An Empirical Study of the Impact of Excess Cash Holdings on Enterprise Value for Nordic and Chinese Listed Companies

by

Baizhanysh Baizrakhmanov

Xiaochen Gu

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Supervisor: Fredrik Lundtofte

Abstract

Cash holding strategy is an important financial decision for firms. It is highly related to firms' operation and development because cash is an important guarantee to meet the business payment and investment opportunity. However, some scholars believe that due to agency problems, too much cash holdings are likely to produce negative impact on enterprise value. Compared to listed firms on Chinese A-share market, listed firms on NASDAQ OMX Nordic are subject to more mature governance and more stringent regulatory law and disclosure requirements. Therefore, the impact of excess cash holdings on enterprise value should have some difference between China and Nordic countries. This paper takes excess cash holdings as research object and selects the period from 2009 to 2013 as the estimation window. Then, this paper adopts Opler (1999) improved model about the influencing factors of cash holdings so as to derive excess cash holdings and then uses the revised Fama and French (1998) model to implement empirical test about the impact of excess cash holdings on enterprise value. This paper's research results are as follow:

(1) For both the listed firms on Chinese A-share market and the listed firms on NASDAQ OMX Nordic, companies' excess cash holdings have a negative impact on enterprise value. Because positive excess cash holdings are a kind of irrational allocation of assets for firms and the evidence of agency problem, management tends to use this part of cash in low efficiency areas and self-interest behaviors, which causes negative impact on enterprise value. (2) Compared to the listed firms' excess cash holdings on Chinese A-share market, the impact of excess cash holdings on enterprise value is less negative for listed firms on NASDAQ OMX Nordic. This is because listed firms on NASDAQ OMX Nordic are subject to more mature governance and stricter regulatory law and disclosure requirements, agency problems are alleviated and investor protection level is enhanced.

Keywords: excess cash holdings, enterprise value, NASDAQ OMX Nordic, Chinese A-share market

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1   Introduction

Cash is the most liquid and the lowest profitable asset for firms. Cash is also an important guarantee for enterprises to meet the business payment, repay the debt to maturity, and fulfill the obligation of paying taxes and other financial activities. Standard & Poor's latest data showed that by 10th January 2013, European largest 1000 non-financial companies, Europe-debt-1000 companies, have cash and cash equivalents amounted to 110 billion euros. Chinese scholars, Zhang Xianzhi and Ying Qiao (2012), found that the cash holdings of listed companies in China, Britain, United States and Canada were 19.85%, 9.9%, 8.1% and 7% on average from 2009 to 2012. Chen Deqiu, Wang Cong and Li Sifei (2011) emphasized that companies were holding more and more cash both in developed and emerging markets in the past 20 years.

Cash holdings have always been one of the important issues of firms' decision-making. Myers (1996) believes that how to determine firms' cash holdings policy is one of the most difficult problems in the financial field. On one hand, the strong liquidity of cash can guarantee the demand of firms' production and operation activities and reduce the financial risk. On the other hand, the low profit of cash makes the cash holdings need to bear certain holding cost. In addition, too much cash holdings are likely to reduce the rate of return on investment and lead to self-interest behavior of management and controlling shareholders. Therefore, it is particularly important to determine the appropriate level of cash holdings and improve the value of cash holdings. The economic consequences of high level of cash holdings are the value creation or value destruction, which is one of the most concerned problems for investors.

In recent years, many scholars who focus on the economic consequences of high level of cash holdings conducted many researches in an attempt to get a universal conclusion. However, the relevant research theories have different positions. From firms' motivation for holding cash, scholars formed different theories: *theory of demand of money* (Keynes, 1936), *trade-off theory* (Opler, 1999), *pecking order theory* (Myers et al, 1984), *agency theory* and *free cash flow theory* (Jensen, 1986). Among them, theory of demand of money believes that the motivation of currency demand behavior is attributed to trading motivation, precautionary motivation and speculative motivation. Firms' trading motivation is in order to meet the business needs of the money from the period of expenditure to income, which depends on the size of the current production scale and the length of the production cycle. The precautionary motive for holding money is in order to cope with unexpected expenses. Speculative motive is

to hold money for speculation. Trade-off theory thinks that a firm's cash holdings are not only a part of the funds in the idle state, but are still able to generate revenue. The company's behavior of holding high cash is in order to avoid the high cost of external financing to a certain extent. It is the best choice for enterprises according to their own situation and can maximize the value of enterprises. Regarding to pecking order theory, it says that due to the presence of asymmetric information between investors and companies, companies' external financing cost is often higher. When the companies do not have enough money for internal financing and are unwilling to make external financing, investment and business activities will be affected and lead to the reduction of enterprise value. Therefore, the theory also believes that higher cash holdings have a positive impact on the enterprise value. Agency theory and free cash flow theory imply that there will be moral hazard, information asymmetry and other problems due to the separation of management and ownership. Moreover, managers tend to avoid risk and care more about short-term interests rather than to consider long-term interests of company and its shareholders, due to the differentiation of benefits between shareholders and managers. A company's cash holdings are the easiest assets that a manager can control so managers tend to hold cash for selfish purposes, which damages the interests of the whole enterprise and results in a decline in the value of the company.

As to how cash holdings affect enterprise value, academics still cannot come up with a theory that all scholars are convinced. At the same time, the related empirical researches about whether cash holdings can enhance the value of enterprise or decrease enterprise value are also controversial. In recent studies, there are three different research conclusions. One is that, cash holdings are positively related with enterprise value. Another is that, cash holdings have reverse effect on the enterprise value. The last one implies a nonlinear effect of cash holdings. However, it is certain that both extremely high levels of cash holdings and very low levels of cash holdings are harmful to firms. Too much cash and cash equivalents are likely to cause the waste of resource and serious agency problem. On the contrary, low levels of cash holdings would lead to investment inefficiency and even to financial distress due to inability to pay maturity debt. Therefore, unreasonable cash holdings and cash usage will have a negative impact on the value of enterprises.

China is still a developing country and has serious agency problems, inefficient corporate governance, weak protection of shareholders and undeveloped capital market. Due to the special system background of China, not only shareholders and management layer have interest conflicts, but controlling shareholders and minority shareholders also have more

serious conflicts of interests. To some extent, the interest conflicts between large shareholders and small shareholders occupy a dominant position. These agency conflicts intensify the cash holding problem. Nordic countries are highly developed countries and listed corporations of these countries are subject to strict legal supervision and information disclosure requirements. Therefore, on these countries' stock markets, agency problems are suppressed and the level of investor protection and corporate governance are better compared to China. Because of these differences, it is highly possible that the relationship between excess cash holdings and enterprise value will be different in these countries. This problem is discussed in this paper.

This paper mainly studies the content of two aspects. One is the relationship between excess cash holdings and enterprise value. The other is the difference in the relationship between enterprise value and excess cash holdings for Chinese and Nordic listed firms. In order to study the content of these two aspects, this paper is divided into two sections. In the first section, this paper analyzes the factors that affect company's cash holdings and improves the Opler's (Opler, 1999) panel model to estimate optimal cash holdings, where the residuals we consider as excess cash. In the second section, this paper uses the classic firm value regression model of Fama and French (Fama et al, 1998) for reference and excess cash is considered as an independent variable of this regression. Through the regression, this paper attempts to find out the relationship between excess cash holdings and enterprise value and the difference of the impact of excess cash holdings on enterprise value. Also, this paper will discuss what leads to the difference in these two areas.

This paper's innovation is reflected in following:

(1) The comparison between listed firms in Chinese A-Share market and NASDAQ OMX Nordic market using regression dummies. It gives valuable information for studying differences between developed and developing countries in terms of theories explaining excess cash. Previous articles mainly focus on factors that would influence cash holdings and excess cash holdings, such as how agency problems and economic policy affect the value of cash and cash equivalents, but this articles' focus is about the difference among different markets.

(2) Previous researches focus on value of cash holdings and its marginal value, but cash holdings per se may not mean much, because every company has different size,

structure and need in cash depending from economic or industry conditions. Thus, excess cash can reflect impact on value better.

(3)   Based on literature review, we assume that there might be non-linear relationship between excess cash and enterprise value for which we included quadratic term for excess cash. Then, for estimation of excess cash holdings we employ two specifications with different dependent variables to measure optimal cash holdings.

In this paper, we analyze cash holdings and the relationship between excess cash and enterprise value from the qualitative and quantitative aspects. The comparison of firms' cash holdings in different areas helps to expand the perspective of corporate cash management. At present, cash behavior researches about difference among countries are rare. Most of the researches in this field just focus on companies of one area based on a certain perspective, such as agency problem and monetary policy. More importantly, this paper studies the difference between countries and, why they have these differences. It would give an example for cash management study among developed and developing countries.

Cash asset has strong liquidity and firms holding a certain amount of cash can ensure the needs of production and management activities and reduce financial risk; on the other hand, cash holdings need to take cost because of low return of cash. In addition, excessive cash holdings will reduce the company's investment income and even lead to self-interest behavior of management and major shareholders. Therefore, it is important to find the appropriate level of cash holdings and improve cash holdings value. Cash holding behavior can reflect an enterprise's business strategy and financial strategy, but meanwhile, it is also affected by corporate governance, external macro economy and policy system.

Cash holding policy is an important part of financial management of enterprises and it is highly related to budget management, strategic management and financial management. The change of cash holdings level directly affects the enterprise's flexibility. Therefore, suitable level of cash holdings is necessary for enterprises to avoid financial risk and it helps enterprises to adopt to macro environment. Studying the differences between countries helps enterprises to know what methods they can employ to improve cash policy and enhance enterprise value. Thus, through comparison, it helps firms with different financial policies and economic situation to learn from each other.

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Chapter 1 is the introduction. This chapter first describes the background of this article, which contains the main theories about cash holdings, the relationship between cash holdings and enterprise value and the difference between Nordic firms and Chinese firms. The following part is the research method and purpose, the research significance and outline of the thesis.

Chapter 2 is the theoretical review about the relationship about cash holdings and enterprise value. The relationships between enterprise value and cash holdings are classified into the positive correlation, the negative correlation and non-linear correlation.

Chapter 3 is the research hypothesis. It introduces the basic characteristics of Chinese and Nordic stock markets and the theoretical analysis about the characteristics of cash holdings. Then this chapter proposes the two hypotheses.

Chapter 4 is the measurement of excess cash holdings. This chapter first introduces the definition of excess cash holdings and lists the reasonable factors that affect cash holdings. Then this chapter runs regression of optimal cash holdings model to test these factors and selects the model, which fits better. The residuals are defined as excess cash holdings.

Chapter 5 is the empirical study about the relationship between excess cash holdings and enterprise value and the difference between corporations on Chinese A-share market and corporations in NASDAQ OMX Nordic market. This chapter uses the excess cash holdings calculated in chapter 4 to do theoretical and empirical analysis for the effect of excess cash holdings on enterprise value.

Chapter 6 summarizes the research results of the thesis and clarifies the limitations of the thesis and the direction of further research.

2 Theoretical Review

In the 1980s, the related researches about economic consequences of cash holdings emerged continuously and accumulated many findings. In this chapter, we make an overview of research progress about the impact of cash holdings on enterprise value. At present, conclusions on the relationship between enterprise value and cash holdings contain positive correlation, negative correlation and non-linear correlation. The conclusions of researches are summed up below.

