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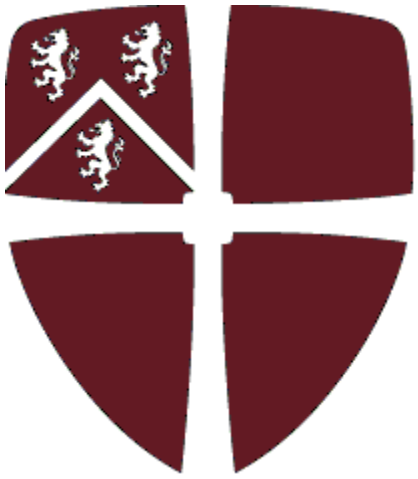

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EXCESS CORPORATE CASH HOLDINGS AND STOCK RETURNS: EVIDENCE FROM THE UK

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ABSTRACT

This study uses a sample of over 5,000 firm-year observations from firms listed on the FTSE All Share index between 1989 and 2012 and presents new evidence for the determinants of cash holdings. I find that UK cash holdings are significantly positively related to a firm's growth opportunities, leverage, cash-flow and the volatility of past industry cash-flows. I find significant negative relationships between cash holdings and capital expenditures, size and whether or not a firm pays dividends. I show that firms that hold more cash than would be expected given a set of firm-specific characteristics (high excess cash firms) underperform low excess cash firms during market expansions. However, high excess cash firms are seen to outperform during downturns. I also show that high excess cash firms invest more over the two years after being categorized as high excess cash. However I find no general relationship between a measure of excess cash and stock returns. I suggest that firms holding excess cash are doing as a precautionary measure and that the UK's corporate environment may foster excessive caution from management.

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1. INTRODUCTION

All firms hold some cash and liquid assets[1], but what determines the level of this holding? The relative size of corporate cash holdings varies dramatically, even for firms within the same industry. Vectura, a British-based pharmaceuticals business, held almost 46% of its assets in cash at the end of 2012. By contrast, GlaxoSmithKline, another British-based pharmaceuticals business, held under 4% of its total assets in cash.

There are several theories explored in the literature that seek to explain this variation in cash levels. The Trade-Off theory, the Pecking Order theory and what are referred to as Agency theories place the motivation to hold cash in a context with other financing options. Along with the transaction, precautionary and speculative motives, these theories make predictions about how much cash a firm will hold given a set of firm-specific characteristics. There have been many studies devoted to testing the explanatory power of such characteristics for firms based in America, Europe and East Asia, though few have focused on British firms.

Another strain of literature has sought to test whether or not holding high levels of cash is beneficial to a firm's shareholders. Apart from academic interest, the marginal value of *excess* cash holdings to UK shareholders is of importance to investment professionals and company management alike. Some studies have therefore looked to link high levels of cash holdings to the performance of a firm's stock price. These have again been primarily focused on the US, and so there is little evidence from the UK.

It is important to make a distinction between the UK and other areas the literature has studied, such as the US or mainland Europe. The UK has a distinct corporate environment which will affect how firms and their managers are incentivised and supervised.

[1] In this paper, 'cash' will refer to all cash and highly liquid assets held by a firm. See Chapter 3 for more information.

This study makes use of a dataset of over 5,000 firm-year observations of firms listed in the FTSE All Share Index. Sourced from DataStream, the UK sample covers the years between 1989 and 2012. The study first looks to add to the literature covering the determinants of cash holdings, where there is very little evidence from the UK equity markets. In doing so it is also possible to evaluate the predictions made by, and therefore the usefulness of, the various cash holding theories.

Secondly, this study explores the link between stock returns and an excess cash measure (ECM). Simutin (2010) finds evidence that his ECM is a proxy for risky growth options, and shows that a trader could make positive, risk-adjusted returns by investing in firms with higher cash than their peers. I look to replicate this result for a UK sample, calculating returns for portfolios of high ECM firms over the 23 year period. I also evaluate the usefulness of cash holdings in the context of the wider market conditions, as the literature presents conflicting evidence over whether high cash firms thrive in periods of market expansion or downturns.

The rest of the dissertation goes as follows. Chapter 2 of summarises the relevant literature underpinning the theories of cash holdings, explores the determinants of cash holdings and considers the reasons why excess cash may relate to stock returns. Chapter 3 details the data and methodology used. Chapter 4 presents the empirical results of the various models employed, and seeks to place them in a wider theoretical context. Chapter 5 concludes.

2. LITERATURE REVIEW

If perfect markets are assumed, a firm would be able to borrow and lend money at the same rate. This would render corporate cash holdings irrelevant (Opler, Pinkowitz, Stulz, & Williamson, 1999). When transaction costs, opportunity costs, information asymmetries and agency issues are considered, the idea that there is an optimal level of cash holdings becomes more credible.

In the following sections, the cash holding theories and motives are detailed. This is followed by a discussion on the firm-specific characteristics that determine cash holdings, and then an account of the literature linking cash holdings and stock returns.

2.1 CASH HOLDING THEORIES

In trying to answer the question "How do firms choose their capital structures", Myers (1984) contrasted two theories: Trade-Off theory and Pecking Order theory. These theories have been complimented by what can be generally described as Agency theory, incorporating the Free Cash-Flow theory from Jensen (1986) and a Risk Reduction theory detailed by Tong (2006).

2.1.1 TRADE-OFF THEORY

Kraus & Litzenberger (1973) describe a classic trade-off model in which there is an optimal point where the marginal costs and benefits of holding cash are balanced. The main benefits of holding cash include the reduced likelihood of financial distress and the ability to pursue optimal investment policy. The marginal costs of holding cash are essentially opportunity costs, the most prominent being the low return gained due to the liquidity premium.

The trade-off theory predicts that more cash is held by firms that enjoy greater marginal benefits, such as those with uncertain financial outlooks, or those with smaller marginal costs, such as those which have fewer investment opportunities. The theory implies there should be an optimal level of cash holdings for each firm.

2.1.2 PECKING ORDER THEORY

The Pecking Order theory set out by Myers and Majluf (1984) states that firms always prefer financing projects with cash to debt, while debt is preferred to equity. Cash is accrued when a firm's profits exceed its investment requirements. In this case, the surplus cash-flow is used to pay back debt and, if the firm is confident of meeting its future investment requirements and other financial obligation, cash is returned to shareholders via a dividend.

If cash is available, firms avoid borrowing or raising money through a share issue due to the extra costs involved. The extra costs involved in raising funds through debt include transaction costs and, importantly, information asymmetries. Myers and Majluf (1984) show that in a world where firms cannot share private information with capital markets, borrowing can become prohibitively expensive. This could lead to profitable investment opportunities being passed up.

Similarly, equity is costly when information asymmetries are considered. If one assumes managers act in the interests of their shareholders, then they will only issue shares to new investors when they are overpriced. If the offer was undervalued then new shareholders would gain at the expense of the old. Knowing this, rational investors will then interpret share offers as a signal that a firm is overpriced, which would lead to a drop in the share price and a blow to the wealth of existing shareholders. In order to consider issuing shares as a financing option, the value of the extra funds must be greater than the cost to the existing shareholders.

The Pecking Order theory does not predict that there is an optimal level of cash holdings; cash is seen as a shock absorber between earnings and investment requirements.

2.1.3 AGENCY THEORY

The Trade-Off and Pecking Order theories implicitly assumed that the firm was acting, in the stewardship of its managers, in the best interests of its shareholders. However, there is often a divergence between the incentives for managers and shareholders to hold cash. In other words, there is an agency issue.

2.1.3.1 FREE CASH-FLOW THEORY

As Opler et al (1999) state, in the occurrence of agency costs of managerial discretion, managers hoard cash in order to follow their own agenda at the expense of shareholders. By building up cash reserves, managers do not have their expenditures and investments scrutinised by capital markets. They are freer to invest "at below the cost of capital or [waste cash] on organisation inefficiencies" (Jensen, 1986, p. 2). Though shareholders may be best served by having cash

returned to them through a dividend or share repurchase, managers may prefer to hoard cash for future pet projects. This is the scenario presented by Jensen's (1986) Free Cash-flow hypothesis, which classifies cash holdings as free cash-flow, and finds that this problem is worsened if a firm has a surplus of free cash-flow.

