} + \beta_8 \text{MB}_{it} + \beta_9 \text{Lev}_{it} + \beta_{10} \text{Liq}_{it} + \beta_{11} \text{Prof}_{it} + \beta_{12} \text{Lev}_{it}^2 + \varepsilon_{it} \quad (2)$$

The intercepts  $\alpha_i$  and  $\alpha_t$  represent firm- and time specific effects respectively. According to Judson and Owen (1996), it may be assumed that firm-specific effects are unobservable but that these effects have an influence on the cash ratio. The firm specific effects are individual for each firm and do not change over time, whereas time-effects are the same for all firms in any given year, but vary over time. In this context, the time-effects can be interpreted as economy-wide factors over which the Swedish firms' have no control.

In specification (2) above, only the lag of cash is assumed to be endogenous (so  $\text{Cash}_{it-2}$  is used as an instrument), and all the other explanatory variables are considered to be exogenous. To correct for heteroscedasticity, Windmeijer (2005) standard errors are applied.

One may also estimate a model where all regressors are treated as endogenous, which is shown in specification (3) below:

$$\text{Cash}_{it} = \alpha_i + \alpha_t + \beta_1 \text{BankD}_{it-2} + \beta_2 \text{CapExp}_{it-2} + \beta_3 \text{Cash}_{it-2} + \beta_4 \text{CF}_{it-2} + \beta_5 \text{CFVol}_{it-2} + \beta_6 \text{Div}_{it-2} + \beta_7 \text{Size}_{it-2} + \beta_8 \text{MB}_{it-2} + \beta_9 \text{Lev}_{it-2} + \beta_{10} \text{Liq}_{it-2} + \beta_{11} \text{Prof}_{it-2} + \beta_{12} \text{Lev}_{it-2}^2 + \varepsilon_{it} \quad (3)$$

## 4. Results

This part of the thesis first presents some descriptive statistics for the variables employed in this study. Then the empirical results stemming from the dynamic panel regression models are showcased.

### 4.1 Descriptive statistics

In **table 2** below descriptive statistics for all the variables applied in the study are showcased.

**Table 2:** Descriptive statistics

Variables	Mean	Min	Median	Max
<i>Dependent variable:</i>				
Cash holdings	0,058	0,040	0,053	0,092
<i>Independent variables:</i>				
Bank debt	0,587	0,021	0,712	0,974
Capital expenditures	0,067	0,003	0,051	0,189
Cash flow	0,049	-0,478	0,057	0,278
Cash flow volatility	0,036	0,008	0,045	0,258
Dividend payers (dummy)	0,346	0	0,387	1
Firm size (natural logarithm)	9,498	4,908	8,518	11,992
Investment opportunities (Market/Book)	1,081	0,425	1,148	6,782
Lag of cash holdings	0,057	0,040	0,053	0,092
Leverage	0,187	0	0,253	0,764
Liquid asset substitutes	0,039	-0,391	0,042	0,410
Profitability	0,153	0	0,139	0,341
Square of leverage	0,026	0,008	0,031	0,085

In the table above, the mean, median, minimum and maximum values for the dependent and explanatory variables for the period 1985 - 2014 is displayed. **Cash holdings** is the ratio of total cash and marketable securities to total assets. **Bank debt** is defined as the ratio of bank borrowing to total debt. **Capital expenditures** is a ratio of said divided by total assets. **Cash flow** is calculated as earnings before interest and taxes, but before depreciation (EBITD). **Volatility of cash flow** is estimated as the standard deviation of the first difference of cash flows to total assets. **Dividend payers** is a dummy variable that assumes a value of one if a company pays dividends in a given year. **Firm size** is the natural logarithm of total assets in 1980 prices (\$US). **Investment opportunities** is measured as the ratio of market value of equity minus the book value of equity plus book value of assets to book value of assets. **Lag of cash holdings** is the cash holding ratio at time t minus 1. **Leverage** is defined as the ratio of total debt to total assets. **Liquid assets substitutes** is defined as net working capital (NWC) to assets, where NWC is defined as net current assets minus cash and equivalents, and assets is the book value of total assets minus total cash and equivalents. **Profitability** is defined as EBITD to total book value of assets. **Square of leverage** is the product of leverage and leverage.

