Do Firms Hold Too Much Cash? Evidence from Private and Public Firms

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Abstract

We document that private firms hold less cash than public firms and this difference is driven by the cost of debt financing. As the cost of debt financing declines, private firms increase their cash holdings. Private firms are also more likely to use cash flow to pay off debt instead of building cash reserves and are less sensitive to the precautionary reasons for holding cash. Our findings suggest that private firms hold relatively little cash because the opportunity cost is high given their higher cost of debt. The results highlight that costly debt payments may drain valuable precautionary cash holdings.

I. Introduction

This paper investigates how fundamental differences between public and private firms affect their cash policies. Keynes (1936), predicts that cash holdings may be beneficial to firms with limited access to external capital markets because they can be used to finance future valuable projects or activities.[1] Along those lines, Harford, Klasa, and Maxwell (2013), emphasize that cash reserves are important in reducing refinancing risk for firms with short-term debt. Additionally, Pinkowitz and Williamson (2001), show that public firms that are subject to monitoring primarily by powerful banks rather than by capital markets tend to hold more cash. This line of research suggests that private firms should hold higher precautionary cash reserves than public firms, given that private firms have limited access to external capital markets, have more short-term debt and are subject to monitoring by banks. In contrast to these predictions, empirical evidence, using U.S. data, documents that private firms tend to hold less cash than public firms (Farre-Mensa, 2011; Gao, Harford, and Li, 2013).

This paper examines a hypothesis that the positive cash holdings differential between public and private firms is due to the higher opportunity cost of holding cash in private firms. Holding cash is costly (Opler et al., 1999 and Almeida et al., 2004). Rather than hoarding cash today, a firm may use it to repay costly outstanding debt or avoid issuing new debt. As such, the opportunity cost of holding cash is positively related to current borrowing costs.

Existing literature documents that the cost of debt financing is higher for private firms than for public firms (Pagano, Panetta, and Zingales, 1998; Saunders and Steffen, 2011). Saunders and Steffen, for example, find that private firms face higher borrowing costs than public firms because of the higher costs of information production, lower bargaining power and

[1] This benefit is described as a precautionary motive for holding cash. Opler et al. (1999), among others, provide evidence consistent with this precautionary motive.

the higher likelihood of shareholder-debtholder conflicts. Thus, private firms may face not only considerable precautionary benefits of holding cash but also substantial costs of holding cash because of high borrowing costs. When the current costs of debt financing are significantly high, the costs of holding cash may outweigh the benefits, and private firms may use funds to reduce debt rather than hold cash.[2] This implies lower cash balances for private than for public firms.

To investigate this cost of cash hypothesis, we analyze cash policies of private and public European firms. This approach allows us to make contributions to the literature on corporate liquidity not only by utilizing a unique comprehensive sample of private firms, but also by taking advantage of cross-country variation in the degree of development of financial institutions.[3] Thus, we are able to perform an in-depth analysis of the role of financing frictions in explaining cash holdings. We start by documenting that, similar to U.S. evidence, European unlisted firms hold significantly less cash than listed firms.[4] These results are robust to alternative specifications and hold both in matched and unmatched samples.

We then explore the determinants of the differential in cash holdings across listed and unlisted firms to provide new insights into the economic forces that drive corporate liquidity. Our analysis shows that the differential in cash holdings across listed and unlisted firms is related to the degree of debt market development. In countries with less developed debt markets, unlisted firms retain significantly less cash than in countries with more developed debt markets. As debt markets develop and the cost of debt financing is reduced (Qian and Strahan, 2007; Bae and Goyal, 2009), unlisted firms increase their cash holdings and the differential in cash holdings between unlisted and listed firms shrinks significantly. This result is consistent with the notion

[2] Reducing debt today may also increase future funding capacity and, as such, provides an additional rationale for using cash to pay-off debt.
[3] Unlike U.S. firms, both public and private European firms are required to report their financial data.
[4] The unlisted firm category includes private firms as well as unlisted public firms. We use the terms "listed" and "public" interchangeably to refer to listed public firms.

that private firms retain relatively little cash because the opportunity costs are high due to high cost of debt financing.