2.1 Positive Correlation between Enterprise Value and Cash Holdings

There are many researches showing that cash holdings have a positive role in promoting enterprise value. Myers and Majluf (1984) found that, due to information asymmetry and transaction costs, companies have higher costs to raise funds from external sources. In order to reduce the high costs caused by asymmetric information, holding abundant cash is valuable. High growth companies have worse information asymmetry and insufficient investment, so it is more valuable for them to hold enough cash. Pinkowitz and Williamson (2001) conducted empirical studies to support the above conclusion. They found that one marginal dollar of cash holdings represent more than one dollar of market value for firms. They also found that the company's cash holdings value mainly depends on growth options, investment opportunities and conflicts between shareholders and creditors. Unlike the direct study of shareholder value of marginal cash holdings, Mikkelson and Parch (2003) provided indirect proof of the value of cash holdings from the characteristics of high cash holdings company's performance. They studied the business performance of listed companies whose cash holdings levels are more than 25% in five consecutive years and combined with other financial characteristics. They proved that the high levels of cash holdings improve enterprise value.

Based on the research results from worldwide, Chinese researchers use Chinese listed corporations data to do empirical studies and get similar conclusions. Peng Taoying and Zhou Wei (2006) made relative researches about cash holdings and effects of high levels of cash holdings on enterprise value. As a result, they also found that excess cash holdings have positive effect to company's operating performance. Zhang Zhaonan and Yang Xingquan (2009) analyzed the impact of corporate governance on cash holdings from the angle of divergence of interests between controlling shareholders and other shareholders. As a result,

cash holdings quantity and the value of company have positive correlation at 1% level of significance, and by improving corporate governance environment it can significantly improve the Chinese listed corporations' market value of cash holdings. Tan Yanyan (2013) found that excess cash holdings can enhance enterprise value from the view of financial constraints, and the value of excess cash held by private enterprises is significantly higher than that of state-owned enterprises.

2.2 Negative Correlation between Enterprise Value and Cash Holdings

Harford (1999) shows that companies holding high level of cash tend to conduct activities that may lead to reduce enterprise value, like mergers and acquisitions. It mainly reflects on the decline of stock shares caused by announcement of acquisitions and decline of company's operating performance after acquisitions. It means the value of excessive cash holdings may be less than its par value. Coude (2004) used 4515 companies' data from Canada, France, Germany, United Kingdom and the United States between 1989 and 2002 and acquired the results that excessive cash holdings have a negative effect on the firms' operating performance. Schwetzler (2004) improved Mikkelson and Parch's method. They analyzed companies with abnormal cash holdings separately, and found that companies with three consecutive years of excess cash holdings have worse operating performance. In addition, they examined the relationship between cash holdings and enterprise value from the aspect of protection of shareholders and managers' rights. They found that under the conditions of weak protection of shareholders, the more stable is the position of managers with control rights, the higher are the company's cash holdings, but the company's value is relatively low. Faulkender (2006) used different returns of excess stocks to study the difference of marginal values of cash caused by different financial policies and the influence of capital constraints on the values of cash. Theoretical analysis shows that different companies have different levels of demand for cash and different financial constraints. The research results show that marginal value of cash will increase with the level of cash holdings and financial leverage. At the same time, cash for dividend payment method will also reduce marginal value of cash when it is compared to stock repurchase.

In China, some scholars also have concluded that the cash holdings will have a negative effect on the value of enterprise. Chen Xuefeng and Weng Juntu (2002) used the companies with allotment of shares as the sample. They analyzed the change of the companies' operating

performance before and after allotment of shares and found that the more are cash holdings in cash-rich companies, the worse is the operating performance of the company. Gong Kaisong and Song Shanshan (2006) used the empirical data of listed corporations in China as a sample. In addition, the classical enterprise value regression model was used for reference in order to study the relationship between excess cash holdings and corporate value of listed corporations in China. The study found that the listed corporations' excess cash holdings are negatively related to firm value. The growth of the company has an impact on the relationship between excess cash holdings and firm values, the stronger is the growth, the weaker is the negative relationship between the two. Namely, growth of firms can improve the market value of excess cash holdings. Gu Naikang (2007) studied the value of cash holdings of Chinese listed corporations from the view of shareholders, and found that marginal value of one yuan of cash held by listed companies is only 0.5-0.6 yuan, which is relatively small.

2.3   Nonlinear Relationship between Enterprise Value and Cash Holdings

In recent years, scholars have started to consider the relationship between corporate cash holdings and corporate value from internal environment, external environment and other factors. Some scholars believe that due to co-existence of information asymmetry and agency costs, cash holdings and firm value do not form a simple linear relationship. The results were as follows:

Dittmar et al (2007) started from the perspective of corporate governance, and found that the book value of $1 cash holdings decreased to $0.42-$0.88 of market value for firms with poor corporate governance, while market value of cash holdings for firms with good governance is higher, about two times of the firms with poor governance. Tong Zhenxu (2009) studied whether the diversification of business would affect the value of cash holdings. He found that the value of cash holdings of diversified companies is lower than that of less diversified companies. Meanwhile, the diversification decreases the value of cash holdings when corporate governance level is low; but when corporate governance level is high, the relationship is insignificant. Arslan (2006) explored the relationship between the sensitivity of investment cash flow and financial constraints. He found when the economy is depressed; sufficient cash holdings can increase the company's ability to catch investment opportunities. There is clear evidence that holding cash is an effective tool for the company, especially in

the period of financial distress. Bates (2009) believed that retaining high cash holdings is beneficial to the company when external capital market is unstable.

Jiang Baoqiang and Bi Xiaofang (2006) took listed corporations in China as a sample to explore the relationship between excess cash holdings and enterprise value and performance. The results show that the relationship between enterprise value and excess cash holdings would be affected by agency cost. When agency costs are higher, the value of the firm is negatively correlated with excess cash holdings; when the agency costs are lower, the enterprise value is positively related to excess cash holdings; the relationship between the two is not significant when the cash holdings are below normal level. Wang Donghong and Wang Haigang (2008) also found that listed corporations' cash holdings and corporate value have U-type relation in China through the empirical research. It implies Chinese firms have the co-existence of information asymmetry and agency problems. When cash holdings are limited, information asymmetry theory plays a leading role and thus holding a certain amount of cash is useful to increase shareholders' value; however, when cash holdings increase to a certain extent, the impact of agency problems begins to be prominent and the value of company declines. This indicates that a moderate excess cash holdings help to enhance the value of the enterprise, but too much excess cash holdings will lead to a decline in corporate value.

2.4   Summary and Comments on Literature Review

The existing theory has no unified conclusion on the value effect of cash holdings in enterprises, and the value of cash holdings depend on the combined effect of multiple factors. The existing literature considers the effect and value of cash holdings from theoretical and empirical levels respectively. With increase in theoretical researches, empirical researches have been conducted gradually, and have formed plenty of research results. Regarding to whether cash holdings enhance or reduce the enterprise value, scholars have different conclusions based on different theories. In general, research results can be divided into three categories. One is based on asymmetric information theory that cash holdings can create value for the enterprise. Another is based on agency theory that cash holdings will damage corporate value. The last one is based on asymmetric information theory and agency theory that cash holdings and firm value have an inverted U-shaped relationship, that is, cash holdings can enhance corporate value in a certain extent but too much cash holdings will damage corporate value.

Scholars are not consistent in consideration of the relationship between cash holdings and enterprise value. Generally, most scholars study the value of cash holdings from the perspective of internal characteristics, like corporate governance, diversified management, executive power and so on. After the financial crisis, scholars shifted attention to the impact of external environment on the value of corporate cash holdings. At present, there have been researches to study the value of corporate cash holdings from environmental management level, environmental fluctuations, financial ecological environment and other external factors. However, researches based on the perspective of comparing two countries are rare, especially the comparison between developed and developing countries.

In recent years, many scholars pay much attention to the economic consequences of corporate cash holdings while few scholars pay attention to the economic consequences of excess cash holdings. Because each company has different situation, we cannot consider that a company has unreasonable cash holdings level when it has too much or too little cash. Thus, it does not have much practical significance to study the influence of the level of cash holdings on enterprise value. Therefore, it is more meaningful to study the economic consequences of cash holdings by excess cash holdings as the entry point.

3 Hypotheses Formulation

First, it is necessary to understand the general situation of Chinese market and Nordic market. Chinese economic system and institutional environment have a great difference compared to European countries. Most listed corporations derive from the restructuring of state-owned corporations. Deng Xiaomei (2014) found that the overall level of listed corporations' cash holdings on Chinese stock market is high, but many companies still lack cash. This phenomenon will inevitably bring negative effect on enterprise value. Securities market in China is still in a transforming and developing period. Many companies have serious agency problems, inefficient corporate governance and weak protection of shareholders. In addition, government's motivation and the nature of state-owned property have an important impact on the listed corporations.

In comparison, Nordic countries are developed exported-oriented economies and one of the richest areas in the world. They have relatively mature financial market and economic system that features high degrees of private ownership. This paper selects firms listed on NASDAQ OMX Nordic, which is a branch of NASDAQ. These firms are traded on one platform and are regulated by European Union. Therefore, Nordic listed firms are subject to stricter legal supervision and information disclosure requirements. Thus, their information asymmetry and agency problems are not as serious as for Chinese listed companies. Due to these big differences, it is worthwhile to compare cash holdings level of these countries, which is one of the most valuable resources for companies.

After introducing the basic characteristics of Chinese and Nordic market, it is necessary to find out the main factors that lead to the increase of cash holding level. Free cash flow hypothesis (Jensen, 1986) implies that wide existence of agency problems would cause divergence between business goals of management and shareholder interests. Management expects to hold more cash to reach the state of abundant cash holdings. The main reasons include: (1) Holding more cash can effectively offset operational risks, reduce the probability of bankruptcy or being taken over, and thus ensure the status of management in firms; (2) Abundant cash holdings can reduce a company's dependence on external financing to prevent the introduction of external supervision of financing and the restraints on management's decisions. (3) Holding more cash can increase the amount of resources that management can

dominate and it is easy for management to use this part of resources for their own consumption and needs.

Cash itself is one of the lowest profitable assets. When the company holds positive excess cash, it indicates that the allocation of resources is not reasonable and the profitability of assets is reduced. At the same time, excessive cash holdings imply serious agency problems in firms, which means that management can meet the needs of self-interest through unreasonable decisions. All of above-mentioned unreasonable usages of excess cash holdings will damage enterprise value. In terms of existing researches, La Porta and Silanes (2002) found that holding a large amount of cash is often associated with transaction costs, high management salaries, excessive investments, blind expansion and other behavior, which damages the interest of shareholders and investors. Kalcheva (2007) found the evidence that enterprises with excessive cash holdings usually face the decline of firms' operating performance and market value. All these reflect that excess cash holdings and enterprise value have negative relationship. Based on economic and institutional differences mentioned above, we assume the first hypothesis:

H1: *Companies' excess cash holdings have negative impact on enterprise value.*

As mentioned above, the developed market suffers stricter regulatory measures and disclosure requirements, which can decrease investors' supervision cost and limit self-serving behavior of management. Nordic stock market has more mature governance environment and stricter governance constraints to force these companies continuously upgrade the management level and the level of investor protection to meet the market requirements. Therefore, firms' internal agency problems are alleviated. Yang Xingquan, Zhang Zhaonan, Wu Haoman (2010) found that although companies with excess cash are often accompanied by overinvestment, the improvement in corporate governance can inhibit this phenomenon. Therefore, when Nordic listed corporations hold excess cash, due to higher level of corporate governance, lower agency problem and better investor protection, investors have a higher valuation of excess cash because they are more likely to believe that the company's market value is more precise and management can use this cash efficiently. Based on above-mentioned introduction and literature review, we can formulate second hypothesis:

H2: *Compared to the Chinese A-share market listed corporations' excess cash holdings, the impact of excess cash holdings on enterprise value is less negative for Nordic listed corporations.*

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4 Measurement of Excess Cash Holdings

According to the traditional theory of financial management, firms' cash holdings are one of the strongest liquid assets, but also are the assets with the lowest rate of return. It is also an essential resource for the normal production and operation. In order to ensure the normal production and operation, firms must hold a certain amount of cash. Theory of demand of money (Keynes, 1936), main supporter of static tradeoff theory (Opler, 1999) and free cash flow hypothesis (Jensen, 1986) all believe that companies have certain optimal cash holdings level and optimal cash holdings should be closely related to firms' production, management, environment and financial conditions. The cash holdings that are over optimal cash holdings can be considered as excess cash holdings. It is the rest of cash and cash equivalents that are relatively free to allocate and to use after deducting operational demand, investment demand and risk demand.