As can be seen from **table 2** above, the average ratio of cash to total assets in Swedish firm amount to 5.8 %, and the mean size of the Swedish firms in the sample amounts to approximately 3.5 billion \$US (the natural logarithm of this figure is equal to 9,5). All variables with extreme values have been winsorized at the 1% and 99% level, meaning that these values are set equal to the figures corresponding to these percentiles.

## 4.2 Dynamic panel regression models

In **table 3** below, two dynamic panel regression models using different specifications are estimated with the GMM method. In the first model, all independent variables are treated as exogenous, except for the lag of the cash ratio variable which is considered endogenous. In the second specification, all variables are treated as endogenous. In order to control for time effects, time dummies are applied in both models.

**Table 3:** Results of dynamic panel data estimation for the period 1985 - 2014

Dependent variable: Cash holdings	Predicted sign	(1) GMM 1 – Exogenous variables	(2) GMM 2 – Endogenous variables
Bank debt <sub>it</sub>	Negative	-0,045 (0,008)	-0,029 (0,005)
Capital expenditures <sub>it</sub>	Negative	0,031 (0,006)	0,038 (0,007)
Cash flow <sub>it</sub>	Neg/Pos	0,073* (0,013)	0,131* (0,020)
Cash flow volatility <sub>it</sub>	Positive	0,157** (0,032)	0,124** (0,035)
Dividend payers <sub>it</sub>	Negative	-0,063* (0,036)	-0,072* (0,052)
Firm size <sub>it</sub>	Neg/Pos	-0,039* (0,007)	-0,057* (0,009)
Investment opportunities <sub>it</sub> (Market to Book value)	Positive	0,011 (0,006)	0,095* (0,007)
Lag of cash holdings	Positive	0,678*** (0,039)	0,497*** (0,047)
Leverage <sub>it</sub>	Negative	0,126* (0,037)	0,019* (0,011)
Liquid asset substitutes <sub>it</sub>	Negative	-0,057 (0,017)	-0,138* (0,021)
Profitability <sub>it</sub>	Positive	0,114* (0,044)	0,160* (0,053)
Square of leverage <sub>it</sub>		0,212** (0,102)	0,193** (0,091)
First order autocorrelation, AR(1)		-11,2	-10,5
Second order autocorrelation, AR(2)		1,57	2,23
Sargan J test value		95,3	84,1

Heteroscedasticity robust Windmeijer standard errors have been applied in order to avoid bias in the standard errors, and are reported in parentheses. \*, \*\*, and \*\*\* means that the variable coefficient is statistically significant at the 10%, 5% and 1% level respectively. As there are missing observations for some of the variables, the number of observations differ depending on firm. Time dummies have been included in both of the models. The GMM – Exogenous model only treats the first lag of cash holdings as endogenous, and the second lag of cash holdings is used as an instrument. Since all variables are considered endogenous in the GMM – Endogenous model, the second lag of all explanatory variables are used as instruments. The test statistics for first and second order residual autocorrelations are distributed as standard normal variables and the null hypothesis is that there is no autocorrelation in the residuals.

In **table 3** above, the results of two different GMM estimations are displayed. In the first model (GMM – Exogenous), only the lag of Cash<sub>it</sub> is treated as endogenous, whereas in the second model all the explanatory variables (as well as the regressand) are treated as

endogenous. The test statistic for higher-order serial correlation in the first model is significant at the 1% level (p-value is equal to 0,006), indicating that the null hypothesis of no model misspecification should be rejected, as the independent variables cannot be considered exogenous.

In the second model (GMM – Endogenous), lagged values (dated  $t - 2$ ) of the explanatory variables are used as instruments, following Blundell et al. (1992). In the second model, negative first-order serial correlation is found to pose a problem, whereas the Sargan test for second-order serial correlation does not indicate any issues. This means that the instruments of the GMM estimation do not suffer from the effects of endogeneity. The second model, where all explanatory variables are treated as endogenous, is therefore used to analyze the results.

The results of the second GMM model show that the variables lag of cash holdings, cash flow, cash flow volatility, dividend payers, firm size, investment opportunities, leverage, liquid asset substitutes, profitability and square of leverage are statistically significant. The variables bank debt and capital expenditures are not significant in the second model.