Dittmar, Mahrt-Smith, & Servaes (2003) found support for this hypothesis in a study of 11,000 firms across 45 countries (including the UK). They showed that in countries where shareholders' rights are more poorly protected, firms hold more cash. This relationship was confirmed by Pinkowitz, Stulz, & Williamson (2003) in their own study encompassing 25 countries. In a study of UK firms, Ozkan & Ozkan (2003) found that if managers and shareholders' interests were aligned through increased managerial ownership of up to a quarter of a firm's shares, cash holdings declined. However, this relationship was non-monotonic, and as managers' gain more control of a firm, its cash holdings would begin to increase.

2.1.3.2 RISK REDUCTION HYPOTHESIS

Amihud & Lev (1981) put forward a hypothesis that managers select lower net-present-value (NPV) but less risky investments in order to reduce their own "employment risk", which the authors describe as the risk of losing one's job or professional reputation.

Tong (2006) presents evidence to support this hypothesis by examining CEO incentives. The author finds that firms in which CEOs have limited stock options (and therefore limited direct exposure to a firms share price) hold more cash, which reduces firm risk. They also find that each 1% increase in cash holdings reduces firm value by 0.49%. This is in keeping with the idea that management pursues policies that serve their own interests at the expense of firm value and shareholder wealth.

2.2 MOTIVES FOR HOLDING CASH

Keynes (1934) categorised the motives for holding cash as the transaction motive, the precautionary motive and the speculative motive.

2.2.1 THE TRANSACTION MOTIVE

Taken from Keynes' (1934) theories on the demand for money, and developed by Baumol (1952) and Miller & Orr (1966), the transaction cost motive is concerned with the transaction costs involved in raising outside finance. Taking on debt or selling assets will incur costs from intermediaries, and these have to be balanced against the opportunity costs of holding cash. One important distinction between this motive and the precautionary motive is the implied economies of scale. As shown by Mulligan (1997), larger firms hold less cash. This is in part because larger firms are better able to negotiate access to less costly debt, even negotiating lower fees from intermediaries.

2.2.2 THE PRECAUTIONARY MOTIVE

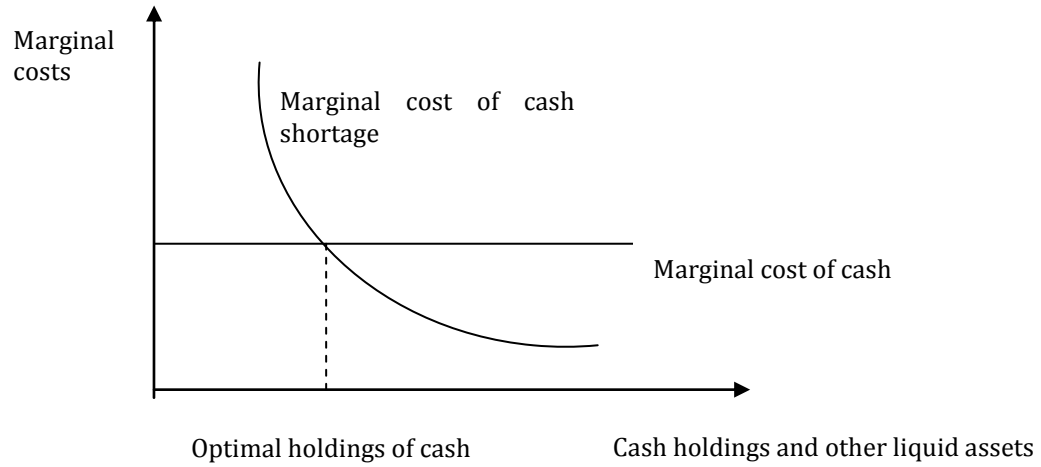
With the precautionary motive, cash is used as a hedge against a future liquidity shortage. Opler et al (1999) present a model in which the marginal costs of cash and costs of a shortage are balanced, in a similar way to the Trade-Off theory.

The main cost of holding cash is the opportunity cost which stems from the low rate of return paid to liquid assets (Ferreira & Vilela (2004)). There is no reason to think that these costs vary with the size of a firm's cash holding, so it is assumed that the marginal costs of holding cash are constant (see the horizontal marginal costs curve in **Figure 2-1**).

In a shortage – when a firm does not hold enough cash to cover payments – a firm will have to seek out external finance or liquidate assets at a cost. The marginal cost of a shortage is greater the larger the shortage. The larger the shortage is, the more leveraged the firm must become or the more illiquid assets it has to convert, hence the downward sloping marginal cost curve in

Figure 2-1. The optimal holding of cash is the point where the marginal costs of holding cash and the marginal costs of a cash shortage are equal.

FIGURE 2-1: PRECAUTIONARY MOTIVE AND OPTIMAL CASH HOLDINGS



Source: Opler et al (1999, p. 8)

Almedia, Campello, & Weisbach (2004) find evidence to support this motive by testing a sample US manufacturing firms. They found that financially constrained firms increase cash holdings as cash-flows increase, but unconstrained firms exhibited no relationship.

If there was an exogenous shock, such as an increase in the likelihood of a financial shortage due to deterioration in wider-market conditions, then the marginal cost of a cash shortage would increase and the optimal amount of cash held would increase. Baum, Caglayan, Ozkan, & Talavera (2005) showed that increased macroeconomic volatility obscures managers' ability to determine the efficient level of liquid asset holdings.

2.2.3 THE SPECULATIVE MOTIVE

Keynes' speculative motive drives managers who have private information on an upcoming investment opportunity to save cash in order to profit from it. As the information on the opportunity, the outcome of which the managers know *a priori* will be profitable, is private,

information asymmetries mean that external financing will be costlier than internal (Myers and Majluf (1984)).

If a firm does not have enough cash to cover a cost or to make an investment it has to seek alternative finance options. If taking on debt can be costly due to information asymmetry and issuing new shares can affect the wealth of current shareholders so, in a world where managers maximise shareholder wealth, positive NPV opportunities may be passed up.

A lack of cash can therefore lead to underinvestment. Myers (1977) found that a firm financed with 'risky' debt will shun valuable investment opportunities which would boost the net present value of the firm. Jensen & Meckling (1976) also show that the amount invested by a manager will be below the optimal level if outside financing, via either debt or equity, has to be sought.

2.3 THE DETERMINANTS OF CASH HOLDINGS

Each of the theories presented above have predictions on how a variety of firm characteristics affect the level of cash holdings. By studying the theory and empirical evidence relating to these determinants it is possible to critique the cash holding theories and build a picture of which types of firms 'should' hold more cash.

There has been an extensive literature which has tested the determinants of corporate cash holdings. Opler et al (1999) came up with a set of variables which exhibit explanatory power for a cross section of firms' cash holding in America. Other authors conducted similar studies using US samples, while Ferreira & Vilela (2004) looked at firms across Europe and Song & Lee (2012) studied East Asian firms. There have been few papers focusing on the UK, with only Ozkan & Ozkan (2003) conducting a partial review of Opler et al's (1999) findings for British firms.

The conclusions of the theories presented are summarized at the end of the section in Table 2-1.

2.3.1 MARKET-TO-BOOK VALUE

2.3.1.1 THEORY

This variable can be thought of as a proxy for the value of future opportunities. The book value of assets includes no valuation for a firm's growth potential, whereas the net present value of future opportunities (or at least the market's expectation of what this value is) should be captured by the market value. This ratio will be higher for firms who have more growth opportunities on the horizon.

The speculative motive for holdings cash would suggest that firms with greater investment opportunities will hold more cash. In addition, as Opler et al (1999) suggest, the precautionary motive will also be stronger for high market-to-book firms, as the investment opportunities which may have to be forgone are better than those of low market-to-book firms. This raises the cost of bankruptcy and increases the optimal level of cash holdings, suggesting a positive link between firms' market-to-book value and their cash holdings.