The degree of shareholder rights at the country level also explains the cash holdings differential between listed and unlisted firms through its impact on the cash holdings of listed firms. Specifically, shareholder rights are negatively related to the cash holdings of listed firms. This result is consistent with Dittmar, Mahrt-Smith, and Servaes (2003), and Gao, Harford, and Li (2013), who suggest that public firms are likely to hold too much cash due to agency problems.[5] Thus, both the degree of agency problems in public firms and the cost of debt financing for private firms explain the cash holdings differential. Further, we document that stock market development reduces the cash holdings of listed firms. This result is consistent with the precautionary motive for cash holdings, suggesting that the benefits of holding cash are related to access to external capital markets. In sum, the results highlight that liquidity management becomes the key issue for corporate policy when a firm faces financing frictions. Most importantly, our results suggest that the relation between financing frictions and cash holdings is non-linear. While a subset of public firms that have easy access to developed equity markets is likely to hold relatively little cash compared to public firms that have limited access to developed equity markets, because the benefits are low, private firms are likely to retain relatively little cash because the costs are high.

Next, we show that listed and unlisted firms differ in their propensity to save cash out of cash flow. Following Acharya et al. (2007), we estimate simultaneously responses of firms' cash and debt policies to cash flow innovations. Listed firms display a higher propensity to save cash

[5] Agency problems could explain the reason public firms hold more cash than private firms. Entrenched managers prefer to retain cash rather than to pay it out to shareholders because cash reduces firm risk and increases managerial discretion (Opler et al., 1999; Kalcheva and Lins, 2007). This explanation for the cash differential is based on the assumption that agency problems are more severe in public than private firms. Shareholder rights at the country level are likely to mitigate agency problems at the firm level.

from cash flow (their cash flow sensitivity of cash is significantly higher than that of unlisted firms). In contrast, unlisted firms are more likely to use cash flow to payoff their debt; their cash flow sensitivity of debt is significantly higher than that of listed firms). This result further supports the hypothesis that holding cash is relatively costlier for private firms. Moreover, while traditional finance theory suggests that cash should be viewed as negative debt, and it is a matter of indifference whether a firm uses internal resources to accumulate cash or repay debt, our results show that firms' preferences for cash or debt depend on the organizational form (public versus private) and access to external capital markets; thus cash does not function as negative debt.

Another important difference in cash policies across listed and unlisted firms that we document is closely related to the precautionary motive for holding cash. Prior literature shows that public firms with high cash flow volatility (e.g. Opler et al., 1999; Bates, Kahle and Stulz, 2009) are more likely to hold cash. The precautionary motive predicts that cash holdings allow these firms to deal with adverse shocks when access to capital markets is costly. While we also find that listed firms with high cash flow volatility hold more cash, this is not the case for unlisted firms. Cash flow volatility has no impact on the cash holdings of unlisted firms. Further, we find that the cash differential between listed and unlisted firms is higher in industries with better growth opportunities and, while listed firms increase cash holdings with an increase in growth opportunities, unlisted firms do not. The precautionary motive suggests that firms with better growth opportunities hold more cash (Bates et al., 2009) however, this is not the case for private firms.[6] Reliance on costly debt financing may affect the ability of private firms to

[6] Firms with better growth opportunities hold more cash because adverse shocks and financial distress are more costly for them.

accumulate cash for precautionary reasons. This finding is consistent with the theoretical predictions in Bolton et al. (2013) that a cost of debt financing for the firm is that debt payments may drain valuable precautionary cash holdings.

The remainder of the paper is organized as follows. Section II describes the data and sample selection procedure. Section III examines the differences in cash holdings between listed and unlisted firms, and Section IV examines the determinants of these differences. Section V investigates the cash flow sensitivity of debt and cash for listed and unlisted firms. Section VI investigates the precautionary motives for holding cash by listed and unlisted firms. Section VII concludes the paper.

II. Data Description

In this section, we describe our data and sample selection procedure.

A. The Sample Selection

Our primary data source is the 2011 version of Amadeus, by Bureau van Dijk. This database provides balance sheet and income statement items for a set of European firms from 1996 to 2011. An important advantage of Amadeus is that it includes data for a comprehensive set of public and private firms. This advantage is made possible because European law requires both public and private firms to report financial statements. The data are collected from each national official public body in charge of collecting the annual financial statements in its country, and always come from the officially filed and audited accounts.