Following the work of Ozkan and Ozkan (2004), the adjustment coefficient is estimated as one minus the coefficient for the lagged cash holdings variable, yielding a value of just above 0.50. This may be interpreted similarly to Ozkan and Ozkan (2004), namely that Swedish firms cash holdings are quite time persistent and adjust their target cash ratios rather fast.

### 4.3 Tests for structural breaks

Considering that there has been a major increase in the cash to total assets ratio in recent years (as seen in **figure 1** on page 1), it seems warranted to investigate whether there have any been a structural breaks in the estimated parameters of the model. For these purposes, three GMM breakpoint test statistics are considered. The null hypothesis for the Andrews-Fair Wald and the Andrews-Fair LR type statistics states that none of the parameters exhibit any structural breaks, as seen in **table 4** below, the p-values indicate that the null should be rejected at the 1% level. For the H&O-statistics, the null hypothesis of sample stability is also rejected at the 1% level. Based on these results, two additional panel models, using data for the period before the crisis (1985 - 2007) as well as after the crisis (2010 – 2014) are estimated.

**Table 4:** Tests for structural breaks

Test type	p-value
Andrews-Fair Wald	0,000
Andrews-Fair LR	0,001
Hall and Sen O-statistic	0,001

#### 4.4 Panel models before and after the crisis

In **table 5** below, the dynamic panel models for the period 1985 – 2007, and 2010 – 2014 are displayed in columns three and four respectively. For both periods, the endogenous GMM model has been applied, as the models where all variables except the lag of cash is assumed exogenous are rejected by the misspecification tests. Following Blundell et al. (1992), the explanatory variable dated  $t-2$  have been used as instruments.

**Table 5:** Results of dynamic panel data estimations for the periods 1985 – 2007 and 2010 – 2014 respectively

Dependent variable: Cash holdings	Predicted sign	(1) GMM 2 - Sample period: 1985 - 2007	(2) GMM 2 – Sample period: 2010 - 2014
Bank debt <sub>t-2</sub>	Negative	-0,021 (0,010)	-0,054 (0,025)
Capital expenditures <sub>t-2</sub>	Negative	0,019 (0,005)	0,026 (0,013)
Cash flow <sub>t-2</sub>	Neg/Pos	0,090* (0,024)	0,151** (0,047)
Cash flow volatility <sub>t-2</sub>	Positive	0,113* (0,051)	0,160** (0,081)
Dividend payers <sub>t-2</sub>	Negative	-0,039 (0,023)	-0,084* (0,038)
Firm size <sub>t-2</sub>	Neg/Pos	-0,056* (0,015)	-0,078* (0,018)
Investment opportunities <sub>t-2</sub> (Market to Book value)	Positive	0,047* (0,012)	0,095** (0,034)
Lag of cash holdings	Positive	0,736*** (0,103)	0,547*** (0,093)
Leverage <sub>t-2</sub>	Negative	0,111** (0,026)	0,091* (0,016)
Liquid asset substitutes <sub>t-2</sub>	Negative	-0,137* (0,061)	-0,128* (0,063)
Profitability <sub>t-2</sub>	Positive	0,144* (0,067)	0,170** (0,074)
Square of leverage <sub>t-2</sub>		0,270** (0,089)	0,216** (0,075)
First order autocorrelation		-14,5	18,7
Second order autocorrelation		1,63	1,59
Sargan test value		69,8	44,1

This is the second set of dynamic panel data model. \*, \*\*, and \*\*\* means that the variable coefficient is statistically significant at the 10%, 5% and 1% level respectively. Heteroscedasticity robust Windmeijer standard errors have been applied in order to avoid bias in the standard errors. As there are missing observations for some of the variables, the number of observations differ depending on firm. Time dummies have been included in both of the models. The GMM 2 model, where the second lag of all explanatory variables are used as instruments is applied for both time periods. The test statistics for first and second order residual autocorrelations are distributed as standard normal and the null hypothesis is that there is no autocorrelation in the residuals.

When comparing the results displayed in **table 5** to the previous ones, it may be noticed that there are no major differences with regards to the sign of the variables. The only factor that has gone from being significant to being insignificant when the sample is split in two is the dividend payer variable. It seems that the structural break (i.e. the 2008 – 2009 financial crisis) has had little impact on the factors which determine Swedish corporate cash holdings.



## 5. Analysis and discussion of results

In this part of the thesis, the results from the previous section are discussed and compared to the hypothesized relations between cash holdings and the different explanatory factors.