A different perspective is offered by Stulz (1990), who incorporates agency and information asymmetry problems into their model. The author studies a world where management derives perks from investment not shared by shareholders and invests as much as possible. If managerial discretion is high, managers will not be able to convince shareholders that the firm is underfunded and therefore risks missing out on valuable investment opportunities. Therefore, high market-to-book firms with this problem will hold less cash than one might expect. Equally, managers may hoard cash during periods of poor growth opportunities in order to over invest. So these low market-to-book firms will hold more cash than their peers. Thus, the presence of an agency problem obscures the relationship between the market-to-book ratio and cash.

2.3.1.2 EMPIRICAL EVIDENCE

Despite the fear that the positive relationship may be obscured by the problems presented in Stulz (1990), there is a good deal of empirical evidence for a positive relationship between market-to-book relationship and cash holdings.

Opler et al (1999) document a statistically significant positive relationship between the log of cash/assets and US firm's market-to-book ratio. This finding is confirmed by Simutin (2010) and Bates et al (2009) for the US, Ozkan & Ozkan (2003) for a UK sample and by Song & Lee (2012) for Asian firms.

This supports the predictions of the speculative motive: firms with better growth opportunities will hold more cash, as the cost of missing out on these opportunities is greater.

2.3.2 SIZE

2.3.2.1 THEORY

As detailed previously, the transaction motive for holding cash has implied economies of scale (Mulligan, 1997). Larger firms could have better access to equity markets. As Barclay & Smith (1995) point out, there are large fixed costs to a public issue, which result in economies of scale. This lowers the marginal cost of external financing, meaning the optimal cash holding would be reduced.

In addition, the precautionary motive may be weaker for larger firms as they are more diversified, thereby carrying less risk of financial distress, according to Titman & Wessls (1988).

2.3.2.2 EMPIRICAL EVIDENCE

The log of real size is found by Opler et al (1999) to have a significant negative correlation with the log of cash/assets. Simutin (2010) also confirmed a negative link between the log ratio of cash to assets and the log of real size. Bates et al (2009) captured the same negative relationship, but using cash/assets or the log of net cash/assets as the dependant variable.

Ferreira & Vilela (2004) found evidence for this negative relation across a number of European countries, though Ozkan & Ozkan (2003) find no evidence for UK firms.

Overall, the evidence confirms the economies of scale predictions made by the transaction motive. However, it would be useful to confirm this link in a UK sample.

2.3.3 CAPITAL EXPENDITURE

2.3.3.1 THEORY

The Trade-Off theory would predict that firms with higher capital expenditures would hold more cash as a buffer against a possible shortage, as such a firm would experience high costs in the face of financial distress. By contrast, the Pecking-Order theory might predict a negative relationship between capital expenditures and cash holdings, as firms with higher capital expenditure would have less surplus cash-flow with which to build cash reserves.

Bates et al (2009) propose that capital expenditures can create assets which could be used as collateral, which in turn could increase a firm's capacity for debt. This would reduce the firm's demand for cash, and so would imply a negative relation between capital expenditure and the amount of cash held.

2.3.3.2 EMPIRICAL EVIDENCE

Depending on the model used, Opler et al (1999) find both positive and negative relationships between capital expenditures/assets and the log of cash/assets. Simutin (2010) finds a significant negative relationship between the two variables. Bates et al (2009) also find a negative relationship between cash/assets and capital expenditures, though they also show a statistically significant positive relation between the log of cash/net assets and capital expenditures/assets. Song & Lee (2012) found a negative relationship between the ratio of cash to the book value of assets and investment (defined as capital expenditures plus acquisitions, as a proportion of assets).

Riddick and Whited (2009) also find that these two may have a negative relation. They show that firms invest more after receiving a temporary positive productivity shock, as investment effectively becomes more valuable and there is an incentive to 'dissave' – to use cash reserves to raise investment.

2.3.4 RESEARCH AND DEVLOPMENT COSTS

2.3.4.1 THEORY

Research & Development costs (R&D) could be considered a proxy for growth opportunities – the higher the spending on R&D, the more valuable future investment opportunities will become. The speculative motive would therefore predict a positive relationship between cash holdings and R&D spend. Opler et al (1999) state that R&D expenses are a type of investment for which information asymmetries are most important, as it is hard for outside financiers to evaluate the true value of the growth opportunities that may arise.

The Pecking Order theory, however, would predict a negative relationship between cash and R&D. Using the same logic presented for capital expenditure, as a firm spends more on R&D, there is less surplus cash-flow that can be accumulated.

2.3.4.2 EMPIRICAL EVIDENCE

R&D costs/sales have a significant positive correlation with the log of cash/assets according to empirical evidence presented by Opler et al (1999). These findings are replicated by Bates et al (2009) and Simutin (2010). This supports the predictions of the speculative motive.

2.3.5 DEBT

2.3.5.1 THEORY

The Pecking Order theory implies a negative relation between the amount of cash held and the amount of debt, according to Opler et al (1999). If a firm is highly leveraged, then it will find it increasingly costly to take on extra debt and will find interest costs increasingly arduous to meet. Firms will therefore use cash to reduce their level of debt, leading to the negative relation.

Ferreira & Vilela (2004) present another interpretation. The authors suggest that Trade Off theory may imply a positive relationship, as leverage increases the likelihood of bankruptcy, which will induce firms to hold more cash.

Opler et al (1999) set out a form of Agency Theory in which a firm's management pursues their own interests, deliberately steering the firm's corporate finance policy to avoid supervision. By having a low level of debt, the firm is less subject to the monitoring of capital markets and is more likely to hold excess cash. This would indicate a negative relationship.

Conversely, Acharya, Almeida and Campello (2007) hypothesise a positive relationship between debt and cash. They set out a scenario in which a firm has positive NPV projects in the future but anticipates finding it difficult to fund such opportunities when the time comes. The firm therefore either boosts its cash reserves or increases its debt capacity in order to hedge for this risk. It can do this by paying off debt with its cash reserves in order to more cheaply take on debt in the future or by borrowing more now in order to top up its cash balances. Either way, the firm can boost its future funding capacity and therefore its ability to take on all positive NPV investments. Cash and debt therefore has a positive relationship in this case.

2.3.5.2 EMPIRICAL EVIDENCE

The measure used to characterise a firm's debt, or leverage, varies from paper to paper. However, Opler et al (1999), Bates et al (2009) and Simutin (2010) all find a significant negative relationship between cash holdings and debt for US firms, while Ozkan & Ozkan (2003) repeated this for a UK sample. This supports the hypothesis presented by the trade-off theory, but does not rule out the idea of high-cash firms being run for the benefit of managers who stay clear of the supervision that debt brings.

2.3.6 CASH-FLOW

2.3.6.1 THEORY

According to Pecking Order theory one would expect, *ceteris paribus*, that firms with higher cash-flows would accumulate more cash. Jensen's (1986) Free Cash-flow theory would support this positive correlation. If a firm has high cash-flows relative to assets, this empowers managerial discretion. Holding cash is beneficial to management, rather than returning it to shareholders, and so large cash reserves are accrued.

Kim, Mauer, & Sherman (1998) state that cash-flow provides liquidity to meet operating costs, and it is therefore a substitute for cash holdings. This would imply a negative relationship.

2.3.6.2 EMPIRICAL EVIDENCE

Bates et al (2009) find no significant relationship between cash-flow/assets and cash/assets using pooled ordinary least squares (OLS), though they do document a significant positive relationship using a fixed effects model. However they find a significant negative relationship between cash-flow/assets and the log of cash/net assets.

In their UK study, Ozkan & Ozkan (2003) also find some evidence for both positive and negative relationships using different models, though the positive correlation was only significant at the 10% level. Both Opler et al (1999) and Simutin (2010) record a significant positive relationship between the ratio of cash-flow to assets and the log of cash to assets for US firms. In addition, Ferreira & Vilela (2004) find a positive relationship in their study of European firms. These findings support the predictions of the Pecking Order and Free Cash-flow theories. However, some more work is required to establish this link in a UK sample.

