The Effect of Excess Cash on M&A

Evidence from Europe

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Abstract

This paper studies the development of corporate cash holdings and their effect on M&A in a European context. We observe a secular increase in corporate cash ratios which is in line with the U.S. trend. Contrary to expectations, on average, higher cash levels do not go hand in hand with positive excess cash ratios. Excess cash levels are found to have significant implications on certain M&A parameters. More specifically, a one standard deviation increase in the excess cash ratio results in a relative increase of a firm's likelihood to become an acquirer in the next year by 3.7%. Following Jensen's (1986) free cash flow hypothesis, we interpret this as an indicator of increased agency conflicts. Furthermore, for every dollar of excess cash held, unexpected acquirers are found to destroy one cent of the firm's market value of equity in the announcement period. Combined with evidence that post-merger operating performance seems to be unaffected by the cash status of the acquiring firm, this suggests that cash-rich firms tend to pay more for their targets. Possible explanations for this can be found in hubris or agency conflict arguments.

Keywords: Cash holdings, Excess cash, M&A, Europe, Overinvestment
JEL classification: D82, G31, G34, L21

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1. Introduction

Over the last years, considerable media attention has been devoted to the increase in cash holdings of U.S. firms. The case became most prominent in 2013 when famous activist investor Carl Icahn increased his holdings in Apple Inc. and openly pushed for a bigger investor payout, arguing that the company was substantially undervalued as a result of its excessive cash pile (Satariano, 2013). Apple CEO Tim Cook subsequently bowed to mounting shareholder pressure and announced a doubling of the company's capital return program (Dowling, 2013). Icahn continued to claim that the buybacks were insufficient and demanded that an even bigger piece of Apple's USD 155bn in cash and investments at the end of September 2014 should be paid out (Apple Inc., 2014).[1]

Icahn is not alone with his position that companies should pay out more of their accumulated cash holdings. Buying in established companies and then applying short-term financial measures such as increasing buybacks remains a popular strategy among activist investors. But can one really generate value by simply returning more of the cash profits to investors? Why would not all managers then follow this panacea to value creation? Critical voices say that paying out too much of the cash does more harm than it does good. The main argument here is that it impairs performance by forcing companies to abandon investments in long-term initiatives like capital expenditures, and R&D (George, 2016).

Interest in the topic of increased U.S. corporate cash holdings has also begun to reach a wider audience than the narrow circle of elite investors. Most recently, an article in *The New York Times* was titled "Why Are Corporations Hoarding Trillions?" (Davidson, 2016). It reports that, collectively, American businesses are currently holding USD 1.9tn in cash. This would be enough to buy all of the four largest companies by market capitalization worldwide: Apple, Alphabet, Microsoft, and Berkshire Hathaway.[2] From another perspective, this amount is larger than the aggregated nominal GDP of all Nordic countries[3] in 2014 (Worldbank, 2016).

In light of the current ultra-low interest rate environment, it is particularly striking why companies are sitting on such a large stockpile of cash. One might argue that low borrowing rates are one reason why we observe an increase in cash holdings. However, the rate of return on liquid assets, which is typically below a firm's cost of capital, requires companies to invest their money in profitable long-term projects instead of leaving it idle on their balance sheets to not generate negative returns. Following the activists' claim, they could just pay the funds back to shareholders. Yet

[1] Icahn no longer holds any Apple stock as of April 28, 2016 (Samson & Foley, 2016).
[2] Market capitalizations as of April 15, 2016.
[3] Denmark, Finland, Iceland, Norway, and Sweden.

companies choose to keep the cash. So the question arises: Why have companies shifted from borrowing to saving money?

This apparent puzzle sets the scene for this thesis. Initially, we would like to get a better understanding of what motivates companies to hold cash and what the drivers are for the trend of rising corporate cash holdings. Against the backdrop of the recently increased attention to cash balances in the U.S., we are particularly interested to see if a similar development can be observed for companies based in Europe. This will serve as the starting point for us to answer the question: How much cash is too much? There is no general rule for the optimal amount of cash in corporate liquidity management; instead we will focus on individual firm characteristics which require different firms to hold different amounts of cash. Building on that, we want to investigate how spending patterns are affected if a firm has too much cash. Specifically, we will examine acquisitions which are an easy method to spend substantial amounts of money and thereby, provide a remedy for investors' demands to make use of excessive cash. Drawing from personal experience, we also hypothesize that the amount of cash one has readily available considerably impacts one's decision making. This is assumed to hold true not only in a personal setting but also in a corporate context. Besides our interest in the relationship between corporate cash holdings and M&A activity, we are also interested in understanding how such decisions are absorbed by the market and how they impact performance. After all, the stakes are typically high – investing in other companies is directly linked to a company's strategy and many people are affected by the outcome.

Our interest in the connection between corporate cash holdings and M&A is also motivated by the recent discussion on tax inversion deals. In short, tax inversion deals aim at relocating a company's legal domicile to a lower tax nation. This has become a popular strategy for U.S. multinationals which have accumulated large cash holdings in foreign subsidiaries to minimize the tax burden when retrieving profits. Tax avoidance is always a sensitive topic and in response to the public outcry about multinationals' tax planning strategies, the U.S. government has taken action to curb corporate inversions (U.S. Department of the Treasury, 2016). Its efforts show first signs of success: The largest deal in the drug industry's history, the merger of U.S. pharmaceutical giant Pfizer with Dublin based Allergan, was recently terminated after the U.S. Department of the Treasury proposed the new regulations (Hallam et al., 2016).

As follows from the above, most of our motivation for this paper has been sparked by trends and events from the U.S. Specifically, this study has largely been motivated by findings from (i) Opler et al. (1999), who examine the determinants and implications of cash holdings in their sample of publicly traded U.S. firms in the period from 1971 to 1994 period; (ii) Bates et al. (2009), who report that the average cash-to-assets ratio for U.S. industrial firms more than doubled from

1980 to 2006; and (iii) Harford (1999) who, in his sample of U.S. acquisitions from 1977 to 1993, provides evidence that bids by cash-rich firms are more probable and value decreasing. On a general note, much of the research in the field of corporate cash holdings and their development has been concentrated on U.S. companies. The focus of our research, however, is on European companies. This is where we can contribute most to existing literature. While the European market does not provide for the same level of harmonization, for example in terms of legislation and business practices, as the U.S. market, we believe that the underlying drivers behind cash holdings and M&A are the same in Europe. Furthermore, this study builds on research which, for some parts, has been done almost two decades ago. In that sense, it contributes to existing literature by providing a current estimate of corporate cash developments and their effect on M&A parameters. Finally, our paper not only updates previous findings but also extends existing research by adapting and improving established methodology where deemed to be necessary. In sum, this study attempts to shed light on a distinct area of corporate finance in a European context. As the public attention regarding cash holdings is increasing, we believe that this topic is a contemporary field of research which is interesting to both academia and the corporate world.

The paper is structured as follows: Section 2 provides an overview of theoretical frameworks and discusses the key findings of previous research. Based on this review, we deduce our research hypotheses at the end of the section. In Section 3, we present and describe our data. Sections 4 and 5 represent the centerpiece of our analysis: In Section 4, we introduce the methodology to measure excess cash. Section 5 presents empirical findings on the relationship between excess cash and M&A. In Section 6, we discuss limitations of our study and suggestions for future research. Finally, Section 7 concludes the paper with a summary of our main findings. Throughout this paper we use a number of ambiguous terms which are defined in the Appendix (Table 5).

2. Theory and Previous Research

This section covers the theoretical frameworks of our study and reviews the key findings from existing literature in the field of corporate cash holdings. As an introduction to the topic, we start by explaining why firms hold cash in the first place, then move on to discussing secular trends in the area. Subsequently, we establish a theoretical link between cash and M&A parameters which is mainly based on the dominant U.S. literature. Following this, we give an overview of the status quo of European research on cash holdings and their implications. Following the theoretical review, we deduce our research questions and present our hypotheses at the end of this section.

2.1. Motives for Holding Cash

Modigliani and Miller (1958) reformed modern corporate finance theory with their propositions, stating that a firm's capital structure choices should not have any effect on its value. Following their first landmark paper, they also showed that a firm's payout policy and its holdings of liquid assets are irrelevant in a world of perfect capital markets (Miller & Modigliani, 1961). If firms unexpectedly need cash to finance their ongoing operations or to make investments, they could do so at zero cost. Equally, there are no opportunity costs of holding cash in perfect capital markets. Thus, shareholder wealth would be unchanged by firms borrowing money and investing it in liquid assets. However, it is widely known that companies do not live in this stylized world. Numerous imperfections such as asymmetric information, irrational behavior, agency costs, and taxes, significantly influence firms' decision making processes. Given these frictions, the finance and economics literature has identified several motives of firms for holding cash. In the following, we briefly review the underlying theory and introduce the findings of previous research on these motives.

Transaction motive. Converting noncash assets into cash to use for payments incurs costs in the process (Baumol, 1952; Miller & Orr, 1966). In absence of assets to liquidate, a firm can raise funds on the capital market. Equally, there are transactions costs associated with raising external funds. The fixed portion of these costs induces firms to raise funds infrequently and to keep some liquid assets as a buffer. From this follows that transaction costs typically do not need to be directly proportional to a firm's size, so there are economies of scale associated with the transaction motive. Thus, one would expect larger firms to hold less cash as a percentage of assets. This has been widely confirmed by evidence (Mulligan, 1997).

Precautionary motive. Firms hold cash to become more resilient to adverse shocks and crises in which access to the capital market is costly (Keynes, 1936). Following this reasoning, it can be expected that riskier firms hold more cash since they face a higher probability of financial

distress. A similar logic holds true for firms with better growth opportunities since foregone investments pose high opportunity costs. Thus, financial distress is especially costly for firms with better growth opportunities. Opler et al. (1999) present evidence in support of this theory as they find that firms with (i) riskier activities, (ii) strong growth opportunities, or (iii) poor access to the capital market tend to hold more cash than other firms. Lins et al. (2010) also find strong evidence for the precautionary motive in their survey asking CFOs to rank their decision criteria for holding cash. Based on the study, the most important factor in determining how much cash to hold is the security buffer that cash reserves provide against cash flow short falls. Full survey results are included in the Appendix (Table 6).

Tax motive. Firms with international affiliates might incur adverse tax consequences when retrieving foreign earnings. One would thus expect that multinational companies have higher cash holdings, but evidence on this motive remains controversial. Foley et al. (2007) find that U.S. multinational firms which would trigger larger tax expenses by repatriating earnings have higher consolidated cash holdings. In contrast, Pinkowitz et al. (2013) find evidence that the increased cash holdings of multinationals cannot be explained by the tax treatment of profit repatriation, but that it is intrinsically linked to their R&D intensity. We will come back to this notion later in greater detail.

Agency motive. Agency conflicts, as a result of the separation of ownership and control in corporations between managers and owners, could lead to the accumulation of corporate cash balances. As argued by Jensen (1986), entrenched managers tend to retain cash instead of increasing payouts to shareholders even when the firm has poor investment opportunities. High cash holdings can help entrenched managers to reduce their personal undiversified risk, i.e. losing their job due to financial distress, and to increase their discretion. In particular, the latter can be connected to the extraction of private benefits, such as consumption on the job. Dittmar et al. (2003) find evidence in support of the agency motive, suggesting that firms hold more cash in countries with greater agency problems.

Following the description of the general motives of firms for holding cash, it is now interesting to look at a firm's consequent benefits and costs. There are two main advantages of holding liquid assets. First, as is evident from the transaction motive, the firm saves costs to raise funds and does not have to liquidate assets to make payments. Second, derived from the precautionary theory, the firm can use cash to finance its operations and investments when other sources of funding are not available or comparatively costly. Hence, cash reserves provide benefits to shareholders by reducing the underinvestment problem because it is them who ultimately suffer the loss from underinvestment. Thus, they should approve of managers maintaining a cash buffer which gives them

sufficient internal financial flexibility to pursue profitable investments at any time (Harford, 1999). In contrast, there are several costs which are opposed to the aforementioned benefits. The costs of holding liquid assets include (i) a lowered rate of return on these assets due to a liquidity premium, (ii) possible tax disadvantages resulting from the taxation of interest gains on both the corporate level and personal level from an investor's point of view, and (iii), probably most prominently, agency conflicts (Opler et al., 1999). Essentially, the latter means that the same freedom from external capital markets that makes cash reserves valuable to shareholders is susceptible to be abused by managers. This argumentation would thus favor a cash buffer which is as low as possible and to raise cash when needed. Easterbrook (1984) states that frequent trips to the capital market can indeed be an effective control mechanism for limiting agency conflicts.

The tradeoff between benefits and costs of cash holdings implies the existence of an optimal cash level. This allows an analysis of whether a firm holds too much or too little cash from the perspective of shareholder wealth maximization. In theory, the optimum would be reached where the marginal costs of holding liquid assets are equal to their marginal benefits (Opler et al., 1999). However, agency conflicts can lead to opposing views on the optimal amount of cash. Shareholders are expected to favor a minimalist approach to cash holdings whereas managers will have a preference for higher cash levels. Thus, agency theory might help to explain why some firms hold more cash than the amount maximizing shareholder wealth.

In contrast to the above mentioned tradeoff theory, Opler et al. (1999) introduce an alternative view on cash holdings which is in line with the pecking order model of a firm's capital choices (Myers & Majluf, 1984). According to this financing hierarchy theory, there is no optimal amount of cash. The argument originates from the idea that cash is simply negative debt. Hence, an optimal capital structure has to specify an optimal amount of net debt, irrespective of whether a firm has high cash holdings and high debt, or low cash holdings and low debt. In addition, there might not even be an optimal amount of net debt. This is because firms usually try to avoid to raise funds in the form of equity as it is expensive due to information asymmetries. Instead, they prefer to sell debt when they do not have sufficient resources. Alternatively, if firms have sufficient resources to invest in profitable projects, they repay debt when it becomes due and accumulate cash otherwise. Liquid asset holdings are then simply a function of the fortunes of the firm and conditions in the capital market instead of a targeted optimum. Despite this theory's valid reasoning, it seems as if it can be refuted. Opler et al. (1999) find evidence for a target cash adjustment model which is largely in line with the tradeoff theory in their sample of U.S. firms from 1971 to 1994.

2.2. Developments in Cash Holdings

The mounting cash levels of U.S. corporations are prominently covered by the media. Research takes a closer look on the developments in corporate cash holdings and sheds some light on the issue.

Bates et al. (2009) investigate how the cash holdings of U.S. firms have evolved since the 1980s. They document a secular increase with the average cash-to-assets ratio for U.S. industrial firms more than doubling from 1980 to 2006. They find that this increase is mainly due to firms' cash flows becoming riskier. This finding is mostly in line with the precautionary motive of holding cash. In general, Bates et al. provide evidence that the increase in cash ratios can be explained mostly by changes in underlying firm characteristics and only marginally by changes in the relation between firm characteristics and cash holdings, or by external shifts in the demand curve for cash. More specifically, they find that cash flow risk for firms has increased, inventories have decreased, capital expenditures have decreased, and R&D expenses have increased. They link the increase in cash flow risk to the widely studied increase in idiosyncratic risk (Campbell et al., 2011) and reason that greater R&D intensity relative to capital expenditures requires firms to hold a greater cash buffer. R&D expenses are a form of investment where information asymmetries are most important. One would thus expect costs of financial distress to be larger for R&D intensive firms (Opler & Titman, 2004). It follows that firms with higher R&D expenses are expected to hold more liquid assets. In sum, findings suggest that the precautionary motive is a critical determinant for holding cash.