The Amadeus dataset is divided into three parts. The first contains the largest firms in the database, the second contains the next largest, and the third contains the remaining firms. Our sample comes from the first part of the dataset – the largest firms. The dataset includes a flag for

whether the company is listed on a major stock exchange. However, the dataset reports only contemporaneous information rather than historical information for this variable. We use historical Amadeus DVDs to track changes in listing status over time. We use the variable "Legal Form" to exclude unlimited partnerships, sole proprietorships, cooperatives, foreign companies, foundations, and government enterprises.

As in Giannetti (2003), we exclude Eastern European economies since the quality of the accounting data provided for these economies is poor. We exclude firm-years with total assets less than 10 million U.S. dollars, and exclude financial and miscellaneous firms (US SIC-equivalent codes 60-69 and 89). With a few exceptions, we set a variable to missing if its observations are within its top or bottom percentile, to avoid the effect of outliers. The exceptions are standard deviation of cash flows and balance sheet items, such as cash scaled by total assets. In these cases, we set a variable to missing if its values are non-positive or its observations are within the top percentile. These filters result in 1,004,674 firm-year observations.

We complement firm-level data with country indexes of financial and legal development. We measure debt market development using private credit to GDP from Djankov, McLeish and Shleifer (2007) and the index of creditor rights from La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). To gauge the degree of shareholder rights, we use the anti-self-dealing index from Djankov et al. (2008), which measures how difficult it is for minority shareholders to thwart the consumption of private benefits by controlling parties. Djankov et al. (2008), argue that self-dealing is the central problem of corporate governance in most countries. Following Dermiguc-Kunt and Levine (1996) and Love (2003), we compute an index of stock market development that equals the sum of standardized market capitalization to GDP, total value traded

to GDP, and turnover (total value traded to market capitalization). We obtain each of the elements of this index from the World Bank.

B. The Matching Procedure

Only 2.5% of the firm-year observations in our sample are listed firms. All other firms are unlisted. To make the samples of listed and unlisted firms more comparable in size, we match listed firms to unlisted firms based on country, industry code, and total assets. We keep our matching criteria simple to allow for comparisons between public and private firms across multiple characteristics.

In order to match each listed firm to an unlisted firm, we first consider all listed firms in 2008, choosing this year because it contains the largest number of firms for any given year in our sample. We then exclude the largest listed companies (total assets of the company exceeds total assets of the largest unlisted company in the country by 20 million U.S. dollars or more) as these companies are likely to have easy access to international financial markets and are less likely to be subject to the constraints imposed by domestic markets (see Giannetti, 2003). Next, we require exact matches on country and industry code and the closest possible match on total assets, measured as of 2008. The matching is done without replacement. Our matched sample includes only the largest private corporations. We perform most of the tests using the matched sample. To the extent that the largest private companies are more likely to behave like public companies, this procedure may bias our results towards finding no differences between public and private firms. For robustness, we also perform some of the tests using the full (unmatched) sample.

C. Descriptive Statistics

We present descriptive statistics in Table 1 for the matched sample of listed and unlisted firms. The table contains total assets in millions of USD and various balance sheet items as percentage of total assets. We document that unlisted firms hold significantly less cash and cash equivalents than listed firms: unlisted firms hold 9% in cash as a proportion of total assets, while listed firms hold 14%. This difference of 5% is statistically significant. Interestingly, unlisted firms also hold higher levels of short term debt, a variable typically associated with higher levels of cash (see Falato, Kadyrzhanova and Sim, 2013, Harford, Klasa, and Maxwell, 2011, and Opler et al., 1999). We also note unlisted firms are somewhat smaller than their listed counterparts even in our matched sample.

In table 2, we present cash holdings across countries. Unlisted firms hold less cash in most countries, and this difference is statistically significant in 11 out of 16 countries. This pattern is also very consistent over time. In Figure 1 we plot average cash holdings over time for listed and unlisted firms, and find that unlisted firms hold less cash than listed firms for every year in the sample period.