### 5.1 Results of the dynamic panel models using endogenous variables as instruments

The analysis in this section is based on the results from the second GMM model (2) in the first set of regressions, which are summarized in **table 6** below. As the findings for the models utilizing data exclusively before and after the crisis respectively were very similar, the subsequent analysis and conclusions are based on the model comprising of the entire data set.

**Table 6:** Summary of regression results

Variables	Expected sign (Trade-off / Pecking order theory)	Observed sign	Significance level
Bank debt	Neg/Neg	Negative	Not significant
Capital expenditures	Negative	Positive	Not significant
Cash flow	Neg/Pos	Positive	10% level
Cash flow volatility	Positive	Positive	5%
Dividend payers (dummy)	Negative	Negative	10% level
Firm size (natural logarithm)	Neg/Pos	Negative	10% level
Investment opportunities (Market/Book)	Pos/Pos	Positive	10% level
Lag of cash holdings	Positive	Positive	1% level
Leverage	Negative	Positive	10% level
Liquid asset substitutes	Negative	Negative	10% level
Profitability	Positive	Positive	10% level
Square of leverage	Positive	Positive	5% level

#### 5.1.1 Bank debt

The sign for the bank debt variable is negative, as predicted, but not statistically significant in any of the models. One of the foremost arguments why bank debt should play a role with regards to cash holdings is that banks are in better position than other lenders to monitor the firm, i.e. there is less information asymmetry between the lender and borrower as compared to forms of financing. This implies that the cost of debt is lower for firms relying primarily on bank debt, which should enable such firms to hold less cash. The reason that this line of reasoning apparently does not apply to Swedish firms might be due to the non-monotonic relationship between leverage and cash holdings, as is explained further down in the analysis.

#### 5.1.2 Capital expenditures

The relationship between cash holdings and capital expenditures is positive but not statistically significant for Swedish firms. Previous research has pointed out that oftentimes, excess cash is used to fund expenditures when current cash flows are too low and previous

studies have also established a positive relationship between capital expenditures and the level of cash holdings. As capital expenditures are usually larger in firms with many investment opportunities, there should be a greater demand for stocking up on cash in such corporations. Accordingly, in a pecking order world, there should be a positive connection between capital expenditures and the level of excess cash (D'Mello et al., 2008). This is also the case for Swedish firms, but the relationship is not clear enough to be statistically validated.

### 5.1.3 Cash flows

For the cash flow variable, a significant positive relation is found. This finding is contradictive with the notion that firms with large incomes are less dependent on spare cash than companies with less substantial cash flows, and that cash flows should therefore act as a substitute for cash holdings. Instead it seems that Swedish corporations with high cash flows prefer to use internal sources of financing, i.e. cash. It may be also be argued that large cash flows acts as a proxy for growth opportunities. As Swedish companies with large cash flows often have many investment opportunities, they need larger piles of excess cash to be able to finance suddenly emerging positive NPV projects.

### 5.1.4 Cash flow volatility

The volatility of cash flows has also been considered as a variable of its own and the sign for the coefficient is positive and significant at the 5% level. This finding is intuitive in the sense that Swedish corporations that experience unstable cash flows have to safeguard against unexpected income shortages by having access to larger cash reserves than companies which experience less fluctuations in their income flow. From a precautionary motive point of view, it may be argued that excess cash acts as a warranty that the business can continue its operations even at times when cash flows are low. In times of a crisis such as the one in 2008, the cost of obtaining external sources of liquidity (i.e. credit) rises as borrowers are faced with an onslaught of potential new lenders. This argument is also brought forward by Bates et al. (2009) who point out that cash holdings serves the purpose of handling sudden shocks that makes access to the capital market expensive or unfeasible. Under such circumstances, companies with superior investment opportunities will incur even greater losses if they do not have enough funds of their own.