More recent research in this field confirms earlier findings showing that cash holdings of U.S. companies are significantly higher during the 2000s than in the late 1990s (Pinkowitz et al., 2013). In particular, Pinkowitz et al. (2013) examine the tax motive of cash holdings. They observe that U.S. multinationals hold over 3% more assets in cash than comparable domestic firms after the financial crisis of 2008, whereas they have similar cash holdings in the late 1990s. One might prematurely conclude that adverse tax consequences play an important role in explaining this trend. Such reasoning is supported by a recent study by the U.S. think tank *Citizens for Tax Justice* which proclaims that U.S. firms held USD 2.1tn overseas in 2015 to avoid taxes (McIntyre et al., 2015). In the same vein, as mentioned previously, tax inversion deals allowing firms to lower their tax rate and to retrieve foreign earnings more easily have become a sensitive topic. A detailed analysis by Pinkowitz et al. (2013) shows, however, that the increase in cash holdings of multinationals cannot be explained by the tax treatment of profit repatriation. They find that firms which become multinationals do not increase their cash holdings afterwards and suggest that the high abnormal cash levels of multinationals are intrinsically linked to their higher R&D activity. The authors present

evidence that the *Homeland Investment Act of 2004*, which provided a one-time tax holiday for the repatriation of foreign earnings by U.S. multinationals, failed to reduce the cash holdings of U.S. multinational firms. If tax considerations were the key driver of the recent development, one would have expected cash levels to fall as a result of the tax holiday. This does not imply that the tax cost of repatriation or tax planning strategies are irrelevant for multinationals (Tomy, 2014). It rather seems that these costs determine where firms hold their cash but not the amount.

While Pinkowitz et al. (2013) focus on U.S. multinationals, they also extend their sample to look at the development of corporate cash holdings in other countries. In a cross-country comparison, the global trend appears to be similar, albeit less pronounced, to the U.S. trend. Research on the reasons for country variations remains limited but it is generally assumed that the underlying drivers of cash holdings and secular trends are similar across the world.

2.3. Cash and M&A

Jensen's (1986) free cash flow hypothesis presumes that more internal funds allow managers a higher degree of freedom as external control by the capital market is reduced. It follows that agency conflicts are assumed to be most severe in the presence of large free cash flows. Since cash holdings often are the result of accumulated free cash flow, the same conflicts are expected to be present in cash-rich firms.

Jensen (1986) also finds that acquisitions are a primary method by which managers can spend excessive cash instead of distributing it to equity holders. As mentioned earlier, acquisitions might allow managers to reduce their personal undiversified risk and to increase the scope of their authority. As a result, entrenched managers in cash-rich firms have an incentive to take advantage of their freedom by making potentially value-destroying investments from which they can extract private benefits such as empire building. The market for corporate control is supposed to limit such self-serving behavior but it is inherently imperfect as a result of information asymmetries.

An early paper by Lang et al. (1991) presents evidence in support of the free cash flow hypothesis to explain M&A behavior. The paper earned later criticism by Harford (1999) who points out that Lang's methodology does not control for the widely differing levels of normal cash holdings across companies. Normal cash holdings are the level of cash which a company is expected to need in the regular course of business. Depending on the nature of the respective industry and firm-specific characteristics, these cash levels are expected to vary from firm to firm. To adjust for these differences, Harford (1999) develops a model which predicts such normal cash levels. A similar approach is employed by Opler et al. (1999) and subsequent research in the field. Employing this adapted methodology, Harford's (1999) findings are also consistent with the free cash flow

hypothesis which confirms Lang et al.'s (1991) initial results. For his sample of U.S. firms from 1972 to 1994, Harford finds that cash-rich firms are more likely to make acquisition attempts. Moreover, his evidence suggests that acquisitions by cash-rich firms are value decreasing which is reflected by the market's negative announcement reaction and by subsequent poor operating performance of the combined firm.

In what can be regarded as an extension of Harford's (1999) paper, Oler (2008) investigates not only returns of cash-rich bidders at announcement but also whether a firm's cash level can predict post-merger returns. He finds that an acquirer's cash level is negatively predictive of post-merger returns. This indicates that the announcement response is incomplete and that the market does not fully recognize the bad signal which is inherent in less prominent accounting measures such as acquirer's excess cash holdings.

Overall, existing research provides rich evidence in support of the agency cost argument for acquisitions by cash-rich firms which is rooted in the free cash flow hypothesis.

2.4. Current State of European Research

Most of the existing literature in the field of corporate cash holdings focuses on the U.S. This section reviews the status quo of the limited research on cash holdings and their effect on M&A in Europe.

In a broad study on the differences of cash holdings between private and public firms, Akguc and Choi (2013) find that public companies hold more cash than private companies. The same effect is amplified in a subset of companies from Eurozone countries which signals increased precaution of public firms in the face of risks from the common currency policy. In addition, companies from countries outside the Eurozone are shown to have decreased their cash holdings during the European sovereign debt crisis, while companies from Eurozone countries increased their cash holdings. Lastly, the study shows that European companies have target levels of cash that they adjust to and that firms in countries with higher shareholder protection have less cash holdings.

In search of an explanation for variations in cash holdings, Pfaff and Zimmermann (2013) perform an analysis to improve the understanding of the underlying motives for holding cash in Europe. Their main finding is that there is a subset of companies whose high cash holdings cannot be explained by the motives mentioned in Section 2.1. Instead, the authors propose manager conservatism as an alternative behavioral explanation. The evidence points to the notion that executives' experience might explain part of the variation in cash holdings for some companies.

Pinkowitz et al. (2013) provide evidence on cash-richness in Europe. They use a global sample for studying how abnormal cash holdings have developed in recent years and differentiate between geographies. For Europe in particular they report negative excess cash ratios in most years from 2001 to 2010. Moreover, they find an increase in relative excess cash from before to after the financial crisis.

Closest to our research design are the results from Söderström (2012). In his paper, he studies how equity financed acquisitions in Europe are affected by cash-richness. He finds that the probability of using equity as the method of payment is negatively related to cash-richness and that cash-richness decreases after an acquisition. In contrast to the findings described in the previous section, Söderström reports that post-merger operating performance is positively related to cash-richness. His findings are surprising in light of the agency conflict argument and are also particularly interesting as he finds a negative relationship between cash-richness and announcement returns. Söderström suggests that one possible explanation for the positive operating performance could be that high cash reserves convey profitable future growth opportunities. Why the market does not correctly account for the increase in operating performance at announcement remains open for debate.

Even though Söderström (2012) focuses on equity financed deals while we examine the whole market, we will follow his methodology for some parts of our analysis due to the similar overall approach. In conclusion, we see that there still is a need to establish European research on cash-richness and its effect on M&A parameters which is comparable to the dominant U.S. literature in this field.

2.5. Research Questions

After having reviewed theory and previous research, we derive our research hypotheses in the following.

First, it is hypothesized that the secular trend of increased corporate cash holdings which has been observed by Bates et al. (2009) for U.S. companies holds true in Europe. This does not only apply to absolute cash levels but also to cash levels relative to firm size, thereby excluding natural growth effects such as inflation.

Hypothesis I: *Cash levels of European firms have increased.*

Second, in line with an overall increase in cash, it is hypothesized that cash levels are higher than what can be justified by the underlying firm characteristics. We acknowledge existing research which tries to provide reasons for the observed increases in U.S. cash holdings and are interested if cash levels have increased beyond of what can be rationally explained by company parameters.

Cash levels which are greater than expected are called positive excess cash. Firms with positive excess cash are called cash-rich.

Hypothesis II: *European firms hold positive excess cash.*

Third, in line with Jensen's (1986) free cash flow theory, it is hypothesized that the presence of excess cash levels has an impact on M&A behavior. More specifically, it is assumed that positive excess cash levels lead to increased M&A activity. This hypothesis is motivated by the idea that acquisitions provide managers with an easy outlet to spend excessive cash holdings in their own interest.

Hypothesis III: *Positive excess cash leads to increased M&A activity.*

Fourth, it is hypothesized that, ceteris paribus, acquisitions done by cash-rich firms create less value for the acquirers' shareholders. The sophisticated market is aware of agency conflicts and understands mangers' ulterior motives behind certain acquisitions. Since cash levels are readily observable and also allow for inferences on a firm's excess cash level, we hypothesize that, in comparison, the market reacts negatively to acquisition announcements by cash-rich firms.

Hypothesis IV: *Positive excess cash decreases acquirers' abnormal announcement returns.*

Fifth, it is hypothesized that the market discounts announcement returns of cash-rich firms in anticipation of poor operating performance following the deal. It is assumed that the influence of excess cash on announcement returns correctly predicts the future change in underlying operating performance.

Hypothesis V: *Operating performance declines after deals done by cash-rich acquirers.*

3. Data Overview and Descriptive Statistics

In this section we introduce and describe the data employed to derive the results in the remainder of this paper. Detailed definitions of ambiguous terms used in this section can be found in the Appendix (Table 5).

To test our hypotheses regarding cash development in general and the effect of excess cash on M&A in particular, we draw a sample of active and inactive firms for the period 1999 to 2014 from Compustat Global and complement it with corresponding stock, currency and inflation data from Datastream. Acquisition data for our sample are drawn for the period 2005 to 2014 from the SDC Platinum M&A database. The sample is restricted to publicly traded firms incorporated in the EU-15[4] reporting in their domestic currency. We exclude utilities (SIC codes between 4900 and 4999) since they can be subject to strict regulation in certain countries of our sample. We also exclude financial firms (SIC codes between 6000 and 6999) because they might hold cash and marketable securities for other reasons than the typical firm, e.g. to meet legal liquidity requirements or as part of their business model. We exclude firms with non-positive sales and non-positive book value of assets in a given year. We also require firms to have a reported market value of equity for a given firm year to be included. We impose several other restrictions to our sample and omit observations that do not meet the data requirements necessary for our study. Our complete sample including all restrictions totals 6,255 firms and 54,159 firm years over the period 1999 to 2014. Our M&A data include 14,196 completed deals over the period 2005 to 2014 for acquiring firms from the complete sample.

Figure 1 illustrates the development of absolute and relative cash levels of the sample. Absolute cash levels slope upwards and more than double from about USD 400 billion in 1999 to over USD 900 billion in 2014, implying a CAGR of 5.8%. Cash levels relative to assets follow the movements of absolute cash levels which confirms Hypothesis I. Note, however, that relative cash levels increase less than absolute cash levels. One reason is that the relative measure controls for changes in price levels. Some of the growth in absolute cash levels can be attributed to this effect since the countries in the EU-15 experienced price inflation during the sample period.[5] Comparing these results to previous literature, we find that relative cash holdings are significantly higher in the U.S. than in Europe and that there is a comparable increase in relative cash holdings (cf. Bates et al., 2009; Pinkowitz et al., 2013). Following Dittmar et al. (2003), higher cash holdings in the U.S.

[4] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.
[5] Measured by country-specific CPI data.

might be explained by easier access to funds compared to Europe, even though this stands in contrast to Opler et al.'s (1999) findings.

Figure 1: Development of Absolute and Relative Cash Levels

This figure presents the development of aggregated absolute and relative cash levels, the latter of which is defined as the sum of absolute cash levels deflated by the sum of assets. The left y-axis measures absolute cash levels in USD millions and the right y-axis measures relative cash levels. The data are based on 54,169 firm years over the period 1999 to 2014 for our sample of public firms incorporated in the EU-15.

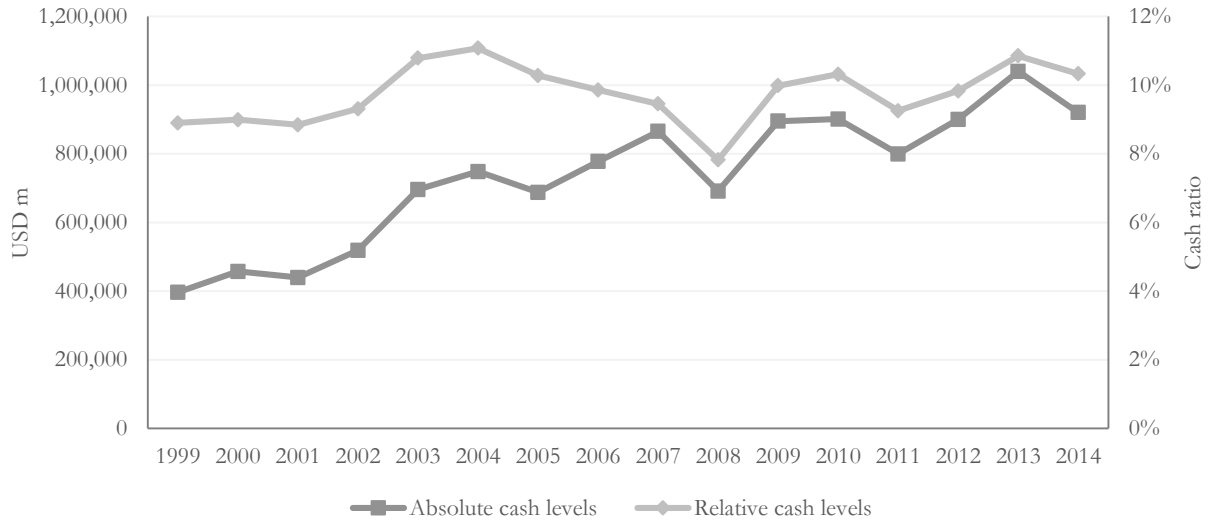
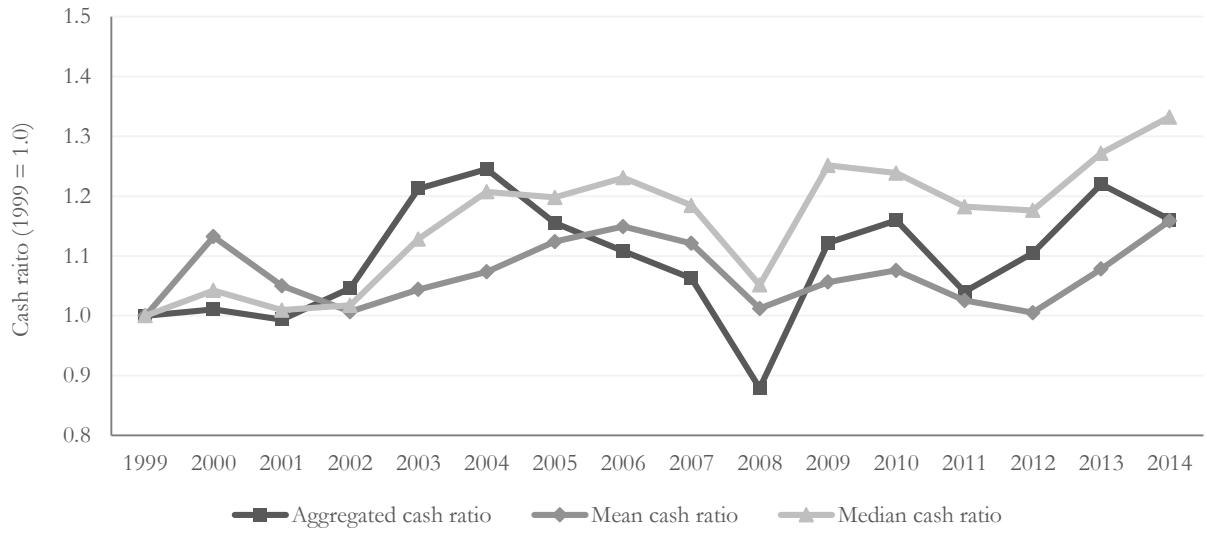


Figure 2 illustrates the development of different measures of relative cash levels in relation to their level in 1999. All ratios show an upwards sloping trend. The aggregated cash ratio, defined as the sum of cash levels divided by the sum of assets, increases by 16%, the mean of all individual firms' cash ratios also increases by 16%, and the median of all individual firms' cash ratios increases by 33% in total. Following economic downturns, all ratios decrease during the peaks of the financial crisis in 2008 and the European debt crisis in 2011. Interestingly, the overall trend of increasing cash levels is not matched by a similar increase in relative debt levels. In unreported results, we find that the average ratio of net debt to assets has decreased from almost 9% in 1999 to less than 3% in 2014. This finding is surprising considering that a netted measure of debt is often used by practitioners as a measure of leverage and, thus, of financial risk. It invites to take a more detailed look at the relationship between cash levels and financing decisions. This, however, goes beyond the scope of this paper as we focus on the effect of cash on acquisition parameters only.