III. Differences in Cash Holdings between Public and Private Firms

In this section, we test whether public firms hold less cash than private firms using regression analysis. We consider the following model:

$$Cash\ Holdings_{it} = \beta * Listed_{it} + \delta * X_{it} + \varepsilon_{it}, \qquad (1)$$

where *Cash Holdings* is cash and cash equivalents divided by total assets. *Listed* is an indicator variable for the firm being listed on a major stock exchange in the country. We include a set of firm-level control variables, as well as country, industry, and year dummy variables (X). We

include country dummies to ensure we are measuring within-country differences between listed and unlisted firms as well as controlling for unobserved country effects. We also include industry and year dummies to control for industry wide factors and time trends that may affect cash holdings.

The set of firm-level controls includes variables that have been found in previous studies to determine cash holdings (e.g. Opler et al., 1999, and Bates et al., 2009). Leverage is measured as total debt divided by the sum of total debt and shareholder funds. Total debt is the sum of long term debt plus short term loans. Firms with low debt are less subject to monitoring by capital markets and thus may hold more excess cash. Size is measured as the log of total assets, where assets are in USD. Economies of scale to holding cash would predict a negative relation between size and cash. We use sales growth to proxy for growth opportunities. Later in the paper, we consider alternative proxies for growth opportunities. Firms with growth opportunities may prefer to hold more cash for precautionary reasons to prevent having to forego growth opportunities due to financing difficulties. Cash flow to assets is operating cash flow divided by lagged assets. Firms with high cash flow may be able to accumulate more cash.

We compute the standard deviation of cash flows from the current and the past four values of annual cash flows to assets ratio. If two or more cash flows to assets ratios are missing, then the variable is set to missing. We expect firms with high cash flow risk to hold more cash for precautionary reasons. Investment in tangible assets is change in tangible fixed assets divided by lagged assets. To the extent that investment in tangible assets increases debt capacity, it may reduce the demand for cash. Investment in intangible assets is change in intangible fixed assets divided by lagged assets. Investment in intangible assets is associated with higher levels of information asymmetry, and greater difficulty accessing external capital markets. As a result, it

increases demand for cash. Net working capital is current assets minus current liabilities minus cash divided by lagged assets. Net working capital consists of assets that substitute for cash, and thus we expect a negative relation between cash and net working capital. Finally, firm age is observation year minus year of incorporation. More mature firms typically have more stable cash flows and lower growth opportunities and require less cash.

Results of the analysis are presented in Panel A of Table 3. We continue to find that unlisted firms hold less cash than listed firms when controlling for other determinants of cash holdings. This result holds in both the matched and full (unmatched) samples. The coefficients on the firm-level control variables are as expected and consistent with previous studies.

We should note that the analysis in Panel A of Table 3 does not control for the dividend policies of listed and unlisted firms. This is because Amadeus excludes dividend variables. Previous research, such Opler et al. (1999), however, shows that firms that pay dividends hold less cash. To investigate whether differences in dividend policies explain the difference in cash holdings between listed and unlisted firms, we obtain data on dividend payouts for listed firm using Osiris, another dataset distributed by Bureau van Dijk with extended coverage of financial data for listed firms. Panel B of Table 3, compares cash holdings of listed firms that pay dividends to cash holding of unlisted firms. If higher propensity of unlisted firms to pay dividends explains our results in Panel A, then we should find no difference in cash holdings between listed firms that pay dividends and unlisted firms. This is not the case however: both listed firms that pay dividends and listed firms that do not pay dividends hold more cash than unlisted firms.[7]

Our results also suggest that low cash holdings of unlisted firms are not due to the inability of the private firms to generate enough cash from operations because we control for

[7] See Michaely and Roberts (2012), for a detailed discussion of dividend policies of private firms.

cash flow. This is different from Denis and Siblilkov (2010), who show that some public firms with limited access to external markets exhibit low cash holdings because of persistently low cash flows.

The positive cash holdings differential between listed and unlisted firms is surprising within Keynes's (1936) framework that predicts that cash holdings are beneficial to firms with limited access to external capital markets (such as unlisted firms) because cash can help those firms seize valuable projects or activities in future. This benefit is termed the precautionary motive for holding cash. Opler et al. (1999), among others, provide evidence consistent with the precautionary motive for holding cash among listed firms. We hypothesize, however, that the high costs of holding cash borne by unlisted firms may explain why unlisted firms hold little cash when compared to listed firms. In the next sections, we provide evidence consistent with this cost of cash hypothesis. We also explore the role of the agency problems in explaining differences in cash holdings between listed and unlisted firms.