In this chapter, the content is divided into: (1) Based on the existing theory of cash holdings, we define the concept of excess cash holdings; (2) Based on analysis and selection of the factors that affect cash holdings, we establish two models for cash holdings that put potential influencing factors as control variables; (3) According to the statistical test, correlation test and regression results, we select the regression which fits better to calculate company's excess cash holdings and then derive the excess cash of Nordic and Chinese listed firms in order to continue our study in the next chapter.

4.1 The Definition and Calculation Method of Excess Cash Holdings

Due to the different actual situation of each company, we cannot consider firms' level of cash holdings to be unreasonable if a company holds too much or too less cash. There is no practical significance simply studying the impact of a company's cash holdings on the company value and other factors. Therefore, we introduce the concept of excess cash holdings to avoid this problem.

So, what is excess cash holdings? Generally, it is the cash that exceeds optimal cash holdings. For further explanation of excess cash holdings, we must first figure out the factors that affect the optimal level of cash holdings for a certain company. In *The General Theory of*

Employment, Interest and Money, Keynes (1936) analyzed the microeconomic motives of demand for money. According to that, the motivation of money demand behavior is attributed to trading demand, investment demand and precautionary demand. In addition, the demand against financial risk is another important function of firms' cash holdings, which was examined in many scholars' articles. Within the four aspects of demand above, precautionary demand is different from the other three, in a sense that, decision makers predict future matters based on firms' current situation, so that they can have excessive cash holdings. It cannot be included in the factors that affect companies' optimal cash holding, so it should be left out. The other three aspects of demand are the main factors that lead to the different optimal cash holding of each firm and the cash beyond demand is relatively excessive cash for firms, which is considered as excess cash because this portion of cash can be controlled and used freely. In other words, excess cash holdings are the difference between actual cash holdings and optimal cash holdings. However, companies would face various special conditions in real operating activities. In addition, some companies would give up some cash due to the costs of holding cash. Therefore, if cash held by corporations does not fully meet their actual needs, excess cash holdings do not have positive values.

For specific approach, this paper first refers to the methods of Opler (1999) and Dittmar (2007) to list the factors that may influence the firms' optimal cash holdings and then build two regression models with different calculation methods for cash holdings. Second, this paper performs relative tests to decide which model fits better. Finally, the model's residuals are considered as excess cash holdings.

4.2   Choice of Variables

When choosing independent variables, one rule that must be followed is that the selected variables are able to affect the level of firms' cash holdings. Based on the demand of cash holdings, this paper selects variables from trading, investment and financial risk. In the financial data of firms, some variables both have characteristics of trading and investment. Therefore, this paper combines trading variables and investment variables together.

 a. Trading and Investment Variables

Firm size - In theory of demand of money, Miller (1966) believed that a company's cash holdings are correlated to the company's size effect, and added firm size into optimal cash

holdings model. They thought that big firms could reduce cash holdings by relying on economy of scale during operating activities. Therefore, big companies need less cash to maintain normal operation. However, big firms may have more serious agency problems, so that management tends to hold more cash.

Working capital – It is the difference between current assets and current liabilities. Opler (1999) suggested that the more the working capital, the stronger the company's ability to repay short-term debt. In addition, the fund demand of company's daily operations and investments can be guaranteed better with more working capital. Normally, when companies have enough working capital, the need for cash holdings will decrease.

Cash flow - Opler (1999) suggested that the cost of cash deficiency would be reduced when a company has more than enough cash flow because once there is a deficiency, large cash flows can be used to make up for the deficient amount of cash. Therefore, a company with large amount of cash flow does not need to hold much cash, which means they would have a negative correlation.

Dividends distribution - Opler (1999) and Dittmar (2003) put the dividends distribution into consideration when they analyzed the factors influencing cash holdings. Through the empirical tests, there was a negative correlation between dividends distribution and cash holdings. However, according to the implications of theory of demand of money, if enterprise needs to allocate dividends, it should hold more cash to prepare and thus the demand for cash will improve. Otherwise, there will be a negative signal to the market because of the inability to pay dividends. Therefore, there should be a positive correlation between dividends distribution and cash holdings.

Capital expenditure - Keynes (1936), Opler (1999) and some other scholars believe that capital expenditure can affect cash holdings level. They believed that companies with more capital investment would set aside enough cash for investments ahead, thereby avoiding the time cost and opportunity costs of investment. So, there should be a positive relationship between the two.

Tobin's Q (Investment opportunities) - Investment opportunities mainly describe the expected level of investment of companies, not the actual level of investments. In theory of demand of money (Keynes, 1936), higher value of investment opportunities is bound to increase speculative motivation of holding cash in order to catch opportunity with profits. On the other hand, more investment opportunities mean better remarkable development prospects for the company. The financial distress costs are very high if the company misses valuable investment opportunities. In this case, firms tend to hold more cash.

R & D investment - For some companies, Research and Development (R & D) investments occupy important proportion in firms' cash use. According to the view of theory of demand of money (Keynes, 1936), when companies have demand for research and development, they will improve their cash holdings level to meet the needs of R & D. Because if cash is insufficient, cash deficiency costs are very high and are likely to affect the company's business, development and even survival. Therefore, cash holdings and R & D investments may have positive correlation (Opler, 1936).

 b. Risk variables

Financial leverage - Financial leverage reflects the structure of firms' assets and liabilities. When other conditions are identical, low leverage firms are more capable of repaying debt than highly leveraged companies. Free cash flow hypothesis of Jensen (1986) suggests that management is restricted to act for their own benefits when external supervision increases due to relatively high external financing. In addition, companies tend to hold less cash because for companies with less cash it is easier to get external financing when they need.

Debt (maturity) structure - It shows the extent of urgency for firms' debt repayment. According to the theory of demand of money (Keynes, 1936), companies holding more short-term debt would face high pressure of short-term repayment. In order to repay short-term debt, these companies should hold more cash to reduce debt risk. More importantly, firms with too much short-term debt may even face financial distress when they lack the necessary amount of cash holdings. So, between debt structure and cash holdings, there should be a positive correlation.

4.3   Sample Data and Model Selection

Given that, 2015 annual reports of listed corporations have not been fully disclosed, and in order to have 5 years window of estimation, we collected data for years 2008-2014, because the data of one year before estimated *t* and one year of lag of *t* are used in analyzing enterprise value regression. Therefore, the window of estimation is 2009-2013.

For China, this paper selects companies in A-share market, which is the main stock market for Chinese largest firms, as primary sample from Wind Info database. The samples are selected according to following principles: (1) Excluding financial listing corporations. This is due to special capital structure of financial companies and thus these companies are normally

excluded from total sample; (2) Exclude PT (Particular Transfer) and ST (Special Treatment) companies, which have negative revenue for three and two consecutive years respectively. This is because these companies operate poorly and at a loss, and even have the risk of delisting. These companies' financial indicators are likely to seriously deviate from the normal level so we exclude them; (3) Eliminate companies that miss data of the variables we needed. For Nordic countries, this paper collects data of NASDAQ OMX Stockholm listed 307 Nordic companies for years 2008-2014 from Worldscope database in Datastream. Regarding the data, we select similar principle as above. (1) Remove the companies that have data loss and corrupted data. (2) Exclude duplicating firms and financial firms. After resizing and combining the Chinese and Nordic samples, the total number of companies approaches to 1060 with 872 Chinese and 188 Nordic companies, and the observations number reach to 5034 for the 5 years window of estimation.

We used latest currency exchange rate CNY-SEK 1.24633 as of 05.05.2016 to convert all values for Chinese companies to Swedish krones. The statistical software used in this paper are EVIEWS 8.0 and EXCEL 2013.

This article draws on the research of Opler (1999) about the factors influencing firms' cash holdings and controls fixed effects of year and industry. This is due to the fixed effects presence since the F-stat as well as the Likelihood Ratio indicate that period dummies are highly significant, which suggests heterogeneity should be accounted for period dimension. Then, it can be also assumed that there is heterogeneity in industry group effects. In addition, this is supported by residuals heterogeneous behavior as it can be seen on the Graphs 5 and 6. At the same time, according to the above cash holdings factors analysis, this paper selects suitable independent variables to adjust the model. R&D variable is excluded due to presence of too many missing values. The adjusted model is as follows:

$$Cash_{i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 Divid_{i,t} + \beta_3 Capex_{i,t} + \beta_4 TobinQ_{i,t} + \beta_5 Lev_{i,t} +$$
$$\beta_6 NWC_{i,t} + \beta_7 Cashflow_{i,t} + \beta_8 Debtstr_{i,t} + \beta_9 Year\ Dummy + \beta_{10} INDdummy + \varepsilon_{i,t}$$

The meaning and calculation method of the variables in the model are shown in Table 1

Table 1. Variables Explanation and Calculation for Cash Holdings Regression

This table presents definition and methods how the variables were calculated for given specifications. Each variable was transformed into ratios except Size and Divid. Industry dummies represent fixed effects for separate industries and were categorized into 9 Industries.

Variables	Definition	Calculation
$Cash_{i,t}$	Cash and Cash Equivalents Ratio	Cash1: Cash/Total Asset

		Cash2: In(Cash/Total Asset)
Size$_{i,t}$	Firm Size	ln(Asset)
Divid$_{i,t}$	Dividend Dummy	Dividend Payout= 1, No Dividend Payout = 0
Capex$_{i,t}$	Capital Expenditure Ratio	Capital Expenditure/Total Asset
TobinQ$_{i,t}$	Investment Opportunities	Enterprise Value/Total Asset
Lev$_{i,t}$	Leverage Ratio	Total Liability/Total Asset
NWC$_{i,t}$	Net Working Capital Ratio	(Current Asset-Current Liability) /Total Asset
Cashflow$_{i,t}$	Cash Flow Ratio	Cashflow Ratio/Total Asset
Debtstr$_{i,t}$	Current Liability Ratio	Current Liability/Total Liability
Year Dummy	Fixed Effect of Time	
INDdummy	Fixed Effect of Industry	9 Classified Industries
ε$_{i,t}$	Residuals (excess cash)	

In order to make the model more reliable, it should be noted that cash holdings are mainly measured in two ways. (1) Opler (1999) and Dittmar (2007) use the ratio of cash and cash equivalents over total assets to measure the level of cash holdings. (2) Kusnadi (2003) use the logarithm of ratio of cash and cash equivalents over total assets to measure the level of cash holding. In this paper, we use above two definitions of cash to run the regressions and observe the significance of the variables and the degree of fitting of the two methods.

4.4   Empirical Results and Analysis

a. Statistical Descriptive Analysis

Table 2 presents the descriptive statistics for variables in the regression. This paper classifies the sample into total sample, Chinese sample and Nordic sample. This paper separately lists three samples' mean and median values.

Table 2. Descriptive Statistics for Cash Holdings Regression

This table presents mean and median values for variables included in Cash(1) and Cash(2) specifications for total sample and separately for each market. The variables definitions are described in Table 1.