Figure 2: Development of Cash Levels Relative to 1999

This figure presents the development of different cash ratios relative to 1999 levels. Aggregated cash ratio is the sum of cash divided by the sum of assets of all firms, mean cash ratio is the mean of individual firms' cash ratios, and median cash ratio is the median of individual firms' cash ratios. The data are based on 54,169 firm years over the period 1999 to 2014 for our sample of public firms incorporated in the EU-15.



Both Figure 1 and Figure 2 clearly point to an increase in relative and absolute cash levels since 1999. To add an additional dimension to this view, we also test for the development of the concentration of cash holdings among firms. For this, we calculate the Gini coefficients of cash holdings for our sample. Results are reported in the Appendix (Figure 8) and indicate a high concentration of cash which increases to over 0.9 after 1999. This shows that a vast amount of cash is held by relatively few firms. This is particularly interesting since our sample consists of publicly listed companies only which naturally excludes many small and medium sized enterprises. As a result, the effect of differences in firm size should be limited.

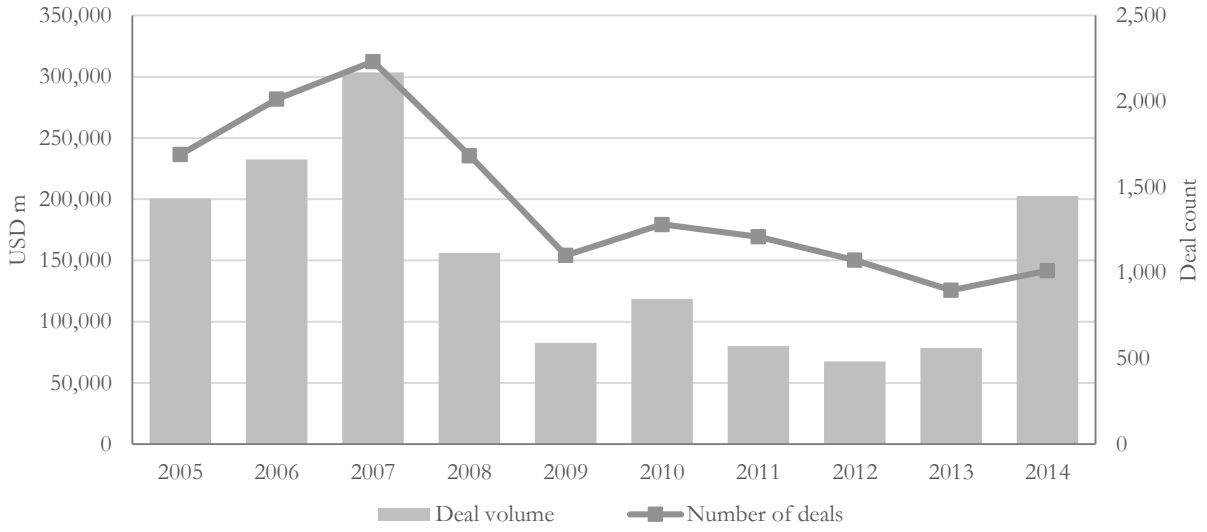
Our findings regarding the overall increase and concentration of cash levels do not allow us to judge whether the reported cash levels are in excess of what they normally should be or whether they are still reasonable in the light of changes in underlying corporate requirements. To solve this issue, we will introduce a model to calculate normal cash holdings in Section 4.

To present a first notion of the M&A market to which we will apply our findings on cash holdings in Section 5, we illustrate the development of the European, i.e. EU-15, M&A market from 2005 to 2014 in Figure 3. We observe a continuous increase in deal volume as well as in the number of completed deals in the boom years from 2005 to 2007. This is followed by a plunge in 2008, marking the outbreak of the global financial crisis. The market recovers slightly in 2010 but is again depressed in the following years during the European sovereign debt crisis. In 2014, M&A activity picks up again but remains below its pre-crisis peak of 2007. Overall, it seems that the European M&A market has not yet fully recovered from the recent crises it endured. This stands

in contrast to the development of the U.S. M&A market which has recovered strongly from the shock in 2008 (cf. Institute of Mergers, Acquisitions and Alliances, 2016). U.S. acquirers reported booming figures for M&A activity over the last years, clearly outpacing their European counterparts.

Figure 3: Deal Volume and Number of Deals

This figure presents the development of M&A activity of public firms incorporated in EU-15 countries. The left y-axis measures the aggregated volume of completed deals and the right y-axes measures the total number of deals. The data are based on 14,196 deals over the period 2005 to 2014.



4. Model of Normal Cash Holdings

In this section, we first discuss the determinants of cash holdings and then introduce our methodology to calculate expected cash holdings. The results are used to define whether a firm's cash holdings are in excess of what they should be in the normal course of business. The calculation and definition of excess cash is of great importance to our study as this is a key variable used in all of our subsequent statistical models.

We define a company's cash ratio as cash and short term investments divided by assets. Excess cash is defined as the difference between the actual and predicted cash ratio. Cash-rich firms are classified as firms having positive excess cash. To calculate predicted cash holdings, we employ Opler et al.'s (1999) model of normal cash holdings. This model regresses firms' cash ratios on the following firm characteristics which have been identified by literature (cf. Opler et al., 1999; Bates et al., 2009; Pinkowitz et al., 2013):

1. **Industry cash flow risk.** Firms with a higher cash flow volatility are assumed to be more precautionary and are thus expected to hold higher cash levels.
2. **Market-to-book ratio.** The market-to-book ratio of assets can be used as a proxy for growth opportunities. Firms with more growth opportunities are assumed to be more averse to financial constraints and are thus expected to hold more cash.
3. **Firm size.** There are economies of scale associated with the transaction motive. Thus, larger firms are expected to hold less cash relative to assets.
4. **Cash flow.** Firms are expected to accumulate more cash as a result of positive cash flow.
5. **Net working capital.** Receivables and inventories are highly liquid and can substitute for cash. Thus, firms with higher net working capital are expected to hold less cash.
6. **Capital expenditures.** Theory is ambiguous here. On the one hand, firms are expected to accumulate less cash during periods with higher investments in fixed assets. Moreover, higher fixed assets can lead to an increased debt capacity and can thus reduce the need to hold cash. On the other hand, higher capital expenditures might indicate more investment opportunities. Firms with more investment opportunities are expected to hold more cash to not have to forfeit any profitable project.
7. **Leverage.** Theory is ambiguous here as well. On the one hand, highly levered firms might try to reduce leverage with cash to lower their marginal costs when raising additional funds. Thus, one would expect lower cash levels for highly levered firms. On the other hand, highly levered firms might hold more cash as a precautionary measure to not default on payment obligations.

8. **Research and development expenses.** Due to information asymmetries, firms with higher research and development expenses are expected to have higher costs of financial distress. Similar to the market-to-book ratio, research and development expenses can also be used as a proxy for growth opportunities. Firms with higher costs of financial distress or more growth opportunities are assumed to be more averse to financial constraints; thus they are expected to hold more cash.
9. **Dividends.** Firms that are able to pay dividends are assumed to be more stable and less financially constrained; thus they are expected to hold less cash.
10. **Acquisitions.** Similar to capital expenditures, acquisitions could have either a positive or a negative relation to cash. On the one hand, firms are expected to accumulate less cash during periods with higher acquisition spending. On the other hand, more acquisitions might indicate more investment opportunities. Firms with more investment opportunities are expected to hold more cash to not have to forfeit any profitable project.

The original model developed by Opler et al. (1999) does not include financing decisions as explanatory variables. Following a more recent study by Bates et al. (2009), we control for these effects by adding two additional factors to our model:

11. **Net equity issuance.** Firms typically issue equity infrequently and then use up the funds over a period of time. Due to this time lag, firms with more net equity issuance are expected to hold more cash.
12. **Net debt issuance.** Similar to net equity issuance, debt issuances tend to be done infrequently and subsequently used up over a period of time. Due to this time lag, firms with more net debt issuance are expected to hold more cash.

To control for country fixed effects, we also add country dummies to our model (cf. Pinkowitz et al., 2013). We hypothesize that legislation, particularly in respect to capital markets, taxation, or investor protection, could impact firms' decisions as to how much cash to hold.[6] Furthermore, such differentiation is necessary since the countries in our sample are characterized by differing stages of economic development.

Incorporating all variables, the equation of our cross-sectional model estimated across all firms for every year then follows as:

$$\begin{aligned} \text{Cash ratio}_i = {} & \alpha + ß_1\,\text{IndSigma}_i + ß_2\,\text{MtB}_i + ß_3\,\text{Size}_i + ß_4\,\text{CF}_i + ß_5\,\text{NWC}_i + ß_6\,\text{CapEx}_i \\ & + ß_7\,\text{Lev}_i + ß_8\,\text{RD}_i + ß_9\,\text{Div}_i + ß_{10}\,\text{Acq}_i + ß_{11}\,\text{NetEquity}_i \\ & + ß_{12}\,\text{NetDebt}_i + \gamma\,\text{Country}_i + \varepsilon_i \end{aligned} \tag{1}$$

[6] Cf. Söderström (2012) for a differentiated discussion of legal and institutional diversity within the EU-15.

where i indexes the firm. IndSigma is the standard deviation of cash flow to assets averaged across firms in the same industry defined by the two-digit SIC code.[7] MtB is the market-to-book ratio of assets. Size is the natural logarithm of assets deflated to 2003 million U.S. dollars using CPI data. CF is cash flow deflated by assets. NWC is net working capital deflated by assets. CapEx is capital expenditures deflated by assets. Lev is debt deflated by assets. RD is research and development expenses deflated by sales. Div is a dummy variable equal to one if firm i declares a common dividend in the given year and zero otherwise. Acq is annual acquisition cash flow deflated by assets. NetEquity is net equity issuance deflated by assets. NetDebt is net debt issuance deflated by assets. Country are country dummy variables which are equal to one if firm i is incorporated in the respective country. Gamma is a vector of coefficients for the country dummies.

We use winsorizing to increase the robustness of our estimators to outliers. Similar to Bates et al. (2009), we winsorize the independent variables as follows: IndSigma is winsorized at the 1% tails, the top tail of MtB is winsorized at the 1% level, the bottom tail of CF is winsorized at the 1% level, the bottom tail of NWC is winsorized at the 1% level, CapEx is winsorized at the 1% tails, Lev is winsorized so that it lies between zero and one, RD is winsorized at the 1% tails, and Acq is winsorized at the 1% tails.

Employing a Fama-MacBeth (1973) model, we then estimate an independent cross-sectional regression for every year of a set estimation period and average the coefficients. We define our estimation period from 1999 to 2003 and then use the coefficients to predict the cash ratios for the years 2004 to 2014. We choose this methodology over a simple fitted OLS model because it eliminates the issue of autocorrelation in pooled cross-sectional analyses.

The regression results are reported in Specification (1) of Table 1.[8] We find positive and significant coefficients for cash flow risk, research and development expenses, and net equity issuance. These results are in line with our expectations as outlined above. Size, net working capital, capital expenditures, leverage, dividends and acquisitions have a significantly negative effect on cash holdings. These results also confirm what can be expected from theory. In cases where theory is ambiguous, we can state that: First, the coefficients for capital expenditures and acquisitions confirm the theory that investments consume existing cash balances and might facilitate access to the capital market which allows to hold lower cash balances. Second, in the case of leverage, we can confirm the expectation that highly levered firms might try to reduce leverage with cash to lower their marginal costs when raising additional funds.

[7] Standard deviation is measured over the five previous years. A minimum of three years of firm data is required for a data point to be included in the calculation. Firm years from 1994 to 1998 are included in our sample for this analysis.
[8] We exclude the variable net debt issuance from our regression because of incomplete data in our sample.

Surprisingly, we find a negative and significant coefficient for cash flow. While this result stands in contrast to our expectation, it is consistent with the findings of Pinkowitz et al. (2013). Existing literature does not provide a clear interpretation of the negative cash flow sensitivity but suggests that financial constraints can have an influence (Almeida et al., 2004). Also contrary to our expectation, the coefficient for the market-to-book ratio is not significant and slightly negative. Since the market-to-book ratio and research and development expenses are proxies for arguably the same underlying determinant, i.e. growth opportunities, we perform an additional regression in which we drop the R&D variable to avoid multicollinearity. We find that the coefficient for the market-to-book ratio remains negative and insignificant.[9] Despite a different geographical focus, our results are largely comparable to those in Pinkowitz et al.'s (2013) global sample including the U.S.

To test the robustness of our model, we perform OLS regressions on the estimation period from 1999 to 2003 and on the whole period from 1999 to 2014. The results are reported in Specifications (2) and (3) of Table 1.[10] Overall, we find fairly similar coefficients to the ones from the Fama-MacBeth regression which points to the validity of our model and the chosen estimation window. The only material differences are as follows: The coefficient for the dividend dummy becomes significant at the 1% level in the second regression and the coefficient of the equity issuance variable becomes significant at the 1% level in the second and third regression. Additionally, we also run regressions including year dummy variables to account for yearly fixed effects. The results are not reported since they do not differ in magnitude or significance from those in Table 1.

[9] Results are not reported here. All other coefficients have the same magnitude as before. The only change in significance occurs for the coefficient of the dividend dummy which increases to the 1% level.
[10] Specification (3) in particular is comparable to Harford's (1999) and Söderström's (2012) methodology.

