Can manager conservatism explain corporate cash holdings? Evidence from the Eurozone

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Abstract

Differences in cash holdings across firms have traditionally been explained by precautionary savings motives. However, in line with a recent U.S. study, we identify a group of European industrial companies with a particularly high ratio of cash to assets, which cannot be explained by precautionary savings, agency or tax motives. We hypothesize that these firms are managed by conservative executives and develop four proxies for conservatism to study their impact on cash holdings. We find support for the notion that differences in age, professional background, and compensation structure aid in our understanding of cash policies. We find no evidence of a relationship between gender and cash holdings.

Keywords: Cash holdings, precautionary savings, behavioural finance, manager fixed effects, CEO and CFO characteristics, executive compensation

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1 Introduction

Corporate cash policies are one of the most debated topics in recent years, both in academics and in the media. A recurring observation is the substantial increase in cash holdings over time. On the academic side, Bates, Kahle and Stulz (2009) report that the average cashto-assets ratio¹ of U.S. industrial firms has more than doubled in the last three decades. Beyond prominent examples such as Apple Inc., whose cash hoarding is ascribed mainly to tax reasons, a recent article on Bloomberg notes that the trend to stockpile cash also holds for European companies (Webb, 2013). In the same article, Francois-Xavier de Mallmann, head of European investment banking services at Goldman Sachs Group Inc., notes that 'many European companies are taking a conservative view with respect to their capital structure and keeping meaningful cash positions'. An active debate has emerged about the implications. Bodo Uebber, CFO of Daimler AG, emphasizes that these cash holdings are necessary to be prepared for uncertain times (Webb, 2013). In contrast, a recent article in the Financial Times claims that keeping massive liquidity reserves idle at the balance sheet harms shareholders, employees, and the economy as a whole (Rossi, 2013). Hence, they argue that shareholders should force these companies to either reinvest or distribute their profits.

The issue of corporate liquidity management, and especially cash holdings, is an important topic in corporate finance since it is an integral part of financial strategy. Presence of sufficient cash holdings is essential not only with respect to corporate liquidity itself, but liquidity is also closely linked to solvency, as a recent study by Gryglewicz (2011) has shown. However, whereas capital structure and solvency has been an active field of research for many decades, differences in cash policies have only recently begun to receive increased attention. From a more practical point of view, a better understanding of cash holdings is vital for the company for several reasons. On the one hand a company needs sufficient liquidity to avoid underinvestment or even financial distress. On the other hand, keeping excess cash is associated with substantial costs, not only because the rate of return on liquid assets is typically far below the firm's cost of capital, but also because of costs arising from agency conflicts and double taxation. Beyond this general trade-off in the costs and benefits of cash holdings, several studies suggest that cash comprises important strategic aspects, which we will briefly outline later.

This study focuses on the cash policies of the cash-richest firms. In doing so, this study builds on prior research by Dittmar and Duchin (2012), who present evidence that conventional finance theory cannot fully explain cash holdings of all companies. For a sample of U.S. industrial firms, Dittmar and Duchin (2012) identify and analyse a group of companies,

¹Consistent with prior research, cash will refer to the sum of cash and cash equivalents throughout this paper.

whose cash holdings are significantly higher than predicted by conventional Precautionary Savings Theory. This theory states that firms should keep liquidity buffers if anticipated cash outflows exceed the ability to generate cash flows, or if these cash flows are particularly uncertain. Building on their findings, we test precautionary savings motives for a sample of industrial companies in the Eurozone and identify a similar group of cash-rich firms whose cash holdings pose a riddle in the context of this theory.

Specifically, we observe that the top decile of firms with highest ratio of cash to total assets (henceforth 'cash ratio') are more profitable in terms of ROA, have higher operating cash flows, spend consistently less on CapEx and acquisitions, and operate with less leverage than all other firms. All these differences are statistically significant at the 1% level. Nonetheless, these firms hold a substantially higher proportion of cash to total assets than other firms. We call these firms in the top decile 'cash-rich'² and investigate measures to explain the cash ratio of these firms. We hypothesize that they are managed by conservative executives who maintain high cash ratios because they value liquidity. This induces them to sit on a stockpile of cash just like Scrooge McDuck, the famous comic figure from Walt Disney.³ Cash policies of these firms are therefore to some extent decoupled from the underlying financing need of these firms.

Despite the importance to gain a better comprehension of corporate cash policies, only few studies consider behavioural aspects in this context. This is even more a concern since several studies suggest that behavioural factors have substantial explanatory power for corporate decisions, as we will discuss later. Among the studies that explore behavioural explanations of cash holdings, most are focused on analysing companies in the U.S. market. To our knowledge this study is the first to analyse behavioural explanations for corporate cash holdings in Europe.

This paper is organised as follows. Section 2 will provide a brief overview of the literature on Precautionary Savings Theory as well as on alternative explanations to differences in cash holdings. In Section 3 we construct four proxies of conservatism and develop hypotheses about their influence on liquidity reserves. The fourth section describes the sample, databases used, and methodology applied. In Section 5, we establish the notion of cash-rich firms and argue that cash-rich firms behave systematically different from non-cash-rich firms. Building on this observation, in Section 6 we empirically test the hypotheses motivated in Section 3 to understand if behavioural factors can aid in explaining cash holdings. A conclusion is provided in Section 7.

²Analogously, we will call firms which are in one of the other nine deciles 'non-cash-rich'.

³The name Scrooge McDuck has experienced significant transformations in different languages. Our German-speaking readers may recognize him under the name 'Dagobert Duck', whereas Swedish readers may be more familiar with 'Joakim von Anka'.

2 Literature Review

2.1 Precautionary Savings Theory

Differences in cash holdings have traditionally been explained by a precautionary savings motive. The concept has first been formalized by Keynes (1936) and states that in the presence of financing frictions, liquidity is valuable because it allows the firm to pursue attractive investment opportunities as they arise. Hence, firms with better investment opportunities and more uncertainty should keep higher liquidity buffers. An influential paper by Opler, Pinkowitz, Stulz and Williamson (1999) investigates the determinants and implications of cash holdings on a 40 year sample of U.S. industrial firms. They observe that firms with riskier cash flows and better growth opportunities tend to keep more cash, while firms with superior access to capital markets tend to keep less. Interestingly for our study, Opler et al. (1999) also find evidence that well-performing firms keep more cash than predicted by their model, but do not provide a formal explanation for this observation.

Recent evidence on precautionary savings motives is provided by Bates et al. (2009). Based on the observations that cash ratios have increased substantially over the last decades, they observe that overall precautionary motives continue to provide a valid explanation for this development. Specifically, Bates et al. (2009) note that cash flows of the average firm have become riskier, that inventories and receivables have decreased,⁴ and that R&D activities have intensified. Accordingly, they find that cash ratios have increased by almost 300% for firms operating in industries which experienced the greatest increase in idiosyncratic cash flow volatility, whereas the average rise in cash ratios has been much smaller. Consistent with the observation that idiosyncratic risk plays an important role, Duchin (2010) notes that firms operating in several industries maintain less liquidity reserves, because they are well-diversified in their investment opportunities. The cash-ratio is even lower if investment opportunities are strongly positively correlated with the firm's sources of cash, which provides a natural hedge against cash shortfalls.

A very important issue in the context of precautionary savings is the trade-off between costs and benefits of cash, i.e. finding the optimal level as determined by the marginal value of incremental cash. A good overview is provided by C. S. Kim, Mauer and Sherman (1998). The most important benefit of excess cash is that it limits the firm's dependence on costly external financing. In contrast, the biggest cost stems from the low rate of return on liquid assets, which is usually far below the firm's cost of capital. Hence, the authors argue that the optimal level of cash holdings is increasing in the costs of external financing, and decreasing in the differential in return on the firm's operating assets and its cash holdings.

Mikkelson and Partch (2003) investigate the effect of large cash reserves on operating

⁴Inventories and receivables are assets which can be quickly converted into cash when needed.

performance. They report that, maybe contrary to intuition, large liquidity reserves do not harm the firm's performance, but often even enhance it. The main driver behind this superior performance is a higher propensity to invest, particularly in R&D projects. Building on this work, Denis and Sibilkov (2010) confirm this positive effect of higher cash holdings on investment activity. They emphasize that this observation is particularly true for financially constrained firms since these firms would otherwise need to bypass investment opportunities. Hence, they conclude that holding of sufficient cash reserves is a 'value-increasing response to costly external financing' (p.267). Faulkender and Wang (2006) support this view by noting that capital markets understand the value of cash and reward companies which keep substantial liquidity with higher valuations. However, they also describe an upper bound to the extent that cash holdings are value-increasing. Overall, they observe that the marginal value of cash is decreasing in the level of cash holdings and in the ability to access capital markets. Synthesizing these findings, Gamba and Triantis (2008) develop a dynamic model which provides theoretical support for these empirical findings. Interestingly, they also show that it can be optimal for a firm to simultaneously borrow and lend, which is related to the different strategic dimensions of cash and debt.

As indicated in the introduction, cash comprises important strategic aspects which are often overseen in both literature and practice. The first strategic dimension relates to the distinction between cash and debt. When considering conventional valuation models, cash is usually treated as negative debt by netting it out. However, Acharya, Almeida and Campello (2007) point out that this is not accurate in the presence of financing frictions. In contrast to the conditional nature of debt, which is often not available when it is needed the most due to failure to meet covenants or even a general credit crunch, cash is unconditional in nature. More specifically, Sufi (2009) observes that, due to covenants, credit lines, which are often considered a substitute to holding non-operational cash, are only a viable alternative for firms which maintain high and stable cash flows. Lins, Servaes and Tufano (2010) further elaborate on these empirical results by conducting a survey of 204 CFOs globally. In line with prior research, they find that credit lines are used for different purposes than cash. Since credit lines are generally only available in good times, they are used as a means to exploit future business opportunities. In contrast, cash is a hedging instrument employed against cash shortfalls in bad times. Campello, Graham and Harvey (2010), Campello, Giambona, Graham and Harvey (2011), and Campello, Giambona, Graham and Harvey (2012) complement these findings by a series of surveys of CFOs during the 2008/2009financial crisis. Overall, they find that although companies were not completely cut form access to credit lines during the crisis, insufficient cash reserves were nonetheless costly as measured by bypassed investment opportunities, deep cuts in spending, and the sale of assets to fund operations.

The second strategic aspect of cash relates to the effects of cash holdings on competitive strengths. A study by Haushalter, Klasa and Maxwell (2007) shows that in highly integrated industries inability to finance new investment opportunities leads to substantial losses in market share. Specifically, they observe a predatory behaviour by competitors who strategically use the competing firm's liquidity shortages to exploit new growth opportunities. Fresard (2010) formalizes this idea and finds empirical support in a large sample of U.S. firms. He observes that high cash reserves lead to a systematic gain in market share at the expense of competitors, in particular those who are financially constrained. He emphasizes that this competitive effect is very much different from the strategic aspect of debt holdings.

The research discussed suggests that the question whether a firm is financially constrained plays an important role in determining the optimal level of cash holdings. An influential paper in the context of identifying financially constrained firms has been provided by Almeida, Campello and Weisbach (2004). The authors argue that financially constrained firms are characterized by a high propensity to save cash out of cash flows. The underlying rationale is that only financially constrained firms need to balance anticipated liquidity shortages by bypassing profitable investments today. They thus exhibit a positive 'cash flow sensitivity of cash'. In contrast, financially unconstrained firms can fund all of their current investment opportunities and therefore do not need to save cash today. However, at the same time, financially unconstrained firms have no use for excess cash in the future either, assuming that they remain financially unconstrained. Hence, their cash policies are indeterminate.

Hennessy and Whited (2007) partially question common definitions of financial constraints, including the one by Almeida et al. (2004) on theoretical grounds. Based on a structural estimation they observe that some common proxies for financing constraints actually decline when financing cost parameters increase, which runs counter to the purpose of these proxies. This observation might be important later, when we observe that in our sample the cash-rich firms exhibit a higher savings ratio out of operating cash flows, which according to Almeida et al. (2004) would be an indication that they are financially constrained.

2.2 Complementary explanations of cash holdings

Beyond precautionary savings, three other areas are potentially important for explaining cash holdings: Agency problems, tax issues, and behavioural factors.

When discussing corporate finance decisions, an omnipresent controversy centres around the question to which extent these decisions are determined by agency problems. In the context of cash policies, firms could hold more cash because managers value the fact that liquidity buffers insulate them, at least partially, from capital markets and provide a greater tolerance for operational mismanagement and strategic mistakes. A recent paper by Gao, Harford and Li (2013) finds limited support for this agency-based explanation. Comparing private with public firms, they observe that private firms hold on average only half as much cash as public firms, controlling for several factors. They ascribe these differences to the fact that private firms possess a much stronger corporate governance structure than public firms.

In contrast, several other papers observe that the presence of agency problems reduces cash holdings. Dittmar and Mahrt-Smith (2007) note that firms with weak corporate governance use up their cash reserves very quickly, by spending it on projects which overall harm operating performance. Consistent with this observation, Harford (1999) and Harford, Mansi and Maxwell (2008) find that poorly governed firms engage more in acquisitions, which are on average value-destroying. Taking into account that cash-rich firms in our sample have, by construction, a much higher cash ratio⁵ and, as we will see later, are also more profitable, have a higher market valuation, and engage less in acquisitions, they seem to not suffer from agency problems. After all, we expect agency problems to have a negative influence on cash holdings and cash-rich firms are characterized by very high cash-holdings. One might argue that conservatism is a kind of agency problem itself. However, we note that in contrast to the type of agency problems described above, conservatism seems to have very different implications for cash holdings and the value that the market assigns to them. In other words, if the cash-rich firms in our sample were characterized by substantial agency problems in the classical sense, then without such problems the cash ratios of these firms should be even higher. Hence, agency problems seem to not be capable of explaining why these firms are cash-rich and we reject agency problems as an explanation for this observation.

Another widely discussed factor is the relation between cash holdings and tax regimes. A study by Foley, Hartzell, Titman and Twite (2007) finds support that the increase in cash holdings of U.S. firms is partly due to the repatriation tax on profits generated abroad. In order to avoid this tax, firms may prefer to keep cash in their foreign subsidiaries, which

 $^{{}^{5}}$ Recall that we define cash-rich firms as the decile of firms with the highest cash to assets ratio in each respective year.

is particularly relevant for large multinational companies. However, outside the U.S. this so-called worldwide tax system is rare. Instead, all eight European countries in this sample apply a territorial tax system, under which dividends received from foreign subsidiaries are usually exempt from domestic corporate taxes (Dittmer, 2012). We therefore reject tax motives as a decisive factor for explaining cash holdings of firms in our sample.

Having excluded agency problems and tax issues as potential explanations for why some firms are particularly cash-rich, in what follows we will focus on behavioural explanations, the core of this study.

There has been little research on the relationship between cash holdings and behavioural factors so far. Only recently Dittmar and Duchin (2013) have published a working paper about behavioural factors on differences in cash holdings. Specifically, they study the relationship between executives that previously worked at a firm that experienced financial difficulties and cash holdings of the current firm. They use four different indicator variables to measure if the previous firm has experienced financial difficulties or has otherwise been financially constrained. The first measure is related to bond ratings. The authors argue that firms which issue bonds without having a bond rating are likely to have had difficulties to raise new debt. The second measure is based on a size-age index developed by Hadlock and Pierce (2010).⁶ The third and fourth indicators are constructed by dividing the sample of previous firms into deciles. Specifically, the third measure argues that firms in the lowest decile in terms of change in operating cash flow have experienced adverse cash flow shocks, which might induce the manager to become more cautious. The fourth measure is analogous, but characterizes the lowest decile in terms of lowest stock return. Based on these proxies, Dittmar and Duchin (2013) find that firms run by CEOs who have previously worked at firms that experienced financial difficulties maintain a significantly higher cash ratio than other firms. It is important to note that the authors control for all kind of variables related to precautionary savings motive in their regression. Hence, the results indicate that behavioural factors have a substantial incremental explanatory power beyond what can be explained by the firm's financials.

⁶Hadlock and Pierce (2010) use qualitative information on a random sample of U.S. firms between 1995-2004 to directly measure financial constraints. They then analyse several quantitative factors to identify which combination of these factors would have been most accurate in predicting financial constraints. Based on this approach they observe that a function of size and age has the greatest explanatory power.

3 Hypotheses

In this study we test behavioural factors on their influence on cash holdings in European companies, starting from the observation that some firms hold levels of cash which cannot be explained by conventional theory. By using a different set of behavioural variables and analysing companies outside the U.S., we extend academic research in understanding differences in cash holdings and validate findings by Dittmar and Duchin (2013). In the following section, we develop four hypotheses related to behavioural factors and their impact on corporate cash holdings.

Consistent with Dittmar and Duchin (2013), we take the view that factors related to the CEO, CFO and the management board can improve our understanding of corporate cash holdings. A whole stream of literature suggests that characteristics of managers have a significant effect on corporate policies in general. For example, Bertrand and Schoar (2003) show that different managers have different management styles, which can explain a wide part of variation in investment, financial and organisational firm practices. Similarly, Bamber, Jiang and Wang (2010) find that manager fixed effects can explain firms' disclosure styles. In a more recent study, Malmendier, Tate and Yan (2011) report that managers' traits, experiences, and beliefs affect corporate decisions such as in particular capital structure.