IV. Explaining Differences in Cash Holdings between Public and Private Firms

In this section, we explore cross-country differences in the development of legal and financial institutions to explain the difference in cash holdings between public and private firms and provide support for our hypothesis on the importance of the cost consideration in firms' cash policies. Additionally, we explore time variations in the cost of loan financing within countries to provide further support for our findings.

A. Cost of Cash Explanation

We first investigate the effect of creditor protection and loan market development on the difference in cash holdings between public and private firms. Qian and Strahan (2007), and Bae and Goyal (2009), provide evidence that the cost of loans declines with an increase in creditor protection. Djankov et al. (2007), provide evidence that creditor protection is directly related to the amount of private credit a financial system provides to firms, a measure of loan market development. Supply and demand suggests an inverse relation between the amount of private credit supplied by the country's financial system and the cost of loans. Our cost of cash hypothesis, in turn, predicts that as the cost of private debt financing declines and the cost of holding cash is reduced, private firms increase cash holdings and the difference in cash holdings between public and private firms is likely to shrink. The latter condition is because private firms should be affected by the loan market to a greater extent than public firms. Private firms have very limited access to public capital markets, and higher debt levels, and thus are more dependent on private credit than public firms. In sum, we expect the difference in cash holdings between listed and unlisted firms to be higher in countries with a high cost of private debt financing associated with lower creditor protection and less developed loan markets than in countries with a low cost of debt financing.

Results of the analysis are tabulated in Table 4. We proxy for loan market development and the cost of loan financing at the country level with the amount of private credit as a percentage of GDP from Djankov et al. (2007), and creditor rights index from La Porta et al. (1998). We study the effect of the cost of loan financing on the cash differential between listed and unlisted firms by looking at the cash differential for firms with the cost of loan financing above median and below median. In panel A, we partition the sample in countries with private credit to GDP above the median and countries with private credit to GDP below the median. In

panel B, we partition the sample in firms with the creditor rights index above the median and below the median. For the sake of brevity, we do not tabulate the results for firm-level control variables. Control variables are the same as in Table 3.

Results in Panel A show that listed firms hold more cash in both subsamples; however, this differential is significantly larger when private credit to GDP is low and the cost of loan financing is high. Listed firms hold 1.3% more cash than unlisted firms when private credit to GDP is high and the cost of debt financing is low; and 5.2% more cash when private credit to GDP is low and the cost of debt financing is high. These coefficients are statistically different at the 1% level. Results in Panel B are similar. Listed firms hold more cash in both sub-samples, but listed firms hold more cash in countries with low creditor rights. Listed firms hold 1.3% more cash in countries where creditor rights are above the median, and 4.5% more cash where creditor rights are below the median. As with private credit to GDP, these coefficients are statistically different at the 1% level. These results suggest that the cost of debt is an important reason private firms hold less cash than public firms, which is consistent with the cost of cash hypothesis.

Dittmar et al. (2003) argue that agency costs cause public firms to hold more cash, when cash is more easily available, as proxied by private credit to GDP. Our results contrast with theirs, in that we show that the difference in cash holdings between private and public firms shrinks (in other words private firms are less cash deficient) in countries with more developed debt markets. Our results suggest that cost of cash is a more likely explanation for the relation between cash holdings and private credit to GDP.

B. Agency Explanation

Agency costs could also explain the difference in cash holding between public and private firms. It may be in the self-interest of managers to hold excess cash because cash reduces firm risk and increases managerial discretion (Opler et al., 1999). To the extent that public firms are more susceptible to agency costs, the difference in cash holdings could result from public firms holding excess cash (Gao et al., 2013). Dittmar et al. (2003), provide evidence consistent with agency costs causing excess cash holdings. Using a cross-country sample of listed firms, they find that listed firms hold more cash in countries with low shareholder rights protection.

The agency-based explanation predicts that the cash holding differential between listed and unlisted firms is related to the degree of shareholder rights. Strong shareholder rights at the country level reduce agency problems in listed firms, causing the difference to shrink.