Table 1: Impact of Firm Characteristics on Cash Holdings

This table presents the results of different regressions determining the effect of several firm characteristics on cash holdings for our sample of public firms incorporated in the EU-15. Specification (1) is a Fama-MacBeth regression, and Specifications (2) and (3) are OLS regressions. The dependent variable is Cash Ratio and is defined as cash deflated by assets. IndSigma is the standard deviation of cash flow to assets averaged across firms in the same industry defined by the two-digit SIC code (standard deviation is measured over the five previous years and a minimum of three firm year data is required for a data point to be included in the calculation), MtB is the market-to-book ratio of assets, Size is the natural logarithm of assets deflated to 2003 million U.S. dollars using CPI data, CF is cash flow deflated by assets, NWC is net working capital deflated by assets, CapEx is capital expenditures deflated by assets, Lev is debt deflated by assets, RD is research and development expenses deflated by sales, Div is a dummy variable that indicates if a firm declared a common dividend, Acq is annual acquisition cash flow deflated by assets, NetEquity is net equity issuance deflated by assets, and Country are country dummy variables which are not reported here. Ambiguous terms are defined in the Appendix (Table 5).

t-statistics are given in parentheses. Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	(1) FMB 1999-2003	(2) OLS 1999-2003	(3) OLS 1999-2014
Intercept	0.2768*** (26.40)	0.2825*** (31.20)	0.2752*** (52.77)
IndSigma	0.1645*** (6.75)	0.1513*** (10.44)	0.1389*** (14.77)
MtB	-0.0002 (-1.44)	0.0000 (0.05)	0.0000 (0.09)
Size	-0.0078*** (-14.62)	-0.0081*** (-12.34)	-0.0104*** (-30.32)
CF	-0.0910*** (-5.11)	-0.1114*** (-16.21)	-0.0190*** (-7.16)
NWC	-0.1686*** (-7.00)	-0.1638*** (-26.98)	-0.1540*** (-46.82)
CapEx	-0.2676*** (-16.76)	-0.2218*** (-10.68)	-0.2168*** (-17.14)
Lev	-0.3597*** (-38.01)	-0.3729*** (-55.48)	-0.3253*** (-90.38)
RD	0.1656*** (24.14)	0.1693*** (34.72)	0.1739*** (79.78)
Div	-0.0104** (-2.27)	-0.0140*** (-5.05)	-0.0036** (-2.46)
Acq	-0.1954*** (-4.44)	-0.1155*** (-3.00)	-0.1975*** (-12.26)
NetEquity	0.0563* (1.77)	0.0088*** (8.04)	0.0122*** (15.25)
Country	Incl.	Incl.	Incl.
R^2	0.3631 (average)	0.3351	0.3284
N	17,214	17,214	54,169

Lastly, we also estimate cross-sectional regressions for every year from 1999 to 2014 to control for potential changes in the coefficients. The results are generally comparable to those from the Fama-MacBeth regression and can be found in the Appendix (Table 7). The intercepts stay significantly positive over the whole period and only marginally change in magnitude. This suggests that the selection of variables in our model is equally valid in each year of the sample period. The coefficients for industry risk are consistently positive and significant, except in 2007 and between 2012 and 2014. Consistent with our previous findings, the effect of the market-to-book ratio on cash holdings is ambiguous. The coefficients are small and vary in significance over the years. The coefficients for size do not vary much in magnitude and stay significantly negative throughout the whole period. The findings for cash flow are mixed which emphasizes the puzzle regarding the same variable in the Fama-MacBeth regression. The effect of net working capital on cash holdings decreases in absolute magnitude but stays significantly negative throughout the whole period. The effect of capital expenditures on cash holdings remains relatively stable and significantly negative throughout the whole period. The coefficients for leverage become less negative but stay significant over time. The effect of research and development expenses on cash holdings remains comparable in magnitude and significance. In contrast, the coefficients for the dividend dummy change over time and are mostly insignificant which is consistent with Pinkowitz et al.'s (2013) findings. Only in the early years we measure a significantly negative effect. In recent years, we occasionally observe positive and slightly significant coefficients. The effect of acquisitions on cash holdings remains negative throughout the whole period, but loses significance in 1999, 2001 and 2003. We observe a similar dynamic in the coefficients for net equity. The effect is consistently positive, but varies in magnitude and loses significance in 2001 and 2002.

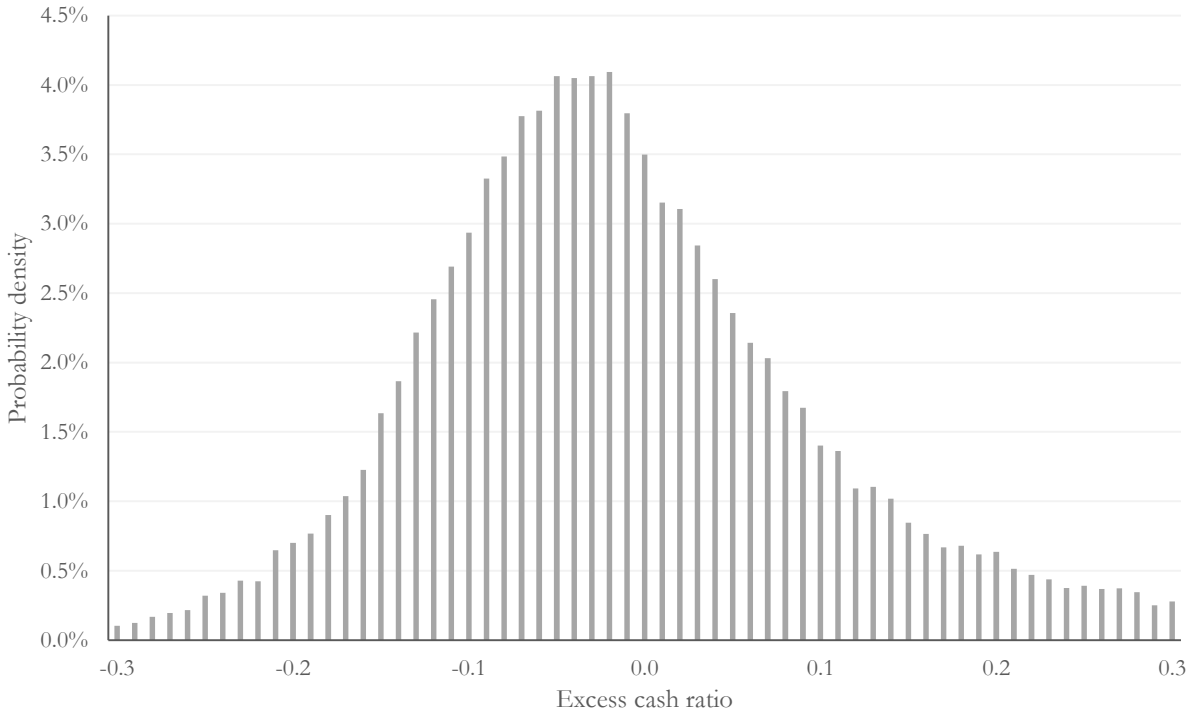
Applying the coefficients from the Fama-MacBeth regression from Table 1 to our sample, we calculate the expected cash ratios for all firm years from 2004 to 2014. These are subtracted from actual cash ratios to calculate excess cash. The distribution of the results is illustrated in Figure 4. As a result of the large number of observations the distribution tends towards normality but is slightly skewed towards the right side which is consistent with Söderström's (2012) results. With 14,677 cash-rich and 22,278 cash-poor firm years the majority of results (60.3%) is negative, as is the average of -0.7%. Based on the entire distribution, the quartile thresholds are as follows: Q1: -0.0918; Q2: -0.0273; Q3: 0.0530. Since, on average, we do not observe positive excess cash in Europe we reject Hypothesis II.

Additionally, the results let us draw two inferences: First, the fact that most firm years are characterized by negative excess cash, albeit only marginally, could mean that our model does not capture all rational determinants of cash holdings correctly. Alternatively, it might be that firms

hold irrational amounts of cash. In the following, we will assume that the latter is the case since our robustness tests and previous research give us reason to believe that our model is sound. Second, we can gain additional insight by also analyzing absolute excess cash levels. In our sample, we find a positive average of USD 38.05 million. The absolute quartile thresholds are as follows: Q1: USD -12.26 million; Q2: USD -1.38 million; Q3: USD 4.88 million.[11] In contrast to our previous reasoning, these findings partially confirm Hypothesis II. Combined, our results let us assume that there is a minority of firms that hold the majority of positive excess cash in given years. This reasoning fits in with the previous finding that cash levels are highly concentrated as measured by the Gini coefficients.[12] We therefore conclude that positive excess cash applies to only a minority of firms and is not a universal phenomenon. Harford (1999) reaches a similar conclusion for his U.S. sample as he finds that firms hold positive excess cash only temporarily.

Figure 4: Distribution of Excess Cash

This figure presents the distribution of excess cash ratios across the 36,955 firm years in the period from 2004 to 2014 for our sample of public firms incorporated in the EU-15. The distribution is based on the results from the previously introduced model of normal cash holdings. Bin widths are 0.01% and tails are capped at +/- 0.3% excess cash over assets.



To illustrate the development of cash ratios over time, we display an annual split in Figure 5. We observe positive excess cash ratios, on average, between 2005 and 2007. From 2008 onwards, marking the start of the financial crisis, predicted remain above actual ratios on average, i.e. negative

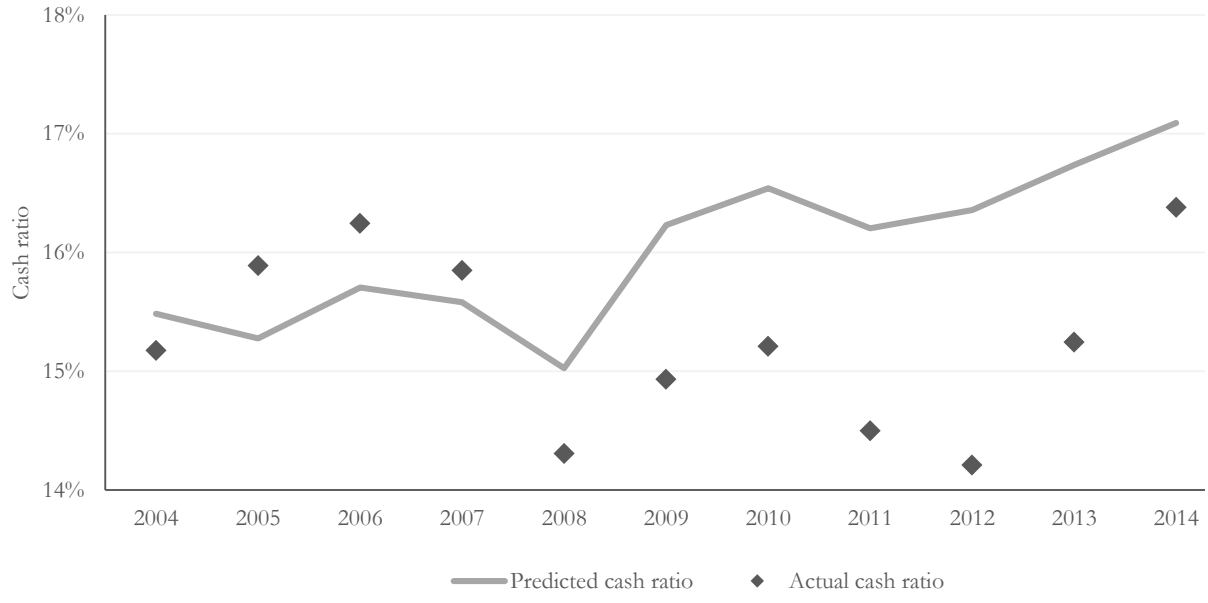
[11] Results are not illustrated here.

[12] Gini coefficients for excess cash are not reported due to the fact that we observe some negative values for excess cash. Mathematically, this produces coefficients which exceed one and which therefore do not provide a meaningful comparison to our earlier measure of cash concentration.

excess cash. The gap reaches its maximum in 2012 and gradually decreases towards the end of the sample period. The overall trend in cash roughly follows the economic climate in Europe. This supports Opler et al.'s (1999) theory stating that cash levels are rather a function of a firm's fortune and the conditions in the capital markets than a targeted optimum. However, the movements in actual cash levels appear to be more extreme in magnitude than the movements in predicted cash levels. Firms hold more cash than predicted during booms and hold less cash than predicted during recessions. The reason might be that, due to market inefficiencies and market participants' biases, firms react in an unreasonable extent to economic changes compared to what our stylized model would demand. This interpretation, however, fails to explain why we observe negative excess cash ratios in recent years. Pinkowitz et al.'s (2013) results support our findings for recent years, as they observe significantly negative excess cash ratios for Europe for all years but 2008 during the period from 2001 to 2010.

Figure 5: Actual versus Predicted Cash Ratios

This figure presents the actual and the predicted annual average cash-to-asset ratios across 36,955 firm years over the period 2004 to 2014 for our sample of public firms incorporated in the EU-15. The results are based on the previously introduced model of normal cash holdings.



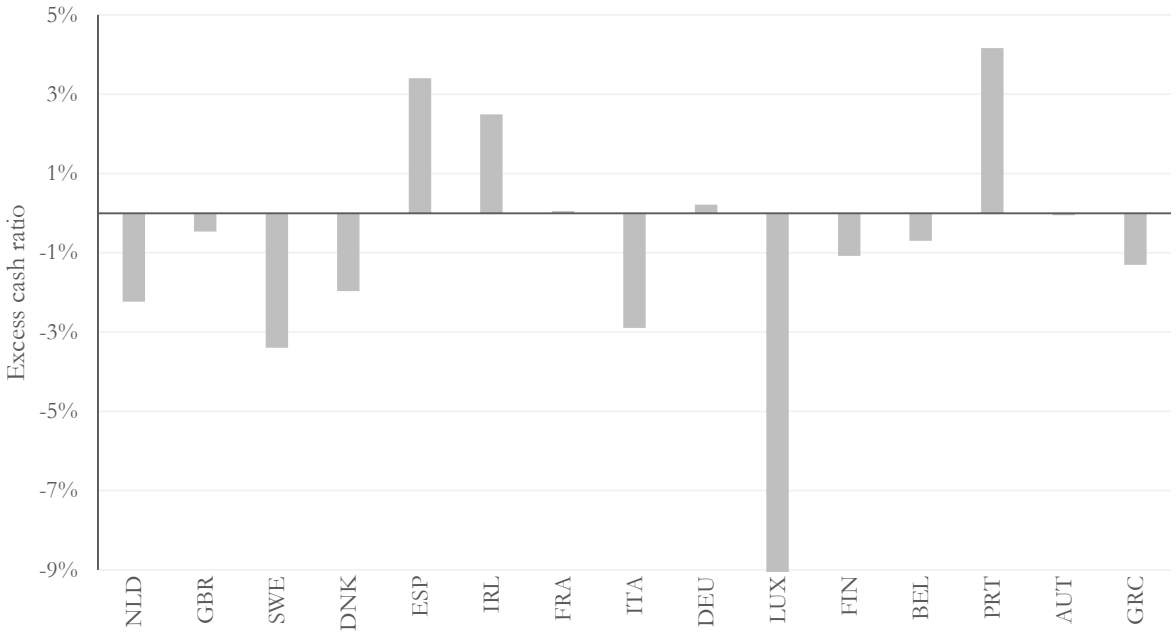
As mentioned previously, our research interests primarily lie in the European market to add to the findings from the U.S. literature. Deepening our analysis by one level, we not only look at Europe in aggregate but also investigate how excess cash ratios vary among the different member states of the EU-15. Looking at the results in Figure 6, we observe significant cross-country variations in average excess cash ratios. The majority of countries reports negative excess cash ratios with Luxembourg being the largest outlier among the negatives. We find strongly positive excess cash ratios only for Spain, Portugal and Ireland. These discrepancies are likely constituted by the

heterogeneity of the different countries and point to the fact that the dummy variables in the model of normal cash holdings fail to pick up all the inter-country variation. There are three possible explanations for this finding which are not mutually exclusive. First, it is likely that firms in their respective countries simply differ with respect to the determinants of cash holdings as previously defined. For example, firms in countries with more liquid local capital markets might find it easier to issue equity than others. Second, we assume that country specific characteristics of cash holdings have evolved over our sample period. Such a development is not captured by country dummies which can only filter for fixed effects. This might be due to shifts in country specific legislation. For example, it could be that privatization of previously state owned companies leads to significant changes in their liquidity requirements. Moreover, the development is likely attributable to firms in different countries reacting differently to macro trends in the economy. For example, all three positive outliers, Spain, Portugal, and Ireland, were hit particularly hard by the European debt crisis beginning at the end of 2009. The evidence points to the notion that these countries continue to hold relatively high cash balances throughout the sample period, even though our model predicts them to hold less cash on grounds of the underlying determinants. This finding could support the precautionary theory on a country level. Contrasting our reasoning for Spain, Portugal, and Ireland, however, are our findings for Greece, which was arguably most affected by the European debt crisis. Greece is not among the outliers and actually reports marginally negative excess cash. We therefore conclude that our model does pick up reactions to macro trends and that firms in outlier countries fail to adjust their cash balances appropriately. Third, parts of the variation could be explained statistically. For example, in the case of the largest outlier, Luxembourg, our sample comprises only 25 unique firms and 148 firm years in total. This small sample size makes findings on the country level prone to being misrepresentative of the whole population.

