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UNIVERSITY OF NOTTINGHAM

# The Increase Cash Holding of UK Public firms

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by

LIYAN WANG

Msc Finance and Investment

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## 1.Introduction

Bates(2009) state that the average cash to assets ratio for U.S. industrial firms more than doubles from 1980 to 2006. They investigate U.S firms from 1980 to 2006 find that the average cash- to- assets ratio has increased by 0.46% per year. In the last twenty years, lots of studies and researches have been conducted to find what makes firms hold more cash than they used to be. For example, Ozkan and Ozekan (2003) investigate the empirical determinants of corporate cash holdings for a sample of UK firms, which focus on managerial ownership among other corporate governance characteristics. Kusnadi(2003) investigates publicly listed companies in Singapore, which concentrated on analyzing corporate governance and corporate cash holdings by using firm-specific data from Singapore. Saddour (2006) investigate French firms from 1998 to 2002, find that growth companies hold higher levels of cash than mature companies. They also find that both trade-off and pecking order theories play an important role in explaining the determinants of cash holdings of growth and mature French firms.

First, the transaction motive suggests that companies hold cash to avoid the transaction costs of selling assets and raising funds from external finance. The precautionary motive states that companies hold cash as buffer against possible adverse shocks in the future, or get benefit from good investment opportunities in the futures. The tax motives for companies to hold cash is that the tax incentive that multinational firms face. The agency motive suggests that the existence of asymmetric information and conflicting interests between investors and managers result in companies to hold cash. Lastly, based on the pecking order theory, companies prefer to use internal finance than external finance.

The literature generally uses three main theories to explain cash holdings which are trade- off theory, pecking order theory and agency theory. The trade-off theory

which suggests that the optimal amount of cash that company hold is a trade-off between the benefits and costs of cash; the pecking order theory claims that there is a financing hierarchy exists in company, which means companies prefer to use internal finance over external finance. Moreover, companies prefer choose debt over equity when using external financing. The agency theory describes the in a managerial entrenchment company, entrenched managers choose to hold more cash rather than pay it out to shareholders when lack of investment opportunities.

In the first part of this paper, it is going to review the theoretical background of underlying cash holdings theories, motives and determinants. The second part is going to construct seven variables and hypothesis based on the theories and motive discussed in part one. Third, due to most of the past studies and research are based on U.S. capital market however this paper is going to focus on UK public companies. Therefore, I will talk about difference of corporate governance between U.S. and U.K. from three aspects, institutional investors, board structure and role of regulation. The following section is about data description, regression and results. From summarize the data; it can be found that the cash ratio in UK during the last two decades increased as well. And the companies without dividend cash ratio increased much more than those companies with dividend which is consistent with Bates et al(2009)'s conclusion. In regression analysis, I followed the model Bates et al(2009) and Daher(2010) used in their studies. I got some similar results with past studies, as well as some differences. I find that the firm size, capital expenditure, net working capital, leverage ratio are negatively related to cash ratio and cash flow is positively related to cash ratio. This result is in line with past studies. However, I find sales growth rate is irrelevant with cash ratio which is not consistent with Opler et al. and Harris (1999) which argue there is a positive relationship between investment opportunity and cash ratio. Moreover, when considering agency problem, I use Herfindahl Index to proxy of ownership concentration and I find there is no relationship between ownership concentration and cash ratio which is not accordance with Bates et al(2009) but this may caused by smaller sample size as

difficult to get data.

## **2. Theoretical and Empirical Literature Review**

### **2.1 The motives**

In a perfect capital market, the amount of a firm's cash holdings does not affect the wealth of its shareholders. Cash holdings are irrelevant as companies can raise fund at zero cost if they do not have enough cash. However, there are some costs such as transaction costs, taxes, financial distress costs, asymmetric information and agency costs associate with external finance in real market. As a consequences, cash holdings influence shareholders wealth (Soenen,2003).

The literatures have provided four motives for companies to hold cash. This section is going to talk about four motives which are mentioned in literatures. The four motives are transaction motive, precautionary motive, tax motive and agency motive.

#### **The Transaction Motive.**

The earliest explanations supplied by academic study were based on trade-offs motivated by transactions costs. These theories imply that companies hold cash when they incur transaction costs associated with changing a noncash financial asset into cash and uses cash for payment. In other words, companies facing a shortage of internal resources can raise funds, by selling assets, issuing new debt or equity or reducing dividends. However, all these methods will incur transaction cost (Baumol,1952).

#### **The Precautionary Motive.**

Company needs cash to secure future cash needs because of the unpredictability of future cash flow. Opler, Pinkowitz, Stulz, and Williamson (1999) pointed out that

companies will hold more cash if they have riskier cash flows and poor access to capital market.

### **The Tax Motive.**

Foley, Hartzell, Titman, and Twite(2007) find that US companies with repatriating foreign earnings hold more cash due to repatriating foreign earnings generate tax consequences. Foley, Hartzell, Titman and Twite(2007) mentioned in their paper that the US taxes the foreign operations of domestic companies and grants tax credits for foreign income taxes paid abroad. For most US Affiliates, these taxes are equal to the difference between foreign income taxes paid and tax payments that would be due if foreign earnings were taxed at the US rate, and they can be deferred until earnings are repatriated. These tax burdens make foreign operations of domestic firms more willing to hold the retained earnings aboard unless they have attractive investment opportunities. Therefore, companies which operated aboard and have repatriating foreign profits hold higher levels of cash.

### **The Agency Motive**

Jensen(1986) find that entrenched managers would prefer to keep cash than pay dividend to shareholders when the company has poor investment opportunity. Entrenched managers are like to build excess cash balance to realize their own benefit rather than maximize shareholders wealth.

## **2.2 Cash holding theories**

Since Keynes(1936) published those motives for company cash holdings, some more advanced models have been developed. In the next section the affecting factors for cash holdings according to three different models to explain why companies hold cash.



### The Static Trade-off Theory

According to the static trade-off model of firm cash holdings, the amount of cash held by a company is determined by weighting the marginal costs and the marginal benefits of holding liquid assets (Ferreira and Vilela, 2003).

There are several benefits of holding liquid assets. First, the benefit of holding cash is that cash decreases the exposure to financial distress, if there are unexpected losses, cash would act as a buffer. Moreover, holding cash can reduce the transaction costs associate with the external funds or liquidating assets. Third, cash enable a firm to take the optimal investment policy and hence makes a firm to accept positive NPV projects if external financing constrains are met.

On the other hand, there is one cost of holding liquid assets. Ferreira and Vilela(2004) state that the main cost of holding cash is the opportunity cost of the capital invested in liquid assets. Holding cash rather than investing in other project will result in lower return earned on it.

Opler et al., 1999; Ross et al.(2000) state that there is a optimal amount of cash holding exists since selling financial and real assets produces costs. Transaction costs generally include fixed costs and variable costs, depending proportionally on the amount of cash raised. As a result, each company has a optimal amount of liquid assets and cash cannot be regarded as negative debt.

The optimal amount of cash for a company is determined by the marginal cost of a liquid asset shortage and the marginal cost of holding liquid assets. The marginal cost of cash holding is fix as there is no evidence show that the lower return of cash compared to other investments changes as the amount of cash hold changes(Anonym,2010). The more liquid assets a company have, the less frequently it requires to access to capital market.

An increase in the probability of being sell of liquid assets or an increase in the of being short of liquid assets would shift the cost curve to the right, lead to a higher optimal amount of cash holdings(Opler et al.,1999).

Due to the assumptions of static trade-off theory, there are some financial and non-financial variables that influence the optimal amount of liquid assets(Dittmar et al.,2003; Ferreira and Vilela,2002; Opler et al., 1999).

The trade-off theory suggest that company with better investment opportunities are expected to have more cash as the opportunity costs would be higher if they abandon NPV-positive projects because difficult raising fund. In other words, when a company has large amounts of liquid assets, it can take projects, even if the shareholders or debtors are not willing to supply fund to these projects.

Larger company normally easier to access to capital markets than smaller companies. Because the fixed cost associate with raising external funds is relatively more expensive for small company than larger company.

Companies holding liquid asset substitutes are expected to hold less cash than other companies. This is because cash and liquid assets are substitutions; it indicates that companies with a high level of liquid assets are not necessary hold large amount of cash.

Ferreira and Vilela(2002) state that there is no clear relationship between leverage ,the amount of liquid assets of a company and firm cash hold in the trade-off model. They state that as the leverage increases the risk of a company to suffer from financial distress in the future, therefore, companies with high level of leverage are expected to hold more liquid assets in order to reduce bankruptcy risk. However, on the other hand, leverage can also be regarded as proxy for a company's

ability to raise debt. Companies that easy get debt from outside investors are usually large companies with good reputation. Therefore, as they are easier to access to capital market, they are expected to hold less cash. However, Anonym(2010) argue that this misleading as the leverage only stands for a company's former ability to access capital markets rather than the ability to raise cash in the future. Moreover, companies with high level of debt will be more difficult accessing to capital market as the high leverage will make external financing more expensive. And the amount of money should be influenced by the future ability to raise money not now. Hence, generally there is no clear prediction for explaining cash holdings in the trade-off model.

The Trade-off theory suggest that company pay dividend are expected to have lower cash level as they can reduce these payment to get additional funds. In contrast, companies not paying dividend have to access the capital market.

The trade-off model suggests that the greater the company cash flow volatility, the company may short more liquid assets. However, it may be costly for company to short liquid asset so that company may pass up valuable investment opportunities. Therefore companies with higher cash flow volatile are expected to hold more cash in an attempt to reduce the expected costs of liquidity constraints( Ozkan and Ozkan,1996). Almeida, Campello, and Weisbach(2004) find that financially constrained firms have higher cash flow sensitivity of cash. In other words, financially constrained firms hold much more cash when cash flow is high. Han and Qiu (2007) find that from 1998 to 2002, the cash holdings of constrained firms increase with cash flow volatility.