Whereas Malmendier et al. (2011) use indirect measures of CEO characteristics,⁷ Graham, Harvey and Puri (2013) use a survey-based approach to conduct psychometric personality tests. More specifically, the authors survey senior executives on psychological traits such as risk-aversion and find support for the notion of different styles both between CEO and CFOs and between U.S. and non-U.S. executives. In line with previous research, they observe that corporate policies are significantly related to these CEO and CFO characteristics.

Even though behavioural explanations are common in many areas of corporate finance, such factors have received little attention in the context of cash policies. The paper by Dittmar and Duchin (2013) is among the first to address this research gap. We use their work as a starting point to find further evidence on whether managerial conservatism can contribute to the understanding of deviations from Precautionary Savings Theory. We proceed in two steps. First, we test whether manager fixed effects can explain variation in cash holdings when controlling for firm fixed effects and firm time-variant controls. Second, we theorise that conservative managers should, ceteris paribus, hold a larger cash ratio than less conservative managers. To test this notion, we develop four proxies of conservatism and analyse their explanatory power on corporate cash holdings. Our proxies are age, gender, compensation structure and past experience, and are discussed below.

⁷For example, they use option holdings to measure overconfidence, or birth dates to identify CEOs who have grown up during the Great Depression.

3.1 Age

It is generally accepted that older people are more conservative than younger people. Work in this field dates back to Pollak (1943), who investigates attitudes of people below and above the forties and finds support that older people tend to be more conservative, though the differences in conservatism is small. Truett (1993) surveys 30,000 people in the U.S. on conservatism and finds a consistent and linear relationship between conservatism and age. With respect to manager fixed effects, Bertrand and Schoar (2003) find that older managers appear to be more conservative regarding financial decisions. Building on these findings, we use age as a proxy for conservatism and conjecture that older managers are more likely to work for firms with a higher cash ratio.

Hypothesis 1a Companies with an older CEO (CFO) have a higher cash ratio and are more likely to be cash-rich.

Hypothesis 1b Companies with an older management board have a higher cash ratio and are more likely to be cash-rich.

3.2 Gender

Differences in gender regarding risk aversion and conservatism have been an active field of research in recent years. There has emerged strong evidence that females tend to be more risk averse in many situations. Byrnes, Miller and Schafer (1999) compile a meta-analysis of 150 studies regarding differences in risk-taking tendencies between gender. They find that males tend to show greater risk taking, though they observe that the gender gap seems to be growing smaller with age. Eckel and Grossman (2008) review results from experimental measures and find that women are shown to be more risk averse in most studies. These difference in risk-taking and conservatism might be a result of different risk assessments. Fehr-Duda, de Gennaro and Schubert (2006) find that females show different risk taking behaviour because they underestimate the probabilities of a gain more strongly than men. Similarly, Harris, Jenkins and Glaser (2006) survey 657 participants and find that women perceive a greater likelihood of negative outcomes.

While there is strong evidence that women tend to behave more conservatively on average, there is less evidence on how this affects women in professional settings. While Bellucci, Borisov and Zazzaro (2010) show that female loan officers are more risk-averse than male colleagues when giving loans to new borrowers, Atkinson, Baird and Frye (2003) compare female and male fixed-income mutual fund managers and observe no differences in investment behaviour. On a CEO level, Palvia, Vähämaa and Vähämaa (2013) present evidence from U.S. commercial banks and find that, under certain circumstances, banks with female CEOs

or chairwomen were less likely to fail during the financial crisis. Lastly, Faccio, Marchica and Murac (2013) report that firms with female CEOs have lower leverage, less volatile earnings and a higher chance of survival. Based on the overall direction as described in the literature, we hypothesise that female CEOs are more conservative than male colleagues and test gender as a proxy for conservatism.

Hypothesis 2a Companies with a female CFO have a higher cash ratio and are more likely to be cash-rich.⁸

Hypothesis 2b Companies with a higher female ratio in the management board have a higher cash ratio and are more likely to be cash-rich.

3.3 Compensation

Our third proxy for conservatism is based on the relative split between fixed, variable and long-term compensation as a share of total compensation. All else equal, conservative managers should have a preference for less risky compensation. Hence, they should prefer fixed compensation to bonus compensation, and immediate remuneration to delayed remuneration. Graham et al. (2013) find support for this link. They present empirical survey-based evidence that CEO traits, such as risk-aversion or time preference, are mirrored in CEO compensation contracts. Graham et al. (2013) report that conservative executives are much more likely to be paid with fixed salaries, and much less likely to be paid variable elements such as stock, options and bonuses. In line with the notion that more conservative managers are expected to hold higher cash balances, Chava and Purnanandam (2010) report that a CEO's risk-decreasing incentives are associated with higher cash holdings.⁹ However, seemingly contrary to this observation, Liu and Mauer (2011) find evidence of a positive relation between CEO risk-taking incentives and cash holdings. One important reason is that debt holders dislike manager risk-taking incentives and thus require firms which offer such incentives to keep higher liquidity reserves. However, this risk adjustment also occurs on a personal level, as we will discuss below.

These findings suggest that two opposing factors determine the link between CEO conservatism and corporate cash holdings. First, due to firm and executive matching, conservative managers will work for firms with higher cash holdings. Conservative managers are characterised by a higher base salary, lower bonus and lower long-term compensation. This

⁸We do not test the effect of female CEOs because the number of observations in our sample is too small for a meaningful analysis. For example, the subset of German companies, the biggest subsample, comprises only one female CEO.

⁹Interestingly, they further observe that a CFO's risk-decreasing incentives reveal themselves more in the context of general capital structure than in cash holdings. This could be some indication that we will observe stronger links between CEO characteristics and cash holdings than it is the case for CFOs.

relationship could hold either because executives can influence their compensation design, or because firms structure compensation contracts such that they attract executives with specific attributes. Second, when a manager's compensation mix differs from this manager's preferred compensation mix, this manager might adjust corporate strategies, such as cash holdings, to change firm risk and hence her own risk exposure. By doing so, she adjust her personal risk towards her preference. For a conservative manager who is incentivised with a larger share of variable or long-term compensation than she prefers, we thus expect her to build up cash holdings. We call this strategy risk adjustment.

The impact of the matching effect seems to be stronger than the impact of the risk adjustment effect for relative salary and bonus compensation. Finkelstein and Boyd (1998) investigate Fortune 1,000 firms and find support for managerial discretion on CEO pay. In a recent literature review on CEO compensation, Frydman and Jenter (2010) find that managerial power and increased demand for scare managerial talent can explain some elements of CEO pay. In addition, Morse, Nanda and Seru (2011) find evidence that powerful CEOs can influence their own compensation by inducing boards to shift weight of performance measures towards those in which the firm is performing better. Lastly, Graham et al. (2013) show direct and strong evidence for matching between firms and executives. We therefore hypothesise that high fixed and low bonus components will be associated with a conservative CEO and correspondingly higher cash ratios.

Hypothesis 3a A higher fixed component in the compensation structure of a CEO (CFO) is associated with a higher cash ratio and increases the likelihood of the firm being cash-rich.

Hypothesis 3b A higher bonus component in the compensation structure of a CEO (CFO) is associated with a lower cash ratio and decreases the likelihood of the firm being cash-rich.

For manager contracts, long-term compensation has gained in popularity over time. Frydman and Jenter (2010) report for a U.S. sample that long-term bonuses reached over 35% of total pay in 2005. We find a significantly lower share of 7% long-term compensation in our sample of European companies (Table 5). While long-term compensation is designed to align the CEO's monetary interests with long-term shareholder interests, all else equal, executives will prefer immediate to delayed compensation. After all, future firm performance is inherently uncertain and dependent on many factors other than CEO skills. Even more, it may happen that long-term compensation elements are paid when the executive is not in office any more, such that the compensation depends partly on the performance of her successor. Given that CEOs in general will have little interest in receiving long-term compensation, we argue that CEOs who receive a high share of long-term compensation had no or little discretion about this compensation element.¹⁰ Put differently, matching seems to be less dominant in the case of long-term compensation since only few executives should have a preference for a high relative long-term component. We argue that most managers, if they could choose, would like to reduce the relative importance of long-term incentives. Therefore, CEOs that receive long-term compensation above their preferred level might reduce operational risk. By doing so, the CEO reduces the variability of her compensation and comes closer to her preferred compensation structure, the idea of risk adjustment. Therefore, we expect a higher proportion of long-term compensation to be associated with a higher cash-ratio.

Hypothesis 3c A higher long-term component in the compensation structure of a CEO (CFO) is associated with a higher cash ratio and increases the likelihood of the firm being cash-rich.

A word of caution about our compensation proxies seems appropriate at this point. In general, there are two major concerns regarding relative compensation as a proxy for conservatism. First, the matching direction between CEOs and firms is not clear. Either executives could choose their compensation package or boards could tailor it to the kind of executive they want to recruit. In both cases we expect conservative individuals to have a higher proportion of certain and a lower proportion of risky compensation such that matching does not influence the direction of the hypotheses. Second, however, the observed ex-post relative compensation structure depends on uncontrollable external events and can differ from the ex-ante agreed upon relative compensation structure. Therefore, we expect the discussed relationship between conservatism and relative compensation structure to hold most strongly for firms that perform closest to their ex-ante expected performance. For firms that perform a lot better (worse), we expect observed risky compensation to be higher (lower) than anticipated without indicating the executives level of conservatism. Even though this proxy will not hold for out- and under-performing firms, we believe this proxy to be meaningful for firms that perform within a reasonable range of ex-ante expectation.

3.4 Past experience

Past experience has been shown in a number of studies to have formative influence on attitudes and behaviours. For example, Hertwig, Barron, Weber and Erev (2004) show that decision made from experience vs. description can lead to different choice behaviour. In this context, decision from description refers to situations in which the proband gets an

¹⁰Given that the mean long-term compensation component in our sample is much lower than the one reported for U.S. firms, this gives additional support to our argumentation. It is very likely that shareholders insist on a minimum long-term component and are not willing to reduce this component below a certain level.

explicit description of risks such that she knows the underlying distribution function. In contrast, decision from experience refers to a situation in which the proband does not get to know about this underlying distribution but rather needs to take (potentially incomplete) samples to make inferences about the same. When only considering evidence on executives, Malmendier et al. (2011) show that CEOs who grew up during the Great Depression are averse to debt and rely more on internal financing. They further report that CEOs with military experience tend to use more aggressive policies, including higher leverage. With respect to financial expertise, Custodio and Metzger (2013) show that firms lead by CEOs with financial expertise hold less cash, are more levered, and are more likely to pay out cash to shareholder. Lastly, Dittmar and Duchin (2013) show that executives who have experienced financial difficulties tend to keep higher liquidity reserves and lower levels of net debt. Given these findings, the career path of a CEO is likely to have a strong influence on his perceptions and decision-making style.

We theorise that CEOs, who previously have been CFO of this company, will differ from CEOs that have not been CFO before. Only recently Matsunaga, Wang and Yeung (2013) have shown that appointing a CEO, who has previously been CFO, has significant effects on areas such as financial reporting, tax policies and analyst coverage. Hence, we test if this holds for corporate cash holdings. Our argument builds on survey evidence by Graham et al. (2013). In their survey of over 1,000 CEOs and CFOs, the authors show that CEOs are significantly more optimistic than CFOs. 80% of U.S. CEOs are ranked to be very optimistic, compared to 65% of U.S. CFOs. This difference is significant at the 1% level. Further, Graham et al. (2013) ask CFOs to compare themselves to CEOs on optimism. When doing so, only 5.1% of CFOs think of themselves as more optimistic than the CEO. When asked for the reason, 35.7% of CFOs state that the CEO is more optimistic in about everything. In the comparison of U.S. with non-U.S. executives, the general pattern remains though the relationship appears to be less strong. Unfortunately, Graham et al. (2013) do not provide a comparison between European CEOs and CFOs. Given this evidence, however, we take the view that this pattern holds for European CEOs and CFOs. A lower degree of optimism is likely to correlate with higher conservatism. Therefore, we hypothesise that CEOs, who have been former CFO of the company, are likely to implement more conservative financial policies.

Another argument for the same prediction could be that CEOs with prior experience as a CFO put a higher weight on the true long-term financial needs of the company than on pressure from capital markets. Many studies have shown that shareholders dislike excess cash. Hence, a short-term oriented manager should distribute cash to please shareholders, whereas a more long-term oriented manager should have incentives to keep higher liquidity reserves. Bhojraj and Libby (2005) have shown that increased capital market pressure induces man-

agers in general to exhibit more myopic behaviour. In particular, they prefer projects that boost short-term earnings even if they may be inferior in terms of long-term cash flows. Although there is little evidence on how CEOs and CFOs differ in their responsiveness to this capital market pressure, there is some indication that CFOs might place relatively less weight on this short-term pressure. In the context of financial structure, Graham and Harvey (2002) report that CFOs put less emphasis on formal targets than on informal criteria such as financial flexibility. In addition, Mergenthaler, Rajgopal and Srinivasan (2012) observe that CEOs are more heavily penalized for failing to meet quarterly analysts forecasts than CFOs. Hence, beyond the fact that CFOs appear to be more conservative than CEOs in general, it could be that they exhibit less myopic behaviour. Both arguments lead to the prediction that CEOs, who have previously been CFO at that company, should be associated with high cash holdings.

Hypothesis 4a Companies managed by CEOs who have previously been CFO at the same company have a higher cash ratio and are more likely to be cash-rich.

While we expect CFOs to be more conservative than CEOs on average, we believe that CFOs have strong financial expertise and a deep understanding of the firm's financial situation. Therefore, such a CEO will not be conservative without limit but only increase cash holdings if she perceives the firm to have too little cash. Clearly, cash-rich firms are unlikely to have too little cash and therefore we expect above effect to disappear for cash-rich firms.

Hypothesis 4b If a firm is already cash-rich, the positive association between a CEO who has previously been CFO and the firm's cash ratio ceases to exist.

We started this section on the observation that prior research finds that Precautionary Savings Theory cannot fully explain cash holdings of all firms. Instead, behavioural factors might help in explaining corporate cash holdings, especially for the group of cash-rich firms that have significantly higher cash holdings than explained by precautionary motives. We theorise that these firms are managed by conservative executives and developed hypotheses to test proxies for conservatism. We continue with an overview of the sample and methodology, an empirical investigation of the properties of cash-rich firms and then finally test our hypotheses.

4 Sample, data, and methodology

4.1 Sample description

Our sample consists of all listed firms in Germany, France, Italy, Spain, The Netherlands, Belgium, Austria and Finland, which had information in Worldscope as of November 2013. We focus on these countries because they are the largest economies in the Eurozone as measured by GDP. Further, these countries have a strong industrial sector, which is our area of interest for the subsequent analyses.

We exclude firms with SIC codes 4900 to 4949 (Utilities) and 6000 to 6999 (Financials). The rationale for excluding these firms is that their cash policy tends to be subject to regulatory requirements and cash ratios may therefore substantially differ from what they would be based on the economic and behavioural motives studied in this paper. This methodology is consistent with prior studies on cash policies by for example Bates et al. (2009), McLean (2011), and Dittmar and Duchin (2013).

We limit our sample to the ten-year period from 2003 to 2012, mainly due to availability of compensation data for the CEO and CFO of these companies. We then remove firms that had total assets or sales of EUR <5mn in any year of the observation period. The rationale is that this subset of firms may bias the sample, since small companies tend to behave systematically different from larger, more rationalized companies. This methodology is consistent with earlier papers on cash policies, which exclude firms failing to meet a required minimum size (cf. for example Almeida et al. (2004), Acharya et al. (2007), or Foley et al. (2007)). Having cleaned our data as described above, our sample comprises 12,290 firm-year observations. A geographic split of our sample can be found in Panel B of Table 10.

Overall, the sample distribution resembles the economic power of these countries, although Finland appears to be overrepresented. The reason is that listing activity tends to be higher than in other countries, in particular compared to Southern Europe. One potential concern could be that Finish companies may therefore be on average smaller and hence behave differently. To address this concern we control for size in all our models and also include country fixed-effects. Similar to the geographic split, a distribution of firms over industries can be found in Panel A of Table 10. In order to account for differences among firms across industries we explicitly control for several factors such as leverage and market-to-book ratio. We further include industry fixed effects in all our models.

4.2 Databases and variables

We use three different groups of variables: Financial data for the firm, executive data on the CEO and CFO, and board level data. All financial data, including cash and assets, are extracted from Worldscope. Since data on the executives is not available on Worldscope, we have gathered the relevant data from CapitalIQ. However, executive data, in particular on compensation, is missing for many of the companies in the sample. For this reason, the sample used in any analysis involving executive data is substantially smaller than the one used in the base model. Hence, one should be cautious when comparing models including compensation data with those not including them. Lastly, we use the Orbis database for management board data. This data is available only for 2012. Due to the limited sample size, only few of our analyses use data on the management board. All variables have been winsorized at the 1st and 99th percentiles to reduce the impact of outliers on our results. A full list of the variables used and how they are defined can be found in the Appendix in Table 17.