We stop at this level as further analysis of cross-country variations would go beyond the scope of this paper. Taken together, the above mentioned hypotheses call for a more nuanced analysis on an individual country level. Future research in the European context should be specifically dedicated to disparities across European countries and even across separate industries. In conclusion, however, we hold that our overall findings regarding excess cash are representative for the European market as a whole, since the EU's efforts to harmonize laws, regulations and monetary policy have reduced internal market frictions and have thus created an approximation of a common market.

Figure 6: Excess Cash Ratios by Country

This figure presents the average excess cash ratios by country across the 36,955 firm years over the period from 2004 to 2014 for our sample of public firms incorporated in the EU-15. The results are based on the previously introduced model of normal cash holdings.



5. Excess Cash and M&A

Building on the results from Section 4, we perform three analyses to investigate the relationship between excess cash and M&A in the following. For the most part, we closely follow Harford's (1999) methodology to achieve results which are comparable to U.S. literature. The methodology is complemented by several robustness checks and some additional adjustments as suggested by more recent research. In Section 5.1, we measure the effect of excess cash on a firm's likelihood of becoming an acquirer. In Section 5.2, we establish whether positive excess cash decreases abnormal returns around the announcement of acquisitions. Finally, in Section 5.3, we investigate whether a potential relationship between excess cash and abnormal bidder announcement returns can be explained by a subsequent change in the operating performance of the combined firm after the merger.

5.1. Acquisition Activity

In this section, we test for the influence of acquiring firms' excess cash levels on activity on the M&A market. Specifically, we use a probit model to determine whether being cash-rich makes firms more likely to complete acquisitions.[13] For this, we use all observations from our initial sample and merge it with data from the SDC Platinum M&A database. After cleaning the data, our sample totals 26,795 firm years in the period 2005 to 2014 which meet our requirements.

For the dependent variable, the model assigns a value of either one or zero to firms in a given year depending on whether the firm announces a bid that leads to a completed deal afterwards. Excess cash is our main explanatory variable and is defined as the difference between the actual and the predicted cash-to-asset ratio as measured in Section 4. To establish a reliable measure of which firms are likely to become acquirers, we use a combination of several additional control variables identified by Harford (1999) and Söderström (2012):

1. **Firm size**. Small firms typically face financial constraints when attempting to acquire firms which are larger than themselves. Thus, larger firms are assumed to acquire more frequently as they have a larger pool of potential targets to choose from.
2. **Abnormal returns**. Bradley and Sundaram (2006) report a run-up in the stock price of acquirers in the year prior to an acquisition. Following their argumentation, we assume that abnormal past performance is predictive for companies to engage in acquisitions.

[13] We do not impose any restriction on the minimum stake acquired since the goal here is to measure M&A activity in general, and not control. In addition, our research design differs from Harford's (1999) in that we are only able to reliably observe successful bids for the European market whereas he has access to a dataset of all attempted acquisitions in the U.S.

3. **Sales growth**. Following Shin and Stulz (1998), firms' past sales growth can predict future investment. Thus, we assume firms with higher sales growth to be more likely to make an acquisition.
4. **Net working capital**. Fazzari and Petersen (1993) find that investments in fixed assets are negatively correlated to investments in working capital. They interpret this finding such that working capital and fixed assets compete for resources. We assume that a similar relation holds true for acquisitions, which would make firms with higher net working capital less likely to become acquirers.
5. **Market-to-book ratio**. The market-to-book ratio of assets can be used as a proxy for growth opportunities. Firms with more growth opportunities are assumed to realize part of this potential by the means of acquisitions.
6. **Leverage**. Highly levered firms are expected to be riskier and to incur higher marginal costs when raising additional funds (Baxter, 1967). Due to these constraints, we assume that they have less flexibility to become acquirers.

Firm size is defined as the natural logarithm of sales deflated to 2003 million U.S. dollars using CPI data.[14] Abnormal returns are defined as the average daily abnormal return over the two years before the year of the acquisition announcement (t-2 to t-1). Abnormal returns are estimated using a market model with daily stock returns and the FTSEurofirst 300 Index as a proxy for the European market. The market model coefficients are estimated yearly based on daily returns from the previous two years. Sales growth is defined as the percentage year-on-year increase in sales. Net working capital is defined as net working capital deflated by assets. Market-to-book ratio is defined as the market-to-book ratio of assets. Leverage is defined as debt deflated by assets. All continuous independent variables are measured in the year prior to the acquisition, since, depending on legislation and deal specifics, the financials of acquirer and target might or might not be combined in the year of the acquisition announcement. Furthermore, control variables 3 to 6 are measured as a four year average (t-4 to t-1) to limit the influence of yearly outliers. We also include year dummy variables to control for yearly fixed effects in the form of heating or cooling M&A markets. Finally, we use winsorizing to further increase the robustness of our estimators to outliers. All variables except for abnormal returns are winsorized at the 1% tails.

The results are reported in Table 2. In Specification (1), we find that the likelihood of engaging in a successful bid increases significantly with excess cash which confirms Hypothesis III.

[14] This definition differs from the one used in Section 4, where we use assets instead of sales. The reason is that sales as a flow variable are more appropriate than assets as a static variable to measure size in the context of M&A. We also perform the probit with assets and find similar but less significant results which are not reported here.

This result is consistent with previous research (cf. Opler et al., 1999; Harford, 1999). A misconception would be to believe that cash-richness automatically translates into increased acquisition capacity. Theoretically, regardless of cash status, all firms should be able to finance value creating acquisitions. Instead, we hypothesize that our finding can be explained by increased agency conflicts as predicted by the free cash flow hypothesis (Jensen, 1986). As brought forward in the beginning of this paper, we assume that managers of cash-rich firms are more inclined to spend excessive cash holdings by the means of acquisitions than to distribute it to the shareholders. The marginal effect of 4.4% tells us that our result is also economically significant and can be translated into the following statement: A one standard deviation increase in the excess cash ratio increases a firm's likelihood of becoming an acquirer in the next year by 0.6% points which, in relative terms, is equal to a 3.7% increase in likelihood in our sample. As expected, the probability of becoming a successful bidder also increases significantly with size, sales growth and market-to-book ratio. While the coefficient for abnormal returns is also positive as expected, we cannot reject the null hypothesis that there is no effect of past performance on acquisition likelihood. The coefficients for net working capital and leverage are significantly negative, which is also consistent with our expectation. We also report the coefficients for the year dummy variables to illustrate the macro effects in the European M&A market that are controlled for.[15] We observe that 2006 and 2007 are particularly hot M&A markets. With the beginning of the financial crisis in 2008 the probability of becoming a successful bidder decreases significantly and reaches a low in 2009. Beginning in 2010, the market slowly recovers, but remains below 2005 levels. 2013 represents a negative outlier in the overall positive trend since 2010. These results are fairly consistent with the M&A cycles in Europe as illustrated in Figure 3. Marginal effects of all control variables keep the sign and significance of their respective probit coefficients.

[15] The coefficients are relative to 2005, which is the dropped dummy variable.

Table 2: Determinants of Acquisition Activity

This table presents the results of regressions determining factors that drive acquisition activity in the EU-15. Specification (1) is a probit model which predicts whether a firm announces a successful bid in a given firm year between 2005 and 2014. The measured variable in this regression is a dummy for M&A activity that is one when a firm announces a successful bid and zero otherwise. The second column of Specification (1) reports the average marginal effects to the respective coefficients. Specification (2) estimates an OLS regression on the volume of the acquisitions in a given firm year. The measured variable in this regression is annual acquisition cash flow normalized by assets. All continuous independent variables are measured in t-1. Excess cash is the difference between the actual and predicted cash-to-asset ratio as measured in Section 4 , Size is the natural logarithm of sales deflated to 2003 million U.S. dollars using CPI data, Abnormal return is the average of daily abnormal return in the two years prior to an acquisition which are derived from a market model estimated yearly based on daily returns from the previous two years, Sales growth is the four year average of percentage year-on-year increases in sales, NWC is the four year average of net working capital deflated by assets, MtB is the four year average of the market-to-book ratio of assets, Lev is the four year average of debt deflated by assets. Year dummy variables are included. Ambiguous terms are defined in Appendix (Table 5).

z-statistics for Specification (1) and t-statistics for Specification (2) are given in parentheses. Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	(1) Probit		(2) Volume OLS
	Coefficient	**Marginal Effect**	
Intercept	-1.8130***		0.0129***
	(-44.38)		(12.30)
Excess cash	0.1754**	0.0439**	0.0099***
	(2.26)	(2.27)	(5.18)
Size	0.2040***	0.0511***	0.0017***
	(45.49)	(49.70)	(15.22)
Abnormal return	0.4616	0.1156	0.0044
	(0.50)	(0.50)	(0.21)
Sales growth	0.0725***	0.0181***	0.0009***
	(6.10)	(6.11)	(2.88)
NWC	-0.3578***	-0.0896***	-0.0120***
	(-6.14)	(-6.15)	(-7.99)
MtB	0.0402***	0.0101***	0.0006***
	(8.53)	(8.56)	(5.33)
Lev	-0.5027***	-0.1259***	-0.0181***
	(-8.54)	(-8.57)	(-12.16)
2006	0.0432	0.0108	0.0032***
	(1.10)	(1.10)	(2.96)
2007	0.0335	0.0084	0.0039***
	(0.85)	(0.85)	(3.56)
2008	-0.0948**	-0.0237**	0.0021*
	(-2.37)	(-2.38)	(1.94)
2009	-0.3177***	-0.0795***	-0.0100***
	(-7.68)	(-7.70)	(-9.15)
2010	-0.1655***	-0.0414***	-0.0072***
	(-4.13)	(-4.13)	(-6.67)
2011	-0.1533***	-0.0384***	-0.0047***
	(-3.84)	(-3.84)	(-4.43)
2012	-0.1909***	-0.0478***	-0.0075***
	(-4.71)	(-4.71)	(-6.90)
2013	-0.2733***	-0.0684***	-0.0081***
	(-6.54)	(-6.55)	(-7.44)
2014	-0.1633***	-0.0409***	-0.0049***
	(-3.97)	(-3.98)	(-4.48)
R^2	0.0950 (pseudo)		0.0293
N	26,795		26,795

To test the robustness of our model and to gain additional insights into the underlying dynamics we also perform a similar OLS regression on the sample. Due to shortcomings of linear probability models (cf. Long, 1997), we do not use a dichotomous dependent variable as in the probit model. Instead, we examine a different perspective by regressing the annual acquisition cash flow normalized by assets on the same independent variables as before. The results are reported in Specification (2) of Table 2. Most importantly, we find that excess cash has a positive and significant effect on acquisition volumes. Therefore, cash-rich firms are not only more likely to complete acquisitions, but also spend more in total.[16] Similar conclusions can be drawn for all other continuous control variables as well, as they keep the sign and significance from the probit. The year dummy variables are again consistent with movements in the M&A market. The coefficients for the years 2006, 2007 and 2014 become more significant. The coefficient for 2008 turns positive, but loses significance.

Unfortunately, a direct comparison of the results of our probit to the U.S. is impossible due to the fact that Harford (1999) does not report marginal effects for his model. Bearing in mind the limited comparability of probit models, however, the effect of excess cash on M&A activity seems to be more pronounced in the U.S. than in Europe. The probit coefficient for excess cash in the U.S. is more significant and has roughly five times the magnitude of our coefficient.

In this section, we found that firms become more likely to make acquisitions with increasing excess cash levels. To be able to judge the quality of the investment decisions, it is now interesting to determine whether, ceteris paribus, deals done by cash-rich firms create more or less shareholder value. Therefore, we will study the relationship between excess cash and announcement returns in the next section.

5.2. Announcement Returns

Acquisitions are a proven means to observe information about a firm's investment decisions. Postulating an efficient market, we can use announcement returns to investigate how the market assesses the value of a decision to bid relative to the value of an expected course of action. The value of the expected action should already be incorporated in today's share price. For example, that expectation partly depends on a firm's readily observable cash position, since the market has an expectation of how the firm intends to use the funds. The market returns following the announcement of a bid[17] thus reflect both an assessment of whether the announced acquisition is better or

[16] To test whether this effect is due to a generally larger deal size or just an increased number of small deals, we also perform an OLS regression on transaction value relative to acquirer assets in the year prior to the acquisition. In unreported results, we find that cash-rich firms tend to do relatively larger deals.
[17] As mentioned previously, our sample only includes successful bids.

worse compared to the expected course of action and the expected probability that a firm would become an acquirer (Harford, 1999).

To evaluate how the market incorporates excess cash in its reaction to acquisitions, we conduct an event study for acquiring firms using the same sample as for our probit model. Since an acquiring firm can have multiple deals per year, we organize our sample by deal instead of by acquirer. Each deal is matched with the required data from the acquirer and the target. We impose several restrictions to our sample and omit observations that do not meet data requirements necessary for our study. This gives us a sample of 14,196 deals for public acquirers incorporated in an EU-15 country between 2005 and 2014.

The average of all announcement CARs, measured from five days prior to the bid to one day after, is positive at 1.42% in our sample. Looking at cash-rich acquirers only, we find a lower average of 1.27%. Although many previous studies of bidder returns find negative CARs around announcement dates, most of these studies use samples drawn from earlier decades and rely exclusively on U.S. data, e.g. Jarrel et al. (1988) and Moeller et al. (2005). In contrast, other studies, e.g. Jensen and Ruback (1983), report positive bidder returns. The mixed evidence supports the widely accepted idea in M&A research that average bidder returns vary over time and geographies.