The R&D projects always related to high information asymmetries, however manages more knowledgeable about the company's activities and financial situation than current or potential investors. Therefore companies have more R&D expenses should

hold more cash. This is due to companies with high R&D expenses are more financial distress costs are large for R&D projects(Opler et al.,1999).

### **Pecking order theory**

All previously described motives for companies to hold cash is based on the assumption that companies optimize shareholders wealth by comparing the benefits and costs of leverage and cash holdings (Grinblatt and Titman,2004). The pecking order theory suggests that there is no optimal amount of leverage level and cash, but capital structures are determined in a dynamic way (Mangnus,2011). There are two main ideas of the pecking order theory. One is that companies prefer to use internal finance for investment than external finance. The other one is companies prefer to choose debt finance over equity financing when use external financing.

Due to the companies' management has more knowledge than outsider shareholders result in external finance costly(Myers,1984). Thus the companies may not be able to sell the shares for their true value. As a result, the company may choose to pass up a valuable investment opportunity to prevent issuing underpriced shares. The company can eliminate these costs caused by information asymmetry by retaining enough internally generated cash to fund this future investment opportunities.

Moreover, If the company needs external financing, the pecking order theory suggests that the safest shares should be issued before more risky shares are used (Mangnus,2011). Safe shares are the share value does not change much when the company's provided inside information to public. So according to the pecking order theory a company a company issues the straight debt first which is the safest share. Convertible bonds are the next to be used, and the last option is issues equity. If the company has enough funds to invest all positive net present value projects, it often pays off its debt and accumulates liquid assets (Mangnus,2011).

### **Agency cost theory**

The agency problem was first explored in Ross(1973), he described that the managers as the 'agents' and the shareholders as 'principal', the problem that arises as a result of this system of corporate ownership is that the agents do not necessarily make decisions in the best interests of the principal. It is likely that company managers prefer to pursue their own personal objectives, such as aiming to gain the highest bonuses possible. According to the managerial capitalism theory(Martin et al,1998) managers avoid using external finance because doing so would subject them to the discipline of the marketplace. Due to managers are responses for company's routine business, managers being far more knowledgeable about the company's activities and financial situation than current or potential investors. According to agency theory cost theory, the expenses paid for managers to monitoring the companies which is called agency costs.

Due to the conflicts between managers and shareholders are the separation of ownership and control. Consequently, some literature suggests that managerial ownership can help align the interests of managers with those of shareholders y (Jensen and Meckling, 1976; Fama, 1980b; Leftwich et al., 1981). Managerial ownership is defined by Zhou(2001) as "the aggregate number of shares held by the CEO, including restricted shares but excluding stock options, expressed as the percentage of the firm's total shares outstanding". This means, with increased managerial ownership, managers are less likely to invest poor projects and will try to maximize the companies wealth as managerial ownership align their own interest with companies' other investors. As a result, it allows the firm has a relative lower agency cost and increase the firm's ability to raise external finance, which would reduce company's motive to hold cash.

However, Morck et al(1998) argue that high share ownership by managers would lead to outside shareholders difficult to control the decisions of managers. Consequently, managers who are less control by external discipline would prefer hold more cash to pursue their own benefits without replacement (Ozkan and Ozkan,1996). Opler, et al(1999) show that management may hold cash to realize its own objectives at shareholder expense. For example, managers may hold excess amount of cash just as they do not want to take risk. Furthermore, management hold excess cash may due to they does not want to pay dividend. Jensen (1986) states that entrenched managers would maintain cash instead of paying out to shareholders when companies lack of good investment opportunities.

Ozkan and Ozkan(2004) find that a non-monotonic relation where cash holdings fall as managerial ownership increase up to 24%, increase as managerial ownership increases to 64%, then fall again at higher levels of managerial ownership. Composition and the existence of ultimate controllers do not affect the relationship.

Furthermore, Ozkan and Ozkan(2004) argue that the company board of director structure will influence the company's cash holdings. The Cadbury Report recommended that company boards should meet frequently and should monitor executive management. The Higgs Report (2003) in the UK state that the presence of independent non-executive directors on company boards, should help to reduce the notorious conflicts of interest between shareholders and company management (Solomon,2007). The non-executive directors are chosen to stand for the shareholders' interests ( Rosenstein and Wyatt,1997;Mayers et al.,1997). Accordingly, boards with greater outside director representation will make better decision than boards mainly depend on inside-executive directors.(Ozkan and Ozkan(2004))Considered that non-executive directors act a significant monitoring and disciplining function over executive directors, therefore it should expect that companies with outside- dominated boards are likely to experience lower agency costs of raising external finance and hold lower level of cash.

Ozkan and Ozkan(2004) also suggest that firm's cash holdings can be affected by firm's growth opportunity. They find that entrenchment effect decreases when firm's growth opportunities increase because the interests of managers and shareholders are better aligned with greater growth opportunities. To control this influence they interact the managerial ownership terms with the proxy for growth opportunities. Chen and Chuang(2009) examine how corporate governance mechanisms affect the cash holdings of high growth firms. Using a sample of high tech firms listed on NASDAQ, they find that companies hold excess cash to maintain their competitive advantage. They argue that board effectiveness could have two different implications for these cash holdings: an effective board might reduce information asymmetries therefore reducing the cost of external financing. Consequently, this will decrease the firm's cash holdings. Moreover, an effective board can also provide shareholders better protection from managerial agency issues, so that managers of firms with lots of growth opportunities to hold more cash. Chen and Chuang(2009) also suggest that shareholders of high growth companies can accept high levels of cash if they think company's corporate mechanisms can protect their interests.

Lastly, whether the firm's cash holding is influenced when there is a dominant shareholder among the firm's shareholders. Although the effective monitoring by shareholders can enhance alleviating the agency problem between managers and shareholders. The shareholders with relatively small proportion of shares sometimes lack of incentive to monitor managers as the cost of monitoring is likely to outweigh the benefit. In contrast, large shareholders, having more incentive to monitor managers as they hold more shares. As a result, companies with large shareholders will have lower agency costs and lower cost of external financing. This means Company with large shareholders are expected to have lower level of cash.

## **2.3. Some other variables influence the cash holding of company**

### **Bank relationship**

As banks participate in monitoring firms' activities and in collecting and processing the information that not public available. Therefore, bank financing is regarded as more effective than public debt in decreasing issues associated with agency conflicts and informational asymmetry(Ozkan and Ozkan,1996). Moreover, as banks can access to the information that not public available, it allow banks to evaluate and monitor borrowers more effectively than other lenders. That means if a bank willing to lend company money that means positive information about that company. Furthermore, the positive signal about a company provided by banks allows this company to access to external finance more easily. Therefore, this argument suggests that companies with more bank debt in their capital structures should hold less cash (Ozkan and Ozkan,1996).

### **Growth opportunity**

Mangnus(2011) investigate 25 EU countries for the period from 1988 to 2010, find that the most important determinants of changes in cash holdings are the R&D ratio, the cash flow volatility and the net working capital ratio. Together these firm characteristics explain 85% of the change in the predicted cash holdings. This finding is constant with the precautionary motive for cash holdings. Companies that have more growth opportunities and higher levels of risk hold more cash to reduce possible adversity in the future.

### **Investor protection**

Pinkowitz (2003) find that countries with better investor protection hold less cash. Kusnadi (2003) provide additional evidence of the importance of corporate governance in the determination corporate cash holdings and the relevance of the



agency cost theory. This is constant with findings by Dittmar et al(2003) that firms with poor shareholders protection face more severe agency problem and hold higher cash levels.

### **Diversified**

Subramaniam et al (2009) investigate whether the organizational structure of firms affects their cash holdings. Using Compustat firm level and segment-level data, they find that diversified companies hold much less cash than their counterparts. Due to the diversified firms have the potential to use internal capital markets and proceeds from sales of non-core assets, and hence would have less need to hold cash. Moreover, they find that the diversified companies also have more severe agency problems, basically much of the agency problem from conflict over resource allocation across dimension that increases the marginal cost of cash holdings.

### **Capital market development**

Dittmar et al(2003) evidence that the level of capital markets development has a positive impact on cash holdings. However, Ferreira and Vilela(2003) argue that a negative relationship between the level of capital market development and cash holding which is not consistent with agency theory however support the precautionary motive for cash holdings.

### **ROA**

The trade-off theory predicts a negative relationship between return on assets and cash holdings ( Ozkan and Ozkan,2002). The pecking order theory, however, predicts a positive relationship between return on assets and cash holdings..

## **3. Variables Constructions and Hypothesis**

This part is going to construct seven variables and hypothesis mainly based on

trade-off theory, pecking order theory. The seven variables are investment opportunity, firm size, profitability, net working capital, leverage, capital expenditures, and dividend. I will investigate UK public companies cash holding based on these seven variables in later section.

### **Investment opportunity**

The agency theory predicts a negative relationship between cash holdings and investment opportunities as managers of companies with good investment opportunities might better align shareholders interest with managers thus company hold less cash. However, Opler et al.(1999) argues a positive relationship between investment and cash holdings as they find that companies with more investment opportunities might experience higher costs of external financing due to higher costs of underinvestment and financial distress. In order to reduce the costs of distress, these companies are expected to hold higher levels of cash for precautionary reasons. The pecking order theory suggest similar conclusion, it predict a positive relationship between investment opportunities and cash holdings because companies have high investment opportunities are normally more profitable and thus have more cash.