4.3 Methodology

We use financial data from Worldscope to define a base model regression, against which we test our behavioural proxies. Specifically, we test which combination of firm financials has the highest explanatory power with regard to cash ratios and the likelihood of a firm to be cash-rich. In Section 6, we add behavioural factors to this base model to test their incremental explanatory power. The base model regressions are shown in Table 14.

We find that firm size, operating cash flows (OCF) and industry OCF relative standard deviation have no explanatory power on the cash ratio of the average firm. We therefore exclude the latter two from subsequent analyses, but keep size as a control due to the reasons outlined earlier in this paper and due to the fact that it is a standard control in corporate finance research. Acquisitions have a statistically significant negative effect on cash ratios, which seems reasonable. However, data on acquisitions are missing for many firms and we therefore exclude it from the model in order to increase the sample size. As a result, specification (4) of Table 14 becomes the OLS base model and specification (8) the logistic model used for subsequent analysis.

Further, we test various fixed effects to enhance our base model (Table 15). In line with prior studies, we decided to not use firm fixed effects, because firm fixed effects remove all firm-specific variation unless there is an executive turnover. However, due to limited data availability on executives this restriction would greatly reduce the data set. Most related studies cited in the reference section follow a similar rationale and use industry and time fixed effects instead (e.g. Bates et al. (2009), Liu and Mauer (2011), Custodio and Metzger

(2013)). Due to the structure of our sample across different countries, which are culturally different from each other, we control for differences among countries. Moreover, we do not find a strong influence of year fixed effects on our sample as shown in Figure 2. This observation is surprising given that one could expect the financial crisis to have significant effects on cash ratios. However, the comparison of various fixed effects in Table 15 confirms that the inclusion of year fixed effects has little explanatory power. Further, we test separate industry and country dummies as well as industry x country interaction fixed effects. We include interaction fixed effect in all models, since the interaction fixed effects have greater explanatory power than the individual ones (specification (9) in Table 15). This approach is more conservative and has been used in prior studies (e.g. Dittmar and Duchin (2013)). Specifically, it controls for differences in industries across countries, which may occur if some industries are key industries in one country but not in the other.¹¹ We report standard errors that are heteroscedasticity consistent and clustered at the firm level. Clustering standard errors is in line with recent research on cash holdings such as Bates et al. (2009), Fresard (2010) and Dittmar and Duchin (2013).

The results of our regressions are shown in Table 14. We observe that firms with high leverage exhibit lower cash ratios. Growth intensive firms, as measured by their ratio of market value of equity plus debt to the book value of assets, tend to have higher cash ratios. Regarding CapEx, we observe a negative effect on cash ratio. Lastly, we note a positive association between R&D expenditures and cash ratios. Our results are consistent with prior research on cash holdings in U.S. firms by Bates et al. (2009), who have used a very similar set of variables and obtained comparable results in Table III. The findings are also in line with a recent study by Akguc and Choi (2013) on cash holdings in European companies. A brief discussion on how these factors are related to cash holdings will be provided later when we compare the means of cash-rich firms with those of non-cash-rich-firms.

Since we are particularly interested in cash-rich firms, we also estimate logistic regression coefficients. For this model, the dependent variable is a dummy indicating whether a firm is cash-rich. We use the same model specifications as in the OLS regression with industry and country interaction fixed effects and robust standard errors clustered at the firm level. Overall, the results are consistent with those produced by the OLS model.

¹¹These differences could be due to exertion of political influence, subsidies, spill-over effects etc.

5 Characteristics of cash-rich firms

In this section, we investigate the characteristics of cash-rich firms. We start with univariate evidence and, similar to Dittmar and Duchin (2012), argue that cash holdings of this group cannot be fully explained by conventional theory. Further, we investigate the persistence of the decile categorization and find that cash-rich firms are likely to remain cash-rich. Lastly, we analyse differences between cash-rich and non-cash-rich firms in their propensity to save cash and conclude that cash-rich firms behave systematically different. We start this section with a descriptive comparison between cash-rich and non-cash-rich firms.

5.1 Comparison of cash-rich with non-cash-rich firms

Although precautionary motives cannot fully explain why cash-rich firms keep their cash instead of reinvesting or distributing it, we nonetheless find a number of observations in line with this theory.

First, we observe that the group of cash-rich firms has smaller total assets than the group of non-cash-rich firms. Smaller firms are likely to have limited access to external funding, which might induce them to keep liquidity buffers for bad times. Prior research finds some support for this theory. For example, Hennessy and Whited (2007) note that marginal equity flotation costs are roughly twice as high for small firms than for large ones. The same applies to bankruptcy costs, which increase the required yield that debt-holders demand. Moreover, in contrast to small firms, the larger ones enjoy economies of scale in liquidity management.

Second, we find that cash-rich firms operate in more volatile industries. This industry volatility could induce cash-rich firms to build up a buffer to fund investment opportunities in a downturn. This effect is even more important given that these firms are smaller, which increases dependence on savings because their access to capital markets is even more limited in bad times.

Third, cash-rich firms have a higher market-to-book ratio. This can be interpreted in two ways. On the one hand, cash-rich firms could have a high market-to-book ratio because their market value is high, which could be interpreted as the market assessment of growth opportunities. Having attractive growth opportunities implies higher expected future cash outflows in order to finance them, which would be in line with Precautionary Savings Theory. On the other hand, cash-rich firms could have relatively less fixed assets compared to other firms, because a substantial part of their assets consists of internally generated intangibles, which are not accounted for in the balance sheet. Hence, they would have a lower asset basis and thus a higher cash ratio. This would be an indication for being an R&D intensive firm, which provides another plausible rationale for maintaining liquidity buffers.

Fourth, we investigate R&D expenditures and observe that cash-rich firms indeed spend

more on R&D than non-cash-rich firms. Research intensive businesses might require a substantial cash buffer because they potentially face high costs of underinvestment. Moreover, they face additional risks if R&D efforts should not translate into economic success. Prior research by Opler et al. (1999) and Bates et al. (2009) supports this relationship between R&D and better growth opportunities. They further note that firms with a higher proportion of intangible assets have less collateral to offer and thus more difficulties in obtaining debt financing. This provides yet another explanation for holding higher cash reserves.

Having outlined observations in line with Precautionary Savings Theory, we will next discuss findings which seem to conflict with the same.

First, cash-rich firms are on average significantly more profitable than non-cash-rich firms as measured by ROA. This superior profitability also translates into higher operating cash flows. According to Precautionary Savings Theory, firms that generate consistently high cash flows should, all else equal, have a lower cash ratio, because they can fund their CapEx and OpEx from operating cash flows. Further, they need less cash buffers given that they are capable of quickly generating new cash. A possibility to relativize our observations and reconcile them with precautionary motives is to note that cash-rich firms operate in industries with higher cash flow volatility. According to risk-return trade-off theory they should thus be more profitable to compensate investors for additional risk taking.

Second, cash-rich firms spend substantially less on CapEx and acquisitions than noncash-rich firms. This observation seems to clearly contradict Precautionary Savings Theory. Firms with lower investment opportunities, as measured by CapEx, should also require a lower cash buffer. This observation becomes even more surprising given that cash-rich firms have consistently higher income streams.

Third, we find that cash-rich firms spend less on acquisitions, which are among the biggest investments companies can engage in. A firm that anticipates future acquisitions should build up cash reserves in previous periods. However, the cash-rich firms engage in consistently less acquisitions over the whole 10-year period.

Fourth, cash-rich firms have lower levels of debt, even in gross terms. Given that cashrich firms are more profitable, have higher cash flows, and lower CapEx and acquisition spendings, this is rather surprising since they could probably support much higher leverage ratios. On the contrary, some papers such as Almeida et al. (2004) argue that this might actually indicate limited access to capital markets. However, we argue that this observation is not valid for our group of cash-rich firms. Instead, it appears more likely that cash-rich firms substitute debt with equity due to their favourable market valuation. We will discuss this issue in more detail when we compare sources of cash. Moreover, Dittmar and Duchin (2013) test for how past experiences affect debt ratios and observe that managers, who have experienced financial difficulties in a prior position, operate with less leverage in the new firm. We assume similar effects for our sample and take this as yet another motivation to later test for behavioural explanations related to conservatism.

Overall, we argue that while some aspects of our findings are in line with Precautionary Savings Theory, several other cannot be properly explained by such motives. It is also important to note that all differences between cash-rich and non-cash-rich firms are highly statistically significant at the 1% level. The question thus remains why cash-rich firms keep these substantial liquidity buffers instead of distributing cash to shareholders. We interpret this evidence as preliminary support to our thesis that behavioural factors could contribute to our understanding of cash holdings.

Table 1: Firm summary statistics

This table reports descriptive summary statistics for the firm variables used in the analyses. The sample comprises all industrial firms in the eight largest economies of the Eurozone between 2003 and 2012 with nonmissing information on total assets and cash and short-term investments in Worldscope. All variables have been winsorized at the 1st and 99th percentile. Deciles are defined yearly by sorting firms on cash to total assets, where decile 10 refers to top decile (cash-rich). A definition of the variables can be found in the Appendix. Panel A presents detailed summary statistics for the full sample. Panel B provides a T-test for the difference in mean between cash-rich and non-cash-rich firms.

	Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
Cash ratio	12290	0.12	0.11	1.73	6.18	0.00	0.02	0.09	0.27	0.57
Size	12290	12.84	2.06	0.51	2.68	9.20	10.37	12.53	15.75	18.22
Gross debt	12278	0.25	0.17	0.59	3.00	0.00	0.02	0.23	0.47	0.75
Market-book	11490	1.01	0.65	2.28	9.46	0.25	0.46	0.82	1.75	4.06
ROA	12281	0.05	0.09	-0.64	6.39	-0.32	-0.05	0.05	0.14	0.32
OCF	12275	0.08	0.08	-0.15	5.40	-0.20	-0.00	0.08	0.17	0.33
Ind. OCF RSD	12289	2.13	5.82	7.16	57.18	0.26	0.46	0.95	2.62	49.98
CapEx	12007	0.05	0.04	2.17	9.08	0.00	0.01	0.03	0.10	0.26
R&D	5302	0.03	0.05	2.20	8.23	0.00	0.00	0.02	0.10	0.24
Acquisitions	7773	0.01	0.04	4.10	21.29	0.00	0.00	0.00	0.04	0.25

Panel A - Full sample statistics

Panel B - T-test statistics

	Cash-rich	Non-cash-rich	Diff.	
Cash ratio	0.393	0.0929	-0.300***	(-141.75)
Size	11.92	12.94	1.020^{***}	(16.62)
Gross debt	0.0888	0.263	0.174^{***}	(35.41)
Market-book	1.407	0.964	-0.443***	(-22.29)
ROA	0.0693	0.0447	-0.0246***	(-8.93)
OCF	0.0983	0.0754	-0.0228***	(-9.53)
Ind. OCF RSD	2.705	2.062	-0.643***	(-3.67)
CapEx	0.0337	0.0486	0.0149^{***}	(11.09)
R&D	0.0664	0.0299	-0.0365***	(-18.76)
Acquisitions	0.0101	0.0149	0.00476^{***}	(3.14)

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

5.2 Cash ratio persistence

One major concern with our analysis so far would be if cash ratio deciles, in particular the top decile of cash-rich firms, fluctuate over time, i.e. are very unstable. In this case we would be analysing those firms that have been particularly successful or unsuccessful in the given year, without identifying a group of firms that behaves structurally different. We therefore tabulate fluctuations over time to control for this possibility (Table 2). First, we show the change in deciles among all firms (Panel A). Second, we narrow our focus to cash-rich firms and show fluctuations among the top deciles (Panel B). Third, we investigate how many of the firms in the top decile remained cash-rich over the full sample period (Panel C).

We first analyse our deciles as a whole. We observe that around 40% of all firms remain in the decile of the previous year. Out of the remaining 60% of firms, the vast majority moves only one decile up or down per year. Further, the number of firms moving deciles up or down is fairly balanced for most years. Since we are particularly interested in fluctuations among cash-rich firms, we conduct a more detailed analysis for the top decile of firms in Panel B. We observe that for cash-rich firms persistence is even more pronounced. Around 70% of all cash-rich firms have already been in the top decile in the previous period. Another 10%-20% of cash-rich firms have been in the 9th decile in the previous year, i.e. moved up by only one decile.

In order to achieve a better understanding of the fluctuation of cash-rich firms over a longer horizon, we investigate how those firms which have been cash-rich in 2003 (our first observation year) evolve over time. The results are shown in Panel C. A first observation is that within the first three years, more than half of the initially cash-rich firms dropped out of the top decile. However, the biggest part of the drop-outs has moved only one decile below, i.e. although they are not cash-rich any more according to our definition, they still exhibit a very high cash ratio. More importantly, the remaining c. 50 firms prove to be very stable, such that the group of initially cash-rich firms decreases only marginally over the following 6 years. Hence, almost half of our cash-rich firms in 2003 continued to represent the top decile even 10 years later. Overall, we conclude that the characterisation by deciles is stable over time, in particular firms characterised as cash-rich are likely to remain cash-rich. This provides support for our notion that cash-rich firms are indeed systematically different from non-cash-rich firms.

Table 2: Persistence of cash ratio deciles

This table reports the fluctuation of firms among cash ratio deciles over time. The sample comprises all industrial firms in the eight largest economies of the Eurozone between 2003 and 2012 with nonmissing information on total assets and cash and short-term investments in Worldscope. Panel A displays the fluctuation of all firms over time, i.e. if they remained in the same decile (by cash ratio) or moved up or down form one year to the next year. Panel B displays the same for cash-rich firms only, by showing if the firm had already been cash-rich in the previous year or if it moved up from lower deciles. Panel C shows the migration of those 112 firms that had been cash-rich in 2003, the first observation year.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
> +2 deciles	202	211	195	189	209	208	183	153	159	1709
+1 decile	173	168	190	219	231	212	226	238	194	1851
Same decile	420	425	452	439	440	452	474	494	441	4037
-1 decile	220	218	218	216	196	210	236	237	186	1937
< -2 deciles	161	189	177	193	198	202	167	163	181	1631
Total	1176	1211	1232	1256	1274	1284	1286	1285	1161	11165

Panel A - Fluctuations among all firms

Panel B - Fluctuations among deciles of cash-rich firms

	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Remained cash-rich	90	79	77	78	85	91	89	96	85	770
+ 1 decile	13	17	15	25	19	24	23	14	20	170
+ 2 deciles	3	5	6	8	6	7	10	7	4	56
+ > 2 deciles	11	20	25	14	16	6	6	11	7	116
Total	117	121	123	125	126	128	128	128	116	1112

Panel C - Fluctuations among deciles of cash-rich firms in 2003

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Decile 10	112	90	71	55	50	49	51	49	45	43	615
Decile 9	0	15	21	28	22	21	16	21	23	15	182
Decile 8	0	3	8	12	18	17	8	11	11	7	95
Decile < 8	0	4	12	17	22	25	37	31	33	40	221
Total	112	112	112	112	112	112	112	112	112	105	1113

Note: The number of observation in 2012 is reduced due to missing data in Worldscope.

5.3 Sources of cash

We have provided a characterisation of cash-rich firms and evidence for persistence in cash ratio deciles. Our next step is to analyse how firms behave in terms of cash policies once they are cash-rich, and whether we find further indications that cash-rich firms behave systematically different from non-cash-rich firms.

In order to answer this question we analyse the sources of cash holdings, e.g. whether cash is funded through operating cash flows, equity, debt or other financing sources. In Figure 1 we contrast cash-rich with non-cash-rich firms in terms of usage of equity, debt, and other financing sources.¹² Although usage of these different sources varies substantially over time, it becomes evident that cash-rich firms rely more on equity than on debt. We have already noted earlier that this is probably related to their favourable market valuation as expressed by high market-to-book ratios. In contrast, debt financing should be relatively more expensive for cash-rich firms, since they are smaller and more R&D intensive. However, there is no indication that they are limited in their access to debt financing.

In order to get a more detailed understanding, we investigate if firms diverge in their propensity to save cash out of the various sources. We follow a similar approach as used by W. Kim and Weisbach (2008), McLean (2011), and Dittmar and Duchin (2012). Specifically, we run a regression on the dependent variable savings ratio, which is defined as:

$$\ln\left(\frac{Cash_t - Cash_{t-1}}{Total\ assets_{t-1}} + 1\right) \tag{1}$$

The dependent variable thus measures the percentage change in the cash ratio from one period to the next. Regression estimates are shown in Table 3.

Analysing our sample as a whole, we find that for a 1 percentage point increase in OCF, the average firm increases its cash ratio by 0.204%. Similarly, we observe for the average firm that a 1 percentage point increase in equity issue raises the cash ratio by 0.395%. The average firm also has a propensity to save some of the cash obtained by selling assets or decreasing investments. In contrast, firms in our sample save hardly any cash from debt sales. This suggests that debt is not issued in order to increase cash holdings.