We use the anti-self-dealing index from Djankov et al. (2008) to proxy for shareholder rights and agency costs. We partition the sample into countries with above and below median anti-self-dealing, and run the same regression as in Table 3, model 1. Specifically, we run a regression of cash holdings on an indicator variable for listed firms. In these regressions we also include, although we do not tabulate for the sake of brevity, control variables, and country, year and industry dummies. Results are presented in table 5.

We find that listed firms hold more cash in both sub-samples, though the differential is greater in countries with low anti-self-dealing where firms are less likely to be subject to agency costs. Listed firms hold 2% more cash than unlisted firms in countries with high anti-self-dealing, but hold 4.6% more in countries with low anti-self-dealing. The difference of 2.6 percentage points is statistically significant at the 5% level. These results suggest that agency costs are able to explain, at least in part, the reason public firms hold more cash.

In sum, the results so far suggest that both the cost of cash and agency costs may explain the cash holdings differential between public and private firms.

C. Cost of Cash and Agency Explanations for Cash Holdings of Public and Private Firms

In this sub-section, we study the effect of country-level variables on cash holdings of public and private firms. These tests allow us to further understand what drives the cross-country differences-in-differences in cash holdings that we document in the previous section, and provide additional support for our hypotheses.

Results are presented in Table 6. Column 1 reports results for the sub-sample that includes unlisted firms only, while column 2 reports results for the sub-sample that includes listed firms only. In addition to proxies for cost of debt financing and agency problems at the country level, we also include a proxy for stock market development in our regressions. The use of the stock market development proxy is motivated by the literature that emphasizes the precautionary benefits of holding cash. Specifically, the precautionary motive suggests that firms hold more cash to better cope with adverse shocks when external capital markets are difficult to tap. As the access to external capital markets such as the stock market improves, firms should reduce cash holdings due to a decrease in the benefits of holding cash. Each regression also includes firm-level determinants of cash holdings reported in Table 3, year and industry dummies, and the log of gross domestic product as an additional control variable for cross-country differences.

We find that debt market development is associated with a high level of cash holdings for unlisted firms. In column 1, the coefficient on Private-Credit-to-GDP is 0.025 and statistically significant at the 1% level. For listed firms, the coefficient on Private-Credit-to-GDP is 0.001 and statistically insignificant. Further, the difference in coefficients is statistically significant at

the 1% level. These results confirm that the decrease in the cash differential between listed and unlisted firms that we present in Table 4 is driven by an increase in the cash holdings of unlisted firms. The results are consistent with private firms finding it very expensive to accumulate cash in countries where private credit availability is scarce and consequently the cost of debt is high.

Neither the anti-self-dealing index nor the stock market development has an impact on the cash holdings of unlisted firms. Thus, cross-country variation in cash holdings of private firms is mainly explained by debt market development. In contrast, the anti-self-dealing index and stock market development affect cash holdings of listed firms.

Consistent with Dittmar et al. (2003), we find that the anti-self-dealing index is negatively related to the cash holdings of listed firms, which provides support for the agency explanation of the cash holdings differential. Thus, both the degree of agency problems in public firms and the cost of debt financing for private firms explain the cash holdings differential. Additionally, we find that stock market development is negatively related to the cash holdings in listed firms. This result is consistent with the precautionary motive for holding cash. However, the impact of the stock market development is not strong enough to explain the cash holdings differential between listed and unlisted firms (untabulated analysis).

D. Time-variation in the Cost of Debt Financing and Cash Holdings

In this sub-section, we further investigate whether cash holdings of private firms are related to the cost of debt financing. We explore time-variation in the cost of loan financing. During our sample period, European countries made a significant effort to integrate capital markets. Findings in Bekaert et al. (2007), and Gupta and Yuan (2009), suggest that market integration helps reduce financial constraints and is likely to reduce the cost of external financing for private firms. To proxy for the cost of loan financing, we use country-level interest rates

reported by the European Central Bank.[8] These interest rates are calculated using all outstanding loans with a maturity of 1 year or less made by monetary financial institutions in a given country to non-financial corporations. We recognize that a country-level measure is a noisy proxy for the cost of debt financing at the firm-level; however, in its favor, a country-level measure is less susceptible to concerns of endogeneity. Results are reported in Table 6, Panel B. We regress cash holdings on loan interest rates, a set of firm-level control variables, and year and firm fixed effects. We continue to find evidence that cash holdings of private firms are negatively related to the cost of debt financing.