To examine what in particular drives the returns the regressions are set up as follows: The dependent variable is Bidder CAR in the event window days -5 to +1 relative to the bid announcement. Abnormal returns are obtained using a market model with daily stock returns and the FTSEurofirst 300 Index as a proxy for the European market. The estimation period for the market model ranges from days -123 to -6 relative to announcement. Our variable of interest is again excess cash which is defined in Section 4 and measured at year end t-1. Other independent variables are borrowed from the acquisition literature and widely follow Harford's (1999) study:

1. **Past bidder CAR.** Rau and Vermaelen (1998) present evidence that market participants tend to over-extrapolate bidders' past performance when assessing the quality of an acquisition. In addition, Morck et al. (1990) separate bidders by good and bad prior performance, and find that bidders' returns are significantly lower for firms which performed poorly before the acquisition.
2. **Market-to-book ratio.** The market-to-book ratio of assets can be used as a proxy for growth opportunities. Lang et al. (1989) and Servaes (1991) show that it is important to distinguish between firms with good and bad investment opportunities when assessing bidder returns. In particular, using an adjusted market-to-book ratio as a measure of in-

vestment opportunities, they find that bidders with high market-to-book ratios have significantly positive abnormal returns when they engage in a takeover, while bidders with low market-to-book ratios have significantly negative abnormal returns.

3. **Leverage.** Maloney et al. (1993) find that bidders' announcement period returns increase with higher bidder leverage. This observation supports the argument from Jensen's (1986) agency theory that debt can have a disciplining effect.
4. **Diversification.** According to Berger and Ofek (1995), firms' efforts to diversify their business destroy value. The concept is widely known under the terms diversification discount or conglomerate discount. It is derived from the notion that firms should not attempt to do what individual investors can do more efficiently themselves, i.e. building a diversified portfolio. Morck et al. (1990) also show that diversifying acquisitions are less likely to produce positive synergies. Evidence, however, remains controversial as other studies attribute the above mentioned discount to sample selection biases (cf. Graham et al., 2002; Villalonga, 2004).
5. **Cross-border.** Moeller and Schlingemann (2005) find that cross-border acquirers experience significantly lower announcement returns than domestic acquirers. This might be explained by a higher level of risk inherent to international deals.
6. **Method of payment.** Previous research, e.g. from Travlos (1987) and Bhagat et al. (2005), shows that announcement returns are significantly lower for bidders who pay with stock rather than cash. This is based on the hypothesis that if managers use equity they have reason to believe that it is overvalued.

Past bidder CAR is estimated by calculating bidder CAR in a window from days -252 to -20 relative to announcement. CARs are derived from a market model with an estimation period of days -370 to -253. We use the FTSEurofirst 300 Index as a proxy for market performance in EU-15 countries. Market-to-book ratio is defined as the market-to-book ratio of assets and we classify firms having a market-to-book ratio of greater than one at year end t-1 as firms with good investment opportunities. We include a dummy variable equal to one if a firm has good investment opportunities and zero otherwise.[18] Leverage is defined as debt deflated by assets at year end t-1. We classify a deal as being diversifying if the target has a different 2-digit SIC code than the acquirer and include a dummy variable equal to one if a deal is diversifying and zero otherwise. We classify a deal as being cross-border if the acquirer's and the target's country of incorporation differ and include a dummy variable equal to one if a deal is cross-border and zero otherwise. Method of payment is defined as the percentage of cash of the total consideration and we include a dummy

[18] Following Lang et al. (1991), we also test adding an interaction variable between the dummy and excess cash but drop the variable because of wide irrelevance. Results are not reported here.

variable equal to one if a bid is all-cash and zero otherwise. Market-to-book ratio and leverage are winsorized consistent with Section 4. In addition, bidder CAR is winsorized at the 1% tails.

Results from regressions exclusively relying on the variables outlined above might still be inaccurate in capturing the relationship between excess cash and abnormal announcement returns. As mentioned in the beginning of this section, we also need to take into account the expected probability that a firm would become an acquirer. This is because in the case where the market has expected the announcement of a particular acquisition, the relative value assessment has already been incorporated and is not reflected in the announcement period returns. To partially correct for this, the results from the probit model in Section 5.1 are used to model expected acquisition behavior and to then separate unexpected from expected acquirers. We follow the methodology used by Palepu (1986) and Harford (1999).

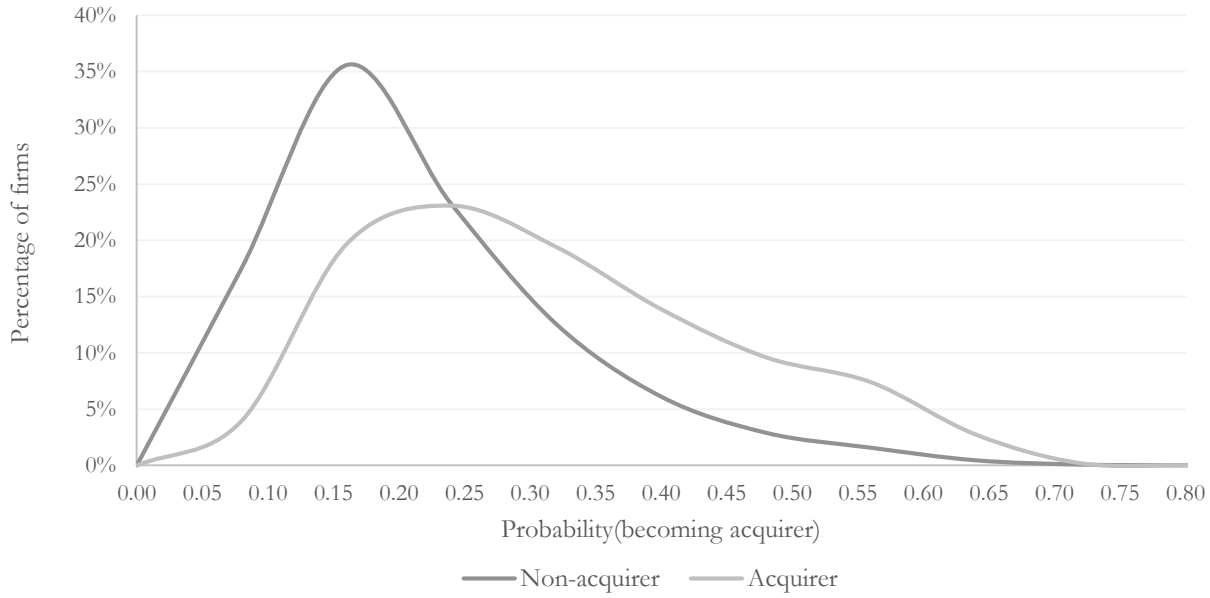
Specifically, we use the results in Table 2 to predict probabilities for firms to become acquirers in their next firm year and construct the empirical distributions of these probabilities. The distribution is calculated by dividing the range between maximum and minimum probability into intervals of the same size. As graphed in Figure 7, the percentage of firms falling into each interval is then allocated for acquirers and non-acquirers (Harford, 1999). The probability density functions of both acquirers and non-acquirers are positively skewed and, as can be expected, non-acquirers have, on average, a lower probability of becoming acquirers than those firms which actually did (18% and 27%, respectively). The intersection of the curves is found at a probability of 24.01 % and marks the cutoff point for determining whether a firm is expected to bid or not. Consequently, acquiring firms with probabilities above 24.01% are designated as expected acquirers and those below are designated as unexpected acquirers. This gives us 2,806 expected and 2,459 unexpected acquirers in the period from 2005 to 2014.

To adjust for the fact that some of the bids we observe are expected by the market, we separate the excess cash variable by whether or not the acquirer is expected to become an acquirer as per our definition. We also include a dummy variable equal to one if an acquisition is unexpected and zero otherwise. Aggregated OLS regression results are presented in Table 3[19], where Specifications (1) to (5) employ different dummies separately to test the robustness and validity of the complete model in Specification (6).

[19] We exclude the dummy for all cash bids from the regressions which are reported here because the underlying data in our sample is incomplete.

Figure 7: Empirical Probability Density Functions of Acquisition Likelihood

This figure presents the empirical distributions of being a predicted acquirer for both acquirers and non-acquirers. The probabilities are obtained from the results of the probit model in Section 5.1 and are based on 26,795 firm years during the period 2005 to 2014 for our sample of public firms incorporated in the EU-15. The intersection on the graphs at 24.01% marks the cutoff point determining whether a firm is expected to become an acquirer or not.



The coefficient of excess cash is significantly negative at the 1% level across the first four regressions in Table 3. Even more important, in Specifications (5) to (7), we find negative and significant coefficients of excess cash if the acquirer is unexpected. In contrast, the coefficient of excess cash if the acquirer is expected is positive but insignificant which is in line with our previous reasoning that the market is able to draw inferences from cash holdings on acquisition behavior when it expects a bid. Additionally, F-tests reject the hypothesis that coefficients for expected and unexpected acquirers are the same and hence corroborate that results for expected and unexpected acquirers are significantly different from each other. Taken together, the results confirm Hypothesis IV of our research questions. The negative effect of cash-richness on abnormal announcement returns can be seen as support for the notion that cash-rich firms experience greater agency problems and make worse investments. To test the economic significance of this result, we normalize excess cash with market value of equity instead of book value of assets in Specification (7). This gives us an approximation of the value destruction associated with holding excess cash. We find that for every dollar of excess cash held, unexpected acquirers destroy one cent of the market value of equity.

Table 3: Analysis of Announcement Returns and Deal Characteristics

This table presents the results of OLS regressions determining the effect of several factors on bidder announcement returns and also presents different bid characteristics. Panel A presents results from regressions of Bidder CAR from days -5 to +1 relative to the announcement of successful bids during the period 2005 to 2014 using the same sample of firms incorporated in the EU-15 as for our probit model in Section 5.1. Bidder CAR around announcement is obtained using a market model with daily stock returns and the FTSEurofirst 300 Index as a proxy for the European market. The estimation period for the market model is days -123 to -6. Excess cash is the difference between the actual and predicted cash-to-asset ratio as measured in Section 4 and is measured at year end t-1. Past bidder CAR is the bidder's cumulative abnormal return calculated similarly as above from days -252 to -20. High MtB is a dummy variable which is equal to one if a firm's market-to-book ratio is greater than one at year end t-1 and zero otherwise. Leverage is defined as debt deflated by assets at year end t-1. Diversifying is a dummy variable equal to one if the acquirer's and target's 2-digit SIC code differ from each other and zero otherwise. Cross-border is a dummy variable equal to one if the acquirer's and target's country of incorporation differ and zero otherwise. Unexpected is a dummy variable equal to one for unexpected acquirers and zero otherwise. Regressions (5) and (6) separate excess cash for expected and unexpected acquirers which are classified by using results from Figure 7. Specification (7) is identical to Specification (6) except that the excess cash ratio is calculated with the market value of equity instead of the book value of assets. F-tests reject the hypothesis that Unexpected * Excess cash = Expected * Excess cash for the coefficients in the different regressions. Ambiguous terms are defined in the Appendix (Figure 5).

Panel B presents the percentage of cash-rich and cash-poor firms that (i) pay in cash only, (ii) bid on firms outside their industry, (iii) bid on firms outside their country of incorporation and (iv) bid in deals for which there are multiple bidders.

t-statistics are given in parentheses. Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

Panel A: Bidder Announcement Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	0.0192***	0.0203***	0.0221***	0.0234***	0.0113***	0.0145***	0.0146***
	(10.48)	(10.44)	(11.16)	(11.13)	(5.53)	(6.08)	(6.14)
Excess cash	-0.0334***	-0.0335***	-0.0326***	-0.0326***			
	(-4.76)	(-4.77)	(-4.59)	(-4.60)			
Unexpected bid					-0.0699***	-0.0698***	-0.0096***
					(-6.90)	(-6.86)	(-2.91)
Expected bid					0.0130	0.0132	0.0003
					(1.17)	(1.16)	(0.68)
Past bidder CAR	0.0076***	0.0076***	0.0074***	0.0073***	0.0073***	0.0073***	0.0063***
	(4.29)	(4.26)	(4.11)	(4.08)	(3.79)	(3.77)	(3.28)
High MtB	-0.0063***	-0.0064***	-0.0054***	-0.0055***	-0.0046***	-0.0037**	-0.0038**
	(-3.68)	(-3.71)	(-3.11)	(-3.13)	(2.62)	(-2.12)	(-2.11)
Leverage	-0.0082*	-0.0079*	-0.0079*	-0.0076*	-0.0047	-0.0043	-0.0041
	(-1.82)	(-1.76)	(-1.75)	(-1.67)	(-0.98)	(-0.88)	(-0.87)
Diversifying		-0.0024*		-0.0026*		-0.0027*	-0.0024*
		(-1.69)		(-1.83)		(-1.84)	(-1.69)
Cross-border			-0.0069***	-0.0070***		-0.0044***	-0.0046***
			(-4.86)	(-4.93)		(-2.96)	(-3.07)
Unexpected					0.0133***	0.0125***	0.0135***
					(8.73)	(7.95)	(8.56)
Adj. R^2	0.0054	0.0056	0.0073	0.0075	0.0182	0.0193	0.0152
N	11,175	11,175	11,002	11,002	9,655	9,493	9,493

Panel B: Characteristics of Bids

	Cash-rich	Cash-poor	*t*-Test for Difference
All-cash	0.2834	0.2496	2.0986**
Diversifying	0.4863	0.4860	0.0396
Cross-border	0.5514	0.5063	4.8174***
Multiple bidders	0.0204	0.0146	0.9352

Overall, the coefficients of the acquirer's past stock performance are significantly positive in all specifications. This is consistent with results from prior studies and suggests that the market tends to extrapolate past performance. Surprisingly, the coefficients of the high market-to-book dummy are slightly but significantly negative. This contradicts expectations that acquisition announcements are welcomed by the market as long as they have good investment opportunities. Throughout our study, we find that the effects of the market-to-book ratio consistently deviate from previous literature (cf. Section 4). This remains a puzzle and invites future research to take a closer look at the underlying determinants. One possible explanation could be that the market values investing in internal projects higher than turning outside for investments if the firm generally has good investment opportunities. We do not find evidence of the leverage effected discovered by Maloney et al. (1993). Contrary to the idea that debt has a disciplining effect as suggested in Jensen's (1986) agency theory, coefficient signs are consistently negative and partly significant at the 10% level. One possible explanation could be that the market is wary of the inherent risk of takeovers added to the existing financial risk. Additionally, we find some evidence for the diversification discount. Signs for the diversifying deal dummy are negative and significant at the 10% level. Magnitudes of the coefficient, however, remain relatively small. A similar effect can be observed for the cross-border deal dummy. Coefficients are slightly but significantly negative, supporting the theory that the market ascribes a higher level of uncertainty to cross-border deals. Similar to Harford (1999), our model has limited explanatory power indicated by low adjusted R^2 which means that the results must be treated with caution.

We drop the dummy variable for the method of payment since payment details for European deals are only fragmentarily reported in the SDC Platinum M&A database leading to poor data quality. Including the variable results in a significantly smaller sample size and might also produce a sample selection bias. Unreported regressions including a dummy set equal to one for all-cash deals produce results which are qualitatively the same as the ones in Table 3 but which are overall less significant. If a greater proportion of cash-rich than cash-poor acquirers use a higher percentage of stock as a means of payment, this might partially explain the negative effect of positive excess cash on announcement returns. Bearing in mind the limited validity of the data set, we can deny this assumption by examining the results in Panel B of Table 3. Cash-rich bidders tend to finance more acquisitions exclusively with cash than cash-poor bidders. A two-sample *t*-Test reveals a highly significant difference between the two sample means. According to literature (Travlos, 1987; Bhagat et al., 2005), this would imply a positive effect on cash-rich bidder returns. Our finding is in line with Jensen's (1986) hypothesis that cash-rich firms use acquisitions as a primary method to spend excessive cash. A caveat here, however, is to equate cash-richness with the ability

to pay in cash. Independent of their cash status, firms still have the possibility to go to the capital markets to finance value creating all-cash acquisitions.