2.3.7 VARIATIONS OF INDUSTRY CASH-FLOWS

2.3.7.1 THEORY

According to the precautionary motive for holding cash, firms will hold more cash if their outlook is harder to predict. The volatility of a firm's industry's cash-flow gives a good

indication of the level of uncertainty felt by managers. Although this affect will vary by industry, one would expect a positive link between industry cash-flow volatility and the level of cash held by individual firms.

2.3.7.2 EMPIRICAL EVIDENCE

Opler et al (1999) categorise firms into industries based on definitions provided by Kenneth French. They find that the average standard deviation of industry cash-flow is significantly positively related to the log of cash/assets. Bates et al (2009) and Simutin (2010) follow this method and produce similar results.

Arena & Julio (2011) study the effect of litigation risk on firms' cash holdings and investment. They found that firms held more cash if the risk of litigation increased in their industry, showing that firms' cash holdings react positively to increases in industry volatility.

This implies that precaution is a strong motive for holding cash, with firms increasing cash holdings due to uncertain business prospects.

2.3.8 WORKING CAPITAL

2.3.8.1 THEORY

Shleifer & Vishny (1992) explore a situation in which a firm experiences a shortage of cash. In order to raise money the firm must sell off assets to its peers. However, firms in the same industry may be experiencing the same financial constraints and therefore less able to act as buyers. Non-firm or non-industry specific assets and those that are more liquid are easier to sell, and reach a higher price. Firms holding such assets will therefore hold less cash. Net working capital is one of the most liquid forms of assets, and therefore a negative relation between working capital and cash is expected. This is in keeping with the predictions of the Trade-Off model.

2.3.8.2 EMPIRICAL EVIDENCE

The ratio of Net working capital/assets is shown by Opler et al (1999) to be negatively related to cash holdings in their sample of US firms, in keeping with the predictions made by Shleifer & Vishny (1992). Bates et al (2009) and Simutin (2010) confirm this relation, while Ferreira & Vilela (2004) had similar results with a European sample.

In their UK study Ozkan & Ozkan (2003) did not test working capital, though they did test a measure of a firm's liquid assets. They found a negative relationship between the ratio of cash to total assets and the proportion of total assets which were classified as current assets.

2.3.9 DIVIDEND DUMMY

2.3.9.1 THEORY

In many studies, a dividend dummy is included. Bates et al (2009) state that a firm paying dividends is likely to be less risky and to have greater access to capital markets. The precautionary motive for holding cash is therefore weaker, and so a negative relation is expected.

Ferreira & Vilela (2004) have a slightly different hypothesis. They suggest that a firm that currently pays dividends has the option of reducing these dividends in a crisis, therefore reducing the likelihood that they will need to raise costly external funds. These firms would therefore hold less cash. This is in keeping with the pecking-order model, and again suggests a negative relationship. One criticism of this hypothesis is that reducing dividends is seen as a negative signal by investors, and could drive down the share price of a firm. This would be value-destroying for shareholders, who may therefore find it preferable for firms to take on debt.

2.3.9.2 EMPIRICAL EVIDENCE

Opler et al (1999) find that their dividend dummy has a statistically significant negative relationship to their measure of cash holdings. This result was replicated by Bates et al (2009)

and Ferreira & Vilela (2004), but not by Simutin (2010), who did not find a statistically significant relationship.

Instead of using a dummy variable, Ozkan & Ozkan (2003) included dividends/assets as an independent variable in their model. They find no significant evidence that there was a relation between dividend policy and cash holdings for UK firms. Again, some work is required to replicate the results achieved for US samples with UK firms.

TABLE 2-1: A SUMMARY OF PREDICTIONS OF THE CASH HOLDINGS THEORIES

This table summarises the predictions made by the cash holdings theories of the relationship between cash holdings and the 'determinants'. A '+' sign indicates a positive correlation predicted, while a '–' sign indicates a negative predicted relationship.

Determinants	Pecking Order	Trade-Off	Agency	Transaction	Precautionary	Speculative
Market-to-book			±		+	+
Size				–	–	
Capital Expenditure	–	±				
R&D	–					+
Debt	–	+	–			+
Cash-flow	+		+		–	
Industry Volatility					+	
Working Capital		–				
Dividend Dummy	–				–	

2.4 DO CORPORATE CASH HOLDINGS AFFECT STOCK RETURNS?

2.4.1 THEORY

The literature has presented many motives for firms to hold cash. If a firm is holding excess cash (more cash than similar peers), then it will be because one or more of these motives has had a particularly strong influence on the firms or their managers.

Simutin (2010) states that the precautionary motive would suggest that firms holding excess cash could be facing particularly poor or uncertain futures. This would imply a negative relationship between cash holdings and stock returns. Rao, Tang, & Chandrashekar (2013) suggest that if the precautionary motive for holding cash is significant, then firms with greater cash reserves are more likely to perform better during downturns. Mikkelson & Partch (2003) also showed that the costs of transforming cash substitutes into cash were particularly high during recessions, and find that financially constrained firms were more affected by macroeconomic conditions.

By contrast, the speculative motive would suggest that firms are hoarding cash in order to invest in future growth opportunities (Simutin (2010)). If so, this would imply a positive relationship between excess cash and both future investment and stock returns. In addition, firms with more excess cash would perform particularly well during times of market expansion (Rao et al (2013))

If the agency theory is to be followed, firms with excess cash may be making value-destroying investments in order to pursue managers own interests, or may simply be making overly-cautious investments to insulate the management from employment risk. Easterbrook (1984) suggests that trips to external capital markets restrict this agency problem by providing extra scrutiny of management's plans. If a firm accrues a large amount of cash, it does not have this supervision mechanism. One would expect such firms' stock prices to perform poorer than their low excess cash peers.

Harford (1999) looked at whether excess cash led managers to make value-decreasing investment decisions. He found that excess cash was coupled with increased acquisitions, and these acquisitions had a negative effect on firm value. However, Mikkelson & Partch (2003) present findings which contradict Harford's (1999). They find that US firms which held a high proportion of assets in cash exhibited greater operating performance than their peers.

It is worth considering the fact that many of the quoted studies focus on US firms. As this paper considers the link between excess cash and stock returns for UK firms, any difference in corporate governance could have an effect on the expected results. Ozkan & Ozkan (2003) study the determinants of UK corporate cash holdings, focusing on measures of corporate governance and managerial behavior. They posit that "the UK corporate sector is characterised by insufficient external market discipline and the lack of efficient monitoring by financial institutions and company boards" (Ozkan & Ozkan, 2003, p. 2104). This would suggest there would more likely be a negative relation between cash and returns in my sample of UK firms than in the US samples used in other papers as the agency motive may be stronger.

2.4.2 EMPIRICAL EVIDENCE

Using a sample of firms from the US, Simutin (2010) establishes a positive link between excess cash and stock returns in two ways. The first is by constructing a series of portfolios on the basis of excess cash levels. Between 1960 and 2006, the spread between the returns from the portfolio containing the top 10% of firms with high excess cash and the portfolio containing the bottom 10% of excess cash firms was 0.4% per month. This result took into account the differences in the betas of the firms, so as to remove the possibility that this result was due to higher marker risk. However, in times of market slowdowns high excess cash firms underperformed their peers by 0.31% a month.

Secondly, Simutin (2010) regressed stock returns on his excess cash measure and a variety of other variables in order to test the robustness of the positive link. He finds that despite controlling for firm size, firm risk, momentum and other factors, excess cash still has significant explanatory powers. Simutin (2010) concludes that the speculative motive is behind the holding of excess cash.

Palazzo (2010) finds a positive link between cash holdings and stock returns, again by creating a series of portfolios of US firms. By sorting firms by size, market-to-book value and cash

holdings, the author is able to establish that high cash-to-assets firms enjoy positive excess returns on average compared to low cash-to-assets firms. The minimum spread achieved was 27 basis points per month, with a maximum of 97 basis points.