Bigelli and Vidal(2009) find that the positive relationship between investment opportunity and cash holding is stronger for private firms as private suffer from a greater risk of underinvestment due to a low level of internally generate funds.

In the literature, investment opportunities are typically measured by the market-to-book ratio; in my case, however, as most book value for companies are difficult to get in DataStream, so it is hard for me to use market-to-book ratio. Therefore, I would follow Daher(2010) measure investment opportunities by the yearly sales growth rate . It is expected to find a positive relationship between cash holdings and investment opportunities.

H<sub>1</sub>: Investment opportunities are positively related to cash holdings.

**Firm size**

Martinez-Carrascal(2010) investigate corporate cash holdings in euro area as a function of firm size. He finds that there are significant differences in investment in liquid assets for firms of different size. He suggests that liquid assets for smaller firms in the euro area are more closely linked to firm cash flow and its variability than cash holdings for bigger companies. This is because smaller firms have more restriction access to external funds due to information asymmetry. He also finds that the relationship between cash holding and tangible assets, which help to get external finance, is stronger for small and medium-sized companies than large companies. In contrast, he point out that cash holding sensitivity to variations in the spread between the return on liquid assets and other uses of these funds is higher for larger companies, can be explained by their lower need to hold a cash buffer for precautionary reasons. This finding is constant with Han and Qiu's study about role of financial constrains in the link between corporate cash holdings and cash flow variability. They find that the cash holdings of smaller firms respond positively to cash flow variability, however large companies' liquid assets do not react to changes in this variable. They argue that if a company is not restricted access to external funds such as large companies, then it has no need to provide for future investment and thus its cash policies should not affected by cash flow variability. Titman and Wessels(1998) argued that as larger firms are more likely to diversified so that they are less likely to have financial distress problems. In contrast, small firms are more likely to be liquidated when they are financial distress( Ozkan and Ozkan,1996) . Accordingly, small companies are expected to hold more cash to avoid financial distress. However, Ogundipe et al(2012) investigate a sample of 54 Nigerian firms listed on Nigerian Stock Exchange for a period of 15 have a different result, which show that firm size is insignificant as cash holding determinants in Nigeria.

I measure firm size as the logarithm of book assets. It is expected that a negative relationship between firm size and cash holdings.

H<sub>2</sub>: firm size negatively related to cash holdings

### **Profitability**

The trade-off theory suggests a negative relationship between profitability and cash holdings since profitable companies have enough cash flows to avoid underinvestment issues.(Kim et al., 1998;Caglayan-Ozkan and Ozkan,2002). Bates et al.(2009) find a negative relationship between profitability and cash holdings. However, Megginson and Wei(2010) investigated the determinants of cash holdings and the value of cash in China's share-issue privatized firms from 1993 to 2007. They found that more profitable and high growth firms hold more cash.

The profitability measured by cash-flow-to-book-value-of-asset. Cash flow is computed as earnings after interest, dividends and tax but before depreciation. It is expected that a negative relationship between cash holdings and firms' profitability.

H<sub>3</sub>: *firms' profitability negatively relationship with cash holdings.*

### **Net working capital**

The net working capital consists of assets that substitute for cash ,which are normally defined as inventories, accounts receivables, accounts payable and other items in the working capital that are used to change cash levels(Bates et al,2009). Opler et al. (1999) suggest that there is no relationship between liquid assets substitute and cash holding based on the pecking order theory. Since liquid assets substitutes can be easily converted to cash, therefore the trade-off theory suggests a negative relationship between cash holdings and liquid assets substitutes. Ferreira and Vilela(2003) find a negative relationship between net working capital ratio and cash holdings, as companies have fewer assets that can function as a substitute for cash, which is constant with transaction motive for cash holdings. This findings also supported by Afza and Adnan(2007), Megginson and Wei(2010) and Alam et

al.(2011).

We measure liquid assets substitutes by net-working-capital-capital-to-assets. We calculate net working capital as current assets less current liabilities and subtract cash from the result.

It is expected to find a negative relationship between liquid asset substitutes and cash holding for our sample.

H<sub>4</sub>: liquid asset substitutes have a negative relationship with cash holdings

### **Leverage**

Both the pecking order theories and trade-off theory suggest a negative relationship between leverage and cash holdings. Ferreira and Vilela( 2004) use a sample of 400 firms in 12 Economic and Monetary Union(EMU) countries for the period of 1987-2000 to investigate the determinants of corporate cash holdings. They find that cash and leverage are negatively related, because less levered firms are subject to less external monitoring and thus allow more managerial discretion resulting in higher cash levels. However, Ogundipe et al (2012) find that a positive relationship between holdings and leverage is constant with agency theory that highly leveraged companies find it hard and costly to access to external funds hence, hold higher level of cash and induce a positive relationship.

The leverage will be measured as the sum of long-term debt and debt in current liabilities divided by the book value of total assets. It is expected to have a negative relationship between leverage and cash holdings.

H<sub>5</sub>: *firms' leverage level negatively related to cash holdings*

### **Capital Expenditures**

The capital expenditures are expenditures are used to generate future benefits(Bates,2009). A capital expenditure is incurred when a business spends money either to buy fixed assets or to add to the value of an existing fixed asset with a useful life extending beyond the taxable year. Previous U.S studies (e.g.Opler et al.,(1999) and Kim et al., (1998)) validate the trade-off theory. The cash level increase with the capital expenditure of company because companies with high capital expenditures keep cash as a shield against transaction costs together with external finance and opportunity costs of insufficient resources(Daher,2010). However, the pecking order theory predicts a negative relationship between capital expenditures and cash holdings because pronounced capital spending typically drains out a firm's cash(Daher,2010).

Capital expenditures are measured by the annual change in fixed assets added to depreciation. It is expected that a negative relationship between cash holdings and capital expenditure.

H<sub>6</sub>: capital expenditures are negatively related to cash holdings

### **Dividend**

Finally, Al-Najjar and Belghitar(2011) explores the relationship between corporate cash holdings and dividend policy using a large sample of around 400 non-financial companies for the period from 1991 to 2008. The result shows that cash holdings are affected by dividend because dividend firms that currently pay dividend are expected to hold less cash as they are more capable of raising funds when needed by cutting dividend. In contrast, Drobetz and Gruninger(2007) investigated the determinants of cash holdings for a comprehensive sample of 156 Swiss non-financial companies between 1995 and 2004. Through regression analysis, they found that dividend payments are positively related to cash holdings.

H<sub>7</sub>: Dividends are negatively related to cash holdings.

#### **4. Different corporate governance of UK**

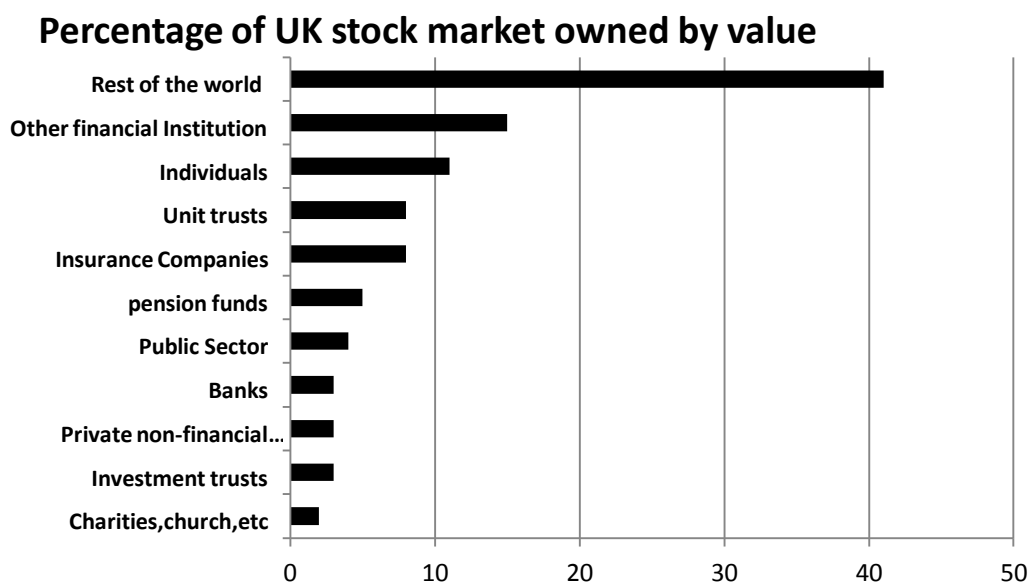
Due to most past studies and researches were conducted in the U.S. companies, I would like to talk about some characteristics of the UK corporate governance system before I describe the methodology and data. Several characteristics of the UK corporate governance system make the cash holding situation is different from US companies which may contribute to a high degree of managerial discretion, which may have a significant influence on managerial ownership and cash holdings. It is going to focus on institutional shareholders and board composition, and the role of regulation.

##### **Institutional shareholders**

The ownership of listed shares by financial institutions (including insurance companies, pension funds and unit and investment trusts) both in the U.K. and the US are very high. Fifty years ago, most shares in UK were held by individuals, who were advised by stockbrokers with direct knowledge of both their investors and the companies in which they invested. By the 1990, this structure had been changed to one in which UK shares were largely owned by financial institutions, initially insurance companies and pension funds

(bis.gov.uk). Although the proportion owned by insurance companies and pension funds are decreasing recently, especially from 1998 to 2010, financial institution still holds a significant amount of shares in UK. From the ownership of UK Quoted Shares report 2010, it shows that financial institutions held over 40 percent of total quoted shares in UK which can be seen from the Figure 1 and Figure 2 below.