Overall, the results in this section highlight the fact that financing frictions play an important role in explaining firms' cash policies. The previous literature demonstrates that public firms that are financially constrained accumulate more cash than financially unconstrained public firms because the precautionary benefits of holding cash are lower for unconstrained firms (e.g., Opler et al., 1999; Almeida, Campello, and Weisbach, 2004). Our results, however, suggest that in extreme cases, when external financing is significantly costly, firms accumulate relatively little cash because the opportunity cost of holding cash is high. Thus, the relation between cash holdings and financing frictions is non-linear. Private firms with limited access to external markets and with a high cost of external financing behave similarly to financially unconstrained public firms with low financing costs, and both accumulate relatively little cash, albeit for different reasons, while constrained public firms accumulate relatively high cash reserves. The identification of this non-linear relation highlights the benefits of an expanded sample such as ours.

[8] The link to the data is: http://sdw.ecb.europa.eu/browse.do?node=9484266

V. The Cash Flow Sensitivity of Debt and Cash for Public and Private Firms

In this section we provide further support for our cost of cash hypothesis. We hypothesize that private firms will use cash flow to pay off debt, in lieu of accumulating cash, because private firms bear a higher cost of debt than public firms. To test this hypothesis directly, we investigate the cash flow sensitivity of debt and cash for listed and unlisted firms. We expect the cash flow sensitivity of debt to be higher for unlisted firms than for listed firms, and the cash flow sensitivity of cash to be lower for unlisted firms.

In our empirical analysis, we follow Acharya, Almeida, and Campello (2007), and endogenize debt and cash policies. Specifically, we estimate the following system of equations using three-stage least squares:

$$\Delta Debt_{it} = \alpha_1 Listed_{it} + \alpha_2 CashFlow_{it} + \alpha_3 CashFlowxListed_{it} + \alpha_4 \Delta CashHoldings_{it} + a_5 \Delta Debt_{it-1} + \delta * X_{it} + \varepsilon_{it}, \quad (2)$$

$$\Delta CashHoldings_{it} = \alpha_1 Listed_{it} + \alpha_2 CashFlow_{it} + \alpha_3 CashFlowxListed_{it} + \alpha_4 \Delta Debt_{it} + a_5 \Delta CashHoldings_{it-1} + \delta' * X_{it} + \varepsilon'_{it}, \quad (3)$$

where *Listed* is an indicator variable for the firm being listed. *ΔDebt* is change in total debt scaled by beginning of the period assets. *ΔCashHoldings* is change in cash scaled by initial of period assets. *CashFlow* is cash flow scaled by lagged assets. We also include a set of firm-level control variables, such as firm size, growth opportunities as measured by sales growth, and country, industry and year dummies (*X*).

Results are presented in Table 7. They are consistent with our predictions. In the regressions of changes in debt we find that higher levels of cash flow are associated with debt reductions for unlisted firms. This effect is muted for listed firms, as evidenced by the positive coefficient on the interaction variable that is of identical magnitude to the negative coefficient on cash flow. For unlisted firms, debt drops by 12.2% for each percentage increase in cash flow. For listed firms, debt increases by a meager 0.1% (the sum of the coefficients on the cash flow relative to total assets, -12.2%, and its interaction with the indicator variable for listed, 12.3%) for each percentage increase in cash flow.

In the regressions of changes in cash, we find that high cash flows are associated with increases in the cash account for both listed and unlisted firms, and this effect is more pronounced for listed firms, as evidenced by the positive coefficient on the interaction variable. Cash holdings of unlisted firms increase by 12.9% for each percentage increase in cash flows, while the cash holdings of listed firms increase by an additional 5.5% for each percentage increase in cash flows for a total of 18.4%.

In sum, we find that public firms are more likely to use cash flow to accumulate cash, while private firms are more likely to pay down debt. These results are consistent with our cost of cash hypothesis.