	Total		Chinese		Nordic	
Variables	Mean	Median	Mean	Median	Mean	Median
CASH(1)	0.149935	0.119758	0.155745	0.127601	0.118509	0.067097
CASH(2)	-2.21331	-2.12219	-2.11296	-2.05885	-2.7568	-2.70038

SIZE	22.10459	22.08573	22.34891	22.2194	21.09202	20.89198
CF	0.049425	0.051365	0.04949	0.047121	0.049157	0.075201
CAPEX	0.049686	0.034324	0.052744	0.039815	0.03668	0.018314
NWC	0.151557	0.145383	0.141913	0.140542	0.192102	0.164351
TOBINQ	1.898635	1.535937	1.963592	1.607904	1.602384	1.071795
DEBTSTR	0.79389	0.845893	0.807395	0.867431	0.737108	0.687363
LEVER	0.500975	0.516587	0.505291	0.518568	0.483086	0.513347
DIVID	0.683791	1	0.702523	1	0.594536	1

From the Table 2, it is obvious that the mean and median values of Chinese Cash(1) (cash and cash equivalent) are higher than that of Nordic countries' Cash(1) and that of total sample's Cash(1). In addition, comparing the mean and median values of cash holdings ratio, it shows that both Chinese firms and Nordic firms have higher mean value than median value. It means that more than half companies' cash holdings are lower than mean value and distribution is right-skewed. It is reasonable because every company needs a certain level of cash and cash equivalents to maintain normal operations. The reason why median is lower than mean could be that there are some companies holding much higher than median level of cash holdings because of industry specifics, special strategies of firms and other reasons.

Normally, larger companies have lower cash holdings level but the rule is not applicable for the data and time period here because Chinese companies' mean and median size is bigger than that of Nordic companies. This is maybe for the reason that China has more serious agency problems as mentioned in introduction and hypothesis parts, so their market values could be more overvalued compared to Nordic companies. Another characteristic is that current liability ratio in China is higher than that of Nordic market while their median values of leverage ratio are almost same, which shows that Nordic companies have lower short-term operational risks, which means better operation and management. Comparing the values of capital expenditure ratio and investment opportunities of these two areas, it shows that Chinese companies have better present and future investment opportunities. Graph 1 compares the difference of mean values of cash holdings ratios in Chinese and Nordic listed companies from 2009 to 2013.
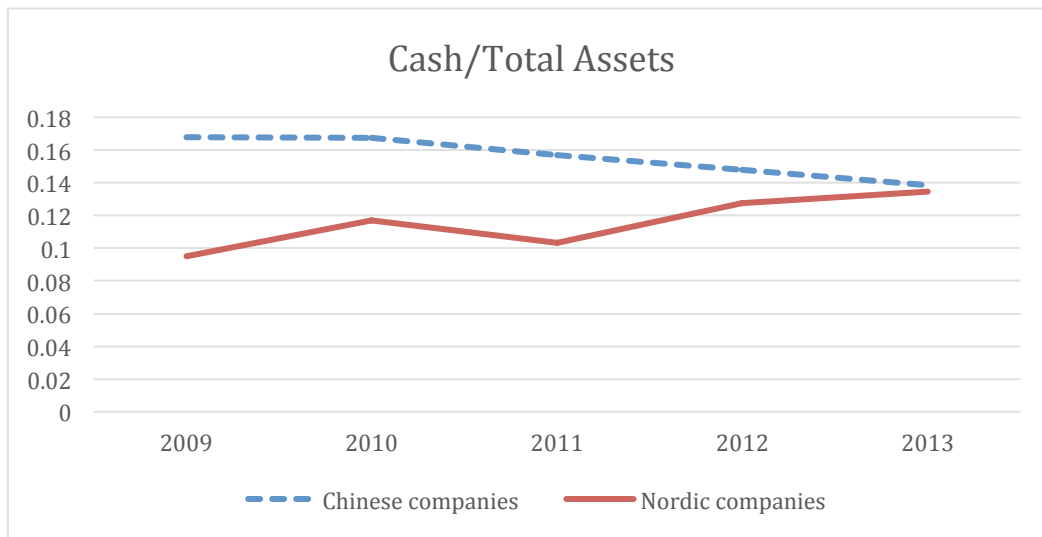
Graph 1. Average Cash Holdings Ratio. This graph presents average cash holdings ratios for two markets from 2009-2013.

From Graph 1, it can be seen that Chinese listed firms have higher cash holdings level than that of Nordic listed firms during the window of estimation. However, it is interesting that, cash holdings ratio of firms in China is decreasing during the period although the cash holdings ratio of Chinese companies is still higher than that of Nordic companies. Nordic firms' cash holdings have large fluctuation but in general they form a rising trend during the period and the cash holdings level is very close to that of Chinese listed firms in 2013. To figure out why these companies have this trend, graphs about the mean value of capital expenditure ratio and investment opportunity from 2009 to 2013 were presented. They can partially explain the improvement and deterioration in investment opportunities for Nordic and Chinese listed firms.
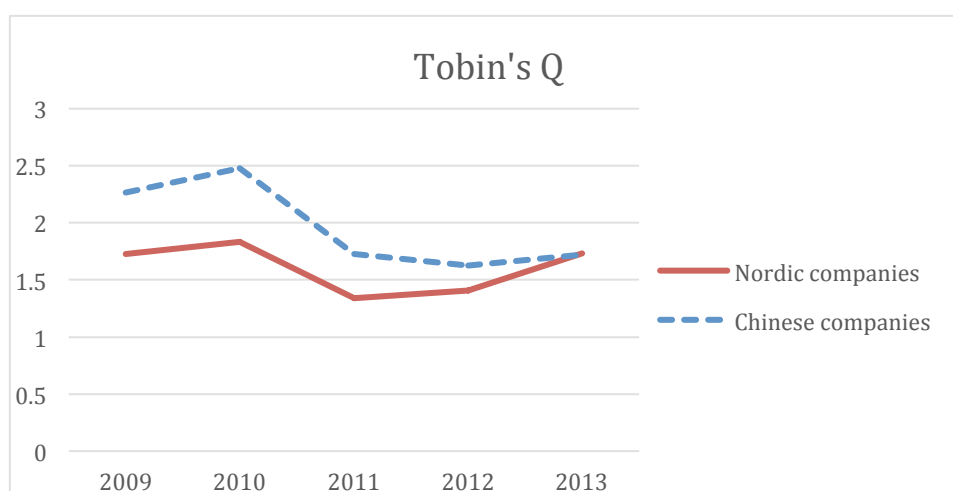
Graph 2. Average Investment Opportunities. This graph represents average investment opportunities for years 2009-2013 for each of the markets.

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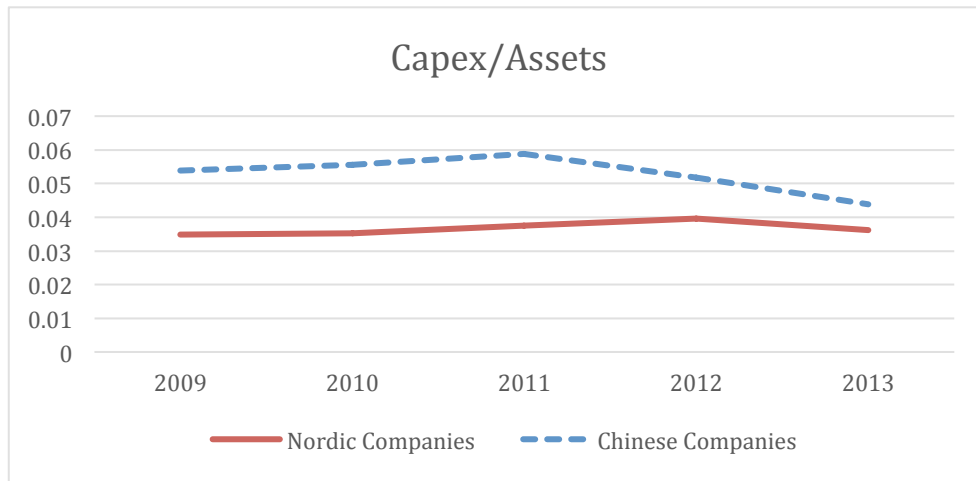
Graph 3. Average Capital Expenditure Ratio. This graph represents Capital Expenditure for years 2009-2013 for each of the markets.

As this paper mentions in the part of variables choice, investment opportunities reflect the expected investment opportunities and capital expenditure ratio shows the actual level of investments. Both of them would have positive correlation with cash holdings ratio. From Graph 2 and Graph 3, investment opportunities of Nordic companies had an obvious increase since 2011 and their capital expenditure ratio had a slight increase during the five year of estimation window. For Chinese companies, both capital expenditure ratio and investment opportunities suffered a decrease during the whole period. Therefore, the actual results are consistent with our analysis of variables properties. More importantly, these connections can partially explain why the cash holdings level of Nordic companies was increasing while the cash holdings level of Chinese companies was decreasing during the period. Also, Graph 2 and Graph 3 show that investment opportunities for Nordic firms were rising while investment opportunities for Chinese firms were falling from 2009 to 2013.

b. Correlation Tests

In this paper, the selected dependent variables and independent variables were tested to observe the relationship between the independent and the dependent variables, and to test whether there is a correlation between them. Significant and frequent correlations between independent variables would lead to multicollinearity problem yielding high R-squared, standard errors and high sensitivity to changes in the specification (Brooks, 2014). The correlation coefficients between the main variables are shown in Table 3.

According to the results of the correlation test, we found that the selected control variables are related to both Cash(1) and Cash(2). Cash(1) has positive relationship with cash flow ratio,

net working capital ratio, investment opportunities and current liability ratio, while firm size, capital expenditure ratio and leverage ratio have negative relationship with Cash(1). For Cash(2), mentioned variables have identical relationship as with Cash(1). As it is shown in Table 3, Cash(1) and Cash(2) are both significant at 1 % level for all the independent variables.

Considering from the coefficients of the independent variables, the coefficients between variables are relatively low and there are no serious multicollinearity problems. But in order to figure out more specific relationship between dependent variables and independent variables, we need to analyze the regression results first.

Table. 3 Multicollinearity table for Cash(1) and Cash(2) variables

This table represents correlation between variables included in the Cash(1) and Cash(2) specifications. Note: ***; **; * denote significance at 1%, 5% and 10% level. The variables definitions are described in Table 1.

Correlation	CASH(1)	CASH(2)	SIZE	CF	CAPEX	NWC	TOBINQ	DEBTSTR	LEVER	DIVID
CASH(1)	1									
CASH(2)	0.839***	1								
SIZE	-0.231***	-0.205***	1							
CF	0.106***	0.080***	0.059***	1						
CAPEX	-0.116***	-0.099***	0.098***	0.148***	1					
NWC	0.528***	0.476***	-0.258***	-0.064***	-0.232***	1				
TOBINQ	0.333***	0.295***	-0.357***	0.083***	0.028**	0.273***	1			
DEBTSTR	0.089***	0.098***	-0.148***	-0.010	-0.094***	0.067***	0.077***	1		
LEVER	-0.359***	-0.292***	0.432***	-0.13***	-0.007	-0.532***	-0.35***	-0.117***	1	
DIVID	0.069***	0.078***	0.241***	0.176***	0.018	0.128***	-0.049***	-0.022	-0.078***	1

c. Empirical Analysis

Table 4 lists the regression results of the models. Among them, Column (1) puts Cash(1) as the dependent variable and Column (2) puts Cash(2) as the dependent variable. The regressions were run with White diagonal standard errors & covariance (degrees of freedom corrected), in order to correct standard errors, with time effects and group industry effects, where for latter we dropped one dummy in order to avoid dummy variable trap.