Panel B of Table 3 also presents results on three additional bid characteristics: (i) whether a bid represents a diversifying acquisition, (ii) whether the bid represents a cross-border acquisition, and (iii) whether there are multiple bidders for a target. We do not find any evidence that cash-rich firms engage in more diversifying acquisitions than cash-poor firms. By contrast, we do find strong support that cash-rich firms tend to acquire targets which are located in a foreign country. This result is positively significant at the 1% level and confirms earlier findings by Moeller and Schlingemann (2005). One reason for this finding might be that cash-rich firms select international targets to increase their flexibility with regards to tax planning strategies in order to optimize their cash holdings. The interest of multiple bidders in the same target might indicate the value of a target. Reversely, the absence of other bidders could indicate that a firm's initial bid overvalues a target to the extent that it preempts competitors from entering into the bidding. In our results, we find that even though the mean for cash-rich firms is marginally higher, the difference is not statistically significant.

To conclude this section, we compare our results to findings from the U.S. Harford (1999) finds that, overall, the U.S. market treats cash-rich firms similar to the European market, i.e. announcement returns are negatively influenced by cash-richness. Nonetheless, there are distinct differences in magnitude: U.S. firms experience a shock roughly three times larger than their European counterparts. To get a better understanding of the reasons for the negative relationship we analyze operating performance in the next section.

5.3. Post-merger Operating Performance

Up until now we have established that cash-richness leads to (i) increased M&A activity and (ii), other things being equal, relatively lower announcement returns. Furthermore, we found that there are some material differences in characteristics of deals done by cash-rich acquirers compared to cash-poor acquirers. To develop a better understanding of why announcement returns are negatively influenced by cash-richness, we investigate whether one reason might be a decline in operating performance following the transaction. Therefore, this section examines the deals in greater detail by comparing operating performance before and after the transactions.

In an earlier study, Healy et al. (1992) examine post-merger operating performance for large U.S. mergers between the late 1970s and the early 1980s. They compare the pre-merger performance of acquirer and target to the post-merger performance of the newly combined entity. In short, they find that there is an abnormal post-merger improvement in operating performance.

Since they also find positive announcement returns in their sample, this result indicates that the market anticipates post-merger performance increases at announcement.

Building on Healy et al.'s (1992) findings, Harford (1999) tests for the same relationship in his study of U.S. mergers in the period of the late 1970s to the early 1990s. He confirms Healy et al.'s results by also reporting a positive relationship between changes in operating performance following mergers and announcement period returns. His results differ, however, in the sense that he reports a decline in post-merger performance. This result is consistent with the negative market reaction to bids done by cash-rich acquirers in his sample and indicates that the market correctly anticipates the effect a merger has on future operating performance.

Even though we do not observe negative abnormal announcement returns, we hypothesize that there is a positive relationship between post-merger changes in operating performance and the negative influence of cash-richness on abnormal announcement returns in our sample. We follow the established methodology to ensure comparability and apply it to our sample of mergers over the period from 2006 to 2012. The aim is to test whether the relative decrease in announcement returns due to cash-richness observed in Section 5.2 can be partially explained by the market's correct anticipation of poor future operating performance. We expect this relationship to be positive, indicating that an expectation of operational deterioration underlies the relative equity devaluations of cash-rich acquirers at announcement.

Following Harford (1999), we measure operating performance as cash flow return-on-assets. We employ the same variable definitions as in our model of normal cash calculations (cf. Section 4). We also incorporate the findings of Barber and Lyon (1996) in the design of our test. They show that it is crucial to control for abnormal firm characteristics prior to the transaction to get a clean measure of the variable. Therefore, we match the sample bidders to a control group based on cash status. The operating performance of cash-rich and cash-poor acquirers is adjusted by subtracting the median performance of other cash-rich or cash-poor firms in the respective control group. Year t-1 before the transaction is set to identify the acquirer's cash status and this classification is then used to match the sample firm with its control group in any of the examined years from t-2 to t+2. We exclude firms in the control groups which engage in acquisitions themselves to ensure a direct comparison between the performance of cash-rich acquirers and non-acquirers. As a robustness check, we introduce a second characteristic and match sample bidders with their respective control groups based not only on cash status but also on industry group defined by their two-digit SIC code.

Average adjusted cash flow return-on-assets is then calculated as the two year (t-2 to t-1 before the transaction) average of acquirer and target cash flow return-on-assets weighted by their

relative market values measured at the end of year t-1. Similarly, post-merger returns of the newly combined entity are averaged over the years t+1 and t+2 after the transaction. We exclude year t0 because, due to timing, a deal might be closed in the year after it was announced and because there might be differences between methods of consolidation. The following OLS regression is then estimated where each transaction i represents one observation:

$$\text{Post-merger adj. } CF/A_i = \alpha + ß \text{ Pre-merger adj. } CF/A_i + \varepsilon_i \quad (2)$$

CF/A is cash flow return-on-assets. ß measures whether pre-merger performance is continued and α measures whether operating performance after the transaction is abnormal compared to before. As mentioned above, Healy et al. (1992) find the intercept to be significantly positive in their study, while Harford (1999) reports a significantly negative coefficient. The regression uses all completed deals in the M&A database from SDC Platinum from 2006 to 2012 for public acquirers incorporated in the EU-15 of our sample. The minimum acquired stake in the target is set to be 50%.[20] It is also worth mentioning that the initial sample is significantly reduced by the fact that only deals between public companies for which there is sufficient pre- and post-merger data available can be considered. Firm identifiers for targets are only fragmentarily reported in the SDC Platinum M&A database which decimates the deal sample for our observation period from 10,596 to 346. Other incomplete information further reduces the sample to 187. As a result, we refrain from winsorizing the dependent and independent variables to not further limit variation.

Table 4 presents our results. Panel A shows regression results on adjusted operating performance for sample acquirers matched on cash status only. Neither in the regression including all firms nor in the separate regressions based on cash status in Specifications (2) and (3) can we find any significant change in post-merger performance as captured by the intercepts. This is surprising for two reasons: First, it does not confirm findings from the previously mentioned studies by Healy et al. (1992) and Harford (1999). Second, it raises additional questions about why announcement returns are decreased by cash-richness if the fundamental operations are unaffected by acquisitions. Interestingly, Söderström (2012) finds a similar relationship in his study of equity financed acquisitions in Europe. He reports that negative announcement returns are followed by a significant improvement in operating performance.

Additionally, looking at the significantly positive coefficients of pre-merger performance, we can conclude that firm performance tends to be autocorrelated over at least a short period of time and that the event of a merger seems to not present a large enough shock to change this.

[20] This differs from Sections 5.1 and 5.2 where no such restriction is used. It is necessary to minimize the possibility that the target might have already been a controlled subsidiary of the acquirer. This would distort the measurement of post-merger performance as the target's performance would already be fully consolidated in the acquirer's books according to accounting rules. We assume that this restriction does not alter comparability between the sections.

Table 4: Operating Performance of Merged Firms

This table presents the results of different OLS regressions analyzing how acquisitions affect the operating performance of merged firms. Deals are observed during the period 2006 to 2012 for our sample of public firms incorporated in the EU-15. The independent variable is pre-merger operating performance which is the two year (t-2 to t-1 before the deal) average cash flow return-on-assets of the acquirer (adjusted by being matched with a control group) and the target, weighted by their relative market values. The dependent variable is the average post-merger (years t+1 to t+2 after the deal) operating performance of the newly combined entity. The intercept measures abnormal post-merger operating performance relative to pre-merger operating performance. Panel A regressions adjust sample acquirers' operating performance by matching them with groups of firms based on cash status and subtracting the median of the respective group's operating performance. Panel B regressions adjust sample acquirers' operating performance by matching them with groups of firms based on cash status and industry, and subtracting the median of the respective group's operating performance. The three different regressions differ in the subsample of acquirers being analyzed. We use all firms in Specification (1), only cash-rich firms in Specification (2), and only cash-poor firms in Specification (3). Ambiguous terms are defined in the Appendix (Table 5).

t-statistics are given in parentheses Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	(1) All Firms	(2) Cash-Rich	(3) Cash-Poor
Observations	187	75	112
Panel A: Firms matched on Cash Status			
Intercept	0.0100 (1.58)	0.0076 (0.68)	-0.0023 (-0.29)
Pre-merger performance	0.0763*** (3.08)	0.0559** (1.98)	0.5151*** (4.96)
Adj. R^2	0.0436	0.0380	0.1751
Panel B: Firms matched on Cash Status and Industry			
Intercept	0.0158** (2.57)	0.0162 (1.55)	0.0011 (0.13)
Pre-merger performance	0.0558*** (2.76)	0.0437** (1.97)	0.4734*** (4.41)
Adj. R^2	0.0344	0.0376	0.1424

Panel B presents results on adjusted operating performance for sample acquirers matched on cash status and industry. Qualitatively, they are similar to the results in Panel A with the main difference being that we find a positive intercept which is significantly positive at the 5% level in the regression for all firms. Considering that the average announcement return across both cash-rich and cash-poor acquirers found in Section 5.2 is positive as well, this coefficient is in line with our original expectation that there is a positive relationship between the market reaction and subsequent operating performance. Nonetheless, the main coefficient of interest, the regression intercept for cash-rich firms, remains insignificant in this regression.

In summary, we do not find any evidence in support of Hypothesis V. This is particularly surprising in the light of our results from the announcement return analysis in Section 5.2. It re-

mains unclear why the market discounts acquisitions done by cash-rich firms if it is not in anticipation of poor future performance. One explanation could be that cash-rich firms tend to pay more for their targets. A reason for this phenomenon might again be found in agency conflicts. Managers might be incentivized by positive excess cash to relatively overpay for targets in order to complete deals. This could also help explaining why cash-rich firms complete more deals as found in Section 5.1. Another reason for the discounted announcement returns might be found in the hubris hypothesis by Roll (1986). It states that hubris can lead managers to unconsciously pay too much for target firms. This bias might be particularly strong for cash-rich firms. We hypothesize that positive excessive cash holdings cause overconfidence in managers, leading them to make positive valuation errors.

Another possible explanation might be that the market understands the risk for increased agency conflicts in cash-rich firms and mistakenly expects that they make bad acquisition decisions on average. This would explain the more wary reaction at announcement. To test if the market's initial assessment is wrong would require additional research on the post-merger stock returns. When the market realizes that there is no deterioration in operating performance, stock prices, controlled for other factors, should rebound, compensating for the initial discount.

In a follow-up on Harford's (1999) study, Oler (2008) criticizes the methodology we employ. He states that it fails to control for other factors which potentially have an influence on post-merger operating performance, e.g. form of consideration (stock vs. equity), nature of the deal (friendly vs. hostile), and whether a deal is diversifying or not. We regard this as valid and sound criticism, notably in view of our results from Section 5.2 where we observe that deal characteristics can differ significantly depending on the acquirer's cash status. To at least partially correct for this shortcoming we rerun the regressions from Table 4 and add several controls for deal characteristics, i.e. dummies for all-cash deals, diversifying deals, cross-border deals, and deals with multiple bidders. Variables are defined in the same way as in Section 5.2. We find that the introduction of additional control variables does not materially change regression outcomes. The intercepts in the regression for cash-rich acquirers remains marginally positive and insignificant. Results are not reported here.

There are also some other caveats and potential limitations to our results in this section. The two most important to cite here are: First, we have to rely on a relatively small sample set of deals which might not be representative. This is particularly pronounced in comparison to the vastly bigger data sets used in our other regressions. Moreover, data quality suffers if there indeed is a sample selection bias in the SDC Platinum M&A database, as hypothesized earlier. Second, our window of post-merger performance is relatively short compared to similar studies. Arguably, two

years after a merger might not be enough to observe fundamental changes in operating performance. Our choice is motivated by the practical reason to not further decrease the sample size.

Finally, we compare our results to existing U.S. literature. Contrary to the findings in Table 4, Harford (1999) finds that cash-rich U.S. acquirers suffer from a significant decline in operating performance subsequent to an acquisition. In combination with the findings from the previous sections, this allows us to make assumptions regarding the fundamental differences between Europe and the U.S. First, the stronger influence of cash-richness on announcement returns and the evidence on operating performance suggest that cash-rich firms in the U.S. experience greater agency conflicts. In the context of M&A, we infer that U.S. managers are more inclined to make value destroying investment decisions. This is in line with what can be expected from Jensen and Meckling's (1976) agency theory: Since U.S. firms tend to have a more dispersed ownership structure than European firms, their shareholders are less effective in monitoring managers (Li, 1994). Second, we hypothesize that there are different reasons for the negative relationship between positive excess cash and abnormal announcement returns. In Europe, it is assumed to be primarily due to overpayment, while in the U.S. the negative influence might be due to both overpayment and a correct anticipation of a decline in operating performance.

6. Limitations and Future Research

We acknowledge that there are limitations of our study and suggest several starting points for extending our research. Most importantly, results are limited by the quality and quantity of the data underlying our sample. We experienced that datasets for the European market are less extensive than comparable datasets for the U.S. While company fundamentals on Compustat Global are well filed starting from the end of the 1990s, market data on Datastream and M&A data on SDC Platinum show large, seemingly arbitrary, gaps for European firms. This might not only lead to decreased comparability to previous U.S. literature but might also result in a sample selection bias in our acquisition sample with U.S. targets being overrepresented.

Nonetheless, future research might want to build on our findings for the European market as a whole and assume a more granular point of view. A valuable extension of our paper would be to examine the differences in cash holdings and their effect on M&A between individual European countries or between distinct industries in more detail.

With regards to our methodology, it is important to understand that there are several assumptions underlying any measurement of excess cash. Even though our model is widely accepted in the literature and has been constantly developed since the 1990s, it is only an approximation by definition. Results are dependent on the chosen estimation period and it is difficult to determine a window that is optimally representative of the evaluation period. An optimal window demands that there are no changes in the relationship between cash holdings and firm characteristics in the estimation and the evaluation period. As discussed in Section 4 and as shown in the Appendix (Table 7), we find that these relationships are relatively stable in our case. Nonetheless, no model can completely eliminate any estimation error. Most notably, results in the M&A section, which build on the estimation of excess cash, are at risk of being affected by those measurement errors. Some researchers, such as Oler (2008), do not apply statistical models to measure excess cash but rely on observable cash levels and compare them to control groups instead. However, this approach comes with its own limitations and does not solve the problem of measuring excess cash cleanly.

One potential shortcoming of the study is that our analysis of acquisition activity in Section 5.1 is based on successful bids only. This is again the result of data limitations since attempted bids are only scarcely reported in the SDC Platinum M&A database. The universe of attempted bids is arguably a more reliable indicator of M&A activity than the universe of successful bids. In case there is a difference in success rates for attempted bids done by cash-rich and cash-poor bidders, our sample could be biased. Moreover, when it comes to the interpretation of results from this analysis, one has to be wary of reverse causation. There is the possibility that firms raise cash well

in advance in anticipation of making a bid. This would confound the agency theory-based interpretation of our results which shows that cash-rich firms have increased acquisition activity. In this case, these acquisitions would be a rationally planned process instead of a move by self-interested managers to deplete excessive cash resources. However, we believe that this issue can be safely neglected as the uncertainty inherent to acquisitions makes it impractical to raise cash up to a year in advance. For example, the emergence of competing bidders or unexpected shifts in the economy can impede the success of an acquisition. Thus, raising funds on short-notice is favorable for potential acquirers.