##### **Figure 1: Beneficial Ownership of UK shares at 31st December 2010**



Source from: (ons.gov.uk)

**Figure 2: Beneficial Ownership of UK by Value (from 1998 to 2010)**

<b>Holdings of UK quoted shares by sector of beneficial owner</b>						
<b>At 31 December for 1998, 2008 and 2010</b>						
	per cent			£ billion		
	1998	2008	2010	1998	2008	2010
<b>Rest of the world</b>	30.7	41.5	41.2	460.9	481.1	732.6
<b>Insurance companies</b>	21.6	13.4	8.6	325.5	154.9	153.6
<b>Pension funds</b>	21.7	12.8	5.1	325.8	148.8	91.3
<b>Individuals</b>	16.7	10.2	11.5	250.8	117.8	204.5
<b>Unit trusts</b>	2.0	1.8	6.7	30.1	21.3	118.8
<b>Investment trusts</b>	1.3	1.9	2.1	19.2	22.1	37.2
<b>Other financial institutions</b>	2.7	10.0	16.0	40.4	115.3	284.5
<b>Charities, church, etc</b>	1.4	0.8	0.9	20.4	8.7	15.1
<b>Private non-financial companies</b>	1.4	3.0	2.3	20.9	34.7	40.3
<b>Public sector</b>	0.1	1.1	3.1	1.4	13.0	54.4
<b>Banks</b>	0.6	3.5	2.5	8.4	40.6	45.0
<b>Total</b>	100.0	100.0	100.0	1503.7	1158.4	1777.5

Source from: (ons.gov.uk)



The ownership situation in US is quite similar with it in UK which can be seen from the Figure 3 below. The equity hold by institution investors is increased from 6.1% to 61% during the period from 1950 to 2010.

**Figure 3: Beneficial Ownership of U.S. by Value (From 1945 to 2010)**



Source: (valuwalk.com)

It is explained that the reason of the significant increase in the ownership of institutions is that the growth in long-term saving lead to the increase in funds available to the institutions for investment (Stapledon,2000). Furthermore, tax is considered as an important role in the institutionalization of the UK equity market. This is because the investment for some financial institution are exempt from capital gains tax , such as pension fund and some firms have tax privileges like life insurance companies.

Given the aggregate size of institutional ownership in the UK equity market, one important question to find is how effective those institutional shareholders are in UK corporate issues. The fact is although the high proportion ownership of financial institutions, investors is not major players from a principal-agent perspective. There are several reasons seem to influence the extent to which institutional investors

activism. First, the ownership in institution investors highly dispersed. Although their accumulated share stakes are very high, shareholdings in individual companies are small: the average of the largest shareholding owned by institutions amounts to only 5.5 percent. Therefore the benefits shareholders can get from monitoring corporations can hardly outweigh the costs of control for institutions, so that it makes institutions to free ride on corporate control (Shleifer and Vishny ,1997).

Second, some investment and pension funds adopt passive index strategies. Active strategy is trying to find the right share by study and investigate. In contrast, the passive investment is a strategy that involves minimal expectational input and instead relies on diversification to match the performance of some market index. It assumes that the market will reflect all available information in the price paid for securities and therefore, does not attempt to find mispriced securities. Comparing with active management, passive management is less costly; this is because active management takes time to do research, and actively managed funds spend more money on overhead and staffing. Moreover, they have higher trading costs because they move in and out of stocks. If the index earns 10%, and the fund has 3% a year in costs, it must earn 13% just to have a net return equivalent to its index. As passive fund do not do many trading as active trading do, they have lower fees, and also have less capital gains distributions that will flow through to tax return(about.com). Consequently, passive invest fund do not dispose of the resources to actively monitor the large number of firms in their portfolios. In order to remain cost-efficient, institutional investors choose to give up poorly performing companies instead of engaging in active monitoring.

Third, the low institutional involvement is also affected by insider-trading regulations. If firms do not willing to fix part of their portfolios, they might have to restrict active involvement in corporate strategy(Goergen and Renneboog,1999). Plender(1997) finds that financial institutions in the UK do not frequently vote at shareholders' meeting since they are not obligated to do so as they are in the US. He finds that only

about 28 percent of pension funds vote on a regular basis whereas 21 percent never vote and 32 percent cast their vote only on extraordinary items.

An essential issue in the whole debate about shareholder activism and the role of institutional investors in corporate governance is the whether or not such intervention results in higher financial performance in investee companies. There are many studies that have attempted to address this issue. It is clearly an implicit assumption of the Hampel Committee and other proponents of shareholder activism that institutional investors' intervention in investee companies produces higher financial returns. There are certainly a perception among the institutional investment community that activism brings financial rewards, as more efficient monitoring of company management aligns shareholder and manager interests and therefore helps to maximize shareholder wealth(Solomon,2007). Franks and Mayer(1994) showed that institutional investors have a significant impact on top management turnover, which is interpreted as positive for corporate governance, as this tends to result in improved financial performance. Similar evidence was presented for Japan by Kaplan and Minton(1994) and Kang and Shivdasani(1995).

Further, some research has shown that block purchases of shares by institutional investors tended to result in an increase in company value, top management turnover, financial performance and asset sales (Mikkelsen and Ruback,1985).

### **Board structure of UK companies**

Boards fall into two general models, a unitary board or a two-tier board. The UK has a unitary board structure which tends to be the most common form, especially in countries which have been influenced by the Anglo-Saxon style of corporate governance. Unitary boards include executive and non- executive directors and the chairman of the board can at the same time be an executive officer(Solomon,2007). On the other hand, two-tier boards have two separate boards, a management board

and a supervisory board. Thus one-tier board compared to two-tier boards face a dilemma: they should make decisions while monitor these decisions. However, this problem does not exist in the two-tier system due to the inherent formal separation of control and management, it is necessary to get this separation in the one-tier system. This encourages the need for some board members to be neutral and to concentrate their efforts on the monitoring task. This has lead to a further class of board members: within the group of the non-executive directors, only some are deemed independent. However, the main problem of this structure about the independence of outside directors and their ability to monitor and control executive directors( see, e.g, Blair,1995). It is also crucial to find that there is no formal rules for companies in the UK to have outside directors and company boards can function without outsider representation (Ozkan and Ozkan,2003). The result of these issues are influence the board composition of firms. Ozkan and Ozkan (2003) find that 298 companies have less than three non-executive directors on their boards in 1997, which occupied 35.5% of the sample. They also find that the average percentage of non-executive directors is 43 and non-executive directors have a majority of the board in only 208 firms, which are 24.8 of the sample. Lastly, it is argued that non-executive directors in UK play a more advisory role rather than performing a disciplinary function. It has been also stated that non-executive directors are not active in disciplining management in the UK due to non-executive directors are well aware of their strategic role but less so of their monitoring role(Jungmann,2006). So based on the discussion above, the outsider board directors are more effective monitor and control managers. Therefore, for UK firms' boards, the inside directors as dominators in boards are not likely to play an important role in reducing the exercise of managerial discretion.

### **Role of regulation**

Ozkan and Ozkan (2003) argue that as the insufficient external market discipline and

more loosening regulatory controlling firms and company boards in the UK is more possible to give managers greater freedom to realize their own benefit. It is argue that the regulatory features in the UK have an important role in influence the form of corporate governance. The US and UK approaches have been quite different. “ In UK, the emphasis over the past few decades has been building up a voluntary code, and morphing that into the self-declaration approach ‘comply or explain.’” The corporate governance regulations in UK start from the publication of the Cadbury Report in 1992, which had been improved by late 1980s collapse of the Maxwell group (para 9,thecq.org). However, due to the non-enforceability, the effects are doubted. In contrast, the Sox full compliance in the US is very expensive and a trend has started where US start-up companies prefer to list in London on the alternate investments market where regulations are looser and listing costs are much lower. With more money now being raised on initial public offerings in London than in New York for the first time since 2000, it has been found that the US companies do not willing to apply SOX regulations are taking the easy way and moving to London. One US firm that choose to listed on London market rather than in the US explained because it would have taken 18 months longer and cost an extra \$ 1m due to SOX compliance regulations(thecq.org). Moreover, Franks et al.(2001) state that there are some different regulatory futures in the UK despite the characterization of the UK as having a common law regulatory system(Franks et al.,2001). The UK Takeover Code makes accumulation of controlling blocks expensive. Moreover, UK has stronger minority protection laws due to the highly dispersed ownership. This “discouraging partial accumulation of share blocks in favor of full acquisitions in takeovers”, making share blocks a weak disciplining device. Third, the obligations regulatory on directors in UK are not sufficient which lead to non- executive directors are more advisory rather than disciplinary. Furthermore, some studies suggest that the regulatory restrictions on the shareholdings of those financial institutions in UK are far fewer than that those in US(See. E.g., Allen and Gale,2000).

In this part, we have discussed the role of institutional investors, board structure, and

role of regulatory. As Solomon(2007) state that more active shareholding can result in better monitoring of company management and therefore to a lessening of the agency problem. Therefore, the institutions investors' activism, structure of board and role of regulatory influence the efficient monitoring of company management aligns shareholder and manager interests, therefore based on agency motive, low involvement in corporate governance of institutional investors, managerial discretion and loosening regulatory would result in poorer align interest between investors and managers thus companies hold more cash. Therefore, it is expected that UK companies have higher average cash ratio than those companies with similar size in US.