Table 4. Regression Results for Cash(1) and Cash(2) Specifications

Note: ***,**,* denote significance at 1%, 5% and 10% level. The variables definitions are described in Table 1. Adjusted-R-squared and F-statistic are included in the table.

Variables	Cash(1)		Cash(2)	
	Coefficient	t-Statistic	Coefficient	t-Statistic
C	0.125***	3.898753	-2.181***	-7.835458
SIZE	-0.003**	-2.384113	-0.039***	-3.476135
CF	0.150***	4.078086	0.888***	5.021048
CAPEX	-0.035	-1.43785	-0.094	-0.404233
NWC	0.236***	27.47071	1.669***	26.36535
TOBINQ	0.015***	9.494419	0.110***	10.57414
DEBTSTR	0.008	0.959705	0.080	1.081395
LEVER	-0.010	-1.121783	0.168*	1.892794
DIVID	0.003	1.074271	0.062**	2.453888
Industry fixed	Yes		Yes	
Period fixed	Yes		Yes	
Adjusted R-squared	0.344		0.279	
F-statistic	133.262		98.762	
Observations:	5034		5034	

From the Table 4, most of the independent variables show strong significant relationship with the dependent variables, and the coefficients of independent variables of regression (1) and regression (2) are basically consistent with theoretical relationship regarding impact on cash holdings.

The size of firms is negatively correlated with the Cash(1) and Cash(2). This connection reflects that bigger firms could have lower cash holdings level due to economy of scale effect during operating activities, which corresponds to our opinion in factors analysis. Dividends distribution would increase firms' cash holdings level. This is different from the empirical test of Opler (1999) and Dittmar (2003), but it proves the correctness of the theory of demand of money, that is, in most of the cases, cash dividends of firms require to have a certain amount

of own capital as a support fund. Capital expenditure has a slight correlation to cash holdings, which is not consistent with the ideas of Keynes (1936) and Opler (1999). This problem could be correlated to the worldwide economic crisis during that time period, which leads to the decrease of current investment opportunities and thus yielded in low level of capital expenditure in both markets as shown in Graph 3. Meanwhile, investment opportunities ratio has a positive connection with cash holdings, which corresponds to the theory of demand of money, which means expected investment opportunities were rising and gradually recovered to common level after 2011 as shown in Graph 2. Net working capital ratio is positively correlated with cash holdings level. Although it is not consistent with static tradeoff theory, this paper uses the difference of current assets and current liabilities to measure working capital. When the company's working capital is higher, cash holdings, as part of current assets, is also likely to be at a relatively high level. Current liability ratio is positively related to cash holdings level, which is consistent with the theory of demand of money. This is because firms with higher percentage of short-debt tend to hold more cash and cash equivalents to resist financial distress.

4.5   Confirmation of Excess Cash Holdings

By comparing the results of the two regressions Cash(1) and Cash(2), the adjusted R^2 for Cash(1) model is 0.344 and the adjusted R^2 for Cash(2) is 0.279, which makes specification Cash(1) having higher explanatory power, but in order to choose between them it is important to check for residuals. As it can be seen from the Graphs 5 and 6, the residuals from Cash(1) specification show smoother behavior around the mean, thus Cash(1) was chosen as the final model. The main purpose of this chapter is to describe firms' cash holdings level better in order to calculate the excess cash holdings, then this paper selects regression (1) with higher degree of fitting to continue with our study. In regression (1), we select the appropriate variables from the aspects of trading, investment and financial risk indicators to regress firms' cash holdings and thus the residuals calculated by this regression are not dependent on the independent variables in the regression. Therefore, the excess cash holdings are the rest of cash we get after deducting the demand of trading, investment and risk. That is to say, it is the cash that can be relatively free to control and use for companies, which is consistent with the concept of excess cash holdings we defined earlier in the beginning of this chapter.

Table 5 shows the excess cash holdings level of the full sample, listed corporations in Chinese and Nordic stock markets.

Table 5. Excess Cash Holdings across Markets

This table represents mean, median and other statistical parameters for Excess cash holdings generated from Cash(1) specification for each of the markets.

	Mean	Median	Max	Min.	Std. Dev.	Obs.
Total sample	-1.13E-17	-0.01131	0.852562	-0.41371	0.093342	5034
Nordic Companies	-0.05067	-0.06927	0.852562	-0.41371	0.109282	674
Chinese Companies	0.007833	-0.00433	0.524447	-0.24963	0.088078	4360

From Table 5 and Graph 4, the mean value of Nordic listed firms' excess cash holdings is negative, and the mean value of Chinese A-share listed companies' excess cash holdings is positive, which reflects that Nordic listed companies hold less excess cash compared to China A-share listed companies.
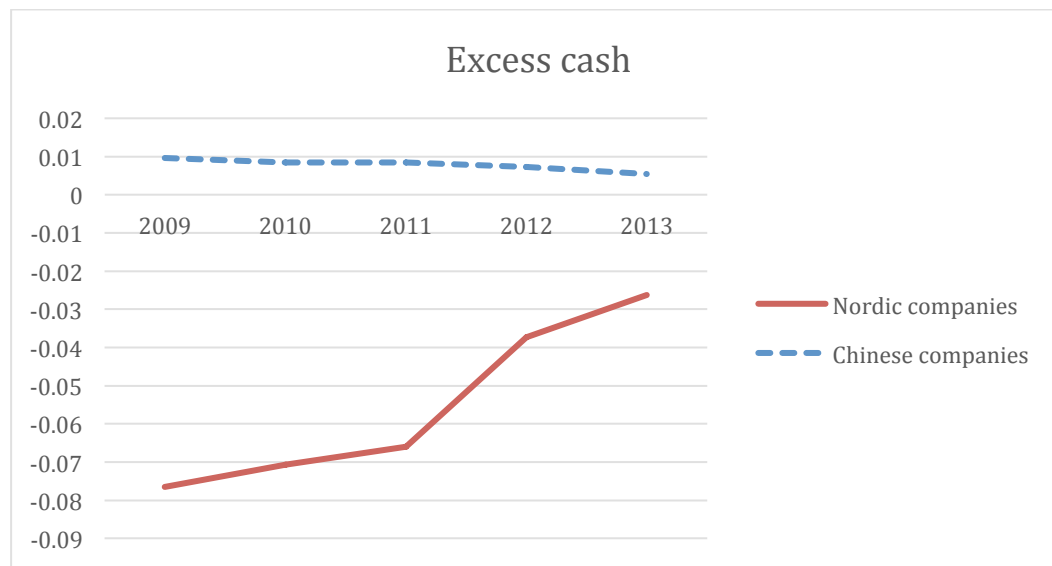
Graph 4. Average Excess Cash Holdings. This graph represents yearly dynamics of mean values of Excess cash holdings generated from Cash(1) specification for each of the markets.

The behavior of holding excess cash by management, in order to meet self-interests, is limited because of the stricter governance in Nordic stock market. More importantly, it is consistent with our findings that the cash holdings level of Chinese firms is higher than that of Nordic firms. In addition, the higher mean value of excess cash holdings for Chinese firms proves that listed firms in Chinese stock market hold more excess cash due to more serious agency problem.

4.6 Summary of Chapter

This chapter uses the data of Chinese A-share and Nordic listed companies from 2009 to 2013 as a data sample and refers to the factors influencing cash holdings model (Opler 1999)

and makes some adjustments based on our data sample. This chapter empirically tests the factors influencing cash holdings and derives the excess cash holdings we need. First, consistent to the analysis of cash holdings theory and current research, this chapter defines the concept of excess cash holdings. According to the existing cash holdings theory and relative literature research, we choose eight factors as research variables from trading, investment and financial risk demand. Then, this paper introduces the selection criteria about the samples and models and confirms our research object and research methods. Through regression analysis, this paper shows the significance of selected variables on the impact of cash holdings and thus we decide to use regression (1) to estimate excess cash holdings. Among the independent variables, firm size, capital expenditure and leverage ratio were negatively correlated with cash holdings while the rest of the variables, including cash flow, net working capital ratio, current liability ratio and investment opportunities were positively correlated. Finally, this chapter considers the residuals of the regression as firms' excess cash holdings and lists the descriptive statistics of excess cash holdings to proceed to the next chapter.

5   Empirical Study for Effect of Excess Cash on Enterprise Value

On the basis of the excess cash holdings calculation, this chapter further studies the impact of Chinese and Nordic firms' excess cash holdings on enterprise value. In this chapter, the main issues: (1) For listed corporations, how would excess cash holdings affect enterprise value? (2) Comparing Chinese and Nordic listed firms, what is difference between them?

5.1   Theory Analysis

As mentioned in the hypothesis, the widespread presence of agency problems is the main reason for increasing cash holdings level because management wants to keep excessive cash holdings to reduce risk and maximize self-interests. However, positive excessive cash normally implies that a company has irrational capital allocation, lower profitability and serious agency problems. Also, unreasonable use of excess cash like overinvestment may decrease enterprise value. Therefore, we reach to our hypothesis that companies' excess cash have negative impact on enterprise value.

Further, the data of Nordic firms comes from NASDAQ OMX Nordic, which is a branch of NASDAQ. The firms in NASDAQ OMX Nordic trade in the same platform and are mainly regulated by EU. Due to the stricter legal regulation and information environment of NASDAQ OMX Nordic, listed companies are subject to stricter regulatory law and disclosure requirements than that of listed corporations in Chinese A-share market. Thus, agency problems and the self-serving problem of management are relatively alleviated in Nordic market. In addition, because NASDAQ OMX Nordic has mature organized structure and builds the unified platform for trading and better investor protection, investors have a higher valuation of excess cash because they are more likely to believe that the company's market value is more precise and management can use this cash efficiently. Therefore, the second hypothesis is that compared to the Chinese A-share market listed corporations' excess cash holdings, the impact of excess cash holdings on enterprise value is less negative for Nordic listed corporations.

Finally, it is necessary to show that the excess cash holdings used in the enterprise value model below actually represent the market value of excess cash, that is, the marginal value of excess cash. Regarding to the market value of excess cash, it can be explained that if a

company adds cash with 1 dollar of book value, the increased enterprise value that is produced from the added cash is the market value of cash. If the market value produced from 1 dollar of book value is less than 1 dollar, it means that the cash with 1 dollar of book value is not worth that much for firms. In this case, it shows that excess cash holdings have negative effect on enterprise value. In our model, if the coefficient of excess cash is smaller than 1, it means excess cash has negative effect on the market value of firms. The smaller the coefficient is, the bigger the negative impact is. For example, if the coefficient of Nordic excess cash holdings is 0.4 and the coefficient of Chinese excess cash holdings is 0.2, it means both of them have negative effect on enterprise value but the negative impact of excess cash holdings on enterprise value is less negative for Nordic listed corporations.

5.2   Data and Model Selection

Considering that 2015 annual reports of listed companies have not been fully disclosed, in order to have 5 years window of estimation, we collected data for years 2008-2014, because the data of one year before estimated *t* and one year of lag of *t* are used in analyzing enterprise value regression. Therefore, the window of estimation is 2009-2013. The samples are selected according to same principles that are mentioned in data selection of Chapter 4. After resizing and combining the Chinese and Nordic samples, the total number of companies approaches to 989 with 872 Chinese and 117 Nordic companies, and the observations number reaches to 4764 for the 5 years window of estimation. The statistical software used in this paper is EVIEWS 8.0 and EXCEL 2013.