Having talked about the average firm, it is very interesting to observe how cash-rich firms differ in their savings behaviour. The interaction terms in the regression indicate if a firm has been cash-rich at the beginning of the period, i.e. we analyse how a firm that is already cash-rich diverges in savings behaviour from the average firm. Our results indicate that cashrich firms save even more out of operating cash flows than the average firm. This distinction becomes stronger when looking at equity issues. Although the impact of equity issues on

 $^{^{12}}$ Other sources include decrease in investments, disposal of fixed assets, and miscellaneous other sources (see Table 17 in the Appendix)

cash ratios is already very high for the average firm (0.395% higher cash ratio for every 1 percentage point increase in equity issue), the cash ratio of cash-rich firms increases by an additional 0.278%. Hence, we conclude that despite the fact that cash-rich firms already have substantial liquidity buffers, they nonetheless issue more equity than the average firm and in addition save a significantly larger proportion of the proceeds from the issue. On the one hand this could be once more explained by their favourable market valuation which makes equity issues a cheap source of financing. On the other hand it remains unclear why these firms need external financing at all. After all, pecking order theory states that a firm should prefer internal funding to external capital sources, primarily due to the costs arising from information asymmetries.

On the debt side, we observe opposite patterns. Cash-rich firms not only issue less debt on average, but they also save significantly less out of debt sales than the average firm. The total effect of debt issues on cash ratio is negative for cash-rich firms, i.e. the cash ratio decreases as they issue debt. This could indicate that cash-rich firms use debt only as a means to co-finance specific investments, for which internal funds might be insufficient. Hence, cash-rich firms seem to not be particularly constrained in their access to debt markets, but use debt financing only selectively due to the relatively higher costs.

We conclude that firms that are cash-rich at the beginning of the year behave systematically different from non-cash-rich firms. Specifically, they rely more on operating cash flow and equity, and less on debt than non-cash-rich firms.

Overall, the results provide another puzzle in the light of Precautionary Savings Theory. Cash-rich firms not only have much higher cash-ratios despite mixed evidence on their actual liquidity needs, but when they already are cash-rich they still have a significantly greater propensity to save additional cash out of all sources but debt issues. Hence, while the sources of their cash are clear, it remains unclear why they keep this cash instead of reinvesting or distributing it. Figure 1: Financing sources of cash-rich and non-cash-rich firms

This figure shows how cash-rich firms differ from non-cash-rich firms in their usage of the various financing sources over time. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on all relevant variables. Data are gathered from Worldscope. Other sources of financing include decrease in investments, disposal of fixed assets, and miscellaneous other sources. All variables are winsorized at the 1st and 99th percentile and described in the Appendix.



Table 3: Sources of cash

This table provides regression evidence on firms' propensity to save cash out of different sources. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with nonmissing information on all relevant variables. Data are gathered from Worldscope. All variables are winsorized at the 1st and 99th percentile and described in the Appendix. The dependent variable is the firms' savings ratio defined as:

$$\ln\left(\frac{Cash_t - Cash_{t-1}}{Total\ assets_{t-1}} + 1\right)$$

The first line related to each cash source indicates their impact on the savings ratio across all firms. The second line then includes an interaction term, which indicates the additional effect if the firm has already been cash-rich in the previous period, as defined by being in the top decile of cash ratios in the respective year. Standard errors are heteroscedasticity consistent and clustered at the firm level. All specifications include industry x country fixed effects.

	Savings	s ratio
OCF, lagged	0.204^{***}	(9.10)
OCF x cash-rich	0.232^{***}	(3.26)
Equity issue, lagged	0.395^{***}	(8.37)
Equity issue x cash-rich	0.278^{***}	(3.03)
Debt issue, lagged	0.0611^{***}	(3.45)
Debt issue x cash-rich	- 0.306^{***}	(-3.70)
Other financing, lagged	0.200***	(3.22)
Other financing x cash-rich	-0.270**	(-2.43)
Dummy cash-rich start of year	-0.0573***	(-4.76)
Size	-0.000418	(-0.46)
Observations R^2 Adjusted R^2	2257 0.309 0.253	

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

6 Behavioural explanations

In the previous section, we have identified and characterized a group of firms that hold cash reserves beyond what can be explained by Precautionary Savings Theory. We have shown that this group of cash-rich firms is more profitable and less leveraged than other firms (Table 1), that cash-rich firms tend to remain cash-rich for a long time (Table 2), and that when a firm is cash-rich, it behaves systematically different from non-cash-rich firms with regard to savings policies (Table 3). Building on this observation, we theorise that executive fixed effects can contribute to our understanding of cash-rich firms and cash holdings in general. We take the view that conservative managers might be an explanation for large cash holdings and developed four sets of hypotheses to test this notion. Evidence from these tests is presented below.

This section is structured into three parts. In the first part, we perform a diagnostic test whether executive fixed effects can explain some of the variation in cash holdings. Subsequently, we provide brief summary statistics on the behavioural variables used in this study and compare differences in mean between cash-rich and non-cash-rich groups. Finally, we test our hypotheses and provide a discussion of the implications for our understanding of cash holdings.

6.1 Manager fixed effects

As a first step of investigating behavioural explanations, we test whether executive characteristics have any explanatory power on cash holdings. Following a methodology as described by Bertrand and Schoar (2003) and Dittmar and Duchin (2012), we find strong evidence for manager fixed effects. Specifically, we estimate executive fixed effects by analysing executive turnovers. If executive management styles have an influence on cash holdings, this effect should become visible when an executive is replaced by an executive with a different style. This methodology might underestimate the true effect of executive characteristics on cash holdings in situations where an executive is replaced with an executive of same style, which could happen under firm and manager matching.

We estimate executive fixed effects in two steps. First, we estimate OLS regression coefficients predicting a firm's cash ratio with firm fixed effects while controlling for time-varying firm attributes. In a second step, we extend the base specification with either CEO or CFO fixed effects. Results are presented in Table 4. For each specification, adjusted R2 and F-test statistics are reported. The F-test statistics evaluate the null hypothesis that the added fixed effects are jointly equal to zero. We do not include year fixed effects in our base model since we find no support for such effects in our sample. Sample size differs between CEO and CFO because the data set contains less CFO than CEO observations.

Our analysis provides strong evidence of executive fixed effects on cash holdings. When adding CEO fixed effects to the base specification, adjusted R2 increases by 5.2 percentage points and the high F-value of 2.04 leads us to reject the null hypothesis of no CEO effects. We find a similar result for CFO fixed effects with an increase in adjusted R2 of 2.7 percentage points and an F-value of 1.53. We do not test marginal combined CEO and CFO effects since this would reduce sample size further due to missing data on executives. Overall, our results suggest that characteristics of the key executives have substantial incremental explanatory power for cash holdings. This is in line with prior research on this topic such as by Bertrand and Schoar (2003), Frank and Goyal (2007), Dittmar and Duchin (2013) and Custodio and Metzger (2013).

Table 4: Manager fixed effects

This table reports evidence on executive fixed effects. The methodology is as follows: A base specification (1a and 2a) reports OLS regression estimates predicting a firm's cash-ratio with firm fixed effects while controlling for size, gross debt, market-book, CapEx and R&D expenditures. In a second step, the specification is extended with executive fixed effects for the CEO (1b) or the CFO (2b). F-test statistics and corresponding p-values are reported on the likelihood that added executive fixed effects equal zero. The number of CEO and CFO changes for each sample is reported as well. Since the sample of firms which reported a change in CFO is substantially smaller than the one for CEOs, the two regression models are based on different samples and should therefore be interpreted separately. The samples consists of all industrial firms in Worldscope from 2003-2012 with non-missing information on all base and fixed effect specifications.

	Cl	ΞO	CI	FO
_	(1a)	(1b)	(2a)	(2b)
Specification				
Base model	Yes	Yes	Yes	Yes
N	1312	1312	648	648
R^2	0.768	0.851	0.792	0.855
adj. R^2	0.716	0.768	0.745	0.772
Fixed effects				
Firm FE	Yes	Yes	Yes	Yes
CEO FE	-	Yes	-	-
CFO FE	-	-	-	Yes
F statistics				
F value	2.	04	1.	53
prob > F	0.0	000	0.0	012
Executive change				
No. CEO change	2	46	-	-
No. CFO change		-	12	28

6.2 Hypotheses testing

In the previous section, we have established that CEO and CFO styles can explain part of the variation in cash holdings, after controlling for our base model and firm fixed effects. Building on this, we continue with testing the hypothesis that conservative managers will be associated with a higher cash ratio. To test this notion, we developed four behavioural proxies for conservatism: (i) age; (ii) gender; (iii) relative share of compensation in fixed, bonus and long-term; and (iv) past experience as CFO. In the following section, we test each proxy on its explanatory power on cash ratios and on the probability of being cash-rich.

As a first step, however, we compare descriptive statistics between cash-rich and noncash rich firms. We find that the CEO of cash-rich firms is on average two years younger than the CEO of non-cash-rich firms (Table 5). We observe the same pattern for CFOs and for the management board as a whole. All differences are statistically significant at the 1% level. These findings are rather surprising given that we expect older executives to be more conservative and to be associated with greater cash balances. We will discuss these interim results later when analysing the regression models. We further observe variation in the gender and long-term compensation variables, although these differences are significant only at the 5% level. In addition, the variable related to long-term compensation points into opposite directions when comparing CEOs with CFOs. Hence, in order to get a better understanding of their effect on cash ratios and the likelihood of a firm to be cash-rich we estimate regression coefficients. We present a discussion of our findings below.

6.2.1 Age

The first set of hypotheses states that older CEOs / CFOs or a higher average age in the management board will be associated with a higher cash ratio and a higher probability of the firm being cash-rich. Contrary to our expectation, we find that age is negatively associated with cash holdings and that the presence of older executives reduces the likelihood of the firm being cash-rich. We therefore reject our original hypothesis and theorise that manager horizon effects might be a possible explanation for our finding.

Our estimation results are presented in Table 6. When predicting the cash ratio, we observe a negative coefficient for CEO age, which is significant at the 1% level. The same is true for CFO age and average age in the management board, although these estimates are not significant at conventional levels. The point estimate for the CEO suggests that a one year older CEO is associated with a decrease in the cash ratio of 0.16 percentage points, which implies that a 10 year difference in CEO age corresponds with a change in cash ratio of 1.6 percentage points. This result is economically meaningful when taking into account that the average cash ratio in the sample is 12.3%, while the difference in CEO age between the 10th and 90th percentile is 19 years. We observe results similar to the OLS model in the

Table 5: Behavioural summary statistics

This table reports descriptive summary statistics for behavioural measures used in this study. Variables related to CEO and CFO are from CapitalIQ and comprise all industrial firms in the eight largest economies of the Eurozone between 2003 and 2012. Variables related to the management board are constructed using data from Orbis and are available for 2012 only. All variables are winsorized at the 1st and 99th percentile. Deciles are defined yearly by sorting firms on cash to total assets, where decile 10 refers to top decile (cash-rich). A definition of the variables can be found in the Table 17. Panel A presents summary statistics for the full sample. Panel B provides a t-test for the difference in means between cash-rich and non-cash-rich firms.

Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
3550	53.68	7.65	0.33	3.24	31.00	44.00	53.00	63.00	81.00
4642	0.01	0.10	10.12	103.51	0.00	0.00	0.00	0.00	1.00
4391	0.57	0.32	-0.16	1.96	0.00	0.11	0.57	1.00	1.00
4391	0.22	0.22	0.66	2.36	0.00	0.00	0.18	0.55	0.81
4391	0.06	0.13	2.65	9.51	0.00	0.00	0.00	0.25	0.64
1603	49.21	6.62	0.11	2.73	31.00	40.00	49.00	58.00	70.00
1925	0.04	0.19	4.84	24.41	0.00	0.00	0.00	0.00	1.00
1898	0.52	0.28	-0.02	2.23	0.00	0.14	0.52	0.96	1.00
1898	0.25	0.21	0.46	2.42	0.00	0.00	0.24	0.53	0.80
1898	0.07	0.14	1.98	6.09	0.00	0.00	0.00	0.29	0.59
453	0.11	0.12	1.00	3.48	0.00	0.00	0.08	0.27	0.50
448	54.46	4.79	-0.19	3.84	30.00	48.33	54.40	60.80	68.00
	N 3550 4642 4391 4391 4391 1603 1925 1898 1898 1898 1898 1898 453 448	N Mean 3550 53.68 4642 0.01 4391 0.57 4391 0.22 4391 0.06 1603 49.21 1925 0.04 1898 0.25 1898 0.25 1898 0.07 453 0.11 448 54.46	N Mean SD 3550 53.68 7.65 4642 0.01 0.10 4391 0.57 0.32 4391 0.22 0.22 4391 0.06 0.13 1603 49.21 6.62 1925 0.04 0.19 1898 0.52 0.28 1898 0.25 0.21 1898 0.07 0.14 453 0.11 0.12 448 54.46 4.79	N Mean SD Skew. 3550 53.68 7.65 0.33 4642 0.01 0.10 10.12 4391 0.57 0.32 -0.16 4391 0.22 0.22 0.66 4391 0.06 0.13 2.65 1603 49.21 6.62 0.11 1925 0.04 0.19 4.84 1898 0.52 0.28 -0.02 1898 0.25 0.21 0.46 1898 0.07 0.14 1.98 453 0.11 0.12 1.00 448 54.46 4.79 -0.19	NMeanSDSkew.Kurt. 3550 53.68 7.65 0.33 3.24 4642 0.01 0.10 10.12 103.51 4391 0.57 0.32 -0.16 1.96 4391 0.22 0.22 0.66 2.36 4391 0.06 0.13 2.65 9.51 1603 49.21 6.62 0.11 2.73 1925 0.04 0.19 4.84 24.41 1898 0.52 0.28 -0.02 2.23 1898 0.25 0.21 0.46 2.42 1898 0.07 0.14 1.98 6.09 453 0.11 0.12 1.00 3.48 448 54.46 4.79 -0.19 3.84	N Mean SD Skew. Kurt. Min 3550 53.68 7.65 0.33 3.24 31.00 4642 0.01 0.10 10.12 103.51 0.00 4391 0.57 0.32 -0.16 1.96 0.00 4391 0.22 0.22 0.66 2.36 0.00 4391 0.06 0.13 2.65 9.51 0.00 4391 0.06 0.13 2.65 9.51 0.00 1898 0.52 0.28 -0.02 2.23 0.00 1898 0.52 0.21 0.46 2.42 0.00 1898 0.25 0.21 0.46 2.42 0.00 1898 0.07 0.14 1.98 6.09 0.00 453 0.11 0.12 1.00 3.48 0.00 448 54.46 4.79 -0.19 3.84 30.00	N Mean SD Skew. Kurt. Min P10 3550 53.68 7.65 0.33 3.24 31.00 44.00 4642 0.01 0.10 10.12 103.51 0.00 0.00 4391 0.57 0.32 -0.16 1.96 0.00 0.11 4391 0.22 0.22 0.66 2.36 0.00 0.00 4391 0.06 0.13 2.65 9.51 0.00 0.00 1603 49.21 6.62 0.11 2.73 31.00 40.00 1925 0.04 0.19 4.84 24.41 0.00 0.00 1898 0.52 0.28 -0.02 2.23 0.00 0.14 1898 0.25 0.21 0.46 2.42 0.00 0.00 1898 0.07 0.14 1.98 6.09 0.00 0.00 453 0.11 0.12 1.00 3.48 30.0	N Mean SD Skew. Kurt. Min P10 P50 3550 53.68 7.65 0.33 3.24 31.00 44.00 53.00 4642 0.01 0.10 10.12 103.51 0.00 0.00 0.00 4391 0.57 0.32 -0.16 1.96 0.00 0.11 0.57 4391 0.22 0.22 0.66 2.36 0.00 0.00 0.18 4391 0.06 0.13 2.65 9.51 0.00 0.00 0.00 1603 49.21 6.62 0.11 2.73 31.00 40.00 49.00 1925 0.04 0.19 4.84 24.41 0.00 0.00 0.00 1898 0.52 0.28 -0.02 2.23 0.00 0.14 0.52 1898 0.25 0.21 0.46 2.42 0.00 0.00 0.00 453 0.11 0.12	N Mean SD Skew. Kurt. Min P10 P50 P90 3550 53.68 7.65 0.33 3.24 31.00 44.00 53.00 63.00 4642 0.01 0.10 10.12 103.51 0.00 0.00 0.00 0.00 4391 0.57 0.32 -0.16 1.96 0.00 0.11 0.57 1.00 4391 0.22 0.22 0.66 2.36 0.00 0.00 0.18 0.55 4391 0.06 0.13 2.65 9.51 0.00 0.00 0.00 0.22 1603 49.21 6.62 0.11 2.73 31.00 40.00 49.00 58.00 1925 0.04 0.19 4.84 24.41 0.00 0.00 0.00 0.00 1898 0.52 0.28 -0.02 2.23 0.00 0.14 0.52 0.96 1898 0.25 0.21

Panel A - Full sample statistics

	Cash-rich	Non-cash-rich	Diff	
			Din:	
CEO				
CEO age	51.79	53.88	2.097^{***}	(4.86)
CEO is prior CFO	0.0120	0.00917	-0.00283	(-0.62)
CEO $\%$ fixed	0.577	0.569	-0.00797	(-0.52)
CEO $\%$ bonus	0.206	0.219	0.0131	(1.21)
CEO $\%$ long-term	0.0619	0.0547	-0.00717	(-1.11)
CFO				
CFO age	47.24	49.44	2.198^{***}	(4.09)
CFO is female	0.0189	0.0403	0.0214	(1.54)
CFO $\%$ fixed	0.524	0.525	0.000124	(0.01)
CFO $\%$ bonus	0.230	0.251	0.0210	(1.46)
CFO $\%$ long-term	0.0566	0.0764	0.0198^{**}	(2.03)
Management				
Female ratio in board	0.0740	0.110	0.0358^{**}	(1.98)
Average age in board	52.36	54.70	2.335^{***}	(3.13)

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

logistic regression, which predicts the likelihood of being cash-rich. Specifically, we observe that if the CEO is one year older, the probability that the firm is cash-rich decreases by 4.0%.¹³ This effect is statistically significant at the 1% level. We notice an effect similar in size for CFO age. An increase in CFO age of one year decreases the probability of the firm being cash-rich by 5.2%. This effect is significant at the 5% level. Lastly, if the average age in the management board increases by one year, the likelihood of the firm being cash-rich decreases by 8.9%, although this effect is slightly below the 10% significance level. Overall, we find consistent and strong evidence that younger CEOs are associated with higher cash ratios and that a decrease in age increases the probability for a cash-rich firm.