## **5. Data description**

For the analysis I use a dataset that contains annual fundamentals of UK firms for the period from 1990 to 2010. I concentrate on testing the hypotheses developed in previous section. A sample of publicly traded UK companies has been selected from both a cross-sectional and a time series dimension, which allows for an analysis of different companies over time. The initial data is obtained for this study is from the Datastream database which provides both accounting data for companies and market value of equity. The panel data set for this paper has been constructed as follows. First of all, the data does not include financial companies, as their business involves inventories of marketable securities that are in cash, and because of their need to meet statutory capital requirements(Opler,1999). Second, I also exclude Utilities Company, because their cash holdings can be affected by regulatory supervision. Third, missing firm- year observations for any variable in the model during the sample period were dropped. Lastly, from these firms, only those with at least five continuous time series observations during the sample period have been chosen. The initial sample contains more than 600 public companies in FTSE of UK with approximately 18723 firm-year observations. Each firm-year observation contains information on cash ratio and five independent variables which are

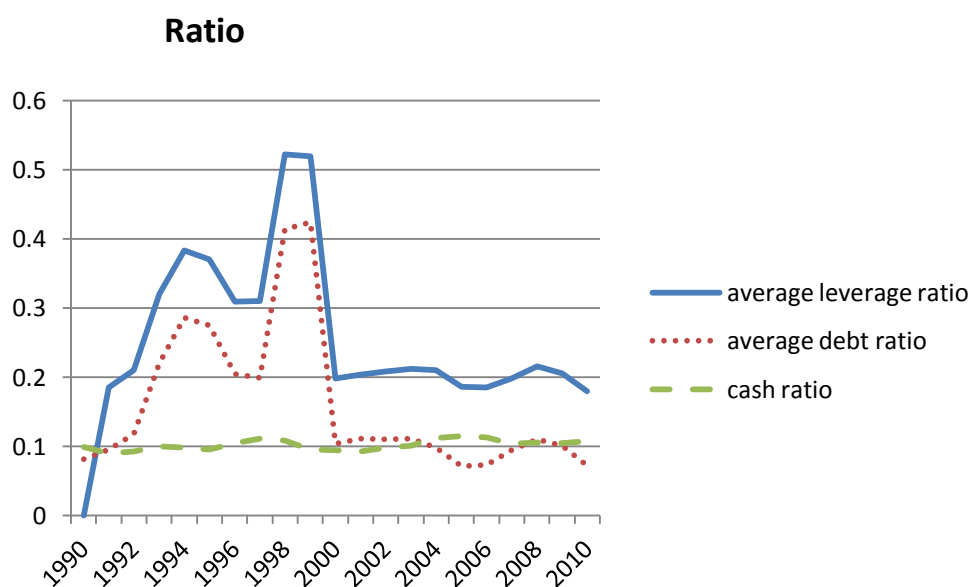
described later in this part. The model I use is the model employed by Bates et al.(2009) that relate the cash ratio to firm characteristics, and tailor these regressions to fit the characteristics of our sample.

The dependent variable that is used in the regression analysis is the cash ratio, which is defined in several different ways. The easiest way uses only cash and short-term marketable securities which are divided by total assets. Instead of dividing by total assets one can also divide by net assets, which is equals the book value of assets minus cash and marketable securities(Bates et al.,2009).In addition, the logarithm of the cash to net assets ratio can be used In order to reduce the problem of outliers(Foley, Hartzell, Titman and Twite,2007). In my research I use the cash to total assets ratio as dependent variable.

The Table 1 and Figure 4 below illustrate the average cash ratios from 1990 to 2010. The third column of Table 1 reports the average cash ratio in each year, and there are 605 companies in total. The ratio is 9.85% in 1990 and increases to 20.7% in 2010, reaching a peak time in 2005. Comparing with the result obtained by Bates et al(2009), it can be found that the average cash ratio of UK public companies is similar with those of the United States for each year in the sample, which it is not constant with what I expected before that UK companies would have higher cash level. Bates et al.(2009) show that the average cash ratio of the large firm in U.S increases from 7% in 1980 to 11% in 2006, peaking in 2004. The same trend is conveyed by the median cash ratio, which is presented in the third column. As we can see that the increase is not obvious, this is constant with the results from study and research conducted by Bates et al.(2009) . Bates et al.(2009) investigate a number of 13599 firms include both public and private firms, and classified all firms into three quintiles based on firm size. They find that cash ratios changes are markedly more pronounced in smaller firms and the large firms are fairly stable over time. As the companies I use in this paper are all large public companies, therefore the changes in cash ratio are small as expected.

**Table1:**

year	N	Average Cash ratio	CashRatio Median	Average Net debt	NetDebt Median	Average Leverage ratio	Leverage Median
1990	251	0.0985	0.0614	0.0817	0.0837	0.1757	0.1464
1991	268	0.0893	0.0554	0.0955	0.0816	0.1848	0.1502
1992	276	0.0926	0.0616	0.1177	0.0845	0.2104	0.1623
1993	287	0.0999	0.0590	0.2204	0.0689	0.3203	0.1569
1994	303	0.0975	0.0607	0.2858	0.0625	0.3833	0.1478
1995	318	0.0954	0.0521	0.2748	0.0664	0.3702	0.1445
1996	351	0.1044	0.0574	0.2048	0.0605	0.3092	0.1432
1997	370	0.1114	0.0700	0.1984	0.0544	0.3098	0.1338
1998	380	0.1082	0.0666	0.4137	0.0813	0.5220	0.1519
1999	390	0.0956	0.0515	0.4235	0.0924	0.5192	0.1566
2000	408	0.0946	0.0495	0.1033	0.1047	0.1979	0.1534
2001	433	0.0919	0.0526	0.1112	0.1065	0.2031	0.1651
2002	459	0.0984	0.0548	0.1099	0.1048	0.2083	0.1642
2003	480	0.1009	0.0576	0.1108	0.1020	0.2117	0.1689
2004	506	0.1118	0.0647	0.0983	0.0763	0.2101	0.1531
2005	523	0.1150	0.0601	0.0710	0.0734	0.1860	0.1346
2006	544	0.1126	0.0561	0.0727	0.0645	0.1854	0.1357
2007	577	0.1036	0.0517	0.0940	0.0854	0.1977	0.1468
2008	569	0.1058	0.0578	0.1096	0.1021	0.2154	0.1700
2009	572	0.1045	0.0645	0.1009	0.0855	0.2055	0.1560
2010	575	0.1070	0.0583	0.0722	0.0709	0.1793	0.1418

**Figure 3: The Average Cash Ratio , Average Debt ratio, Average Leverage**



The results for average cash ratio, average leverage ratio and average net debt are similar with the results obtained by Daher for UK public firms (2010).

Then it turns to the implications of the increase in the cash ratio for the measurement of leverage. Column 7 of Table 1 illustrate average leverage ratio for my sample companies by year. I calculate leverage as total debt divided by total book assets. It can be seen that the leverage ratio increased dramatically from 17.5% to 52.2% during the period from 1990 to 1999 and decreased from 51.9% in 2000 to 17.9% in 2010. When we consider the average net leverage ratio, which subtracts cash from debt, Bates et al(2009) find that the net debt ratio change has a dramatically different perspective from leverage ratio in their US sample. Their study show that average leverage ratio increase from 1980 to 1998 then decreased from 1998 to 2010. While the average net debt ratio is 16.4% in 1980 and falls during 15 years and reaches negative in the last 3 years of the sample. However, the fifth column in table1 shows the average net leverage for my sample. It can be found that average leverage ratio and average net debt have a similar change pattern in this study, which is not constant with Bates et al (2009) results. The Figure 1 shows the change of leverage ratio and debt ratio both increase from 1990 to 1998 although there is a slightly decrease in 1996, and decrease dramatically around 1998 to 2000. The difference result between Bates et al(2009) and my result probably due to they include private companies in their sample. Median net leverage, presented in the column 6, is decrease from 1990 to 1997 then increase from 1998 to 2010.

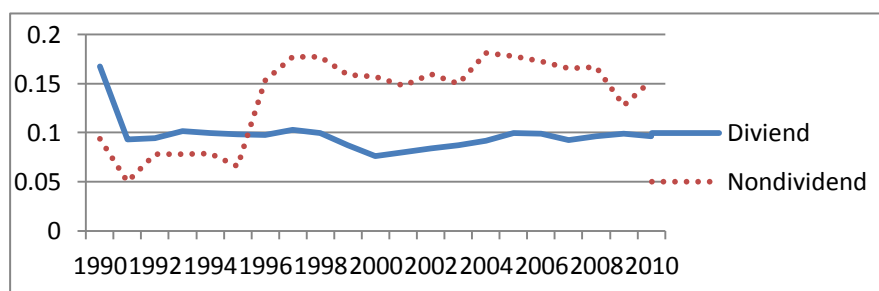
We next turn to discuss the role of dividend. Jensen(1986) states that companies pay no dividend with poor growth opportunities will hold more cash. The Table 2 below illustrates the average cash ratio for dividend and nondividend payers from 1990 to 2010. It can be seen from the Figure 4 that the cash ratio increase is more obvious in nondividend payers than dividend payers. For instance, the average cash ratio of dividend payers is about the same in 2010 as in 1990. In contrast, the average cash ratio of nondividend payers is 67.5% higher in 2010 than in 1990 This result is similar

with the result obtained by Bates et al(2009). Almeida,Campello, and Weisbach(2004) suggest that non dividend paying companies to be financially constrained , which indicate that cash holding increase happened in financially constrained companies. The result that nondividend companies have higher cash holdings is also support the precautionary motive.