This paper refers to the classical enterprise value regression model of Fama and French (1998) model. Pinkowitz (2001) and Dittmar (2007) revised Fama and French (1998) model to estimate the market value of enterprise. In this paper, we also use following revised Fama and French (1998) model to examine the correlation between market value of listed companies and excess cash holdings. Because excess cash might have non-linear relationship with enterprise value, squared term for excess cash is added into regressions.

(2a): Enterprise Value (3)

$$Vt = a_0 + a_1 EC_{i,t} + a_2 EC_{i,t}^2 + a_3 dV_{i,t} + a_4 Agc_{i,t} + a_5 I_{i,t} + a_6 dI_{i,t} + a_7 dI_{i,t+1} + a_8 CF_{i,t} + a_9 dCF_{i,t} + a_{10} dCF_{i,t+1} + a_{11} CAPEX_{i,t} + a_{12} dCAPEX_{i,t} + a_{13} dCAPEX_{i,t+1} + a_{14} dNA_{i,t} + a_{15} dNA_{i,t+1} + a_{16} Divid_{i,t} + Year\ Dummy\ +\ INDdummy + \varepsilon_{i,t}$$

(2b): Enterprise Value (4)

$$Vt = a_0 + a_1 Norddum_{i,t} + a_2 Norddum_{i,t} \times EC_{i,t} + a_3 EC_{i,t} + a_4 EC_{i,t}^2 + a_5 dV_{i,t} + a_6 Agc_{i,t} + a_7 I_{i,t} + a_8 dI_{i,t} + a_9 dI_{i,t+1} + a_{10} CF_{i,t} + a_{11} dCF_{i,t} + a_{12} dCF_{i,t+1} + a_{13} CAPEX_{i,t} + a_{14} dCAPEX_{i,t} + a_{15} dCAPEX_{i,t+1} + a_{16} dNA_{i,t} + a_{17} dNA_{i,t+1} + a_{18} Divid_{i,t} + Year\ Dummy + INDdummy + \varepsilon_{i,t}$$

Equation (2a) only has the variable of excess cash holdings. It is used to test the first hypothesis, **H1**. Equation (2b) adds dummy variable of Nordic listing firms and excess cash holdings multiplied by this dummy. It is used to test the second hypothesis, **H2**.

Table 6. Variables Explanation and Calculation for EV(3) and EV(4)

This table presents definition and methods how the variables were calculated for given specifications. Each variable was transformed into ratio except Size and Divid. Industry dummies represent fixed effects for separate industries and were categorized into 9 Industries.

Variables	Definition	Calculation Method
V_t	Enterprise Value	Enterprise Value/Total Asset
$CF_{i,t}$	Cash Flow Ratio	Cash Flow/Total Asset
$dCF_{i,t}$	Cash Flow Change of Current Period	(The Value of Year T)/Total Asset of Year T - (The Value of Year T-1)/Total Asset of Year T-1
$dCF_{i,t+1}$	Cash Flow Change of Next Period	(The Value of Year T+1)/Total Asset of Year T+1 - (The Value of Year T)/Total Asset of Year T
$dNA_{i,t}$	Net Asset Value Change of Current Period	(The Value of Year T)/Total Asset of Year T - (The Value of Year T-1)/Total Asset of Year T-1
$dNA_{i,t+1}$	Net Asset Value Change of Next period	(The Value of Year T+1)/Total Asset of Year T+1 - (The Value of Year T)/Total Asset of Year T
$I_{i,t}$	Interest Expense Ratio	Interest Expense/Total Asset
$dI_{i,t}$	Interest Expense Change of Current Period	(The Value of Year T)/Total Asset of Year T - (The Value of Year T-1)/Total Asset of Year T-1
$dI_{i,t+1}$	Interest Expense Change of Next Period	(The Value of Year T+1)/Total Asset of Year T+1 - (The Value of Year T)/Total Asset of Year T
$Divid_{i,t}$	Dividend Dummy	Dividend Payout = 1, No Dividend Payout = 0
$Capex_{i,t}$	Capital Expenditure	Capital Expenditure/Total Asset

dCapex$_{i,t}$	Capital Expenditure of Current Period	(The Value of Year T)/Total Asset of Year T - (The Value of Year T-1)/Total Asset of Year T-1
dCapex$_{i,t+1}$	Capital Expenditure of Next Period	(The Value of Year T+1)/Total Asset of Year T+1 - (The Value of Year T)/Total Asset of Year T
dV$_{i,t}$	Market Value Change of Current Period	(The Value of Year T+1)/Total Asset of Year T+1 - (The Value of Year T)/Total Asset of Year T
Nordummy	Dummy variable for Nordic listed Firms	Nordic Firms = 1, Chinese Firms = 0
EC$_{i,t}$	Excess Cash	Actual Cashing Holdings-Optimal Cash Holdings
EC$^2_{i,t}$	Quadratic term for Excess Cash	Excess Cash^2
Agc$_{i,t}$	Agency costs	Administrative costs/Total Asset
Year Dummy	Fixed Effect of Time	
INDdummy	Fixed Effect of Industries	9 Classified Industries
$\varepsilon_{i,t}$	Residuals (excess cash)	

5.3　Empirical Results and Analysis

a. Statistical Descriptive Analysis

Table 7 presents the descriptive statistics for variables in the regression. This paper classifies sample into total sample, Chinese sample and Nordic samples. This paper separately lists three samples' mean and median values.

Table7. Descriptive Statistics for Enterprise Value Regressions
This table presents mean and median values for variables included in EV(3) and EV(4) specifications for total sample and separately for each market. The variables definitions are described in Table 6.

	Total		Chinese		Nordic	
	Mean	Median	Mean	Median	Mean	Median
EV	1.898635	1.535937	1.963592	1.607904	1.602384	1.071795
CF	0.049425	0.051365	0.04949	0.047121	0.049157	0.075201
DCF	-0.00198	-0.00252	-0.00276	-0.00365	0.001333	0.002152
D1CF	-0.00499	-0.00365	-0.00615	-0.00439	-0.00017	0.000212
DNA	0.002288	0.002748	0.003321	0.003982	-0.00431	-0.00064
D1NA	0.005897	0.004053	0.007359	0.006109	-0.00223	-0.00045
I	0.009007	0.007148	0.00919	0.007755	0.008227	0.005628

DI	0.000333	0	0.000321	0	0.000385	3.01E-05
D1I	-0.01602	-0.01178	-0.01961	-0.01696	-0.00041	-0.00022
DIV	0.683791	1	0.702523	1	0.594536	1
CAPEX	0.049686	0.034324	0.052744	0.039815	0.03668	0.018314
DCAPEX	-0.00404	-0.00147	-0.00436	-0.00209	-0.00261	-0.00051
D1CAPEX	-0.00217	-0.00097	-0.00256	-0.00162	-0.00051	4.17E-05
D1EV	-0.03881	-0.02337	-0.04716	-0.03468	-0.00046	0.014651
AGC	0.081806	0.046094	0.046641	0.041391	0.29928	0.229862
EC	-1.13E-17	-0.01131	0.007833	-0.00433	-0.05067	-0.06927
EC^2	0.008711	0.002771	0.007817	0.002389	0.014492	0.006467

The mean of enterprise value in Chinese listed firms is bigger than that of Nordic listed firms. This is because Chinese listed firms have more serious agency problems as mentioned in introduction and hypothesis parts, so their market values could be more overvalued compared to Nordic companies. From the table above, it can be seen that the excess cash holdings level of Nordic listing corporations is lower than that of Chinese listing corporations, which have been shown in Chapter 4.

b. Correlation Tests

The selected variables are tested to observe the relationship between each other and to test if there is a significant correlation between them. Significant and frequent correlations between independent variables would lead to multicollinearity problem yielding high R-squared, standard errors and high sensitivity to changes in the specification (Brooks, 2014). The correlation coefficients between the main variables are shown in Table 8.

According to the results of the correlation test, we can state that there is only one case that the correlation between I and dI is -0.916, which is high and significant. However, the given variables do not need to be excluded because they have been already transformed to differenced ratios and overall the model is adequate. As shown in table 8, the coefficient for enterprise value is significant for most of the variables except excess cash, capital expenditure, dNa and dCf. The insignificance of the coefficient of excess cash variable can be partially explained by the existence of non-linear relationship with enterprise value, which supports inclusion of quadratic term for excess cash in the regression specification. Other than that, it can be stated that the coefficients between variables are relatively low and there are no frequent and serious multicollinearity problems. Nevertheless, in order to figure out more specific relationship between dependent variables and independent variables, we need to analyze the regression results.

Table 8. Multicollinearity Table for EV(3) and EV(4) variables

This table represents correlation between variables included in the EV(3) and EV(4) specifications. Note: ***; **; * denote significance at 1%, 5% and 10% level. The variables definitions are described in Table 6.

	EV	CF	DCF	D1CF	DNA	D1NA	INTEXP	DINTEXP	D1INTEXP	DIVID	CAPEX	DCAPEX	D1CAPEX	D1EV	AGC	EXCCASH	EXCCASH^2
EV	1																
CF	0.116***	1															
DCF	-0.008	0.482***	1														
D1CF	-0.045***	-0.483***	-0.419***	1													
DNA	-0.019	-0.186***	-0.24***	0.194***	1												
D1NA	-0.025*	0.048***	-0.021	-0.229***	-0.212***	1											
INTEXP	-0.26***	-0.05***	0.077***	0.070***	0.000	-0.066***	1										
DINTEXP	-0.026	-0.093***	0.044***	0.075***	0.070***	-0.030*	0.296***	1									
D1INTEXP	0.245***	0.123***	-0.037***	-0.076***	0.048***	-0.916***	-0.263***		1								
DIVID	-0.038***	0.168***	0.018	-0.050***	-0.035***	0.048***	-0.151***	-0.04***	0.163***	1							
CAPEX	0.018	0.151***	-0.034**	-0.013	0.154***	0.017	0.048***	0.029**	-0.100***	0.019	1						
DCAPEX	0.041***	0.021	0.01	-0.037**	0.121***	0.024*	-0.071***	-0.059***	0.076***	0.006	0.365***	1					
D1CAPEX	0.072***	0.016	0.009	0.014	-0.166***	0.153***	-0.05***	-0.048***	0.082***	-0.001	-0.443***	-0.218***	1				
D1EV	-0.298***	-0.036*	0.019	0.081***	-0.038***	0.03*	0.006	-0.085***	0.00	0.00	-0.073***	-0.069***	-0.007	1			
AGC	0.082***	-0.119***	-0.024*	0.042***	-0.047***	-0.086***	-0.138***	-0.009	0.229***	-0.059***	-0.053***	0.019	0.012	0.054***	1		
EXCCASH	-0.015	0.016	-0.059***	-0.089***	-0.294***	0.314***	-0.166***	-0.030*	0.128***	0.011	-0.002	-0.004	0.056***	0.059***	-0.027*	1	
EXCCASH^2	0.126***	-0.101***	-0.045***	-0.025	-0.205***	0.111***	-0.259***	-0.00	0.255***	0.0000	-0.093***	0.01	0.051***	0.028**	0.240***	0.530***	1

c. Stationarity Tests

In order to avoid spurious regressions, unit root tests were performed to check for stationarity of these variables. Levin, Lin & Chu test's null hypothesis suggests presence of a common unit root and the remaining tests' null hypotheses suggest presence of individual unit root. Dickey-Fuller's test allows for an intercept, intercept and trend or none, and is also known as τ-test (Brooks, 2014). Tests were performed on levels of series, using individual intercept with automatic selection of lag length based on Schwarz Info Criterion and using New-West automatic bandwidth selection and Bartlett kernel. Results support strong rejection of unit root presence confirming that the series are stationary even at levels, given that the test statistics exceed critical values at the 1% level.