The presented evidence leads us to reject the hypothesis that older people are more conservative than younger in a professional context. Given that liquidity buffers are used as an insurance against future cash shortfalls, the question becomes which manager has greater personal need for such an insurance. Although older people might behave more conservatively in general, we explain this results with thesis that in a professional context younger managers have better reasons to act conservatively. Younger managers are at an earlier stage of their career, which makes mistakes costly. Hence, they would suffer from greater negative consequences than older managers if their company went into financial difficulties, since this would have negative reputation effects. Negative reputation harms their career prospects, which is particularly relevant given that younger managers are likely to have built up less personal wealth than older ones. Another factor might be that younger managers tend to have less experience and thus face greater uncertainty regarding what the optimal cash level should be. In order to compensate for this greater uncertainty they should be more inclined to keep additional risk buffers in the form of higher liquidity. These two factors might help to explain why we observe that younger managers operate with higher cash ratios.

Our observations are consistent with those by Dittmar and Duchin (2013), who use CEO and CFO age as control variables in some regressions. In line with our results, they report a negative effect of CEO age on cash ratios. The same is true for CFO age, although this effect is significant only at the 10% level.

 $^{^{13}}$ The coefficients in Table 6 show the log odds ratio for the respective variable. In order to interpret them as a percentage effect, one needs to calculate ((exp(log odds ratio)-1).

Table 6: Age regressions

This table reports regression results on the relation between the age of executives and a firm's cash holdings. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on all relevant variables. Data on the firm's financials are gathered from Worldscope. Data on CEO and CFO age are extracted from CapitalIQ. Information on the average age of the management board is taken from Orbis and available only for 2012. All variables are winsorized at the 1st and 99th percentile and described in the Appendix. The dependent variable in the OLS regressions is the firm's cash ratio. The dependent variable in the logistic regressions is a dummy variable which takes the value 'one' if a firm is cash-rich as defined by being in the top decile of cash ratios in the respective year. The coefficients in the logistic regressions report log odds ratios. The constant is not displayed. Standard errors are heteroscedasticity consistent and clustered at the firm level. All specifications include industry x country fixed effects.

		OLS			Logistic	
	(1) Cash ratio	(2) Cash ratio	(3) Cash ratio	(4) Cash-rich	(5) Cash-rich	(6) Cash-rich
Size	-0.00202 (-0.66)	-0.00212 (-0.60)	-0.000799 (-0.21)	-0.107* (-1.85)	-0.166* (-1.73)	-0.175 (-1.05)
Gross debt	-0.289*** (-8.65)	-0.304^{***} (-5.25)	-0.220*** (-4.07)	-11.25^{***} (-10.49)	-12.83^{***} (-6.30)	-11.00^{***} (-3.52)
Market-book	0.0305^{***} (4.43)	$\begin{array}{c} 0.0482^{***} \\ (5.50) \end{array}$	0.0261^{**} (2.23)	0.530^{***} (4.45)	0.920^{***} (4.61)	$0.446 \\ (1.17)$
CapEx	-0.240** (-2.13)	-0.248* (-1.68)	-0.418** (-1.98)	-12.64^{***} (-3.67)	-9.280* (-1.79)	-22.60* (-1.93)
R&D	0.338^{***} (2.82)	$\begin{array}{c} 0.302 \\ (1.30) \end{array}$	$0.258 \\ (1.08)$	4.531^{**} (2.33)	-1.788 (-0.52)	$3.863 \\ (0.71)$
CEO age	-0.00160*** (-2.92)			-0.0404*** (-2.87)		
CFO age		-0.00105 (-1.38)			-0.0537** (-2.04)	
Average age in board			-0.00236 (-1.39)			-0.0927 (-1.58)
Industry x country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations R^2 Adjusted R^2	$2159 \\ 0.443 \\ 0.407$	$975 \\ 0.526 \\ 0.475$	$386 \\ 0.465 \\ 0.169$	1448	563	140
Pseudo R^2	0.101	0.110	0.105	0.295	0.370	0.384

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

6.2.2 Gender

Our second set of hypotheses states that firms managed by female CFOs or whose management board has a higher female ratio should be characterized by higher cash ratios and be more likely to be cash-rich. However, our regression results provide no support for these hypotheses.

We find no significant effect of CFO gender or female ratio in the management board on neither cash ratio nor the probability of being a cash-rich firm. The results of our regressions are shown in Table 7. All regression coefficients are very close to zero and not statistically significant. The observation that females tend to be more conservative in many situation has been well documented in academic literature (Palvia et al. (2013), Francis, Hasan and Wu (2013), Faccio et al. (2013), Huang and Kisgen (2013) or Harris et al. (2006)). This leaves two explanations why we observe no relationship between gender and cash holdings. On the one hand, there could be a high degree of professionalism at this functional level in a company, which eventually results in an assimilation of male and female top executives. On the other hand, female CFOs could in fact behave more conservatively, but this behaviour expresses itself in areas other than cash policies. On the management board level, a further explanation for why we find no effect of female ratio in the board could be that women are often serving in functions other than CEO or CFO. Therefore, they might have limited influence on cash policies.

The academic literature provides mostly evidence in favour of the notion that female executives are more conservative than their male colleagues, as outlined above. However, while these papers investigate the impact of gender on all kind of corporate decisions, none of them is explicitly testing the effect on cash holdings. The only reference we have with regard to cash holdings is Dittmar and Duchin (2013), who control for gender in some specifications. They report a small positive effect of being female on cash ratios, which is significant at the 5% level for CFOs. However, they find no significant effect for CEOs. Differences in sample as well as cultural aspects between U.S. and European firms could be potential explanations for the differences between Dittmar and Duchin (2013) and our study. Further studies are needed to clarify this mixed evidence.

Table 7: Gender regressions

This table reports regression results on the relation between gender of executives and a firm's cash holdings. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on all relevant variables. Data on the firm's financials are gathered from Worldscope. Data on CFO gender are extracted from CapitalIQ. Information on the average female ratio in the management board is taken from Orbis and available only for 2012. All variables are winsorized at the 1st and 99th percentile and described in the Appendix. The dependent variable in the OLS regressions is the firm's cash ratio. The dependent variable in the logistic regressions is a dummy variable which takes the value 'one' if a firm is cash-rich as defined by being in the top decile of cash ratios in the respective year. The coefficients in the logistic regressions report log odds ratios. The constant is not displayed. Standard errors are heteroscedasticity consistent and clustered at the firm level. All specifications include industry x country fixed effects.

	0	LS	Log	istic
	(1) Cash ratio	(2) Cash ratio	(3) Cash-rich	(4) Cash-rich
Size	-0.00306 (-0.89)	-0.00285 (-0.75)	-0.243*** (-2.66)	-0.228 (-1.37)
Gross debt	-0.327^{***} (-6.15)	-0.254^{***} (-4.39)	-13.66^{***} (-7.18)	-11.04^{***} (-3.64)
Market-book	0.0554^{***} (7.22)	0.0209^{*} (1.72)	0.993^{***} (5.03)	$0.333 \\ (0.89)$
CapEx	-0.375** (-2.36)	-0.524** (-2.27)	-13.33** (-2.55)	-26.93** (-2.44)
R&D	$\begin{array}{c} 0.207 \\ (0.92) \end{array}$	$0.219 \\ (0.90)$	-2.426 (-0.72)	5.518 (1.05)
CFO is female	-0.0164 (-0.44)		-0.0695 (-0.07)	
Female ratio in board		$0.0286 \\ (0.53)$		-0.925 (-0.39)
Industry x country FE	Yes	Yes	Yes	Yes
Observations R^2 Adjusted R^2	$ 1114 \\ 0.499 \\ 0.449 $	$391 \\ 0.483 \\ 0.196$	687	147
Pseudo R^2			0.403	0.395

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

6.2.3 Compensation

Our third set of hypotheses states that firms whose executives receive a large share of their relative compensation in the form of fixed (variable) components will be associated with high (low) cash holdings. Moreover, a high share of long-term compensation will be associated with higher cash holdings. We find support for these hypotheses in the logistic regressions on the likelihood of being cash-rich, but not in the OLS regressions on cash ratio. One explanation for this observation could be measurement errors, given the complexity of compensation contracts and the difficulties in differentiating between ex-ante incentive design and ex-post actual compensation. We will discuss this in more detail later.

Estimation results are presented in Table 8. Regarding the OLS regressions, coefficients for relative fixed and relative bonus compensation point into the expected direction. However, the t-statistics indicate that they are not significant at conventional levels. For long-term compensation, neither do the coefficients point into the expected direction nor are the estimates significant.

We also estimate a logistic regression on the dummy variable 'cash-rich firm' and display the results next to those of the OLS regression (Table 8). In line with our hypothesis, we observe that a 1 percentage point increase in the relative weight of the fixed component in the CEO's remuneration contract increases the probability that the firm is cash rich by 0.76%. This result is significant and meaningful. The average weight of fixed compensation in a CEO contract is 52% in our sample, while the 10th and 90th percentile are at 14% and 96% (Table 5). An increase in the share of fixed compensation by 10 percentage points thus increases the likelihood of being cash-rich by 7.6%. We observe an even stronger effect for the CFO, where a 1 percentage point increase in the fixed component results in a 3.91% increase in the likelihood of the firm being cash-rich. This result is significant at the 5% level.

Similarly, we find consistent support for the hypothesis that bonus payments are associated with a lower cash ratio. Our results indicate that a 1 percentage point increase in the bonus component of the CEO's remuneration decreases the likelihood of the firm being cash-rich by 0.67%. Again, the effect is even stronger for the CFO, with the log odds ratio implying a reduction in likelihood of 0.81%. The effects are statistically significant at the 5% level for both the CEO and the CFO. Similarly, these results are meaningful given that relative bonus payments are dispersed across the sample. For both CEO and CFO, the difference between the 10th and 90th percentile is c. 53 percentage points (Table 5). A 10 percentage points increase in bonus compensation thus increases the likelihood of being cash-rich by 6.7% to 8.1%. Fixed and bonus compensation are closely linked to each other since a higher share of fixed compensation naturally correlates with a lower bonus compensation, Therefore, as expected, we find opposing directions of fixed and bonus compensation, although the economic magnitude differs among them. The reason is primarily that bonus payments are within a more narrow range than fixed salary payments (Table 5).

We find mixed evidence for the relationship between long-term compensation and cash holdings. While we find support at the 10% significance level that a higher proportion of long-term compensation is associated with higher cash-holdings for the CEO, we find no support for the CFO. For the CEO, a 1 percentage point increase in the relative weight of long-term components is linked to a 1.80% increase in the likelihood that the firm is cash-rich. We argue that long-term compensation differs from fixed and bonus compensation because firm and manager matching should have a weaker influence on long-term compensation. Instead, the manager is presented with a share of long-term compensation and can respond by altering operational risks to achieve her preferred risk preference, an effect we termed risk adjustment. The exact interplay between matching and risk adjustment remains to be determined. If managers have discretionary power in setting long term incentives for some firms (matching) but not in others (risk adjustment), then these two opposing effects might neutralize each other in the full sample. Nevertheless, for the CEO, we find that higher relative long-term compensation is associated with a higher likelihood to be a cash-rich firm and interpret this as support for the risk adjustment thesis. However, there might be other explanations for this observation. For example, a higher share of long-term compensation might be common in forward looking industries, such as R&D focussed businesses. The high share of cash holdings might then be a function of a risk buffer to be able to fund R&D in all states.

Overall, it is noteworthy that we find consistent evidence for a relationship between relative compensation and cash holdings in the logistic regression, which predicts the probability of being cash-rich, but not in the OLS regression, which predicts the cash ratio. We take the view that this could be related to the complexity added through the difference between ex-ante agreed compensation and ex-post actual compensation.

Given our hypotheses we expect conservative managers to be matched with firms that offer high relative fixed compensation in ex-ante contracts. Let us call such an executive manager A. Let us further assume that manager A will be matched with a firm that offers a 10% bonus payment. In the bad state of the world, this manager will receive no bonus, while in the good state he will receive a 10% bonus. In both states, our proxy will correctly classify manager A as conservative due to his large share of fixed compensation. However, executives who are not conservative might receive a high proportion of fixed compensation as well. For such a manager B, the ex-ante contract might, for example, foresee a 40% bonus payment, in line with this manager's risk preference. A sudden downturn of the business environment, however, might lead manger B to miss her bonus targets, and her ex-post observed bonus payment is reduced to zero. Since manager B is not conservative, her firm is not associated with a high cash ratio. Ex-post, in the bad state, manager A and manager B both receive only fixed compensation, which would lead us to categorise both as conservative, even though only manager A is in fact conservative. This effect creates noise in evaluating the impact of bonus payments on cash ratios.

Ideally, we would therefore have preferred to know actual compensation contracts of CEO or CFO, such that we can determine the sources of variation in compensation contracts. However, this data is not readily available for Eurozone companies. We therefore use the ex-post realizations as proxies for these contracts.

Overall, our findings are in line with academic literature on compensation. Similar to Graham et al. (2013), we find preliminary evidence that compensation structure can be a proxy for conservatism, albeit a noisy one. Further, consistent with Chava and Purnanandam (2010), we present evidence that risk-decreasing incentives are associated with higher cash balances. To conclude, our findings provide support for the notion of a link between executive compensation contracts, executive properties and cash holdings.

Table 8: Compensation regressions

This table reports regression results on the relation between differences in executive compensation contracts and a firm's cash holdings. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on all relevant variables. Data on the firm's financials are gathered from Worldscope. Variables related to executive compensation are constructed based on data from CapitalIQ. All variables are winsorized at the 1st and 99th percentile and described in the Appendix. The dependent variable in the OLS regressions is the firm's cash ratio. The dependent variable in the logistic regressions is a dummy variable which takes the value 'one' if a firm is cash-rich as defined by being in the top decile of cash ratios in the respective year. The coefficients in the logistic regressions report log odds ratios. The constant is not displayed. Standard errors are heteroscedasticity consistent and clustered at the firm level. All specifications include industry x country fixed effects.