To build on that, it would be an interesting opportunity to study the implications of our findings on decision making in practice. A natural extension would thus be to delve deeper into the psychological aspects which lead decision makers of cash-rich firms to follow predictable patterns of behavior. Pfaff and Zimmermann (2013) make an attempt in this context and find that management conservatism can partially explain excessively high cash levels in some firms. Their study, however, focuses on a behavioral aspect in the build-up of cash levels and does not investigate behavioral implications of firms that are already cash-rich.

Moreover, it would be interesting to evaluate the market‘s reaction in response to build-ups in excess cash in a European context. Studying abnormal returns triggered by such dynamics would allow to draw conclusions about the public perception of excess cash in a broader context than just M&A. Controlling for these influences, future research could then focus on the stock returns following the initial announcement returns. This would give insights whether the initial reaction we reported in Section 5.2 is complete and consistent, or whether it reverses over time due to overreaction in face of an unexpected acquisition done by cash-rich firms. If the discounted abnormal returns rebound after the bid announcement one could conclude that the initial reaction is irrational, given that we found firm performance to remain unchanged. This knowledge could then be used to identify practical implications of our findings by constructing an investment strategy and measuring abnormal results. Such strategy would presume that one takes a long position in firms classified as unexpected bidders after a bid announcement to capture the value of the rebound. Oler (2008) implements a similar strategy based on his findings of U.S. acquisitions which are expected to under- or outperform in the post-announcement period based on certain bidder characteristics and finds significant abnormal returns. If, however, returns of cash-rich acquirers do not rebound after an acquisition, this would support our assumption that cash-rich acquirers tend to relatively overpay for their targets.

7. Conclusion

Motivated by the increased attention to growing cash balances in the U.S., we study the development of corporate cash holdings and their effect on M&A in a European context. To ensure comparability with established U.S. research, we follow established methodologies for the most part. We use a sample of publicly listed companies from the EU-15 between 1999 and 2014, and merge it with deal data for the period 2005 to 2014. Our key findings, in line with our research questions, are as follows:

(i) First, absolute and relative cash levels increase in European firms over the sample period. This development is in line with the trend observed in U.S. companies, albeit less pronounced.

(ii) Second, employing a model of normal cash holdings, we find that, on average, European firms have a negative excess cash ratio. This may seem surprising in light of the overall increase in cash levels but implies that corporate cash levels adjust to changes in underlying firm characteristics. In contrast to the average negative excess cash ratio, we find a positive sum of absolute excess cash levels which is evidence that positive excess cash tends to be concentrated in a minority of firms.

(iii) Third, the likelihood of engaging in a successful bid increases significantly with excess cash. More specifically, a one standard deviation increase in the excess cash ratio increases a firm's relative likelihood of becoming an acquirer in the next year by 3.7%. Comparability to the U.S. is limited by the methodology and reported output of the related literature, but excess cash appears to have a weaker effect on M&A activity in Europe.

(iv) Fourth, unexpected cash-rich acquirers experience significantly discounted announcement period returns. Put in economic terms, we find that for every dollar of excess cash held, unexpected acquirers destroy one cent of the market value of equity. This suggests that cash-rich firms make worse investments from a shareholder perspective. In comparison, the effect is weaker than in the U.S.

(v) Fifth, post-merger operating performance seems to be unaffected by the cash status of the acquiring firm. This stands in contrast to our expectations and significant changes in operating performance found in the U.S.

In general, our results confirm previous findings and are mostly in line with established theories. In particular, the result that positive excess cash leads to increased M&A activity is consistent with Jensen's (1986) agency theory. Contrary to expectations, we cannot confirm that there is a notable relationship between the effect of cash-richness on announcement period returns and

subsequent operating performance. Apart from the issue of limited data in the regression, we hypothesize that this indicates that cash-rich acquirers might pay more for their targets. This argumentation can be supported by both agency conflicts and Roll's (1986) hubris hypothesis. While agency conflicts lead managers to consciously act against shareholder interests, cash-rich acquirers may also be affected by hubris and unconsciously pay too much for their targets.

Comparing our findings to the U.S., we contribute mainly by adding new perspectives to established literature. Referring to the differences mentioned in our key findings above, we develop the following theories: First, cash-rich U.S. firms seem to experience more severe agency conflicts than their European counterparts. This is visible in a more negative effect of cash-richness on announcement returns and in a decline in operating performance subsequent to acquisitions. Second, there might be different reasons for the discount on abnormal announcement returns of unexpected cash-rich acquirers. In Europe, the wary market reaction is assumed to be primarily due to overpayment, while in the U.S., the market correctly anticipates a decline in operating performance which might be accompanied by overpayment.

Finally, our findings not only serve academic purposes but also have practical implications. In a corporate setting, they might help firms to optimize liquidity management and investment decisions. Coming back to one of our initial motivations, our findings provide some evidence that agency conflicts are greater in cash-rich firms, which leads to more imprudent deals. From this perspective, activist investors' claim that cash-rich firms should distribute some of their excessive cash holdings back to shareholders seems to be justified.

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Appendix

Table 5: Terms and Definitions

This table presents definitions of selected terms used in this paper. The list of data items is not exhaustive but only includes terms which are used ambiguously in the literature. Additionally, we explain the databases and the M&A terminology we employ.

Term	Definition
Abnormal return	Difference between the actual and the expected return of a security.
Announcement date	Date a deal is made public.
Assets	Book value of assets.
Bidder	Firm that attempts to acquire another firm. Since our sample includes only successful bids, we use the term bidder interchangeably with the term acquirer.
CAR	Cumulative abnormal return is the sum of all abnormal returns over a specified event window.
Cash	Cash plus short-term investments.
Cash flow	Operating income before depreciation minus interest, taxes and dividends.
Cash ratio	Cash deflated by assets, unless defined otherwise.
Cash-poor	Negative excess cash.
Cash-rich	Positive excess cash.
Firm	We use this term interchangeably with the term company.
Compustat Global	Global database comprising financial data of active and inactive companies. Provided by S&P Capital IQ.
Datastream	Global database comprising market data of equities, fixed income securities, indices, currencies and macroeconomic indicators. Provided by Thomson Reuters.
Debt	Long-term debt plus debt in current liabilities.
EU-15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.
Excess cash	Actual minus predicted cash ratio.
Leverage	Debt deflated by assets.
Market model	Model for determining expected returns. Based on an OLS regression of security returns on market returns.
Market value of assets	Book value of assets minus book value of equity plus market value of equity.
M&A	Mergers and acquisitions.
Net debt issuance	Long-term debt issuance minus long-term debt reduction.
Net equity issuance	Sale minus purchase of common and preferred stock.
Net working capital	Current assets excluding cash minus current liabilities.
Public firm	Firm whose shares are traded on a stock exchange.
SDC Platinum	Global database comprising data on market transactions. Provided by Thomson Reuters.
SIC	Standard Industrial Classification system used to classify industries.
Target	Firm that is the subject of an acquisition attempt.

Table 6: Survey of Cash Holdings

This table presents a survey from Lins et al. (2010) conducted with 200 corporate managers in an attempt to understand the reasons for why they hold cash. It presents the answers to the question: "In deciding how much excess cash to hold, how important are the following factors?" Scale is Not important (0) to Very important (5).

	% (4) or (5) score	Mean score	Number of respondents
Cash as a buffer against future cash flow shortfalls	47	3.04	188
Minimal cash ensures efficient running of the company	35	2.57	182
Difference between interest rate on cash and interest rate on debt	35	2.50	184
Time it takes to raise money when funds are needed	31	2.43	187
Level of uncertainty about future investment opportunities	31	2.36	186
Ability to issue debt at a fair price when funds are needed	30	2.29	187
Difference between interest rate on cash and cost of capital	26	2.19	182
Size of the undrawn credit facility	23	2.06	182
Transaction costs of raising funds	22	1.96	184
Difference between interest rate on cash and return on other projects	19	1.93	181
Ability to issue equity at a fair price when funds are needed	19	1.77	181
Using cash to retire debt moves company below target debt level	18	1.64	181
Tax that shareholders would pay if company paid out cash	13	1.48	183
Preference of controlling shareholders	13	1.40	182
Rating agency requirements	12	1.45	179
Signals associated with drawing down the undrawn credit facility	10	1.49	174
Other lender requirements	10	1.23	180
Regulatory requirements	9	1.13	178
Contingent capital (e.g. possible future litigation exposures)	8	1.37	179
Ability to take on projects even if they do not add value to the firm	8	1.08	182
Cannot apply cash to retire debt without incurring accounting charges	7	1.39	176
Cash holdings of other companies in my industry	4	1.21	182

Figure 8: Gini Coefficients of Cash Holdings

This figure presents the development of cash concentration as measured by the Gini coefficients of cash holdings across 54,169 firm years from 1999 to 2014 for our sample of public firms incorporated in the EU-15.

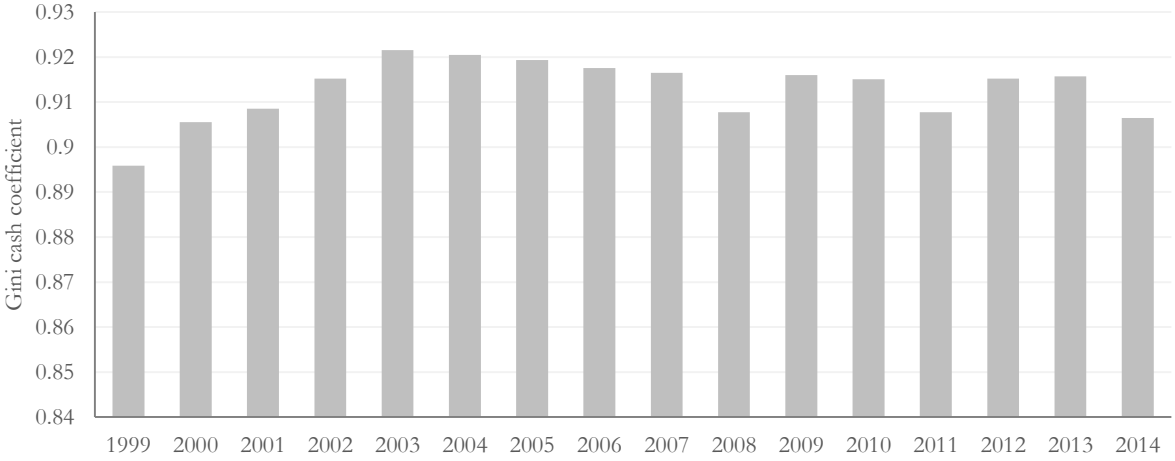

Table 7: Cash Ratio Cross-Sectional Regressions

This table presents the results of cross-sectional regressions determining factors that drive acquisition activity in the EU-15. The dependent variable is Cash Ratio and is defined as cash deflated by assets. IndSigma is the standard deviation of cash flow to assets averaged across firms in the same industry defined by the two-digit SIC code (standard deviation is measured over the five previous years and a minimum of three firm year data is required for a data point to be included in the calculation), MtB is the market-to-book ratio of assets, Size is the natural logarithm of assets deflated to 2003 million U.S. dollars using CPI data, CF is cash flow deflated by assets, NWC is net working capital deflated by assets, CapEx is capital expenditures deflated by assets, Lev is debt deflated by assets, RD is research and development expenses deflated by sales, Div is a dummy variable that indicates if a firm declared a common dividend, Acq is annual acquisition cash flow deflated by assets, NetEquity is net equity issuance deflated by assets, and Country are country dummy variables which are not reported here. Ambiguous terms are defined in the Appendix (Table 5).

Significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Intercept	0.3117***	0.2887***	0.2698***	0.2587***	0.2553***	0.2685***	0.2584***	0.2752***	0.2954***	0.2638***	0.2723***	0.2402***	0.2430***	0.2555***	0.2356***	0.2722***
IndSigma	0.1435***	0.2032***	0.2335***	0.0943***	0.1481***	0.1021***	0.3393***	0.2215***	0.0979	0.2862***	0.1698***	0.2243***	0.1583***	0.0110	0.0049	0.0146
MtB	0.0003***	-0.0004***	-0.0002	-0.0004***	-0.0002*	-0.0001	-0.0004***	-0.0003***	-0.0003***	-0.0003**	-0.0003***	-0.0004***	-0.0006***	-0.0001	0.0002	0.0008***
Size	-0.0097***	-0.0066***	-0.0078***	-0.0075***	-0.0071***	-0.0081***	-0.0085***	-0.0106***	-0.0134***	-0.0111***	-0.0115***	-0.0098***	-0.0081***	-0.0097***	-0.0075***	-0.0117***
CF	-0.0645***	-0.0419**	-0.1229***	-0.1380***	-0.0880***	-0.0782***	-0.0308	0.0082	0.0374**	0.0399***	0.0735***	0.0839***	0.0109***	0.0923***	0.0145	-0.0939***
NWC	-0.2330***	-0.2162***	-0.1497***	-0.1384***	-0.1060***	-0.1459***	-0.1708***	-0.1697***	-0.1678***	-0.1472***	-0.1260***	-0.1334***	-0.1266***	-0.1245***	-0.1345***	-0.1279***
CapEx	-0.2468***	-0.2985***	-0.2337***	-0.2457***	-0.3132***	-0.2669***	-0.2955***	-0.3462***	-0.3091***	-0.2311***	-0.1987***	-0.2961***	-0.1961***	-0.2094***	-0.2580***	-0.1395**
Lev	-0.3718***	-0.3846***	-0.3660***	-0.3427***	-0.3334***	-0.3471***	-0.3320***	-0.3452***	-0.3002***	-0.2936***	-0.2804***	-0.2681***	-0.2867***	-0.2506***	-0.2634***	-0.2542***
RD	0.1590***	0.1507***	0.1590***	0.1685***	0.1906***	0.1935***	0.1711***	0.1608***	0.1703***	0.1499***	0.1764***	0.1729***	0.1574***	0.1718***	0.1569***	0.1792***
Div	-0.0133**	-0.0267***	-0.0072	-0.0012	-0.0034	-0.0003	0.0078	0.0040	0.0020	0.0062	0.0142**	0.0181***	0.0074	0.0107*	0.0107*	0.0034
Acq	-0.1018	-0.3094***	-0.0957	-0.2797**	-0.1905	-0.2711**	-0.3153***	-0.3809***	-0.2941***	-0.2162***	-0.1968**	-0.2861***	-0.1987***	-0.2053***	-0.2734***	-0.2905***
NetEquity	0.0326***	0.1795***	0.0209	0.0013	0.0471***	0.0821***	0.1983***	0.1717***	0.1309***	0.0284***	0.0368***	0.1542***	0.1034***	0.1463***	0.1743***	0.0041***
Country	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
Adj. R^2	0.3528	0.4521	0.3469	0.3263	0.3141	0.3579	0.4076	0.3882	0.3895	0.3297	0.3269	0.3433	0.3326	0.3372	0.3518	0.3653
N	3,271	3,515	3,524	3,499	3,405	3,459	3,512	3,650	3,740	3,543	3,410	3,304	3,206	3,078	3,023	3,030