Results from stationarity test indicate that regression results are statistically significant and this implies that shocks to the series gradually die away and the possibility of spurious regressions would not be caused by non-stationarity problem.

All variables are calculated as ratios and their differences except Size and Divid. As we can see from results we can reject null hypothesis that there is unit root, thus all variables are stationary on levels.

Table 9. Stationarity Test-Levels: Cash(1) and Cash(2) Variables

This table represents unit root tests methods employed by Levin, Lin & Chu t*, Im, Pesaran and Shin W-stat, ADF - Fisher Chi-square and PP- Fisher Chi-square. P-values represent: *0 < 0.01* = rejection of null at 1%, *0.01~0.05* = rejection of null at 5 % and 0.05~0.1= rejection of null at 10%. Note: ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Stationary test:		Null: Unit root (assumes individual unit root process)			
	Method	Levin, Lin & Chu t*	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
CASH(1)	Statistic	-2013.41	-74.5896	2809.23	3499.69
	Prob.**	0	0	0	0
CASH(2)	Statistic	-4386.12	-138.801	2497.27	3047.84
	Prob.**	0	0	0	0
CF	Statistic	-88.2303	-27.6023	3609.14	4430.19
	Prob.**	0	0	0	0
DEBTSTR	Statistic	-964.024	-43.9504	2935.64	3567.02
	Prob.**	0	0	0	0
DIVID	Statistic	-18.4565	-2.33806	443.192	400.866
	Prob.**	0	0.0097	0.857	0.9386
LEVERAGE	Statistic	-90.3071	-14.8577	2748.26	3531.48
	Prob.**	0	0	0	0
CAPEX	Statistic	-180.595	-32.9947	3304.3	4012.84
	Prob.**	0	0	0	0
NWC	Statistic	-69.0178	-16.2813	2804.3	3573.95
	Prob.**	0	0	0	0
SIZE	Statistic	-67.0619	-15.6562	2972.43	4226.53

	Prob.**	0	0	0	0
TOBINQ	Statistic	-98.9121	-17.8934	2795.96	3737.63
	Prob.**	0	0	0	0

Table 10. Stationarity Test-Levels: Enterprise Value Variables
This table represents unit root tests methods employed by Levin, Lin & Chu t*, Im, Pesaran and Shin W-stat, ADF - Fisher Chi-square and PP- Fisher Chi-square. P-values represent: *0 < 0.01* = rejection of null at 1%, *0.01~0.05* = rejection of null at 5 % and 0.05~0.1= rejection of null at 10%. Note: ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Stationarity test		Null: Unit root (assumes individual unit root process)			
	Method	Levin, Lin & Chu t*	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
EV	Statistic	-98.9121	-17.8934	2795.96	3737.63
	Prob.**	0	0	0	0
CF	Statistic	-88.2303	-27.6023	3609.14	4430.19
	Prob.**	0	0	0	0
DCF	Statistic	-238.912	-58.0668	5003.34	5881.27
	Prob.**	0	0	0	0
D1CF	Statistic	-209.892	-48.7252	4866.94	6014.01
	Prob.**	0	0	0	0
DNA	Statistic	-686.648	-85.9728	4000.39	4759.5
	Prob.**	0	0	0	0
D1NA	Statistic	-773.856	-61.8654	4174.24	4941.68
	Prob.**	0	0	0	0
I	Statistic	-106.621	-32.8848	3748.08	4952.4
	Prob.**	0	0	0	0
DI	Statistic	-239.479	-58.5328	4647.53	5369.39
	Prob.**	0	0	0	0
D1I	Statistic	-88.2866	-22.9559	3302.63	4348.94
	Prob.**	0	0	0	0
DIVID	Statistic	-18.4565	-2.33806	443.192	400.866
	Prob.**	0	0.0097	0.857	0.9386
CAPEX	Statistic	-180.595	-32.9947	3304.3	4012.84
	Prob.**	0	0	0	0
DCAPEX	Statistic	-367.699	-60.9218	4455.36	5243.88
	Prob.**	0	0	0	0
D1CAPEX	Statistic	-178.196	-48.2785	4531.9	5422.53
	Prob.**	0	0	0	0
D1EV	Statistic	-80.66	-22.5923	3187.49	3656.85
	Prob.**	0	0	0	0
AGC	Statistic	-60.6225	-16.4094	2657.14	3291.79
	Prob.**	0	0	0	0
EC	Statistic	-99.2795	-21.2135	2636.81	3215.88
	Prob.**	0	0	0	0
EC^2	Statistic	-167.042	-33.7051	3191.76	3767.19
	Prob.**	0	0	0	0

d. Empirical Analysis

The regressions were run with White diagonal standard errors & covariance (degrees of freedom corrected) in order to correct standard errors, with time effects and group industry effects, where for latter we dropped one dummy in order to avoid dummy variable trap.

The regression results are shown in Table 9. The column (3) is the regression results of the model (2a), column (4) is the regression results of the model (2b). From the data in the table, the adjusted R^2 values of regression (3) and (4) are 0.273 and 0.342, which are greater than 0.2. It shows that the fit of two regressions is good. At the same time, the value of the F-statistic is higher, so we can reject the null hypothesis that the coefficient of each regression is zero at the same time. The constant variables of these two regressions were both significant at 1% level, which are 2.234 and 2.301 respectively. In addition, the majority of variables also show a strong significant, so the results of the two regression are relatively reliable.

Table 11. Regression Results for EV(3) and EV(4)

Note: ***,**,* denote significance at 1%, 5% and 10% level. The variables definitions are described in Table 6. Adjusted-R-squared and F-statistic are included in the table.

Variable	(3) Coefficient	(3) t-Statistic	(4) Coefficient	(4) t-Statistic
C	2.234***	26.91681	2.301***	27.19448
NORDDUM			-1.646***	-12.0092
EC*NORDDUM			2.238*	1.715207
EC	-1.50***	-4.25203	-2.681***	-6.1779
EC^2	7.666***	3.74359	7.664***	2.790341
D1EV	-0.406***	-4.98887	-0.407***	-5.05122
AGC	-0.172	-0.51953	2.014***	4.457825
I	-31.75***	-4.97016	6.548	0.928152
DI	10.49***	3.533502	10.379***	3.689145
D1I	-3.802	-1.22895	17.223***	4.980175
CF	2.258***	4.069969	3.083***	5.210611
DCF	-0.606	-1.46506	-0.990**	-2.2465
D1CF	0.812**	2.432024	1.059***	2.896078
CAPEX	-0.056	-0.15254	-0.396	-1.12407
DCAPEX	0.802**	2.537148	0.794***	2.645459
D1CAPEX	1.349***	2.696408	0.860*	1.766851
DNA	-0.228	-0.57056	-0.176	-0.39881
D1NA	-0.125	-0.36273	0.423	1.212916
DIVID	-0.192***	-5.35591	-0.200***	-5.81055
Industry fixed	Yes		Yes	
Period fixed	Yes		Yes	
Adjusted R-	0.273616		0.341997	

squared		
F-statistic	65.07648	83.51878
Observations:	4764	4764

According to regression (3), the coefficient of excess cash holdings is -1.5, and is significant at 1% level, which indicates that the excess cash holdings have a negative impact on enterprise value. The result is consistent with hypothesis *H1*.

The inclusion of Exccash * Norddum is motivated in a sense that, this paper defines the impact of Chinese listed firms' excess cash holdings on enterprise value as a_3 and the impact of Nordic listed firms' excess cash holdings on enterprise value as $(a_2 + a_3)$. According to the regression results of the column (4), the impact of Chinese listed firms' excess cash holdings on enterprise value is -2.681, which is significant at the 1% level. Then for the Nordic listed companies, the effect of excess cash holdings on firm value is $(a_2 + a_3) = -0.443$ and shows a strong statistical significance. Although this effect is still negative, but compared to the Chinese listed companies, Nordic listed companies' excess cash holdings have smaller damage to enterprise value, indicating that the results are consistent with the previous analysis. Therefore, hypothesis *H2* is verified.

Although, we have confirmed that empirical results correspond to both hypotheses, it can be seen that coefficient for quadratic term of excess cash holdings is significant, which means that there is possible non-linear relationship. This might imply that our results and hypotheses are consistent with only the given data and estimation time period.

5.4   Summary of Chapter

This chapter refers to the classical enterprise value regression model of Fama and French (1998) and the revised model of Dittmar (2007) to estimate the relationship between the market value of enterprise and excess cash holdings for Nordic and Chinese listed firms from 2009 to 2013. Basically, this chapter mainly obtains two aspects of conclusions. First, companies' excess cash holdings have negative impact on enterprise value, both for Nordic and Chinese listed companies. Second, compared to the Chinese A-share market listed corporations' excess cash holdings, the impact of excess cash holdings on enterprise value is less negative for Nordic listed corporations. The following part is the research steps. First, through theory analysis, this paper states two hypotheses again and explains the definition of market value of excess cash. Second, the unit root tests results indicate that the series are

stationary and thus results of all the models are statistically significant since they do not allow for spurious regressions problems. Finally, we use the data of excess cash holdings calculated in Chapter 4 and two-stage regression methods to test the two hypotheses. Regression (3) tests the relationship between excess cash and enterprise value. Regression (4) adds dummy variable of Nordic listed firms and excess cash holdings multiplied by this dummy to test whether Nordic listed firms' excess cash holdings have smaller negative effect on enterprise value.

6   Conclusions

This paper uses the data from Chinese and Nordic listed corporations during the time period of 2008-2014. This paper analyzes the relationship between excess cash holdings and enterprise value through theoretical analysis and empirical test. Firstly, this paper defines the concept of excess cash holdings; then, according to the concept of excess cash holdings, the variables are selected from three aspects: trading variables, investment variables and financial risk variables. Then we do the regression for firms' optimal cash holdings level on the basis of Opler (1999) model and define the residuals as excess cash holdings; finally, on the basis of theoretical analysis, we refer to the classic corporate value regression of Fama and French (1998) model and the modified model of Dittmar (2007), and thus empirically examine the relationship between excess cash holdings and enterprise value of Chinese and Nordic listed firms. The specific conclusions of this paper are as follows:

(1) For listed corporations, when firms' positive excess cash holdings level is higher, enterprise value is lower. There is a significant negative correlation between the two. Excess cash holdings are the remaining part of cash after deduction of the cash demand of trading, investment and financial risk. Consequently, due to the low return of cash, the nature of excess cash is a kind of unreasonable allocation of assets. At the same time, excess cash holdings are often associated with serious information asymmetry and agency problems, which will lead to companies with excess cash sparing cash for low efficiency investments or self-interest problems of management. This will be a kind of damage to the value of the enterprise. Therefore, higher excess cash holdings lead to lower enterprise value.

(2) Compared to Chinese listed corporations' excess cash holdings, Nordic listed firms' excess cash holdings have less negative effect on enterprise value. According to the point of view of Conclusion (1), excess cash holdings of listed corporations are closely related with agency problems. Nordic listed corporations are subject to stricter information disclosure requirements and market supervision, thus agency problems are alleviated and management's discretion for self-interest is restricted. Therefore, the efficiency of funds has improvement to some extent. At the same time, due to the good information and investor protection environment of Nordic market, investors have a higher valuation of excess cash because they are more likely to believe that the company's market value is more precise and management can use this cash efficiently. Therefore, the negative effect of excess cash holdings on

enterprise value should be smaller for Nordic firms. Excess cash holdings represent unreasonable allocation of an asset and the increase of low yielding assets will reduce the company's overall profitability and bring harm to enterprise value.