Rao, Tang, & Chandrashekar (2013) used a different measure of cash holdings than the majority of the previous literature. Their measure 'C' was a scaled measure of a firm's cash per dollar of investment. They showed a trading strategy which went long on a portfolio of the firms with the top 10% C ratings (i.e. highest cash to investment opportunities rating) and short on the bottom 10% made an average monthly return of 1.05%.

Rao et al (2013) also found that the effect of their 'C' measure was particularly strong in years of market expansion, and was not significant during downturns. This finding is contrasted Harford, Mikkelson, & Partch (2003), who conclude that American firms with high cash reserves were guilty of harmful overinvestment during non-downturn periods. However, this effect was reversed during downturns, when the extra cash provided a beneficial internal source of finance for investment.

Simutin (2010), Palazzo (2010) and Rao et al (2013) suggest that the speculative motive is what induces firms to hold excess cash, not the precautionary motive. As much of the literature found a positive link between excess cash and stock performance, it is also tempting to dismiss the Agency motives for holdings cash, as these would no doubt lead to a negative link.

CHAPTER 3 – DATA AND METHODOLOGY

3.1 DATA

My study focuses on firms that were included on the FTSE All Share index as of May 2013[2]. That is, all firms that are traded on the London Stock Exchange, apart from financial and utilities firms which were excluded on the grounds that they are subject to regulation regarding how much capital is held (in line with Simutin (2010)).

The main sample runs from 1989 until 2011, with data from 1980-1989 being used to calculate some lagged variables. Each value in the dataset is taken from the 31st of December of each year. The annual dataset was sourced from DataStream.

3.1.1 DATASET USED TO TEST THE DETERMINANTS OF CASH HOLDINGS

This dataset had 5002 firm-year observations. This was an unbalanced sample, with data on 315 individual firms. The definitions of each of the variables used in the initial model are listed in Table 3-1.

Following Bates et al (2009), the ratio of cash/assets was chosen as the dependant variable over the log of the cash/assets ratio, as was used in Simutin (2010). Other measures, such as cash/net assets (as used by Opler et al (1999) have the effect of producing extreme outliers according to Bates et al (2009).

[2] It is worth noting that due to the nature of the data source, firms which were listed in the FTSE All Share index but are no longer listed are excluded from the sample. This could give rise to survivor bias, which is discussed in chapter 5.

TABLE 3-1: DESCRIPTIONS OF THE DETERMINANTS OF CASH HOLDINGS

Variable	Code	Definition
Cash-to-assets ratio	Cash/Assets	Dependent variable. The value of cash held, including marketable securities and cash equivalents, divided by total assets.
Market-to-book ratio	MB	The book value of assets, minus the book value of equity, plus the market value of equity, divided by total assets.
Size	LogSize	The log of real assets, adjusted by CPI to 1980 pounds.
Capital expenditure	CPX	The ratio of capital expenditures to total assets.
Working capital	WC	Net working capital, minus cash, divided by total assets.
Long term debt	LTD	Long term debt divided by total assets.
Research & development	RD	Research and development costs, divided by sales. Firms without R&D listed were assumed to have no R&D costs.
Cash-flow	CF	Operating income divided by total assets.
Industry cash-flow	MyInd	The geometric mean of the standard deviation of CF over 10 years for firms in the same industry. Industry definitions adapted from Kenneth French's industry definitions using SIC codes.[3] A minimum of three observations were used to calculate standard deviations.
Dividend dummy	Div	A dummy variable which was equal to 1 if a dividend was paid by the firm during the year, or 0 otherwise.

Table 3-2 shows the descriptive statistics for each of the variables tested. There were a number of outliers observed in the data, some of which were removed or, in the case of the size variable a log was taken to reduce the variations.

[3] Industry definitions taken from Kenneth French's website, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html. However, due to a lack of firms in certain industries the definitions were broadened. 'Chems' companies were included in the 'Cnsum' industry, 'Steel' and 'Fabpr' firms were included in 'Cnstr', 'Cars' firms were included in 'Trans', 'Clths' and 'Durb' were included in 'Rtail' and 'Finan' companies were put in 'Other'.

TABLE 3-2: DESCRIPTIVE STATISTICS, EXCESS CASH ESTIMATION

Variable	Mean	Median	Standard Deviation	Minimum	Maximum	Count
Cash/Assets	0.09	0.06	0.11	0	0.99	5002
MB	-0.13	-0.05	0.34	-0.97	9.34	5002
LogSize	12.75	12.57	1.82	4.71	18.62	5002
CPX	0.06	0.05	0.06	0.00	0.60	5002
WC	-0.01	0.02	1.47	-65.59	0.85	5002
LTD	0.22	0.12	2.70	0	125.89	5002
RD	0.02	0	0.13	0	4.57	5002
CF	0.10	0.11	0.27	-13.09	1.38	5002
MyInd	6.75	6.51	3.32	0.95	22.81	5002

Table 3-3 presents the correlation between the dependant and independent variables used in the regression. The high correlation between CF and WC stands out, as does the correlation between MB and WC. The WC variable was dropped from the final model due to insignificant t-statistics (without much impact on the explanatory power of the overall model), and this correlation may have been a factor in the lack of significance.

TABLE 3-3: CORRELATION BETWEEN VARIABLES

	Cash/Assets	MB	LogSize	CPX	WC	LTD	RD	CF	Div	MyInd
Cash/Assets	1									
MB	0.08	1								
LogSize	-0.25	-0.19	1							
CPX	-0.07	0.19	-0.05	1						
WC	-0.01	-0.62	0.09	0.01	1					
LTD	0.13	0.34	-0.10	-0.02	-0.03	1				
RD	0.20	-0.03	-0.05	-0.05	0.01	-0.01	1			
CF	-0.01	-0.62	0.11	0.12	0.77	-0.44	-0.03	1		
Div	-0.20	-0.05	0.18	-0.02	0.07	-0.07	-0.18	0.17	1	
MyInd	0.09	-0.14	-0.07	-0.09	-0.02	0.01	0.03	-0.02	-0.07	1

3.1.2 DATA USED TO TEST THE LINK BETWEEN EXCESS CASH AND STOCK RETURNS

The same annual dataset was used to calculate the measure of excess cash, to calculate returns from the excess cash portfolios and in the model regressing stock returns on excess cash. . In Table 3-4, variables quoted in the analysis and used in the models are defined.

TABLE 3-4: VARIABLE DEFINITIONS, EXCESS CASH, STOCK RETURNS AND INVESTMENT

Variable	Code	Definition
Excess cash	ECM	The difference between the actual cash/assets ratio and the value implied by the coefficients from the initial regression.
Beta	Beta	Each firm's market beta was calculated from daily return index data.
Return on assets	ROA	Operating income before depreciation, divided by total assets.
Debt	Debt	Long term debt divided by the sum of long term debt and market value of equity.
Accruals	Accr	Calculated following Simutin (2010), [(change in current assets – change in cash) – (change in current liabilities – change in short term debt – changes in taxes payable) – depreciation expense]/total assets.
Asset growth	Ag	Ratio of total assets to lagged total assets minus one.
Stock Returns	Returns	The percentage change in the returns index from the current year to the next.
Book-to-market	BM	Log of the book-to-market ratio, following the definition in Davis, Fama & French (2000).
Investment	Invest	Capital expenditures plus acquisitions, divided by total assets.