**Table 2: Cash Ratios from 1990 to 2010 Delineated by the Dividend**

	Nondividend	Dividend
1990	0.167295	0.093728
1991	0.092995	0.049967
1992	0.094077	0.077946
1993	0.101522	0.077897
1994	0.099599	0.078508
1995	0.09848	0.065913
1996	0.09784	0.152973
1997	0.102985	0.177161
1998	0.099754	0.177000
1999	0.087411	0.158612
2000	0.076322	0.157085
2001	0.080073	0.147883
2002	0.08368	0.159626
2003	0.087011	0.149926
2004	0.091454	0.181166
2005	0.099832	0.177474
2006	0.098566	0.172764
2007	0.092046	0.16571
2008	0.095965	0.166759
2009	0.098617	0.127555
2010	0.096129	0.153254

**Figure 4 :Cash Ratios from 1990 to 2010 Delineated by the Dividend**



### **Time trend analysis**

Following Bates, Kahle and Stulz(2009) the next part is going to find out if the observed pattern in the cash ratio is statistically significant. I estimate regressions of the cash ratio on the constant and a time variable. The results are show in the table2 below. It can be seen that for the average cash ratio in the table 2 the time variable has a coefficient of 0.0065, which means that the cash ratio increases with 0.65 per year on average and has a p-value below 0.01. The  $R^2$  of the regression is 31.58%. This evidence is consistent with a positive time trend in cash holdings over the sample periods. However, such regressions are only useful to characterize the evolution of the cash holdings during the sample period, and it would not make sense to the in-sample trend to future years(Bates, Kahle and Stulz,2009). I also estimate regressions of average leverage ratio on the constant and a time variable. However, the regression result shows that the coefficient on leverage for sample companies indicates a yearly decrease of 0.005, but it is insignificant with a p-value of 0.147 and an  $R^2$  equals to 0.1073. The net leverage ratio regression on a constant and time result also in an insignificant decrease each year with the negative correlation coefficient of 0.006.

## **6. Empirical findings**

In the section 3, it discussed that how firm characteristics can affect the increase in amount of cash hold by company. In this section, I am going to focus on testing the hypotheses created in section 3. I use a model of regression used by Bates et al.(2009) that relate the cash ratio to firm characteristics.

### **Explanatory variables and Methodology**

It has been discussed what factors are considered as determinants of the increasing cash holdings from the previous literatures, and explained the theories that could have implications on the relationship between cash holdings and these determinants.

The independent variables in the regression models are mainly focus on the transaction and precautionary motives for corporate holding cash. It is going to briefly summarize all the determinants that will be tested in this paper, because some of the variables mentioned in Section 3 will not be tested due to difficult get data and information.

- a. Sales Growth Rate: Measures investment opportunities; the most common way to calculate is the market-to-book ratio. However, I will use the way Daher(2010) applied, which use sales growth rate calculated as yearly difference between beginning of year and year-end sales divided by beginning of year sales. It is expected there is a positive relationship between investment opportunity and cash holdings as companies have higher investment opportunities find it costly for them to be financially constrained (Bates et al., 2009).
- b. Firm Size: due to the economies of scale, larger companies hold less cash. The firm size will be measured as the logarithm of book assets.
- c. Cash flow to Assets: some views suggest that cash flows have positive relationship with cash holdings however others argue that cash flows have negative relationship with cash holding levels. Cash flows are measured as EBIT minus interest dividends and tax plus depreciation.
- d. Net Working Capital to Assets: It suggest that net working capital and cash holding have a negative relationship because working capital includes liquid assets which substitute for cash. Net working capital is measured as current assets minus current liabilities and cash divided by total asset
- e. Capital Expenditures to Assets: it is suggest that companies with higher capital expenditure have lower level of cash holdings. Capital expenditure will be measured as yearly change in fixed assets added to depreciation.
- f. Leverage: As cash usually used to pay off outstanding debt therefore cash is regarded as negative debt. Hence it should be expected that there is a negative relationship between cash holdings and debt. However, others argue

that companies with higher debt should hold cash since higher debt increase the probability of bankruptcy, and thus a positive relationship between leverage and cash holdings could be expected. Leverage is measured as the total debt divided by the book value of total assets.

- g. Dividend: Dividend firms that currently pay dividend are expected to hold less cash as they are more capable of raising funds when needed by cutting dividend. Therefore it is expected that a negative relationship between cash ratio and dividend. The dividend variable will be measure as dummy variable, taking value of 1 if company pays dividend and 0 otherwise.

**Table3**

Variable Name	Measurement	Predicted
Cash Ratio	(Cash and cash equivalent + short term investment)/ Total Assets	
Sales Growth Rate	(Beginning of year + Year-end sales) / by beginning of year sales	Positive
Firm Size	Logarithm of book assets	Negative
Cash Flow to Assets	(EBIT-interest-dividends-tax+depreciation)/Total Assets	Negative
Net Working Capital	(Current assets minus Current liabilities and cash) /total asset	Negative
Capital Expenditures to Assets	yearly change in fixed assets added to depreciation/Total assets	Negative
Leverage	total debt/the book value of total assets	Negative
Dividend Dummy	Company with dividend "1", otherwise take "0"	Negative

Table3 above shows the seven variables, how these variables are measured and the predicted relationship with cash holding. I will run three sets of regression models: variants of the basic least squares regression of the cash ratio on explanatory variables, regressions testing changes in variables rather than their levels, and lastly interaction regressions that allow for intercept and slope changes.

## Models and Results

### Least Squares Regression Models

The first model is going to use is the basic cash ratio regression model, which runs the regression of the cash ratio on seven variables discussed in previous section. The Table 4 presents OLS and panel regressions of cash on the independent variables described earlier

**Table 4**

Model	1	2
<b>Dependent Variables</b>	Cash Ratio= $\alpha + \beta_1$ .Sales Growth + $\beta_2$ .Size + $\beta_3$ .CF + $\beta_4$ .NWC + $\beta_5$ .CAPEX + $\beta_6$ .Leverage + $\beta_7$ .Dividend Dum	Cash Ratio= $\alpha + \beta_1$ .Sales Growth + $\beta_2$ .Size + $\beta_3$ .CF + $\beta_4$ .NWC + $\beta_5$ .CAPEX + $\beta_6$ .Leverage + $\beta_7$ .Dividend Dum + $\beta_8$ .Year Dummy
<b>Sample</b>	<b>All public firms</b>	<b>All public firms</b>
<b>Intercept</b>	.126341 (0.000)	.123893 (0.000)
<b>Sales Growth</b>	-6.85e-06 (0.164)	-6.87e-06 (0.162)
<b>Firm Size</b>	-.016201 (0.000)	-.015868 (0.000)
<b>Cash Flow</b>	.258591 (0.000)	.259152 (0.000)
<b>Net Working Capital</b>	-.272695 (0.000)	-.273360 (0.000)
<b>Capital Expenditure</b>	-.071794 (0.003)	-.076356 (0.002)
<b>Leverage Ratio</b>	-.107461 (0.000)	-.106803 (0.000)
<b>Dividend</b>	.056173 (0.017)	.055267 (0.018)
<b>Year</b>		.003900 (0.132)
<b>Adjusted R<sup>2</sup></b>	22.97%	22.99%

The coefficient on sales growth rate with a value of smaller than negative 0.0001, and it is insignificant as its p value equal to 0.164. Hence I conclude that investment opportunities do not affect companies' cash ratio in this particular model. This is not accordance with the precautionary motive which suggests that firms with better investment opportunities hold more cash since adverse shocks and financial distress are more costly for them(Bates ,Kahle and Stulz,2009)

The coefficient on size has a value of negative 0.0162, and p value of 0, which indicates firm size, has a significant negative relationship with company cash ratio. This is consistent with transaction motive, which state that larger company hold less cash since there are economies of scale with the transaction motive. There is much studies have the same conclusion such as See,Mulligan(1997). Moreover, the result also accordance with the agency motive, since agency motive suggests that due to information asymmetric, large companies hold less cash as they can get external fund easier than small companies.

The coefficient on cash flow ratio has a positive value of 0.258 and p value of 0.000, which reflects that companies with higher cash flow have higher cash ratio. This is consistent with Daher(2010) and Megginson and Wei(2010)'s studies results. Megginson and Wei(2010) found that more profitable companies with high growth rate hold more cash through studied China's share-issue privatized firms. However, it is not accordance with trade-off theory. According to trade-off theory, profitable companies hold less cash as they generate enough cash flows to avoid any underinvestment problems.

The coefficient on the net working capital with a value of negative 0.2727, and p value equals to 0.000, which means the net working capital has a negative relationship with cash ratio in this model. This result is consistent with the result of Bates, Kahle and Stulz(2009). Since net working capital and cash are substitutes, firms with higher net working capital are expected to hold less cash.

The correlation of capital expenditure has a value of negative 0.0717 and p value of 0.003; in the significant level of 5% it indicates that capital expenditure has negative relationship with cash ratio. This result is not consistent with trade off theory which predicts a positive relationship between investment (in capital expenditures) and cash level. The previous U.S. study by Opler et al.,(1999) and Kim et al.,(1998) also find same conclusion. On the other hand this result is accordance with hierarchy view which predicts a negative sign.

The result on leverage support our hypotheses that accordance with most of the studies in the literature. The coefficient with a value of negative 0.1074 and p value of 0.000, which is similar with the result obtained by Daher(2010). Both the pecking order theories and trade-off theory suggest a negative relationship between leverage and cash holdings. Ferreira and Vilela( 2004) use a sample of 400 firms in 12 Economic and Monetary Union(EMU) countries for the period of 1987-2000 to investigate the determinants of corporate cash holdings. They also find that cash and leverage are negatively related, because less levered firms are subject to less external monitoring and thus allow more managerial discretion resulting in higher cash levels.

The coefficient of dividend with a positive value of 0.056 and p value of 0.017,with the significant level of 5% which means companies pay dividend have higher cash holdings in this model. This findings is not consistent with free cash flow theory which suggests that non dividend payers with poor growth opportunities will accumulate more cash(Jensen,1986).It is also inconsistent with the result of Table 2.