### 5.1.5 Dividend payers

This variable is the only one that is found to not be significant in the model comprising of pre-crisis data only, but the variable is significant when the entire period 1985 – 2014 is considered. The latter model indicates a statistically significant negative relationship between dividend paying Swedish firms and cash holdings. It may be argued that this is due to that

dividend paying firms are able to raise funds internally by temporarily cancelling their payouts when the need arises. This finding is in line with the corporate liquidity demand theory of Almeida et al. (2002) who suggest that the alternatives that firms have for raising cash are dependent on their access to the capital markets as well as their own assessment of the likelihood of future investment needs. As a consequence, monetarily constrained firms, (i.e. non dividend payers) stack up their cash reserves whilst the more financially secure companies do not weigh this aspect into their cash policies. However, no statically significant relationship is found for the pre-crisis period. For the period after the 2008 – 2009 crisis it seems that dividends have come to play a role for corporate cash holding decisions amongst Swedish firms. This may be due to dividend paying firms tending to be large and mature firms and these have not been as severely affected by the lack of liquidity as the smaller companies featured in the data sample. Overall, based on the findings of this study it seems that dividend paying Swedish firms do not usually take their dividend payouts into account when deciding upon their cash holding strategies.

#### 5.1.6 Firm size

The influence of the nominal amount of total assets (firm size) on cash holdings is negative and significant. There are some good reasons why this should be the case. For instance, the marginal utility of an additional unit of cash decreases as the nominal amount of assets takes on large values. Something that has also frequently been pointed out in the literature is that loan related fees are fixed, meaning that the cost of obtaining borrowings is relatively lower for large corporations as compared to firms with less financial capacity (Opler et al., 1999). As larger firms also tend to be more diversified, the risk of financial distress is lower, which in turn makes it cheaper for these corporations to take loans. Hence, the results for the Swedish market do not provide support for the free cash flow line of reasoning. In this setting, managerial discretion should increase with the size of the corporation as shareholders are more dispersed and the need to provide lenders with financial information is also less pronounced for large firms. Additionally, companies with plenty of assets are not as likely to become targets of take-over bids, giving managers even further control over investment and policy decisions. In a Jensen free cash flow setting, this should lead to large corporations stocking up on huge amounts of cash. Apparently, this is not the case for the Swedish market. This finding may hence be interpreted in the way that Swedish firms are able to handle the principal-agent issue effectively.

#### 5.1.7 The investment opportunity set (Market to Book value)

The sign of the coefficient for the investment opportunity variable is positive and significant at the 10 % level. According to Jensen's free cash flow hypothesis however, one would

expect to find a negative correlation between the investment opportunity set and cash holdings. This is due to that corporations with low levels of leverage cannot be easily monitored, enabling managers to accumulate more cash for perquisite consumption. Further, the theory considers cash to act as a buffer with no set target level, and the results therefore contradict the abovementioned arguments. However, the results provide support for the notion that the cost of a liquidity shortage are greater for those firms that have a vaster set of investment opportunities as compared to companies with more restrictive investment prospects. Also, according to the pecking order hypothesis, retained earnings should be the first choice for financing new investment projects, in order to minimize the cost of information asymmetries. The results are hence in accordance with the trade-off model and pecking-order hypothesis; the cost of bankruptcy is higher for firms with more investment opportunities and therefore the alternative costs of a cash shortage are greater for those firms. Hence, the results of this study illustrate that Swedish companies consider the cost of not being able to finance positive NPV investments to be enough incentive to maintain relatively high levels of cash.

#### 5.1.8 The adjustment factor (lag of cash holdings)

The lag of the dependent variable cash holdings is strongly significant and is positively correlated with cash holdings in the current time period. This finding illustrates that Swedish firms exhibit a latency with regards to their cash holding policies, as firms require some time to adjust their optimal level of cash holdings when external and internal changes in company characteristics occur. This finding hence provides support for the target adjustment model playing a role for Swedish firms' cash allocation policies.

#### 5.1.9 Leverage and the square of leverage

The role of leverage on corporate cash holdings has previously given raise to some seemingly contradictory hypothesis. On the one hand, corporations with little to none debt are not able to utilize the effects of the tax shield, indicating a sub-optimal capital structure. On the other hand, the increased likelihood of financial distress should lead to higher costs of obtaining additional funding for firms with relatively high levels of debt (Ozkan and Ozkan, 2004). For this reason highly levered firms need to maintain large cash balances to ensure their creditors that they do indeed have the resources required to pay back their loans. At the same time, it may be argued that highly levered firms do not need to keep as much liquid assets as they should be able to instead issue debt themselves. The results of the regression models indicate a positive and statistically significant relationship for the linear leverage variable. Swedish firms that are highly levered apparently do not hang on to large amounts of excess cash. This may be due to the fact that these companies are in a financially stable position as their lenders