			0	LS					Log	istic		
		CEO			CFO			CEO			CFO	
	(1) Cash ratio	(2) Cash ratio	(3) Cash ratio	(4) Cash ratio	(5) Cash ratio	(6) Cash ratio	(7) Cash-rich	(8) Cash-rich	(9) Cash-rich	(10) Cash-rich	(11) Cash-rich	(12) Cash-rich
Size	-0.00211 (-0.77)	-0.00271 (-1.02)	-0.00283 (-1.04)	-0.00402 (-1.09)	-0.00463 (-1.29)	-0.00416 (-1.08)	-0.146** (-2.56)	-0.143^{**} (-2.55)	-0.216*** (-3.71)	-0.125 (-1.21)	-0.174* (-1.78)	-0.237** (-2.41)
Gross debt	-0.286*** (-9.40)	-0.286*** (-9.34)	-0.286*** (-9.35)	-0.349*** (-6.39)	-0.348*** (-6.32)	-0.346*** (-6.40)	-10.79^{***} (-10.92)	-10.89*** (-10.99)	-10.58*** (-10.77)	-15.07*** (-7.48)	-14.97*** (-7.46)	-14.71*** (-7.39)
Market-book	0.0355^{***} (5.44)	$\begin{array}{c} 0.0350^{***} \\ (5.35) \end{array}$	0.0348^{***} (5.42)	0.0512^{***} (6.14)	0.0510^{***} (6.20)	0.0502^{***} (6.07)	0.669^{***} (5.81)	0.686^{***} (5.92)	0.623^{***} (5.49)	1.027^{***} (5.05)	0.999^{***} (4.89)	0.932^{***} (4.71)
CapEx	-0.317^{***} (-2.91)	-0.308*** (-2.82)	-0.307*** (-2.84)	-0.346** (-2.21)	-0.343** (-2.20)	-0.354** (-2.32)	-13.58^{***} (-4.15)	-12.96*** (-4.06)	-12.80*** (-3.92)	-12.41** (-2.36)	-12.00** (-2.37)	-11.78** (-2.30)
R&D	0.297^{**} (2.38)	0.298^{**} (2.37)	0.300^{**} (2.39)	$\begin{array}{c} 0.303 \\ (1.26) \end{array}$	$\begin{array}{c} 0.306 \\ (1.28) \end{array}$	0.304 (1.28)	2.003 (1.14)	$1.830 \\ (1.05)$	1.987 (1.14)	-2.229 (-0.77)	-2.408 (-0.83)	-2.089 (-0.72)
Fixed	$\begin{array}{c} 0.0161 \\ (1.36) \end{array}$			$\begin{array}{c} 0.0184 \\ (1.00) \end{array}$			0.566^{*} (1.86)			1.590^{**} (2.38)		
Bonus		-0.00666 (-0.48)			-0.0164 (-0.78)			-1.101** (-2.40)			-1.673** (-2.00)	
Long-term			-0.00347 (-0.18)			-0.0307 (-1.01)			1.030^{*} (1.74)			-0.169 (-0.15)
Industry x country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations R^2 Adjusted R^2	$2444 \\ 0.441 \\ 0.404$	$2444 \\ 0.440 \\ 0.403$	$2444 \\ 0.440 \\ 0.403$	$1102 \\ 0.534 \\ 0.488$	$1102 \\ 0.533 \\ 0.487$	$1102 \\ 0.534 \\ 0.488$	1616	1616	1616	704	704	704
Pseudo R^2	0.101	0.100	0.100	0.100	0.10,	0.100	0.287	0.289	0.287	0.421	0.418	0.410

* p<0.10, ** p<0.05, *** p<0.01

6.2.4 Past experience

Our last hypothesis states that CEOs who previously have been CFO at that firm are associated with higher cash ratios, and that this effect disappears if the CFO becomes CEO of a cash rich firm. We find support for both parts of our hypothesis.

Regression estimates are reported in Table 9. The coefficient of the OLS model indicates an increase in cash ratio by 5.8 percentage points if the CEO has previously been CFO. This effect is statistically significant at the 1% level and has strong economic implications given that the average firm has a cash ratio of 12.3%. For the logistic model, we observe a similar strong relationship between a CEO that is the prior CFO and the likelihood to be cash-rich, even though the regression estimate is slightly below the 10% significance level. When the CEO has previously been CFO of that company, the probability of the firm being cash-rich is almost tripled. This second observation might conflict with the second part of our hypothesis that the positive effect of the CEO being former CFO ceases to exist if the firm is cash-rich. To test this, we add an interaction term between cash-rich firm and CEO is prior CFO to the OLS model (specification (2) of Table 9). We observe that the added interaction term has a large negative coefficient, while the coefficient of 'CEO is prior CFO' remains similar to specification (1). The implication is highly relevant: when the CEO has previously been CFO in a non-cash-rich firm, she is associated with a 4.85 percentage points higher cash ratio. For a cash-rich firm, however, the overall effect is a reduction of the cash ratio by 1.38 percentage points.

The presented results provide support for our hypotheses. We find a stable and significant relationship between a CEO's past professional experience and cash holdings. This finding extends evidence by Dittmar and Duchin (2013), Custodio and Metzger (2013), and Malmendier et al. (2011), who report similar relationships between past experience and firm policies. In line with the motivation for the hypothesis, we find evidence for differences in style between CEOs, who have previously been CFOs, and those who have not. This links back to the findings by Graham et al. (2013), who present support that CFOs are more conservative than CEOs. This conservatism is balanced by the financial expertise of the CFO, which leads her to decrease cash holdings for cash-rich firms. For these firms, we observe a negative effect of a CEO that has been the former CFO.

There are two potential concerns with regard to these results. First, timing effects in our sample could cause this positive relationship. By construction, our indicator variable is more likely to be 'zero' (and consequently less likely to be 'one') in the first half of the sample period than in the second because we do not track executives out of sample. Hence, if cash ratios in our sample changed systematically over time, this effect would be captured in our indicator variable even though it would be unrelated to the CEOs past experience. This concern is relevant since it could be that firms have a higher cash ratio in the second half of the sample period because macro conditions improved. Since mid 2009, lower interest rates, substantial credit supply as well as rising share prices made it easier for firms to raise capital. To control for this, we analyse cash ratios by year both for our full sample as well as for cash-rich firms only. The results are shown in Figure 2. Our results give no indication of a systematic development of cash ratios over time. Except for the year 2008, in which cash ratios have experienced a minor dip due to the financial crisis, the ratio remains constant. Second, there could be a matching effect. CFOs might be more likely to become CEOs when the company plans to engage in financing activities in the next periods. If this was the case, we would not measure CFO conservatism, but the observed relationship would remain.

To summarise, we find strong support for both hypotheses regarding the effect of a CEO who has previously been CFO in the same firm on cash holdings. Comparing our results to other findings, our results are in contrast to a prior study by Custodio and Metzger (2013). They report that a CEO who is a financial expert has a negative impact on cash holdings. The diverging results could be due to differences in research design. Most importantly, Custodio and Metzger (2013) have a much broader definition of financial expertise than we have. For example they include any manager who has past experience in banking or investment management. Hence, 41% of the CEOs in their sample are 'financial experts', whereas less than 2% of the CEOs in our sample have previously been CFO of that company. Further, due to data availability, we have only 44 'CEO is prior CFO' observations in our sample. Repeating this test on a larger data set would improve the reliability of these results.

Table 9: Past experience regressions

This table reports regression results on the relation between CEOs, who have previously been CFOs, and a firm's cash holdings. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on all relevant variables. Data on the firm's financials are gathered from Worldscope. Information on whether the CEO has previously been CFO is based on data from CapitalIQ. All variables are winsorized at the 1st and 99th percentile and described in the Appendix. The dependent variable in the OLS regressions is the firm's cash ratio. Specification (2) includes an interaction term to measure if the impact of the CEO's past experience as CFO varies as a function of whether the firm is cash-rich (as defined by being in the top decile of cash ratios in the respective year). The dependent variable in the logistic regression is a dummy variable which takes the value 'one' if a firm is cash-rich. The coefficients in the logistic regression report log odds ratios. The constant is not displayed. Standard errors are heteroscedasticity consistent and clustered at the firm level. All specifications include industry x country fixed effects.

	0	LS	Logistic
	(1) Cash ratio	(2) Cash ratio	(3) Cash-rich
Size	-0.00332 (-1.26)	0.000447 (0.35)	-0.165^{***} (-3.14)
Gross debt	-0.294*** (-9.79)	-0.116^{***} (-7.51)	-11.19^{***} (-11.39)
Market-book	0.0346^{***} (5.42)	0.0134^{***} (3.83)	0.613^{***} (5.48)
CapEx	-0.291*** (-2.89)	-0.0667 (-1.16)	-12.72^{***} (-4.07)
R&D	0.291^{**} (2.32)	0.147^{**} (2.39)	2.354 (1.38)
CEO is prior CFO	0.0578^{***} (3.19)	0.0485^{***} (3.38)	$1.049 \\ (1.60)$
Cash-rich x prior CFO		-0.0623* (-1.90)	
Cash-rich firm		0.255^{***} (28.72)	
Industry x country FE	Yes	Yes	Yes
Observations R^2 Adjusted R^2	$2551 \\ 0.444 \\ 0.408$	$2551 \\ 0.767 \\ 0.751$	1717
Pseudo R^2	0.100	002	0.292

 $t\ {\rm statistics}$ in parentheses

* p<0.10, ** p<0.05, *** p<0.01

7 Conclusion

Starting from the observation that the presence of cash-rich firms as defined in this study cannot be fully explained by Precautionary Savings Theory, agency problems or tax effects, we study the impact of behavioural factors on a firm's cash holdings. Using a sample of industrial companies in the Eurozone between 2003 and 2012, we find evidence that manager fixed effects help in explaining differences in cash policies across firms. More specifically, we test and find support for the notion that cash-rich firms are run by conservative managers.

Our key findings are as follows: First, characteristics of the CEO and, to a lesser extent, of the CFO have significant incremental explanatory power when analysing cash policies, beyond what can be explained by firm characteristics and precautionary savings motives. Second, firms which are led by conservative CEOs operate with substantially higher cash ratios. We have tested four proxies for conservatism: age, gender, relative compensation and past experience. We provide evidence that younger CEOs and those who have previously been CFO behave more conservatively. Evidence on differences in compensation contracts is mixed. Although we find some effects, the precise extent needs to be confirmed by future studies. We find no support for an impact of gender on cash holdings. Third, differences in cash holdings have been very persistent. Given that cash-rich firms continue to have a high savings ratio, this persistence is likely to remain in the near and medium term.

These findings have some very practical implications. Given that younger CEOs and those with a CFO background act more conservatively, one needs to be careful when providing risk-decreasing incentives in order to not intensify these effects above the desired level. Further, the design of compensation contracts itself has an impact on cash holdings, which we feel policy-makers need to consider. Given the high relevance of liquidity management for the success of the company, these are important insights.

On the academic side, we contribute mainly to two streams of research. First, we add to the cash literature by providing evidence on the impact of behavioural factors on cash holdings. This area has only recently begun to receive attention and research has focused almost exclusively on U.S. firms. To our knowledge, we are the first to provide evidence for a European sample. Second, we contribute directly to research in behavioural finance. In particular given the current debate about the impact of female executives on corporate policies we contribute to a comprehensive understanding.

One of the biggest challenges when analysing companies outside North America is to find appropriate data in order to be able to construct reliable proxies for conservatism. This restricted our study in the variables which could be investigated and provides opportunities for future research. Further, this study does not evaluate how cash holdings of cash-rich firms are linked to the firms' performance, although this would be an interesting question. Existing literature on this topic provides mixed evidence.

References

- Acharya, V. V., Almeida, H. & Campello, M. (2007). Is cash negative debt? A hedging perspective on corporate financial policies. *Journal of Financial Intermediation*, 16, 515–554.
- Akguc, S. & Choi, J. J. (2013). Cash holdings in private and public firms: Evidence from Europe. Working Paper. Temple University.
- Almeida, H., Campello, M. & Weisbach, M. S. (2004). The cash flow sensitivity of cash. Journal of Finance, 59, 1777–1804.
- Atkinson, S. M., Baird, S. B. & Frye, M. B. (2003). Do female mutual fund managers manage differently? *Journal of Financial Research*, 26, 1–18.
- Bamber, L. S., Jiang, J. & Wang, I. Y. (2010). What's my style? The influence of top managers on voluntary corporate financial disclosure. Accounting Review, 85, 1131– 1162.
- Bates, T. W., Kahle, K. M. & Stulz, R. M. (2009). Why do U.S. firms hold so much more cash than they used to? *Journal of Finance*, 64, 1985–2021.
- Bellucci, A., Borisov, A. & Zazzaro, A. (2010). Does gender matter in bank-firm relationships? Evidence from small business lending. *Journal of Banking and Finance*, 34, 2968–2984.
- Bertrand, M. & Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics*, 118, 1169–1208.
- Bhojraj, S. & Libby, R. (2005). Capital market pressure, disclosure frequency-induced earnings / cash flow conflict, and managerial myopia. *Accounting Review*, 80, 1–20.
- Byrnes, J. P., Miller, D. C. & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, 125(3), 367–383.
- Campello, M., Giambona, E., Graham, J. R. & Harvey, C. R. (2011). Liquidity management and corporate investment during a financial crisis. *Review of Financial Studies*, 24, 1944–1979.
- Campello, M., Giambona, E., Graham, J. R. & Harvey, C. R. (2012). Access to liquidity and corporate investment in Europe during the financial crisis. *Review of Finance*, 16, 323–346.
- Campello, M., Graham, J. R. & Harvey, C. R. (2010). The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics*, 97, 470–487.
- Chava, S. & Purnanandam, A. (2010). CEOs versus CFOs: Incentives and corporate policies. Journal of Financial Economics, 97, 263–278.
- Custodio, C. & Metzger, D. (2013). Financial expert CEOs: CEO's work experience and firm's financial policies. *Working Paper*. Arizona State University.

- Denis, D. J. & Sibilkov, V. (2010). Financial constraints, investments, and the value of cash holdings. *Review of Financial Studies*, 23, 247–269.
- Dittmar, A. & Duchin, R. (2012, November). The concentration of cash: Cash policies of the richest firms. *Unpublished Working Paper*. University of Michigan.
- Dittmar, A. & Duchin, R. (2013, June). Looking in the rear view mirror: The effect of managers' professional experience on corporate financial policy. Working Paper. This version replaces their earlier version from November 2012, which circulated under the title 'The concentration of cash: Cash policies of the richest firms'. The old version has been more restricted towards cash holdings, whereas the new version takes a broader perspective on corporate financial policies.
- Dittmar, A. & Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings. Journal of Financial Economics, 83, 599–634.
- Dittmer, P. (2012). A global perspective on territorial taxation. Tax Foundation. 10 Aug 2012. Retrieved from http://taxfoundation.org/article/global-perspective-territorialtaxation.
- Duchin, R. (2010). Cash holdings and corporate diversification. *Journal of Finance*, 65, 955–992.
- Eckel, C. C. & Grossman, P. J. (2008). Men, women and risk aversion: Experimental evidence. Handbook of Experimental Economics Results, 1, 1061–1073.
- Faccio, M., Marchica, M.-T. & Murac, R. (2013). CEO gender, corporate risk-taking, and the efficiency of capital allocation. USC FBE Finance Seminar.
- Faulkender, M. & Wang, R. (2006). Corporate financial policy and the value of cash. Journal of Finance, 61, 1957–1990.
- Fehr-Duda, H., de Gennaro, M. & Schubert, R. (2006). Gender, financial risk, and probability weights. *Theory and Decision*, 60, 282–313.
- Finkelstein, S. & Boyd, B. K. (1998). How much does the CEO matter? The role of managerial discretion in the detting of CEO compensation. Academy of Management Journal, 41(2), 179–199.
- Foley, C. F., Hartzell, J. Z., Titman, S. & Twite, G. (2007). Why do firms hold so much cash? A tax-based explanation. *Journal of Financial Economics*, 86, 579–607.
- Francis, B., Hasan, I. & Wu, Q. (2013). The impact of CFO gender on bank loan contracting. Journal of Accounting, Auditing and Finance, 28(1), 53–78.
- Frank, M. Z. & Goyal, V. K. (2007). Corporate leverage: How much do managers really matter? *Working paper*.
- Fresard, L. (2010). Financial strength and product market behavior: The real effects of corporate cash holdings. *Journal of Finance*, 65, 1097–1122.

- Frydman, C. & Jenter, D. (2010). CEO compensation. Annual Review of Financial Economics, 2(1), 75–102.
- Gamba, A. & Triantis, A. (2008). The value of financial flexibility. *Journal of Finance*, 63, 2263–2296.
- Gao, H., Harford, J. & Li, K. (2013). Determinants of corporate cash policy: Insights from private firms. *Journal of Financial Economics*, 109, 623–639.
- Graham, J. R. & Harvey, C. R. (2002). How do CFOs make capital budgeting and capital structure decisions? *Journal of Applied Corporate Finance*, 15, 8–23.
- Graham, J. R., Harvey, C. R. & Puri, M. (2013). Managerial attitudes and corporate actions. Journal of Financial Economics, 109, 103–121.
- Gryglewicz, S. (2011). A theory of corporate financial decisions with liquidity and solvency concerns. *Journal of Financial Economics*, 99, 365–384.
- Hadlock, C. J. & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the kz index. *Review of Financial Studies*, 23, 1909–1940.
- Harford, J. (1999). Corporate cash reserves and acquisitions. *Journal of Finance*, 54, 1969–1997.
- Harford, J., Mansi, S. A. & Maxwell, W. F. (2008). Corporate governance and firm cash holdings in the US. Journal of Financial Economics, 87, 535–555.
- Harris, C. R., Jenkins, M. & Glaser, D. (2006). Gender differences in risk assessment: Why do women take fewer risks than men? *Judgment and Decision Making*, 1, 48–63.
- Haushalter, D., Klasa, S. & Maxwell, W. F. (2007). The influence of product market dynamics on a firm's cash holdings and hedging behavior. *Journal of Financial Economics*, 84, 797–825.
- Hennessy, C. A. & Whited, T. M. (2007). How costly is external financing? Evidence from a structural estimation. *Journal of Finance*, 62, 1705–1745.
- Hertwig, R., Barron, G., Weber, E. U. & Erev, I. (2004). Decisions from experience and the effect of rare events in risky choice. *Psychological Science*, 15(8), 534–539.
- Huang, J. & Kisgen, D. J. (2013). Gender and corporate finance: Are male executives overconfident relative to female executives? *Journal of Financial Economics*, 108, 822–839.
- Keynes, J. M. (1936). The general theory of employment. In *Interest and money*. Harcourt Brace, London.
- Kim, C. S., Mauer, D. C. & Sherman, A. E. (1998). The determinants of corporate liquidity: Theory and evidence. *Journal of Financial and Quantitative Analysis*, 33, 335–359.
- Kim, W. & Weisbach, M. S. (2008). Motivations for public equity offers: An international perspective. Journal of Financial Economics, 87, 281–307.