The  $R^2$  value is quite low in this model, only 23.05% indicating that only 23.05% of the changes in the cash ratio are explained by changes in the explanatory variables in this model.

So based the result above, it can be seen that the results by running the regression of the cash-to-assets ratio on the seven variables are consistent with the most past



studies and conclusions. In the significant level of 5%, there are two variables have been found no relationship with the cash ratio which are sales growth rate and dividend, however, dividend is significant in 10% level of significant. The increase cash ratio in this model can be largely explained by cash flow to assets, working capital to assets and leverage ratio. These results suggest that profitability, liquidity and leverage have the main influence on cash holdings of companies. The profitability has positive relationship with companies cash holdings, indicates that more profitable companies hold more cash which contradictory with trade-off theory. Second, liquidity has negative relationship with cash ratio indicates that companies with more liquid assets has lower cash holding level, this is consistent with trade-off theory and transaction motive. Third, leverage level has a negative relationship with company means that companies with higher debt hold less cash which is consistent with pecking order theory.

### **Intercept changes**

Based on the Bates et al(2009), in order to investigate how the intercept change over time, identifying an increase in the cash ratio not explained by changes in modeled firm characteristics, a dummy variable for the year to be added to the model to let intercept shifts over time. The dummy takes the value of 1 if the data is taken before 2000 and value 0 after 2000. The results show in the figure below.

The coefficient on the year dummy takes positive value of 0.0039, however it is insignificant with the value of 0.132. The positive sign indicates that the changes in company's characteristics result in lower cash ratio than what was observed before 2000. This result is consistent with the result provided by Daher(2010). It has been found that the most of the coefficients on other explanatory variables are almost the same with the value and significance to those got in Model1. The  $R_2$  value almost no change, which just increase from 23.5% to 23.8%.

### Agency Problems

Based on the agency theory, the dispersion of ownership make the shareholders with relatively small proportion of shares sometimes lack of incentive to monitor managers as the cost of monitoring is likely to outweigh the benefit. As a result, it will make companies have more severed agency problems. The free cash flow theory of cash holdings states that companies with less agency issues should have lower level of cash holdings because this kind of firms, with fewer entrenched management, self-interested managers, cash is applied more efficiently on new investment opportunities instead of being used by managers for their own benefits. Anderson and Hamadi(2009) explore ownership concentration of company by using a data set of Belgian firms, they find that ownership concentration is positively related to the level of liquid asset holding, which means companies with more ownership concentration have higher level of liquid asset. Moreover, based on the trade-off theory, the liquid assets have negative relationship with cash holdings of company. Therefore, the companies have higher level of ownership concentration should have fewer cash holdings. This is consistent with agency theory and cash flow theory. Bates et al (2009) investigate the relationship between cash holdings and agency issues by three ways. They applied the GIM index of managerial entrenchment which developed by Gompers Ishii and Metrick(2003). They find that companies with the highest GIM index values which are thought to have most entrenched management that hold smallest amount of cash from 1980 to 2006, which is not consistent with Pan(2007) that suggest companies with a high GIM index are more likely to pay dividends and have a higher payout ratio. Moreover, their study suggests that due to agency problem, the increase of cash holding will result in the money value decrease. Third, they find a negative relationship between the future growth of cash holdings and excess cash balances which is not accordance with agency theory.

In this part, I am going to use variants of Model 1 to test the effect of ownership structure and agency conflicts on cash holdings. I will follow the model that Hou and

Robison(2006) applied. Based on Lakhal(2005), the Herfindahl index is used as the proxy of ownership concentration. The Hertindahl(H) index is measured as the sum of the square percentage share owned by the top five largest shareholders in a firm including families, financial institutions, inside shareholders and other outside block shareholders(Jiang and Habib,2009). The higher the H index value means the higher the ownership concentration in the firm. The formula shows how to calculate firm concentration by using Herfindahl Index as follows:

$$H_j = \sum_{i=1}^5 S_{ij}^2$$

$S_{ij}$  represent the shareholding of each shareholder

$H_j$  represent the sum squares of percentage share owned by five biggest investors.

I run Model 3 on all companies by adding the H index to model 1 as a new independent variable. The Model 3 summarized below:

Due to the data availability on the ownership concentration, I have to reduce the number of observations that result in a smaller sample size. I only have 60 public firms H index data. The result of model 3 can be seen in the table below. The coefficient of h index is smaller than negative 0.0001 and it is insignificant with p value of 0.465, which indicates ownership concentration does not affect the company's cash ratio. The result is different from the result obtained by Daher(2010). When I run the model 3 with h index, the coefficient value and significance value of other variables change a little bit with those in model one, this is caused by fewer numbers of observation. The firm size becomes insignificant with the coefficient value of positive 0.0031. The cash flow, networking, capital, capital expense and leverage ratio are still significant factors, and the coefficient sign remain the same with those in model 1. However, the coefficient value of cash flow increase from 0.258 to 0.6, networking capital decrease from negative 0.27 to negative 0.57 ,capital expense increase from negative 0.071 to negative 0.59 and leverage ratio decrease from negative 0.107 to negative 0.4324. The  $R^2$  is increase from 23% to 49%.

Table 5

Model	3	4
<b>Dependent Variable</b>	Cash/ Asset	Cash/ Asset
<b>Model Description</b>	$\text{Cash ratio} = \alpha + \beta_1 \text{Sales Growth} + \beta_2 \text{Size} + \beta_3 \text{CF} + \beta_4 \text{NWC} + \beta_5 \text{CAPEX} + \beta_6 \text{Leverage} + \beta_7 \text{Dividend} + \beta_8 \text{h Index.}$	$\text{Cash ratio} = \alpha + \beta_1 \text{Sales Growth} + \beta_2 \text{Size} + \beta_3 \text{CF} + \beta_4 \text{NWC} + \beta_5 \text{CAPEX} + \beta_6 \text{Leverage} + \beta_7 \text{h Index.}$
<b>Sample</b>	60 public firms	60 public firms
<b>Intercept</b>	.0398982	.0717683
<b>Sales Growth</b>	-.0000184 (0.330)	-.0000178 (0.345)
<b>Firm Size</b>	.0091256 (0.458 )	.0031486 (0.759)
<b>Cash Flow</b>	.6111729 (0.000)	.6008891 (0.000)
<b>Net Working Capital</b>	-.574992 (0.000)	-.577996 (0.000)
<b>Capital Expenditure</b>	.5895649 (0.000)	.5907259 (0.000)
<b>Leverage Ratio</b>	-.433733 (0.000)	-.4324741 (0.000)
<b>Dividend Dummy</b>	-3.05e-08 (0.376)	— — (— —)
<b>H Index</b>	-1.40e-06 (0.450)	-1.35e-06 (0.465)
<b>Adjusted R<sup>2</sup></b>	47.6%	47.65%

I drop the dividend dummy in Model 4, and repeat other variables in model 3. The result of Model 4 also presents in the Table 5 and shows that no difference in Model 3.

### Change in Variables

In this part, I am going follow the model of Bates et al(2009) to find the influence of

fixed unobservable company characteristics on cash holdings. The model 5 applies the changes in the explanatory variables of Model 1 instead of their levels. The model also includes the lagged change in cash and the lagged level of cash to be explanatory variables in order to make partial adjustment of the cash ratio to its equilibrium level.

The result shows that the coefficient of change in sales growth rate, networking capital, capital expenditure level, leverage ratio and cash ratio lag are all significant at 5% level, however the coefficient values are quite low. The coefficient value of sales growth ratio is below positive 0.000 with p value of 0.000. The change in firm size has a negative coefficient with cash ratio however has a p value of 0.843. The change in cash flow has a positive relationship with cash ratio but with an insignificant p value of 0.546. There is a positive relationship between the cash ratio and change in networking capital, and the p value of 0.000 indicates the coefficient is significant. The leverage ratio and cash ratio lag both have a significant positive relationship with cash ratio, the coefficient value are 0.055 and 0.048 respectively. Lastly, the coefficient of change in dividend has a positive value which is smaller than 0.0001 and with an insignificant p value of 0.483. The R2 of this model is quite low with the value decreasing below 8%.

**Table 6**

Model	5
<b>Dependent Variable</b>	Cash/ Asset
<b>Model Description</b>	<i>Cash Ratio</i> $= \alpha + \beta_1 \Delta SalesGrowth$ $+ \beta_2 \Delta Size + \beta_3 \Delta CF$ $+ \beta_4 \Delta NWC$ $+ \beta_5 \Delta CAPEX$ $+ \beta_6 \Delta Leverage$ $+ \beta_7 \Delta Dividend\ dummy$
<b>Sample</b>	All public firms

**The Cash Holdings of UK Public firms**

<b>Intercept</b>	.0398982
<b>Sales Growth</b>	.0000108 (0.000)
<b>Firm Size</b>	0.825 (0.000)
<b>Cash Flow</b>	.0068601 (0.530)
<b>Net Working Capital</b>	.1702797 (0.000)
<b>Capital Expenditure</b>	.1065588 (0.012)
<b>Leverage Ratio</b>	.0558033 (0.000)
<b>Dividend Dummy</b>	5.50e-09 (0.440)
<b>Adjusted R<sup>2</sup></b>	8%

### Interactions

In order to find out if intercepts result from changes in the relationship between cash holdings and company characteristics, I am going to use three models to investigate the changes in both intercept and slope coefficients which followed the models Daher(2010) used .

In this model, I will let independent variables interact with the year indicator which has been added in model 2. The dividend dummy is also interacted with all independent variables however, which find collinearity therefore I drop the dividend interaction. It can be seen that the result does not change much with those obtained in model 1. The R2 slightly increase from 23.08% to 23.82%. The signs and significance of the coefficients on other independent variables are in line with model 1 except the dependent variable capital expenditure. The coefficient of capital expenditure changes from negative 0.07635 to positive 0.01390.