assign them a high credit rating, enabling these firms to have relatively low amounts of cash holdings. However, as noted by Guney et al. (2007) the true relationship between cash holdings and leverage might in fact be U-shaped in nature and therefore the square of leverage is also estimated as a separate variable in the GMM regressions. The coefficient is positive and statistically significant at the 5% level. The quadratic term confirms that leverage does in fact exert a non-linear impact on firm liquidity (as is also noted by Guney et al., 2007). For Swedish firms with none to low levels of debt the relationship is negative as cash serves as a substitute for debt, whereas highly levered Swedish firms need substantial amounts of cash to act as a guarantee that the firm will be able repay its creditors.

#### 5.1.10 Liquid asset substitutes

The sign for the liquidity variable is negative as predicted, and statistically significant as well. This finding indicates that Swedish firms are inclined to use their non-cash assets as substitutes for holdings of cash, and is in line with other studies. The propensity to use alternative sources of funding should, according to the trade-off model, depend on the firm's accessibility to the investment and capital markets. Opler et al. (1999) point out that managers need to be aware of the low return on cash due to the liquidity premium as well as the indirect cost incurred by not being able to utilize the tax shield. However, these considerations have to be weighed against the pecking order argument that cash is the most cheaply and easily accessible source of funding. The findings of this study indicate that Swedish firms seem to weigh the downsides of having large reserves of cash somewhat heavier than the upsides.

#### 5.1.11 Profitability

The regression results show a positive and significant correlation between profitability and the cash to assets ratio. This finding is easy to grasp as successful (i.e. more profitable) firms should be able to accumulate more excess cash than less revenue generating organizations. The relationship provides support for the pecking order hypothesis as firms with large inflows of cash will provide managers with a large pool of funds that can be used to undertake acquisitions and other strategic financing activities. The agency motive is also apparent as the accumulated cash holdings may serve the purposes of enabling directors to gain larger control over investment decisions as well as allowing for more managerial perquisites. In the presence of large amounts of accumulated funds, the performance incentives decrease which in turn allows senior management to indulge in 'pet' projects that do not primarily serve the interests of shareholders (Ferreira and Vilela, 2004).

## 5.2 Discussion of results

During the course of this study, it has become evident that many factors play a role with regards to Swedish firms' cash allocation policies. For instance, the notion that holdings of cash brings along the benefit that positive NPV projects may be subsidized without having to sell off other assets confirms that the transactional cost motive can explain some of the rationale behind Swedish firms' cash strategies. Overall, the results of this dissertation provides support for many of the existing theories, such as the pecking order hypothesis, the trade-off model and the motives underpinning agency theory (the free cash flow line of argument) are also corroborated to some extent.

In a US based study, Bates et al. (2009) noted that the cash to asset ratio of US based firms doubled in the time span from 1980 to 2006. This increase would enable a typical firm to pay off all of its outstanding debt obligations. Interestingly, this pattern has not been observed for the Swedish market prior to the 2008 crisis. Of course, one must consider that Bates et al. (2009) attribute the increase in American corporate cash holdings to more volatile cash flows, an increase in R&D intensive investment projects as well as a decrease in the amount of inventories and receivables, which were trends that Swedish firms apparently did not pick up. However, in light of the economic turmoil of the last decade, it seems that Swedish companies have come to value the precautionary aspects of cash holdings to a far greater extent than before. Based on the empirical evidence, managers of Swedish firms seem to have become more inclined to hoard cash in the aftermath of the 2008 crisis. This bears witness to the notion that the precautionary motive is especially relevant in times of financial instability, as companies are reminded of the dangers of cash shortages.

The post crisis increase in Swedish corporate cash ratios also illustrates the logic behind the transactional motive as the cost of liquidating assets has become apparent to all market participants. The positive and significant coefficient estimate for the M/B variable in this study further reinforces that Swedish firms consider cash to be a superior alternative for their investment needs. The finding that cash flow volatility is positively related to cash holdings is also intuitive in the sense that companies need to ensure that they are able to maintain their operating activities during times of economic recession and other threats, such as competitors entering the market. However, it remains to be seen whether the current level of cash holdings is merely a temporarily reaction brought about by market participants overestimating the effects of a potential liquidity shortage, or whether the 2008-2009 financial crisis has really created a market wide change in how Swedish corporations value their liquid asset holdings.