3.2 METHODOLOGY

3.2.1 TESTING THE DETERMINANTS OF CASH HOLDINGS

The model used to define the determinants of cash holding follows that used by Simutin (2010), which itself builds on Opler et al (1999). Using my annual dataset, I ran a panel data regression:

$$Cash/Assets_{it} = \gamma_0 + \gamma_{1t}MB_{it} + \gamma_{2t}LogSize_{it} + \gamma_{3t}CPX_{it} + \gamma_{4t}WC_{it}$$

$$+\gamma_{5t}LTD_{it} + \gamma_{6t}RD_{it} + \gamma_{7t}CF_{it} + \gamma_{8t}MyInd_{it} + \gamma_{9t}Div_{it} + \varepsilon_{it}$$

(EQUATION 1)

where the aim was to test whether γ_1- γ_9 were significantly different from zero. A pooled OLS, static panel data model was used to generate the results. A number of different econometric techniques have been applied in previous literature; Opler et al (1999) and Simutin (2010) utilised cross-sectional regressions, while Opler et al (1999) and Bates et al (2009) tested using a fixed effects model. Though a fixed effects version of my model achieved higher values of R^2, many of the independent variables lost their explanatory power. I therefore followed the OLS panel model used in Bates et al (2009). Time dummies were also included in the specification.

3.2.2 CALCULATING THE EXCESS CASH MEASURE

Once I had attained the coefficients from the regression detailed above, I was able to calculate a level of 'expected' cash for each firm-year observation. This was done by multiplying the observed levels of each determinant with the corresponding coefficient. The excess cash measure (ECM) was calculated by taking the difference between the actual cash/assets ratio and the ratio predicted by the model. Thus those firms with more cash than expected had positive measures of excess cash, and those firms with less cash than expected had negative excess cash measures.

3.2.3 CONSTRUCTING EXCESS CASH PORTFOLIOS

A common technique used in the literature is to construct portfolios in order calculate returns of a particular group of firms (Simutin (2010), Rao et al (2013)). Taking each year at a time, I split the pool of firms into four quartiles based on their market betas, following Simutin (2010). Each quartile was then split into five quintiles based upon their level of excess cash. The market weighted returns of the highest and lowest excess cash quintiles was then calculated using the

market value of each firm. The returns were calculated using the Returns Index provided by DataStream, which includes dividend payments, in the way described for the 'Returns' variable in the above table. This process was done for each year in the sample (1989-2011).

The portfolios are held for 12 months and then rebalanced. I am then able to calculate the returns from a trading strategy which goes long on the highest excess cash quintile and short on the lowest excess cash quintile.

3.2.4 REGRESSING STOCK RETURNS ON EXCESS CASH

By regressing stock returns on ECM, I was attempting to confirm a link between the two. Again, a static panel data approach was used, with the same annual dataset as before. By including other variables in the specification, I was ensuring excess cash was not simply a proxy for characteristics previously linked with stock returns. Following Simutin (2010), the specification for the model was:

$$Returns_{it+1} = \gamma_0 + \gamma_{1t}ECM_{it} + \gamma_{2t}Beta_{it} + \gamma_{3t}BM_{it} + \gamma_{4t}ME_{it}$$

$$+\gamma_{5t}Ag_{it} + \gamma_{6t}Accr_{it} + \gamma_{7t}Invest_{it} + \gamma_{8t}CF_{it} + \gamma_{9t}Debt_{it} + \varepsilon_{it}$$

(EQUATION 2)

where the variables were calculated as described in the previous section. The null hypothesis tested was that γ_1 was equal to zero. The significance of each variable was evaluated, and any insignificant explanatory variables removed then the model re-tested. An initial regression was also run with only ECM as an explanatory variable. The three key models, which utilised pooled OLS, are presented in the Results chapter.

3.2.5 CALCULATING PAST AND FUTURE INVESTMENT FOR ECM DECILES

This step used the same dataset used to construct the ECM portfolios as outlined in Section 3.2.3, and adapted the method used in Simutin (2010). For each year 't', firms were separated

into ECM quintiles. The ratio of Investment, as defined in Table 3-4, from the previous 5 years and the next 5 years was then calculated. All observations from all years were then aggregated so that each ECM quintile included observations from each year (e.g. the top 20% of excess firms from 2000, 2001, 2002 and so on). Then an average of all available values of past and future investment was calculated for each ECM quintile.

CHAPTER 4 – EMPIRICAL RESULTS

4.1 THE DETERMINANTS OF CASH HOLDINGS

During the Literature Review various 'determinants' of cash holdings were introduced. Different theories predict different relationships between these determinants and cash holdings. Table 4-1 summarizes the result of my regression analysis, along with the sign on the coefficients that were predicted by consensus in the literature.

TABLE 4-1 DETERMINANTS OF CASH HOLDINGS

This table reports on the results of the panel data regression used to estimate the determinants of corporate cash holdings, with the specification:

$$Cash/Assets_{it} = \gamma_0 + \gamma_{1t}MB_{it} + \gamma_{2t}LogSize_{it} + \gamma_{3t}CPX_{it} + \gamma_{4t}LTD_{it}$$

$$+\gamma_{5t}RD_{it} + \gamma_{6t}CF_{it} + \gamma_{7t}MyInd_{it} + \gamma_{8t}Div_{it} + \varepsilon_{it}$$

where the variables are defined as described in the previous chapter. Year dummies were also included. The sample contains UK-listed firms from 1989 to 2011, and excludes financial and utility firms.

	Predicted sign	Coefficient	t-Statistic
Constant		0.261	8.85
MB	+	0.063	4.12
Log Size	−	-0.012	-6.48
CPX	−	-0.217	-3.72
LTD	−	0.005	16.70
RD	+	0.143	5.14
CF	±	0.092	4.36
MyInd	+	0.002	2.58
Div	−	-0.046	-3.89
R^2	0.172	No. of observations	5002

All variables significant at 1% level.

Despite the strong significance of each of the explanatory variables, the model's R^2 is only 0.17. This indicates that the listed variables only explain 17% of deviations in cash holdings. However, it is an improvement on alternative specifications of the model, and comparable to R^2's achieved in the literature using OLS models (see Bates et al (2009)).

The results show that market-to-book value (MB) is positively related to the cash/assets ratio, confirming the findings of Opler et al (1999) and Ozkan & Ozkan (2003), among others. This supports the predictions made by the speculative motive.

Unlike Ozkan & Ozkan (2003), I am able to find evidence for the negative relationship between a firm's size (LogSize) and its cash holdings in the UK. Again, this result echoes the previous literature on US firms (Opler et al (1999), Simutin (2010), Bates et al (2009)), and supports the idea that there are economies of scale within the transaction motive for holding cash.

The results show a significant negative correlation between cash/assets and capital expenditure (CPX), which is in line with Opler et al (1999) and other studies. This could support Bates et al's (2009) proposition that capital expenditures create assets which could be used as collateral, increasing a firm's capacity for debt and lowering its demand for cash.

Going against much of the evidence previously presented in the literature, including Ozkan & Ozkan (2003)'s UK study, I find a significant positive relationship between cash holdings and debt (LTD). This lends support to Ferreira & Vilela's (2004) interpretation of the Trade Off theory, or Acharya et al's (2007) interpretation of the speculative motive.

I find that the relationship between cash/assets and R&D costs (RD) is significantly positive, as predicted by the speculative motive. This is in link with the findings from US studies and, to the best of the author's knowledge, the first time this has been confirmed for British firms.

The link between cash/assets and a firm's cash-flow (CF) is also found to be positive, as Opler et al (1999), Ferreira & Vilela (2004) and Simutin (2010) had previously shown. This lends support to the Pecking Order prediction that firms experiencing high cash-flows, relative to their assets, accrue more cash, although also fulfills the prediction of Jensen's (1986) Free Cash-flow theory.

In line with Opler et al (1999), Bates et al (2009) and Simutin (2010) , I find that the cash/assets ratio is significantly positively related to the standard deviation of industry cash-flows (MyInd). So firms which face a more uncertain future due to historic volatility will save more cash as a precautionary measure.

Finally, I find that the dividend dummy (Div) is negatively related to cash/assets. This backs the idea presented by Bates et al (2009) that firms that pay are less risky and have greater access to capital markets. Although Opler et al (1999), Bates et al (2009) and Ferreira & Vilela (2004) confirmed this relationship for American and European samples, it is a new result for UK firms.