- Lins, K. V., Servaes, H. & Tufano, P. (2010). What drives corporate liquidity? An international survey of cash holdings and lines of credit. *Journal of Financial Economics*, 98, 160–176.
- Liu, Y. & Mauer, D. C. (2011). Corporate cash holdings and CEO compensation incentives. Journal of Financial Economics, 102, 183–198.
- Malmendier, U., Tate, G. & Yan, J. (2011). Overconfidence and early-life experiences: The effect of managerial traits on corporate financial policiess. *Journal of Finance*, 66, 1687–1733.
- Matsunaga, S. R., Wang, S. & Yeung, P. E. (2013). Does appointing a former CFO as CEO influence a firm's accounting policies? *Working Paper*. University of Oregon.
- McLean, R. D. (2011). Share issuance and cash savings. Journal of Financial Economics, 99, 693–715.
- Mergenthaler, R., Rajgopal, S. & Srinivasan, S. (2012). CEO and CFO career penalties to missing quarterly analysts forecasts. *Working Paper*. University of Iowa.
- Mikkelson, W. H. & Partch, M. M. (2003). Do persistent large cash reserves hinder performance? Journal of Financial and Quantitative Analysis, 38, 275–294.
- Morse, A., Nanda, V. & Seru, A. (2011). Are incentive contracts rigged by powerful CEOs? Journal of Finance, 66, 1779–1821.
- Opler, T., Pinkowitz, L., Stulz, R. & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52, 3–46.
- Palvia, A., Vähämaa, E. & Vähämaa, S. (2013). Are female CEOs and chairwomen more conservative and risk averse? Evidence from the banking industry during the financial crisis. *Working Paper*. U.S. Department of the Treasury.
- Pollak, O. (1943). Conservatism in later maturity and old age. American Sociological Review, 8(2), 175–179.
- Rossi, D. (2013). Companies must reinvest their cash hoard. Financial Times.
- Sufi, A. (2009). Bank lines of credit in corporate finance: An empirical analysis. Review of Financial Studies, 22, 1057–1088.
- Truett, K. (1993). Age differences in conservatism. Personality and Individual Differences, 14(3), 405–411.
- Webb, A. (2013). European companies stockpile USD 475 billion as outlook dims. Bloomberg. 25 Feb 2013. Retrieved from http://www.bloomberg.com/news/2013-02-25/europeancompanies-stockpile-475-billion-as-outlook-dims.html.

8 Appendix

Figure 2: Cash ratio by year

This figure shows how the average cash ratio has evolved over time for cash-rich, non-cash-rich and all firms. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on Worldscope. The cash ratio is defined as cash and short term investments divided by total assets and has been winsorized at the 1st and 99th percentile. Numerical values are reported in the table below.



Year	Cash-rich	Non-cash-rich	All firms
2003	0.407	0.0854	0.117
2004	0.413	0.0911	0.123
2005	0.413	0.0930	0.125
2006	0.398	0.0935	0.124
2007	0.396	0.0928	0.123
2008	0.380	0.0851	0.114
2009	0.384	0.0984	0.127
2010	0.373	0.0988	0.126
2011	0.386	0.0948	0.124
2012	0.382	0.0948	0.123
Total	0.393	0.0929	0.123

Table 1	0:	Distribution	of	firms	by	industry	and v	country
					- /			-/

This table reports the distribution of the full sample of firms across industries and countries. The sample comprises all industrial firms in the eight largest economies of the Eurozone between 2003 and 2012 with nonmissing information on total assets and cash and short-term investments in Worldscope. In Panel A, the industry is indicated by the 2-digit SIC code in the left hand column. Whenever the number of total observations per industry was below 100, this industry was merged with related industries in order to increase the size of the group. Such cases are indicated by 4 digit codes. For example, '1014' comprises all industries with 2-digit SIC codes between '10' and '14'. Industries have never been merged across SIC divisions. For this reasons, there remain two groups with significantly less than 100 observations. Panel B reports the distribution of all firms across countries. An index to SIC and country codes is provided at the bottom of the table.

Industries	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
01	2	2	3	3	3	3	3	3	3	3	28
1014	15	15	16	17	18	18	18	18	18	17	170
1517	52	54	58	58	59	58	59	60	61	60	579
20	73	74	78	80	80	81	82	81	81	74	784
2223	36	38	38	38	38	37	39	39	40	34	377
2426	36	39	40	39	41	43	43	44	42	35	402
27	32	34	35	35	36	36	36	35	35	32	346
2829	76	79	81	83	85	85	86	87	87	78	827
3031	25	25	27	28	28	31	33	32	33	26	288
32	31	32	32	33	32	32	32	32	32	31	319
33	27	27	28	28	28	29	30	30	29	28	284
34	17	19	20	21	22	22	21	21	21	19	203
35	110	115	115	118	119	122	121	119	121	108	1168
36	74	79	83	84	86	88	88	90	92	84	848
37	58	60	61	61	61	61	61	61	60	53	597
38	35	37	37	37	38	39	39	39	39	34	374
39	17	19	19	18	18	19	20	21	21	19	191
4045	35	37	38	38	39	40	41	41	42	40	391
4647	10	10	10	10	10	10	10	10	10	9	99
48	38	41	40	41	41	42	43	44	44	43	417
49	10	12	13	13	13	14	14	14	14	11	128
50	33	33	33	33	34	33	32	33	32	28	324
51	19	21	21	21	22	22	22	22	22	20	212
5259	53	54	57	58	61	63	62	64	63	52	587
7072	15	15	16	17	17	17	17	16	16	15	161
7375	133	138	140	145	151	152	154	152	150	134	1449
7879	19	22	23	25	25	26	26	26	26	26	244
8086	12	13	16	16	16	16	17	17	16	16	155
8788	31	31	32	33	33	33	33	33	33	31	323
91NA	1	1	1	1	2	2	2	2	2	1	15
Total	1125	1176	1211	1232	1256	1274	1284	1286	1285	1161	12290

Panel A - Observations by industry and year

Countries	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
AT	41	41	43	45	44	45	45	46	45	44	439
BE	60	63	65	67	68	68	68	68	64	47	638
DE	325	339	345	353	361	363	366	364	366	349	3531
\mathbf{ES}	73	78	81	84	87	91	92	92	92	90	860
\mathbf{FI}	88	91	91	91	93	93	94	96	97	97	931
\mathbf{FR}	327	336	350	353	360	369	369	371	371	291	3497
IT	146	163	170	173	177	178	180	180	180	175	1722
NL	65	65	66	66	66	67	70	69	70	68	672
Total	1125	1176	1211	1232	1256	1274	1284	1286	1285	1161	12290

Panel B - Observations by country and year

SIC codes:

01: Crops | 1014: Mining | 1517: Construction | 20: Food and kindred products | 2223: Textile mill products; Apparel | 2426: Lumber and wood products; Furniture; Paper | 27: Printing and publishing 2829: Chemicals; Petroleum refining | 3031: Rubber and plastics; Leather and leather products | 32: Stone, clay, glass, and concrete products | 33: Primary metal industries | 34: Fabricated metal products except machinery and transportation equipment | 35: Industrial and commercial machinery and computer equipment | 36: Electronic and other electrical equipment and components except computer equipment | 37: Transportation equipment | 38: Measuring, analyzing, and controlling instruments; Photographic, medial, and optical goods; Watches and clocks | 39: Miscellaneous manufacturing | 4045: Railroad transportation; Local and suburban transit; Motor freight transportation and warehousing; Water transportation; Air transportation | 4647: Pipelines except natural gas; Transportation services | 48: Communications | 49: Sanitary services | 50: Wholesale trade with durable goods | 51: Wholesale trade with nondurable goods | 5259: Retail trade | 7072: Hotels; Personal services | 7375: Business services; Automotive repair, services, and parking | 7879: Motion pictures; Amusement and recreation services | 8086: Health services; Legal services; Educational services; Social services; Museums and botanical and zoological gardens; Membership organizations | 8788: Engineering, accounting, research, management, and related services; Foreign governments | 91NA: Public administration; Other

Country codes:

AT: Austria | BE: Belgium | DE: Germany | ES: Spain | FI: Finland | FR: France | IT: Italy | NL: The Netherlands

Table 11: Distribution of cash-rich firms by industry and country

This table reports the distribution of cash-rich firms across industries and countries. The sample comprises all industrial firms in the eight largest economies of the Eurozone between 2003 and 2012 with nonmissing information on total assets and cash and short-term investments in Worldscope. In Panel A, the industry is indicated by the 2-digit SIC code in the left hand column. Whenever the number of total observations per industry was below 100, this industry was merged with related industries in order to increase the size of the group. Such cases are indicated by 4 digit codes. For example, '1014' comprises all industries with 2-digit SIC codes between '10' and '14'. Industries have never been merged across SIC divisions. For this reasons, there remain two groups with significantly less than 100 observations. Panel B reports the distribution of cash-rich firms across countries.

SIC	Cash-rich obs.	Total obs.	$\begin{array}{c} \text{Cash-rich} \\ \% \end{array}$	SIC	Cash-rich obs.	Total obs.	$\begin{array}{c} \text{Cash-rich} \\ \% \end{array}$
7375	331	1449	0.23	48	30	417	0.07
35	189	1168	0.16	37	35	597	0.06
8086	25	155	0.16	33	16	284	0.06
8789	49	323	0.15	5259	33	587	0.06
7879	31	244	0.13	2829	44	827	0.05
7072	20	161	0.12	39	10	191	0.05
36	101	848	0.12	2223	17	377	0.05
1517	63	579	0.11	20	32	784	0.04
38	39	374	0.10	2426	13	402	0.03
4647	10	99	0.10	32	9	319	0.03
34	20	203	0.10	4045	11	391	0.03
50	29	324	0.09	1014	4	170	0.02
27	28	346	0.08	51	3	212	0.01
49	10	128	0.08	01	0	28	0.00
3031	22	288	0.08	91NA	0	15	0.00
Table	continued in	right column		Total	1224	12290	0.10

Panel A - Cash-rich firms by industry

Panel B - Cash-rich firms by country

Country	Cash-rich obs.	Total obs.	Cash-rich $\%$
DE	502	3531	0.14
FR	344	3497	0.10
\mathbf{FI}	87	931	0.09
BE	46	638	0.07
\mathbf{ES}	61	860	0.07
IT	114	1722	0.07
AT	28	439	0.06
NL	42	672	0.06
Total	1224	12290	0.10

Table 12: Firm summary statistics by cash decile

This table reports descriptive summary statistics for the firm financial variables used in the analyses. The sample comprises all industrial firms in the eight largest economies of the Eurozone between 2003 and 2012 with nonmissing information on total assets and cash and short-term investments in Worldscope. All variables have been winsorized at the 1st and 99th percentile. Deciles are defined yearly by sorting firms on cash to total assets, where decile 10 refers to top decile (cash-rich) and decile 1 to the bottom decile (cash-poor). A definition of the variables can be found in the Appendix. Panel A presents detailed summary statistics for the cash-rich firms only (decile 10), Panel B for the average firm (deciles 2-9), Panel C for cash-poor firms (decile 1).

	Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
Cash ratio	1224	0.39	0.10	0.62	2.11	0.26	0.29	0.36	0.57	0.57
Size	1224	11.92	1.76	0.89	3.33	9.20	9.98	11.58	14.58	17.91
Gross debt	1219	0.09	0.13	2.30	9.13	0.00	0.00	0.04	0.26	0.75
Market-book	1135	1.41	0.99	1.30	3.93	0.25	0.49	1.07	2.93	4.06
ROA	1224	0.07	0.13	-0.48	4.02	-0.32	-0.08	0.07	0.24	0.32
OCF	1223	0.10	0.11	-0.19	3.63	-0.20	-0.02	0.09	0.23	0.33
Ind. OCF RSD	1224	2.71	7.54	5.87	36.72	0.26	0.53	1.18	2.69	49.98
CapEx	1191	0.03	0.04	2.68	12.48	0.00	0.01	0.02	0.07	0.26
R&D	610	0.07	0.07	1.02	3.09	0.00	0.00	0.04	0.17	0.24
Acquisitions	751	0.01	0.03	4.70	27.87	0.00	0.00	0.00	0.03	0.25

Panel A - Cash-rich firms (decile 10)

Panel B - Average firms (decile 2-9)

	Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
Cash ratio	9831	0.10	0.06	0.77	2.74	0.02	0.03	0.09	0.20	0.29
Size	9831	13.01	2.10	0.45	2.57	9.20	10.48	12.74	16.03	18.22
Gross debt	9824	0.26	0.16	0.58	3.13	0.00	0.04	0.25	0.47	0.75
Market-book	9203	0.96	0.59	2.36	10.49	0.25	0.46	0.80	1.63	4.06
ROA	9822	0.05	0.09	-0.74	6.93	-0.32	-0.04	0.05	0.14	0.32
OCF	9819	0.08	0.08	-0.20	5.76	-0.20	-0.00	0.08	0.16	0.33
Ind. OCF RSD	9830	2.08	5.64	7.36	60.54	0.26	0.46	0.92	2.62	49.98
CapEx	9636	0.05	0.04	2.19	9.35	0.00	0.01	0.04	0.10	0.26
R&D	4301	0.03	0.04	2.36	9.58	0.00	0.00	0.02	0.08	0.24
Acquisitions	6312	0.02	0.04	4.01	20.50	0.00	0.00	0.00	0.04	0.25

	Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
Cash ratio	1235	0.01	0.01	0.13	1.91	0.00	0.00	0.01	0.02	0.02
Size	1235	12.34	1.68	0.31	2.88	9.20	10.23	12.25	14.54	18.22
Gross debt	1235	0.31	0.17	0.36	2.82	0.00	0.08	0.30	0.54	0.75
Market-book	1152	0.96	0.53	1.91	8.24	0.25	0.47	0.82	1.58	4.06
ROA	1235	0.03	0.09	-0.95	6.22	-0.32	-0.07	0.03	0.12	0.32
OCF	1233	0.07	0.08	-0.37	5.29	-0.20	-0.02	0.07	0.16	0.33
Ind. OCF RSD	1235	1.94	5.16	7.09	59.98	0.26	0.42	0.82	2.49	49.98
CapEx	1180	0.06	0.05	1.74	6.15	0.00	0.01	0.04	0.13	0.26
R&D	391	0.02	0.03	2.80	13.54	0.00	0.00	0.01	0.06	0.24
Acquisitions	710	0.01	0.04	4.29	22.30	0.00	0.00	0.00	0.03	0.25

Panel C - Cash-poor firms (decile 1)

Table 13: Behavioural summary statistics by cash decile

This table reports descriptive summary statistics for the behavioural measures. Variables related to CEO and CFO comprise all industrial firms in the eight largest economies of the Eurozone between 2003 and 2012 with nonmissing information in CapitalIQ. Variables related to the management board are constructed using data from the Orbis database and are available for 2012 only. All variables have been winsorized at the 1st and 99th percentile. Deciles are defined yearly by sorting firms on cash to total assets, where decile 10 refers to top decile (cash-rich) and decile 1 to the bottom decile (cash-poor). A definition of the variables can be found in the Appendix. Panel A presents detailed summary statistics for the cash-rich firms only (decile 10), Panel B for the average firm (deciles 2-9), Panel C for cash-poor firms (decile 1).

	Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
CEO										
CEO age	346	51.79	7.32	0.46	3.16	36.00	43.00	51.00	61.00	76.00
CEO is prior CFO	500	0.01	0.11	8.96	81.35	0.00	0.00	0.00	0.00	1.00
CEO $\%$ fixed	477	0.58	0.33	-0.23	1.87	0.00	0.04	0.58	1.00	1.00
CEO $\%$ bonus	477	0.21	0.22	0.79	2.56	0.00	0.00	0.14	0.53	0.81
CEO $\%$ long-term	477	0.06	0.16	2.65	8.98	0.00	0.00	0.00	0.27	0.64
CFO										
CFO age	168	47.24	6.86	0.23	2.88	32.00	38.00	47.00	55.00	66.00
CFO is female	212	0.02	0.14	7.07	51.02	0.00	0.00	0.00	0.00	1.00
CFO $\%$ fixed	237	0.52	0.30	-0.20	2.05	0.00	0.05	0.54	0.93	1.00
CFO $\%$ bonus	237	0.23	0.22	0.68	2.72	0.00	0.00	0.20	0.50	0.80
CFO $\%$ long-term	237	0.06	0.14	2.61	8.97	0.00	0.00	0.00	0.24	0.59
Management										
Female ratio in board	50	0.07	0.12	1.61	5.24	0.00	0.00	0.00	0.25	0.50
Average age in board	45	52.36	6.60	-0.46	4.53	30.00	45.50	52.33	61.43	67.15

Panel A - Cash-rich firms (decile 10)

Panel B - Average firms (decile 2	2-9	2-9	9
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	Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
CEO										
CEO age	2983	53.95	7.68	0.33	3.27	31.00	45.00	54.00	64.00	81.00
CEO is prior CFO	3828	0.01	0.10	10.17	104.34	0.00	0.00	0.00	0.00	1.00
CEO $\%$ fixed	3616	0.57	0.32	-0.12	1.96	0.00	0.13	0.56	1.00	1.00
CEO $\%$ bonus	3616	0.22	0.23	0.61	2.28	0.00	0.00	0.20	0.55	0.81
CEO $\%$ long-term	3616	0.06	0.13	2.56	9.05	0.00	0.00	0.00	0.25	0.64
CFO										
CFO age	1342	49.48	6.53	0.12	2.75	31.00	41.00	49.00	58.00	70.00
CFO is female	1601	0.04	0.20	4.58	21.94	0.00	0.00	0.00	0.00	1.00
CFO $\%$ fixed	1557	0.52	0.28	0.03	2.27	0.00	0.15	0.51	0.95	1.00
CFO $\%$ bonus	1557	0.25	0.21	0.41	2.37	0.00	0.00	0.25	0.53	0.80
CFO $\%$ long-term	1557	0.08	0.14	1.85	5.54	0.00	0.00	0.00	0.30	0.59
Management										
Female ratio in board	379	0.11	0.12	0.93	3.33	0.00	0.00	0.08	0.27	0.50
Average age in board	379	54.74	4.54	0.09	2.60	43.00	48.67	54.57	60.80	68.00

	Ν	Mean	SD	Skew.	Kurt.	Min	P10	P50	P90	Max
CEO										
CEO age	221	52.94	7.43	0.14	2.95	35.00	44.00	53.00	62.00	73.00
CEO is prior CFO	314	0.01	0.08	12.41	155.01	0.00	0.00	0.00	0.00	1.00
CEO $\%$ fixed	298	0.60	0.32	-0.48	2.30	0.00	0.00	0.62	1.00	1.00
CEO $\%$ bonus	298	0.15	0.18	0.97	3.25	0.00	0.00	0.11	0.42	0.81
CEO $\%$ long-term	298	0.04	0.12	3.59	15.25	0.00	0.00	0.00	0.10	0.64
CFO										
CFO age	93	48.94	7.06	0.09	2.32	32.00	40.00	49.00	58.00	64.00
CFO is female	112	0.02	0.13	7.28	54.02	0.00	0.00	0.00	0.00	1.00
CFO $\%$ fixed	104	0.60	0.27	-0.28	2.42	0.00	0.19	0.61	1.00	1.00
CFO $\%$ bonus	104	0.19	0.18	0.62	2.29	0.00	0.00	0.16	0.47	0.60
CFO $\%$ long-term	104	0.04	0.11	3.20	13.50	0.00	0.00	0.00	0.16	0.59
Management										
Female ratio in board	24	0.08	0.09	0.68	1.84	0.00	0.00	0.02	0.22	0.25
Average age in board	24	53.99	3.84	-0.01	2.69	46.00	49.00	53.75	58.75	62.00

Panel C - Cash-poor firms (decile 1)

Table 14: Base model regression

This table reports regression evidence on the relation between various firm financials and a firm's cash holdings. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on all relevant variables. All variables are winsorized at the 1st and 99th percentile and described in the Appendix. The dependent variable in the OLS regressions is the firm's cash ratio. The dependent variable in the logistic regressions is a dummy variable which takes the value 'one' if a firm is cash-rich as defined by being in the top decile of cash ratios in the respective year. The coefficients in the logistic regressions display log odds ratios. Standard errors are heteroscedasticity consistent and clustered at the firm level. All specifications include industry x country fixed effects.

		0]	LS		Logistic							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)				
Size	-0.000613 (-0.33)	-0.000639 (-0.35)	-0.000521 (-0.31)	-0.000645 (-0.39)	-0.123*** (-2.89)	-0.125*** (-2.95)	-0.110*** (-2.97)	-0.119*** (-3.24)				
Gross debt	-0.238*** (-11.73)	-0.238*** (-11.75)	-0.254*** (-13.77)	-0.251*** (-14.05)	-8.159*** (-12.58)	-8.152*** (-12.58)	-9.081*** (-15.17)	-8.934*** (-15.10)				
Market-book	$\begin{array}{c} 0.0372^{***} \\ (7.13) \end{array}$	0.0375^{***} (7.15)	0.0373^{***} (8.28)	$\begin{array}{c} 0.0362^{***} \\ (8.34) \end{array}$	0.749^{***} (7.60)	0.755^{***} (7.68)	0.760^{***} (8.86)	0.700^{***} (8.96)				
OCF	-0.0262 (-0.54)	-0.0270 (-0.56)	-0.0252 (-0.66)		-1.722* (-1.93)	-1.725* (-1.93)	-1.300* (-1.75)					
Ind. OCF RSD	-0.000430 (-1.27)				-0.0125 (-1.27)							
CapEx	-0.355^{***} (-5.09)	-0.356^{***} (-5.09)	-0.293*** (-4.76)	-0.304*** (-4.87)	-14.77^{***} (-5.37)	-14.88^{***} (-5.41)	-11.35^{***} (-5.21)	-11.98^{***} (-5.57)				
R&D	0.291^{***} (2.91)	0.288^{***} (2.89)	0.292^{***} (3.06)	0.294^{***} (3.09)	3.344^{**} (2.34)	3.198^{**} (2.25)	2.661^{**} (2.24)	2.816^{**} (2.38)				
Acquisitions	-0.177^{***} (-4.40)	-0.175^{***} (-4.40)			-6.455^{***} (-3.13)	-6.345*** (-3.09)						
Industry x country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
Observations R^2 Adjusted R^2	$3926 \\ 0.394 \\ 0.364$	$3926 \\ 0.394 \\ 0.364$	$5035 \\ 0.394 \\ 0.370$	$5035 \\ 0.394 \\ 0.370$	2932	2932	3959	3959				
Pseudo R^2					0.246	0.245	0.245	0.244				

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 15: Base model fixed effects analysis

This table reports regression evidence on the relation between various firm financials and a firm's cash holdings. The purpose of this analysis is to test various fixed effect specifications to develop a base model for subsequent analyses. The sample comprises all industrial companies in the Eurozone between 2003 and 2012 with non-missing information on all relevant variables. Data are gathered from Worldscope. All variables are winsorized at the 1st and 99th percentile and described in the Appendix. The dependent variable in all specifications is the firm's cash ratio. Standard errors are heteroscedasticity consistent and clustered at the firm level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Size	-0.00227 (-1.61)	-0.00218 (-1.54)	-0.00242* (-1.71)	-0.000172 (-0.12)	-0.00211 (-0.33)	-0.0000821 (-0.06)	$\begin{array}{c} 0.0000777\\(0.05)\end{array}$	-0.0000378 (-0.03)	-0.000645 (-0.39)
Gross debt	-0.236^{***} (-12.13)	-0.237^{***} (-12.13)	-0.237^{***} (-12.61)	-0.229*** (-12.71)	-0.108*** (-4.73)	-0.230*** (-12.72)	-0.228^{***} (-12.35)	-0.228*** (-12.80)	-0.251^{***} (-14.05)
Market-book	0.0314^{***} (6.23)	0.0331^{***} (6.31)	0.0320^{***} (6.35)	0.0355^{***} (7.94)	0.0358^{***} (6.97)	0.0377^{***} (8.10)	0.0356^{***} (7.36)	0.0364^{***} (8.21)	0.0362^{***} (8.34)
CapEx	-0.385^{***} (-5.70)	-0.367^{***} (-5.31)	-0.359^{***} (-5.22)	-0.307^{***} (-5.04)	-0.379^{***} (-6.06)	-0.289*** (-4.63)	-0.275^{***} (-4.17)	-0.288^{***} (-4.67)	-0.304*** (-4.87)
R&D	0.402^{***} (4.11)	0.402^{***} (4.03)	0.418^{***} (4.26)	0.354^{***} (3.79)	-0.298^{***} (-2.77)	0.347^{***} (3.66)	0.359^{***} (3.66)	0.372^{***} (3.99)	0.294^{***} (3.09)
Fixed effects									
Year	-	Yes	-	-	-	Yes	-	-	-
Country	-	-	Yes	-	-	-	-	Yes	-
Industry	-	-	-	Yes	-	Yes	-	Yes	-
Firm	-	-	-	-	Yes	-	-	-	-
Year x industry	-	-	-	-	-	-	Yes	-	-
Country x industry	-	-	-	-	-	-	-	-	Yes
Observations	5035	5035	5035	5035	5035	5035	5035	5035	5035
R^2	0.259	0.262	0.266	0.316	0.776	0.320	0.345	0.323	0.394
Adjusted \mathbb{R}^2	0.258	0.260	0.264	0.312	0.721	0.315	0.305	0.317	0.370

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 16: Correlation among variables

This table reports pairwise correlations across all variables used in the analyses. Significance levels are indicated below. Variables related to firm financials are constructed using Worldscope data. Variables related to CEO and CFO are based on data retrieved from CapitalIQ. Variables related to the management board are constructed using data from Orbis and are available for 2012 only. All variables have been winsorized at the 1st and 99th percentile. A definition of the variables can be found in the Appendix.

	Cash ratio	Size	Gross debt	Market- book	ROA	OCF	Ind. OCF RSD	CapEx	R&D	Acq.	CEO age	CEO is prior CFO	CEO % fixed	CEO % bonus	CEO % long- term	CFO age	CFO is female	CFO % fixed	CFO % bonus	CFO % long- term	Female ratio in board	Average age in board
Cash ratio	1.00																					
Size	-0.14 ***	1.00																				
Gross debt	-0.41 ***	$0.18 \\ ***$	1.00																			
Market-book	0.23	-0.05 ***	-0.12 ***	1.00																		
ROA	0.13	0.15	-0.20 ***	0.46 ***	1.00																	
OCF	0.12	0.07	-0.24 ***	0.42	0.76	1.00																
Ind. OCF RSD	0.04	-0.07	-0.05	-0.03	0.00	-0.00	1.00															
CapEx	-0.13	0.02	0.10	0.10	0.06	0.23	-0.05	1.00														
R&D	0.32	-0.20	-0.27	0.29	-0.01	0.05	0.12	-0.10 ***	1.00													
Acquisitions	-0.05	0.08	0.04	0.10	0.07	0.03	-0.01	-0.07	0.04	1.00												
CEO age	-0.09	0.28	-0.01	-0.14	-0.02	-0.04	-0.03	0.00	-0.09	-0.04	1.00											
CEO is prior CFO	0.04	0.06	-0.04	0.01	0.03	0.02	0.01	-0.01	-0.04	-0.00	-0.04	1.00										
CEO % fixed	-0.01	-0.25	0.02	-0.09	-0.14	-0.11	0.02	0.00	* 0.04	-0.10	0.02	-0.05	1.00									
CEO % bonus	0.03	0.34	-0.05	0.07	0.21	0.15	-0.03	0.03	-0.06	0.06	0.05	0.07	-0.41	1.00								
CEO $\%$ long-term	0.01	0.29	-0.02	0.09	0.09	0.06	-0.00	-0.01	-0.02	0.07	0.00	0.04	-0.32	0.02	1.00							
CFO age	-0.13	0.26	0.02	-0.10	-0.01	-0.04	0.02	-0.01	-0.08	-0.00	0.22	-0.03	-0.06	0.12	0.07	1.00						
CFO is female	0.01	-0.07	-0.08	-0.02	-0.01	-0.04	0.00	-0.05	-0.03	-0.04	0.07	0.17	0.04	-0.04	0.01	-0.06	1.00					
CFO % fixed	-0.00	-0.34	0.00	-0.11	-0.19	-0.15	0.02	-0.00	0.07	-0.07	0.00	-0.05	0.68	-0.31	-0.29	-0.08	0.07	1.00				
CFO % bonus	0.00	0.34	-0.05	0.13	0.24	0.21	-0.01	0.05	-0.06	0.07	0.05	0.05	-0.37	0.81	-0.02	0.06	-0.03	-0.36	1.00			
CFO $\%$ long-term	-0.06	0.33	** 0.05	0.03	0.07	0.03	-0.01	** 0.03	** -0.06	0.06	** 0.05	** 0.04	-0.32	-0.01	0.81	** 0.02	0.00	-0.33	-0.04	1.00		
Female ratio in board	-0.07	*** 0.12	** 0.01	-0.03	*** 0.04	0.02	0.03	-0.05	-0.06	** -0.07	* -0.09	* -0.04	*** 0.02	-0.10	*** 0.04	0.01	0.50	0.11	-0.13	-0.03	1.00	
Average age in board	-0.12	*** 0.31	-0.01	-0.04	0.06	0.02	-0.13	-0.02	-0.08	-0.01	* 0.50	-0.02	-0.02	** 0.07	-0.03	0.44	*** 0.07	0.05	* 0.06	-0.10	0.10	1.00
* p<0.10, ** p<0.05, **	** * p<0.01	***					***				***					***					**	

Table 17: Definition of variables

This table provides definitions of all variables used throughout this study, sorted in alphabetical order. The variables have been constructed on the basis of information from three different databases, which are shown in the right-hand column. Worldscope is a service provided by Thomson Reuters. CapitalIQ is part of Standard & Poor's and as such part of McGraw Hill Group. Orbis is a database managed by Bureau van Dijk.

Variable	Description	Database
Acquisitions	Net assets from acquisitions (04355) divided by total assets (02999)	Worldscope
Average age in board	Average age of members of the management board	Orbis
CapEx	Capital expenditures (04601) divided by total assets (02999)	Worldscope
Cash ratio	Cash and short term investments (02001) divided by total assets (02999)	Worldscope
CEO % bonus	The sum of bonus (ctype2) and director bonus (ctype51) divided by total compensation (ctype18)	CapitalIQ
CEO % fixed	The sum of salary (ctype1) and director fee (ctype24) divided by total compensation (ctype18)	CapitalIQ
CEO % long-term	Total annual non-cash compensation (ctype31) divided by total compensation (ctype18). Total annual non-cash compensation includes, among other, restricted stock awards, option awards, and long term incentive plans	CapitalIQ
CEO age	Age of the CEO in years	CapitalIQ
CEO is prior CFO	A dummy variable equal to 1 if the CEO has previously been CFO in the same company, 0 otherwise	CapitalIQ
CFO $\%$ bonus	The sum of bonus (ctype2) and director bonus (ctype51) divided by total compensation (ctype18)	CapitalIQ
CFO $\%$ fixed	The sum of salary (ctype1) and director fee (ctype24) divided by total compensation (ctype18)	CapitalIQ
CFO % long-term	Total annual non-cash compensation (ctype31) divided by total compensation (ctype18). Total annual non-cash compensation includes, among other, restricted stock awards, option awards, and long term incentive plans	CapitalIQ
CFO age	Age of the CFO in years	CapitalIQ
CFO is female	A dummy variable equal to 1 if the CFO is female, 0 otherwise	CapitalIQ

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Variable	Description	Database
Debt issue lagged	The sum of increase or decrease in short-term borrow- ings (04821) and long-term borrowings (04401) divided	Worldscope
	by total assets (02000) of the previous year	
Equity issue lagged	Net proceeds from sale or issue of common or preferred	Worldscope
Equity issue lagged	stock (04251) divided by total assets (02999) of the pre-	wondscope
	vious year	
Female ratio in board	Ratio of female members in the management board	Orbis
Gross debt	Total debt (03255) divided by total assets (02999)	Worldscope
Ind. OCF RSD	$10\math{-}\ensuremath{\mathrm{year}}$ rolling window mean relative standard deviation	Worldscope
	of operating cash flows across 2-digit SIC industries	
Market-book	Market-to-book ratio: The sum of market capitalization	Worldscope
	(08001) and total debt (03255) divided by total assets	
	(02999)	
OCF	Operating cash flow: Funds from operations (04201) di-	Worldscope
	vided by total assets (02999)	
OCF lagged	Operating cash flow lagged by one year: Funds from	Worldscope
	operations (04201) divided by total assets (02999) of	
	the previous year	
Other financing lagged	The sum of disposal of fixed assets (04351) , decrease in	Worldscope
	investments (04440) , effect of exchange on cash (04840) ,	
	and other financing sources (04446) divided by total as-	
	sets (02999) of the previous year	
R&D	Research & development expenses (01201) divided by	Worldscope
	total assets (02999)	
ROA	Return on assets: Operating income (01250) divided by	Worldscope
	total assets (02999)	
Size	Logarithm of total assets (02999) as measured in thou-	Worldscope
	sands of EURO	

Table 17 – Continued from previous page