## 6. Summary, conclusions and suggestions for further research

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In this final part of the thesis, a summary of the findings and what conclusion can be drawn from them are presented along with some suggestions for further research.

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### 6.1 Summary

This piece of writing has sought to study which firm characteristics play a role in determining how much cash that Swedish corporations hold, both before and after the financial crisis of 2008 - 2009. Many studies have been undertaken on the topic of corporate cash policies, but these usually focus on the American market or alternatively go for a very broad approach by incorporating many different countries in the analysis. Relatively little attention has been paid as to what factors determine the cash holding levels of Swedish firms. In light of the dramatic increase in Swedish corporate cash holdings following the recent financial crisis, it is further warranted to gain a better understanding as to what drives the need for corporate liquidity in the Swedish corporate environment. This study has implemented a number of firm characteristics previously found to play a significant role in determining cash holdings levels, both in an international context as well as for the American market exclusively. Additionally, the non-linear relationship between leverage and cash has been considered by adding a squared variable for leverage. Further, by incorporating a lag of cash holdings, a dynamic panel regression model framework involving the usage of the Generalized Method of Moments estimator, it has been possible to study the somewhat endogenous relationship between cash and other firm hallmarks. The instrumental variable approach has also been beneficial for the purposes of investigating if Swedish firms abide by a target adjustment model by successively adopting to changes in leverage and other firm characteristics.

### 6.2 Conclusions

Swedish firms, much like other corporations around the globe, have substantial amounts of liquid assets in the form of cash and cash equivalents. A number of both external as well as firm internal factors influence corporate cash policies, and the classical capital structure theories, such as the pecking order hypothesis, Jensen's free cash flow theory as well as the trade-off analog are all applicable in the Swedish context.

The results indicate that Swedish firms do use cash as a safeguard against fluctuations in their income streams (cash flows) and that the amount of assets that firms dispose of also has an influence on how much liquidity is deemed necessary for safe operating margins.

Additionally, the empirical results show that Swedish firms with many investment opportunities and large cash flows tend to accumulate larger holdings of cash as compared to firms with fewer investment prospects and smaller cash flows. Conversely, being a dividend

paying corporation and disposing of large amounts of liquid asset substitutes, are factors which tend to characterize Swedish companies who hold less cash relative to total assets than other domestic firms. Another key finding from this study is that leverage exerts a non-linear, U-shaped, impact on Swedish corporate cash holdings. Additionally, evidence has been found that Swedish firms follow a target adjustment model and that changes in cash levels affect other firm characteristics, just as these affect the cash ratio. The reason being that there is an endogenous relationship between cash holdings and its determinants.

It is also evident that the financial crisis of 2008 - 2009 has played a significant role with regards to corporate cash allocation policies, as the crisis has evoked a structural break in the trend line for Swedish corporate cash holdings. However, it remains to be seen whether the current level is merely a temporary effect, brought about by precautionary motives, or if the crisis has in fact spawned a shift in the minds of Swedish financial managers with regards to the value of cash.

### 6.3 Suggestions for further research

There are a number of interesting theories about corporate cash holdings, and drivers that can be related to these, which might be interesting to do further study on. For instance, one motive that has been put forward in some of the literature (e.g. Fama and French, 1998) as to why a certain level of cash is chosen by firms is the impact of taxes. In their sample of US based firms, Foley et al. (2007) show that there is a positive relationship between cash holdings and the tax cost of repatriating foreign income, and it would be interesting to uncover whether similar findings may hold true for Swedish firms as well. Another area that is hard to study when only looking at the Swedish market is the impact of national culture on corporate cash policies. It may however be the case that firm-specific culture has an impact which could be related to its cash holding policies, warranting further research amongst Swedish corporations.

The impact of inflation on corporate cash policies is also a factor that has not been explicitly studied in this dissertation, due to it being almost constant for the majority of the time period considered. It may however prove interesting to investigate whether this factor could play a role for Swedish firms' cash holdings, especially if one were to include a time period when inflation was more volatile than it has been for the last two decades.

The role of ownership structure, as well as the influence of institutional and legal frameworks on Swedish corporate cash policies are areas that future research may also turn its attention to.



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