The interactions of the sales growth rate and year dummy, firm size and year dummy,

leverage ratio and year dummy are insignificant. The interactions of cash flow and capital expenditure are significant at 5% level.

The coefficient value of cash flow and year dummy interaction is positive 0.2182 which indicates that an increase in coefficient with time due to the same sign of the coefficient on the variable and the coefficient on the interaction with the year dummy. In contrast, the coefficient value of capital expenditure and year dummy interaction is negative 0.25122 which suggests that an decrease in coefficient with time as the different sign of the coefficient on the variable and the coefficient on the interaction with the year dummy. In another word, the coefficient is lower in the years before 2005 than those in the years after 2005.

**Table 7**

Model	6	7	8
<b>Dependent Variable</b>	Cash/ Asset	Cash/Asset	Cash/Asset
<b>Model Description</b>	$Cash\ Ratio = \alpha + \alpha_1 Year\ Dummy + \beta_n(Indpt\ Vars)_n + \gamma_n(Indpt\ Vars)_n Year\ Dummy$	$Cash\ Ratio = \alpha + \beta_n(Indpt\ Vars)_n + \gamma_n(Indpt\ Vars)_n Year\ Dum$	$Cash\ Ratio = \alpha + \alpha_1 Year\ Dummy + \beta_n(Indpt\ Vars)_n + \gamma_n(Indpt\ Vars)_n Year\ Dummy$
<b>Sample</b>	All public firms	All public firms	All public firms
<b>Intercept</b>	.1254077 (0.000)	.1219512 (0.000)	.1237448 (0.000)
<b>Sales Growth</b>	-.0000222 (0.039)	-.000022 (0.041)	-5.77e-06 (0.238 )
<b>Firm Size</b>	-.0158058 (0.000)	-.0151647 (0.000)	-.0155832 (0.000)
<b>Cash Flow</b>	.2101335 (0.000)	.2107353 (0.000)	.2102608 (0.000)
<b>Net Working Capital</b>	-.2750628 (0.000)	-.2750855 (0.000)	-.2750155 (0.000)
<b>Capital Expenditure</b>	.0139044 (0.000)	.0146281 (0.658)	— (—)
<b>Leverage Ratio</b>	-.1154322	-.1156881	-.1095478

**The Cash Holdings of UK Public firms**

	(0.000)	(0.000)	(0.000)
<b>NewYear Dummy</b>	-.0099824 (0.581)	— — (— —)	-.0041599 (0.238)
<b>Intercept And Year</b>	<b>Sale</b> .0000208 (0.085)	.0000206 (0.088)	— — (— —)
<b>Intercept and Year</b>	<b>Size</b> .0005291 (0.866)	-.0011516 (0.127)	— — (— —)
<b>Intercept Cashflow and Year</b>	<b>and</b> .2182797 (0.000)	.2155678 (0.000)	.2184409 (0.000)
<b>Intercept Capital Expenditure and Year</b>	-.2512282 (0.000)	-.2528731 (0.000)	-.2319314 (0.000)
<b>Intercept Leverage and Year</b>	<b>and</b> .0173279 (0.282)	.0178179 (0.268)	— — (— —)
<b>DividendDumm y and Year</b>	.0560007 (0.047)	.0555931 (0.048)	.0553528 (0.000)
<b>Adjusted R<sup>2</sup></b>	23.68%	23.68%	23.67%

### Intercept Dummies Omitted

The only difference between Model 7 and Model 6 is that Model 7 omitting the year dummy. The coefficient get with this model are almost the same with the result from Model 6. The only change is the coefficient sign of firm size and year dummy interaction. In the model 6, the firm size and year dummy has a positive relationship with cash ratio, however it is change to a negative relationship in this model. The p value of firm size and year dummy in model 7 suggest a insignificant which is the same with model 6.

Daher(2010) regress the last model by omitting variables and interactions which insignificant at the 5% level. And he notice that a general improvement in the



significances of the coefficients. For example, he finds the significant level of private dummy increase from 10% to 5% compare to the model including those insignificant variables and interactions. Therefore, I regress same model by exclude the variables which are insignificant at level 5% in model 6. I exclude the sales growth rate, capital expenditure, firm size and year dummy interaction, leverage ratio and year dummy interaction. I get the similar result; the significant of year dummy increase, as well as the dividend dummy and the significance of other variables remain the same.

### **Robustness Tests**

Lastly, I am going to test the robustness of the regression models carried out in the previous parts, and I am going to change the dependent variable to the log-of- cash and cash equivalent to total assets instead of the cash and cash equivalent to total assets.

The table below shows the result of regression that applied log (cash ratio) rather than cash ratio. It can be seen that the results are very comparable in sign and significance to Model 1, suggesting that the changed by the difference in the definition of the dependent variable(Daher,2010).

In contrast with the model 1, the capital expenditure becomes insignificant, and still remain the negative relationship with cash ratio. The dividend dummy still remains insignificant. The rest of the variables keep their signs and significances from Model 1. It can be also find that the R2 of this model is much lower than that of model 1. It decreases from 23.08% to 10.44%.

The robust tests of Model 2 shows that the coefficient on the year dummy is positive and significance, it is not in line with Model 2 which indicates that year dummy is positive and insignificant. The R2 of this model decreases as well, from 23.08% to

10.51%. This suggest that model 1 and 2 are capable of explaining cash ratio changes better than these two models.

I also test the Models 3.4.5.6. The robust test of Model 3 shows that the H index remains its coefficient sign and insignificance from Model 3. The significance of year dummy also increase in this model compare with Model 3. In Model 3, the year dummy is highly insignificant however which is low insignificant in this model. The R2 increased from 35.46% to 49.64%.

The test of Model 5 is not significant itself with is the same with result obtained by Daher(2010). The robust test of Model 6 reveals that the significance of year dummy increases a lot, from highly insignificant in Model 6 to significant at level 5%. The coefficient and significance of other variables almost remain the same. The intercept changes sign and the R2 decreases again in this model.

**Table 8**

Model	3	4
<b>Dependent Variable</b>	Log(Cash/ Asset)	Log(Cash/ Asset)
<b>Model Description</b>	$\log(\text{Cash ratio}) =$ $\alpha + \beta_1 \text{Sales Growth} + \beta_2 \text{Size} +$ $\beta_3 \text{CF} + \beta_4 \text{NWC} + \beta_5 \text{CAPEX} +$ $\beta_6 \text{Leverage} + \beta_7 \text{Dividend}.$	$\log(\text{Cash ratio}) = \alpha + \beta_1 \text{Sales Growth} + \beta_2 \text{Size}$ $+ \beta_3 \text{CF} + \beta_4 \text{NWC} + \beta_5 \text{CAPEX}$ $+ \beta_6 \text{Leverage} + \beta_7 \text{Dividend}$ $+ \beta_8 \text{ year dummy}$
<b>Sample</b>	All public firms	All public firms
<b>Intercept</b>	.0398982	.0717683
<b>Sales Growth</b>	-0.0000929 (0.190 )	-0.0000937 (0.186 )
<b>Firm Size</b>	.1490741 (0.000)	.158687 (0.000)
<b>Cash Flow</b>	2.777067 (0.000)	2.786395 (0.000)
<b>Net Working Capital</b>	-2.213081 (0.000)	-2.226202 (0.000)

**The Cash Holdings of UK Public firms**

<b>Capital Expenditure</b>	-.4185795 (0.000)	-.5253878 (0.132)
<b>Leverage Ratio</b>	-.9659267 (0.000)	-.9526487 (0.000)
<b>Dividend Dummy</b>	.3373171 (0.420)	.3186547 (0.446)
<b>New Year Dummy</b>	(— —) (— —)	.0880179 (0.021)
<b>Adjusted R<sup>2</sup></b>	10.44%	10.40%

## Conclusion

In this paper I investigate a large sample of UK public companies during the period from 1990 to 2010. Through summarize the data, I find an increase of the cash ratio in UK companies during the last two decades. The increase is more notable in companies pay no dividend than those companies pay dividend. At the same time, the leverage ratio increase from 1990 to 2000 and decrease from 2000 to 2010. The movement of net debt has a similar trend with leverage ratio, which is not consistent with Bates et al(2009) find in U.S. companies. This is because the leverage ratio in UK firms changed more than it changed in U.S. and the cash ratio changed relatively small in UK, therefore the trend of net debt mainly depends on the change of leverage ratio.

I focus on the relationship between cash holdings and company characteristics and find a negative relationship between cash ratio and firm size, net working capital, capital expenditures and leverage. The sales growth rate is found not relevant with cash ratio and cash flow and dividend dummy are positively related to cash ratio. For investigate the influence of agency problem to cash ratio, I also include an indicator of a ownership concentration and find that the higher the ownership concentration in a firm, resulting in less agency problems, the less the cash that firm hold.

The findings for UK companies in this paper are almost consistent with general findings in the literature for U.S. companies. There are some differences between corporate governance in U.S and UK. It has been found that the ownership of listed shares by financial institutions (including insurance companies, pension funds and unit and investment trusts) in the U.K. is very high. However, although the high proportion ownership of financial institutions, investors are not major players from a principal-agent perspective. This is because the ownership in institution investors highly dispersed; some investment and pension funds adopt passive index strategies; the low institutional involvement is also affected by insider-trading regulations.

The results only get a low  $R^2$  which indicate that there should be more variables to explain the increase in cash holdings. Moreover, due to some missing values and difficult to get data for some independent variables, the accuracy of result is influenced. Therefore, a more complete dataset with full observations could lead to sounder and stronger results.

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