This paper proves that excess cash holdings have negative effect on enterprise value both in Chinese and Nordic markets, which provides valuable materials for further studying of developing and developed stock markets. It also gives a strong explanation to the phenomenon that some companies have plenty of excess cash holdings, but their market value is not satisfactory. For investors, the value damage of excess cash holdings can provide a reference for investing, which helps investors to think and screen stocks from the perspective of cash holdings and thereby avoiding investment risks. For management, it is also a warning because management should reduce unreasonable usage of cash and improve capital efficiency, so as to avoid negative impact on enterprise value. Meanwhile, due to the stricter management constraints for Nordic listed companies, the firms' information environment is improved and the agency problems are more effectively controlled and the level of investor protection is improved. Therefore, the destruction of enterprise value brought by excess cash holdings is weaker compared to A-share market in China. It indirectly reflects the weak supervision level in A-share market and the necessity and urgency of strengthening the governance of Chinese securities market.

However, empirical results also show that there is high significance for quadratic term of excess cash, which means that there might be non-linear relationship between excess cash holdings and enterprise value. Therefore, our results are valid only for given estimation period and dataset and might not be valid for different time periods or data sample. This might be the reason, why the scholars cannot come to unified opinion on the impact of excess cash holdings on enterprise value, which is discussed in literature review.

6.1   Limitations and Further Research

This paper presents results consistent with theoretical background presented in previous chapters, which are statistically significant. However, following limitations are present:

(1) Negative excess cash means that the company has less cash than optimal cash level according to our model specification. Yet using only positive excess cash values creates

missing data for observations with negative values, which makes results statistically insignificant.

(2) There is no more than one variable with significant multicollinearity in our data sample. Nevertheless, there can be more frequent and significant multicollinearity among variables for other datasets. We referenced different cash holdings models, but we could not include all of the variables due to data loss.

For further research in this area, this paper can have following improvements:

(1) If the data is abundant and does not produce statistically insignificant results, it might be better to use sample consisting of only positive excess cash values in the regression. Comparing the total sample with the sample consisting of only positive values of excess cash holdings could better examine difference of impact of excess cash holdings.

(2) Use different time horizon and more markets data in order to increase the number of observations and to reduce the data loss problem. This could help to account for non-linear relationship between excess cash holdings and enterprise value. In addition, it can be better to compare different time periods such as before and after worldwide crisis event, which could make results more applicable for general conclusion.

(3) Improve model by introducing variables that account for macroeconomic effects, as well as introduce differenced variables for Cash (1) and Cash (2) in order to better account for optimal excess cash holdings.

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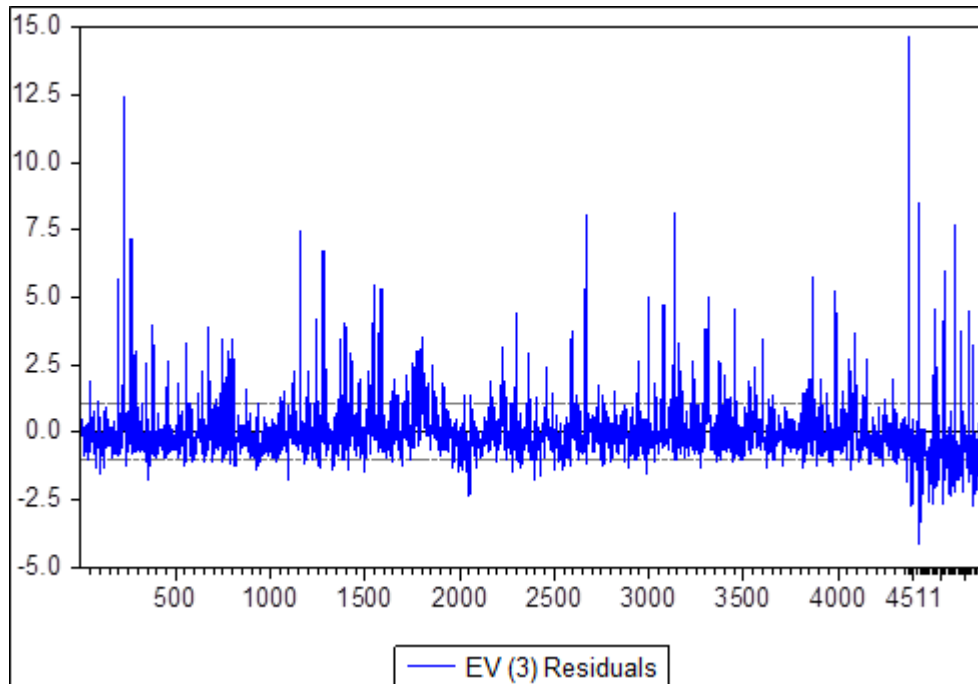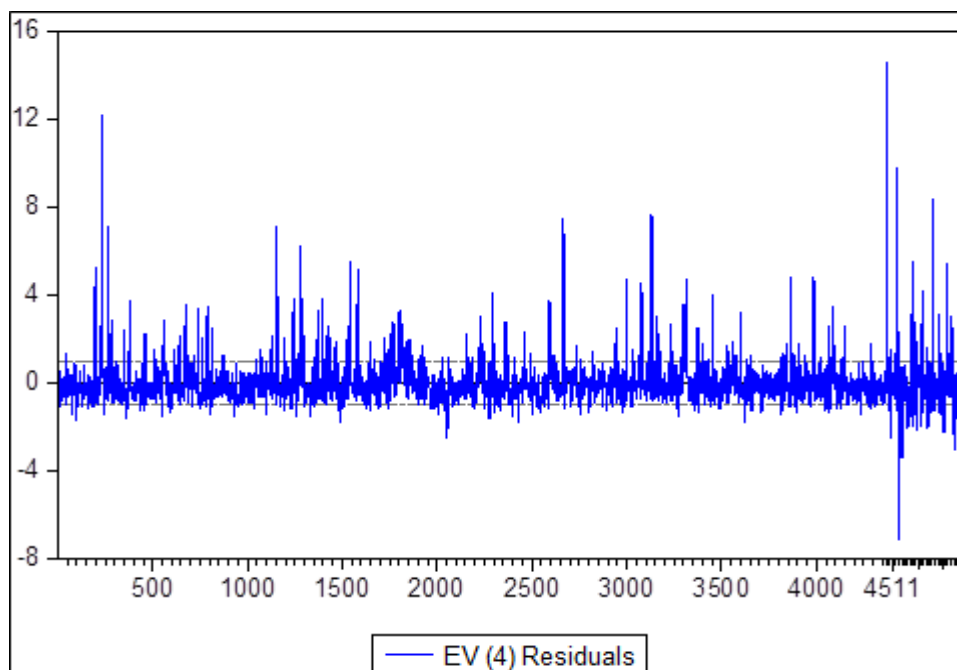
Appendix List
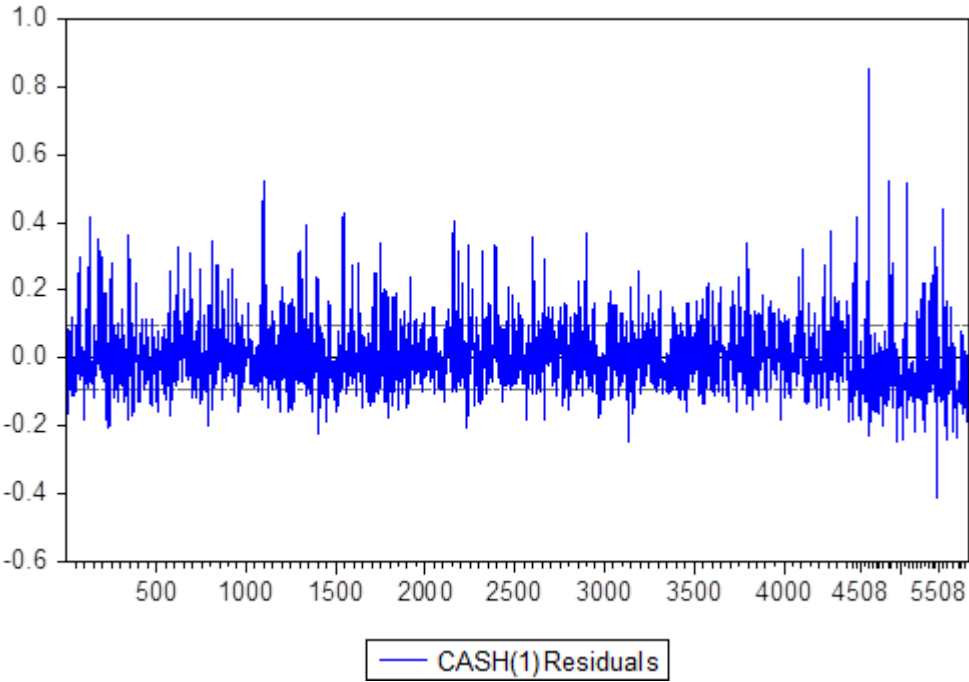
Appendix A: Graph 5. Cash(1) Residuals. This graph represents residuals for given specification for both markets. It can be seen that the residuals are heterogeneous and have smooth behavior around the mean.
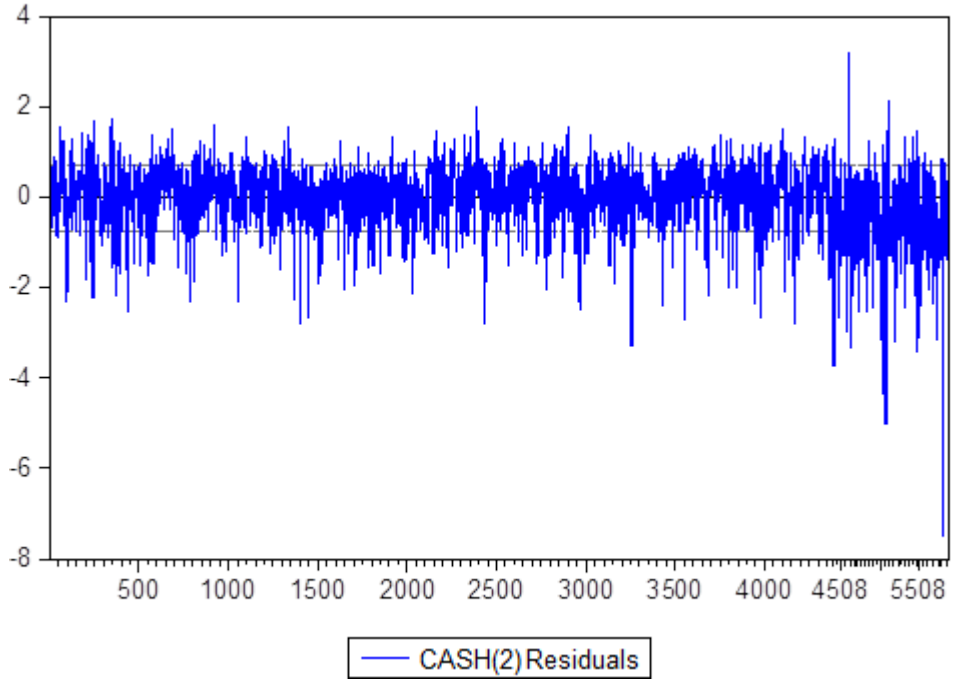
Appendix B: Graph 6. Cash(2) Residuals. This graph represents residuals for given specification for both markets. It can be seen that the residuals are heterogeneous and variation around the mean is high, which is not appropriate proxy for excess cash holdings.

Appendix C: Graph 7. EV (3) Residuals. This graph represents residuals for given specification for both markets. It can be seen that residuals are heterogeneous.

Appendix D: Graph 8. EV (4) Residuals. This graph represents residuals for given specification for both markets. It can be seen that the residuals are heterogeneous.