In previous literature, the relationship between the ratio of cash/assets and working capital (WC) was negative, and statistically significant. Though a negative coefficient was found in my model, it was not statistically significant even at the 10% level. The variable was therefore removed from the specification.

4.2 ESTIMATING THE EXCESS CASH MEASURE

Using the model predicting cash holdings I developed in the previous section, I was able to calculate a value for the expected ratio of cash to total assets for each firm-year observation. By differencing the observed and predicted ratios, I obtained an Excess Cash Measure (ECM). Table 4-2 details some descriptive statistics for the ECM. As one might expect, there is a significant spread from the firm with the most excess cash to the least.

TABLE 4-2: DESCRIPTIVE STATISTICS FOR EXCESS CASH

	Mean	Median	Standard Deviation	Minimum	Maximum	Count
ECM	0.022	0.002	0.097	-0.536	0.856	5002

In order to characterise firms which do hold excess cash, and those which are relatively cash short, I split the over-5000 strong pool of firm-year observations into ECM deciles. **Table 4-3** details the averages of a number of characteristics of the different deciles. From this we learn that the highest 10% of ECM firms hold 32% of total assets in cash, as opposed to the 1.5% held by the lowest ECM decile.

TABLE 4-3: ECM CHARACTERISTICS

This table reports the averages of selected characteristics of each Excess Cash Measure (ECM) decile that firm-year observations are assigned to. The characteristics are defined in Chapter 3. The sample period is 1989-2011.

ECM	Cash/Asset	Beta	BM	LogSize	ROA	CF	Debt	Accr	Ag
Low	0.015	0.39	6.30	11.39	0.068	0.11	0.13	-0.02	0.08
2	0.024	0.43	6.27	12.23	0.068	0.11	0.17	-0.02	0.12
3	0.031	0.52	6.11	12.59	0.075	0.12	0.18	-0.03	0.12
4	0.040	0.62	6.17	13.15	0.067	0.11	0.20	-0.03	0.11
5	0.048	0.68	6.09	13.49	0.076	0.11	0.19	-0.03	0.14
6	0.062	0.73	6.16	13.66	0.076	0.11	0.19	-0.03	0.14
7	0.082	0.63	5.97	13.52	0.075	0.11	0.15	-0.04	0.15
8	0.112	0.62	6.02	13.47	0.071	0.10	0.15	-0.04	0.19
9	0.169	0.63	5.89	12.81	0.079	0.12	0.11	-0.04	0.15
High	0.316	0.62	5.73	12.16	0.102	0.13	0.06	-0.07	0.20
High-Low	0.30	0.23	-0.56	0.77	0.03	0.02	-0.07	-0.05	0.12

One can think of cash as the least risky form of assets, thanks to its liquid properties. Therefore one might expect firms with high ECM to be less risky. However, this seems to be contradicted by the average Betas of the ECM deciles. While the average Beta peaks in the 6th decile, it is obvious that the highest cash deciles exhibit more risk than the lowest deciles. As Simutin (2010) points out after a similar finding in his paper, this general positive relationship "can be justified if excess cash proxies for the presence of risky growth options" (Simutin, 2010, p. 1201).

The Debt measure is essentially a gauge of leverage. Despite the positive correlation found between LTD and Cash in the last section, I would expect to see a negative relationship between leverage and ECM as predicted by the Pecking Order theory. Although no monotonic relationship is observed, it is true that the firms with the lowest levels of excess cash have higher leverage.

Of particular note are the monotonic relationships seen between ECM and accruals (Accr) and asset growth (Ag). These relationships were also found by Simutin (2010), and it is important to make sure the findings of the model regressing returns on ECM are not affected by these relationships by including them as independent variables.

4.3 COMPARING RETURNS FROM EXCESS CASH PORTFOLIOS

What effect does holding more cash than their peers have on firms' stock returns? This question is important in the context of isolating a motive for holding cash. If a positive relation could be found – such as in Simutin (2010) or Rao et al (2013) – then it could be evidence that the managers of UK firms save cash in order to fund future risky investments. Alternatively, if a negative link is found then it could imply that managers are saving due to concerns for the firm's future cash-flows, or that excess cash is a sign that agency issues are at work. The generally positive link established in the previous section between excess cash and a firms Beta might suggest the former is the case.

The first step taken to establish a link between my excess cash measure (ECM) and stock returns is to create portfolios of high and low excess cash and compare the annual returns. The firms are sorted each year, first by their betas and then by their ECM, as described in Chapter 3.

Table 4-4 shows that while the high ECM firms (those with the most excess cash) achieve healthy 15% a year average returns, this is bettered by low ECM firms. If a trader was to follow a strategy of going long on the high cash portfolio and short on the low cash portfolio, they

would make an average annual loss of 2%. This result is evidence of a possible negative link between excess cash and returns, hinting that cash may be either held for precautionary or agency reasons.

TABLE 4-4: ECM PORTFOLIOS, AVERAGE ANNUAL RETURNS

This table reports the average value-weighted returns, in percent per year, for High and Low cash portfolios. Portfolios returns are calculated as described in Chapter 3. Average annual returns for the FTSE All Share index are calculated using the returns index provided by DataStream.

Period	FTSE	Low ECM	High ECM	High-Low
1990-2012	8%	17%	15%	-2%
1990-2000	12%	19%	21%	2%
2001-2012	4%	15%	10%	-5%

By splitting the sample, it is evident that this poor performance was not uniform across the twenty-three years. The trading rule made a small profit over the first 11 years, followed by a larger loss in the twelve years to 2012. It is worth noting that both the high and low ECM portfolios beat the average annual market return, though they exhibited a higher standard deviation of returns.

Both sub-periods presented in Table 4-4 included times of growth and times where the market and wider economy was weak. As Harford et al (2003) found that high cash reserves were beneficial during downturns and Simutin (2010) and Rao et al (2013) found that high cash firms prospered during periods of growth, I separate the sample into three categories based on wider market conditions. By using the FTSE All Share index as a measure of market conditions, following the method used in Simutin (2010), I was able to calculate the average returns of each portfolio during low (category 1), medium(2) and high (3) growth periods.

Table 4-5 shows that high excess cash firms underperform low excess cash firms during periods of growth in the wider market. However, during downturns, high ECM firms perform less poorly than low ECM firms and the market as a whole. These are years in which access to external credit may be more costly, and this supports the idea that cash is being accrued for

precautionary motives. This finding is similar to that of Harford et al (2003), who conclude that high-cash American firms overinvested during non-downturn periods, but during downturns extra cash provided an internal source of finance for investment.

TABLE 4-5: AVERAGE ANNUAL RETURNS IN DIFFERENT MARKET STATES

This table reports the average annual FTSE All share index return, in percent per year, for High and Low ECM portfolios. The 23 years of the sample are ranked by size of FTSE return, and categorised into high (3), medium (2) and low (1) growth periods. Returns are calculated as detailed in Chapter 3.

Market State	FTSE	Low ECM	High ECM	High-Low
Downturn -1	-12%	-8%	-4%	3%
2	14%	23%	16%	-8%
Upturn -3	22%	36%	34%	-2%

4.4 TESTING THE RELATIONSHIP BETWEEN EXCESS CASH AND STOCK RETURNS

Having shown that firms with high level of excess cash underperform those firms with little excess cash, it would be useful to formalise any relationship between excess cash and stock price performance with a regression.

Simutin (2010) found a positive relationship between stock returns and an excess cash measure (ECM) for a US sample. However, given the results presented in section 4.3 one might have predicted a negative correlation in the models presented.

However, the various panel data models used failed to find a significant link, negative or positive, between stock returns and ECM. This would suggest that firms with a high level of excess cash in year 't-1' did not significantly outperform or underperform their peers over the year 't'.

Firms that carried more market risk (Beta) and registered higher asset growth (Ag), cash-flow (CF) and leverage (Debt) experienced higher rates of return. Those that were larger (ME), made more investments (Invest) and accrued more non-cash assets (Accr) than their peers. While no

direct link can be drawn between ECM and returns, it may be insightful to take another look at the characteristics of ECM firms.

TABLE 4-6: STOCK RETURN REGRESSION RESULTS

This table presents the results of three panel data regressions, with Returns as the dependent variable. All variables are as defined in Chapter 3. The sample period is 1989-2012. Time dummies were included each specification.

	Model 1		Model 2		Model 3	
	Coefficient	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Constant	0.27	7.26	0.27	3.03	0.27	3.07
ECM	0.01	0.11*	0.08	1.07*		
Beta			0.05	2.17	0.05	2.21
BM			0.03	2.54	0.03	2.49
ME			-0.05	-8.84	-0.05	-8.85
Ag			0.07	3.65	0.07	3.77
Accr			-0.21	-2.04	-0.22	-2.26
Invest			-0.27	-3.12	-0.28	-3.2
CF			0.34	2.63	0.34	2.62
Debt			0.14	1.87	0.13	1.79
R^2	0.24		0.27		0.27	

**Statistically insignificant at 10% level. All other variables significant at least at 5% level.*

Table 4-3 in section 4.2 shows that firms with more excess cash have lower accruals and higher rates of asset growth. This would imply that the top excess cash firms had higher stock returns than their peers. There must be another factor which is counteracting this affect then, which leads on to a closer look at investment. Models 2 and 3 presented in Table 4-6 confirm that, on average, investment (which is made up of capital expenditure and acquisitions) has been value destroying. Do firms with high levels of excess cash invest more in the future? Or, conversely, have low ECM firms invested heavily in the past?

4.5 EXCESS CASH FIRMS – DO THEY INVEST MORE?

Table 4-7 shows that firms that identified in year 't' as having the most excess cash (and therefore assigned to quintile 5) invest more of their assets in the next two years (t+1, t+2) than any other quintile (cells highlighted in green). So high excess cash firms do invest more, though

the effect only lasts two years. The same firms also invest less than any other quintile in the five years leading up year 't' (cells highlighted in red).

TABLE 4-7: PAST AND FUTURE INVESTMENT OF ECM DECILES

This table details the level of investment made by firms split up into quintiles by an excess cash measure (ECM) during year 't'. Investment, as a proportion of total assets, is defined in Chapter 3. The sample period is from 1990-2012.

ECM	t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
Low - 1	0.105	0.102	0.100	0.094	0.089	0.081	0.087	0.092	0.091	0.090	0.085
2	0.120	0.112	0.110	0.108	0.106	0.107	0.096	0.093	0.097	0.095	0.096
3	0.108	0.113	0.108	0.106	0.106	0.103	0.091	0.091	0.092	0.090	0.093
4	0.104	0.101	0.101	0.095	0.094	0.096	0.090	0.087	0.086	0.089	0.089
High - 5	0.088	0.089	0.085	0.086	0.084	0.082	0.099	0.096	0.091	0.092	0.091
High - Low	-0.017	-0.013	-0.015	-0.009	-0.005	0.001	0.011	0.003	-0.001	0.002	0.006

This paints a picture of firms building up cash reserves and investing less than their peers, then using these funds to finance a higher level of investment over a finite number of years. However, the amount of 'overinvestment' during years 't+1' and 't+2' does not seem to fully account for the relative underinvestment during years 't-5' to 't-1'. In addition, I find no evidence that this has an effect on stock returns, even when the $Returns_{it+1}$ term in (Equation 2 (Section 3.2.4) is replaced with $Returns_{it+2}$ or $Returns_{it+3}$ in order to accommodate any influence the delayed investment has.

This disconnection between excess cash and returns, despite the links between excess cash and investment, could suggest that at time 't' the growth opportunities which lead to the increase in investment during years 't+1' and 't+2' are already reflected in the stock price. There is therefore not a rise in returns when the investments come to fruition.

Alternatively, this could suggest that high excess cash firms, free of the supervision of capital markets, make inefficient investments which are not profitable enough to make a significant positive impact on returns. I would suggest that such firms may be dealing with agency issues, such as the problem described in Amihud & Lev's (1981) Risk Reduction hypothesis, and are overly cautious. This would explain their relatively strong performance during downturns and

their larger underperformance of high-cash firms during times of market expansion. Ozkan & Ozkan (2003) suggest that features of the UK equity market, such as institutions as large passive shareholders, mean that UK firms would be more at risk to such agency issues.

CHAPTER 5 – CONCLUSION

Using a large sample of UK firms listed on the FTSE All Share Index between 1989 and 2012, this study tested the determinants of corporate cash holdings, constructed a measure of excess cash (ECM) and tested for a relationship between the ECM and stock returns.

Initially focusing on the relationship between corporate cash holdings and firm characteristics, I found a significant positive relationship between cash holdings and market-to-book value, research & development costs, cash-flows, the volatility of industry cash-flows and debt. I also found a significant negative relationship between cash holdings and firm size, capital expenditure and whether a firm pays dividends.

While there is evidence of these relations for US, European and even East Asian firms, this is one of the first studies to focus on the UK. A relationship between cash holdings and firm size had not before been established in the UK, with this new evidence adding support for the economies of scale of the transactions motive for holding cash. The results presented evidence to support predictions made by the Pecking Order Theory (the negative coefficients on capital expenditure and R&D and the positive coefficient on cash-flow) that firms accrue more cash when cash-flow is high and investment requirements are low. There was also support for the prediction made by the Trade-Off theory that higher leverage increases the likelihood of bankruptcy which will induce firms to hold more cash.

The speculative motive was also shown to be a factor in cash holdings, evidenced by the positive relationship between cash holdings and market-to-book ratios, R&D costs and the level of debt. There was also verification for the predictions of the precautionary motive, with cash holdings

positively related to market-to-book values and industry cash-flow volatility and negatively related to size, cash-flow and the dividend dummy.

Using these firm characteristics I constructed an excess cash measure (ECM), and found that firms with more excess cash had higher market betas and higher levels of asset growth, in keeping with findings from previous US literature. Sorting firms into high and low ECM portfolios, I found that although the high ECM firms outperformed the market (achieving higher returns than the FTSE All Share index), they underperformed the portfolio of low ECM firms. ECM firms did outperform both the market and low ECM firms in years which were classified as downturn years. This suggests that UK firms accrue cash as a source of internal finance when external finance is less available, rather than holding cash in order to invest in risky growth options as suggested in studies of US firms.

Whereas Simutin (2010) found that the speculative motive was the key factor behind firms holding *excess* levels of cash, I find that the precautionary motive is the most important. I suggest that high ECM firms may be exhibiting signs of excessive caution, as predicted by the agency theory presented by Amihud & Lev (1981) and Tong (2006) as the Risk Reduction Hypothesis. This is made more likely by the relative lack of supervision as of UK firms compared to their US counterparts (Ozkan & Ozkan (2003)). This prediction should be of interest to academics and investment professionals alike.

However, I was unable to find evidence for a statistically significant relationship between excess cash and stock returns using panel data analysis. I did find evidence for, among other relationships, a significant negative link between stock returns and investment. I was also able to show that the highest excess cash firms invest more of their assets than any other firm over the two years after being categorised as high excess cash. I would argue that I found evidence in the extremes of the sample (the highest 10% of ECM firms) of the overinvestment predicted by Harford et al (2003), though this wasn't apparent across all firms holding positive excess cash.

My findings on the determinants of cash holdings successfully replicated results reported from Europe, East Asia and the US, shedding fresh light on the reasons UK firms hold cash. A constraining factor may have been the low R-squared achieved on the cash holdings regression, which may have lead to an imprecise measure of excess cash. Another issue to note is that of survivor bias; the source of the dataset only provided firms which were listed on the FTSE All Share index as of May 2013. Therefore firms which were listed at some point but had since disappeared (whether they were taken private, been acquired or gone bankrupt) were not included in the sample. Similarly, this study was constrained by the annual reporting of balance sheet information by firms. A more dynamic understanding of how cash is used would be possible given a monthly dataset.

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