VI. Precautionary Motive for Holding Cash and Access to Public Equity Markets

In this section, we take a closer look at the ability of private firms to accumulate cash for precautionary reasons. An important benefit of cash holdings is that they allow firms to better cope with adverse shocks and finance valuable projects or activities in the future. High costs of

cash, however, may impair the ability of private firms to respond to this precautionary motive for holding cash.

The precautionary motive would suggest that high levels of cash flow volatility should be associated with higher levels of cash since these types of firms are more likely to suffer from cash shortfalls. We run specifications similar to those in Table 3 separately for listed and unlisted firms, and compare the coefficients on cash flow volatility between these two types of firms. We present results in Table 8. There is a notable difference in the coefficients for cash flow volatility for listed and unlisted firms. Consistent with the precautionary motive, we find that the coefficient on cash flow volatility is positive and highly statistically significant for listed firms. This coefficient, however, is insignificant for unlisted firms. We interpret these results as suggesting that private firms are less sensitive to the benefits of holding cash and they hold less cash, even when it would be prudent to accumulate high cash reserves for precautionary reasons.

We then take a closer look at the relation between cash holdings and growth opportunities. Previous research suggests that high growth firms would benefit from accumulating cash for precautionary reasons (Opler et al., 1999, and Bates et al., 2009). Cash holdings help these firms avoid missing out on valuable growth opportunities due to difficulties with external financing. Results using sales growth suggest that growth opportunities are positively related to cash holdings in both listed and unlisted firms. Sales growth, however, is likely to capture not only growth opportunities but also cash flow from assets in place. Thus, we consider two additional proxies for growth opportunities: industry market-to-book and global PE ratios from Bekaert et al., (2007).[9] Results are presented in specifications 3-6 in Table 8, Panel

[9] We obtain the annual global PE ratios for each industry from DataStream and manually match the DataStream industry codes to 3-digit SIC codes available in Amadeus.

A. We find that these proxies for growth opportunities are positively related to cash holdings only for listed firms.

Further, we investigate the effect of equity dependence on cash policies of public and private firms to provide additional insights into the ability of private firms to accumulate cash for precautionary reasons. Equity-dependent firms are rich in growth opportunities and in need of external financing (Rajan and Zingales, 1998). Results are presented in Table 8, specifications 7 and 8. We compute a firm's external equity dependence as in Rajan and Zingales (1998), to measure the industry's demand for external equity. While we find that external equity dependence is positively related to the cash holdings in listed firms, this is not the case for unlisted firms. The coefficient is statistically insignificant.

In Panel B of Table 8, we investigate whether the effect of equity dependence is significant enough to explain the difference in cash holdings between listed and unlisted firms. We partition the sample into industries that are above and below the median on external equity dependence. In each sub-sample, we run a regression on cash holdings on an indicator variable for the firm being listed, and a number of control variables. The specification is identical to that in Table 3, model 1. Results are consistent with our earlier findings. We find that the cash difference between listed and unlisted firms is higher in industries with high equity dependence.

Overall, the results so far suggest that private firms are less sensitive to the precautionary benefits of holding cash than public firms, consistent with the cost of cash argument.

For robustness, we examine how a change in listing status can affect a firm's ability to hold cash. Results are tabulated in Table 9. We form a sample of firms that switched status from listed to unlisted and *vice-versa*. We run parsimonious regressions of cash holdings on listing status and year dummies. We report results both with and without firm fixed effects. In the

former case, we focus on within-firm differences in cash policies as firms switch their listing status. We document that firms increase cash holdings when they become listed. The coefficient on the variable listed is significant at the 1% level in both specifications. These results are consistent with our earlier results which find that listed firms hold more cash.

VII. Summary and Conclusions

In this paper, we emphasize that financing frictions lead not only to considerable precautionary benefits of holding cash, but also to substantial costs of holding cash. When the costs of external financing are significantly high, firms opt to pay off debt rather than to accumulate cash, because the opportunity cost of holding cash is high. Using a comprehensive sample of private and public firms, we provide evidence consistent with this cost of cash hypothesis.

Private firms, which have very limited access to capital markets and a relatively high cost of debt financing, are more likely to pay off debt and accumulate less cash than public firms. Further, the reduction in the cost of debt financing associated with debt market development leads to an increase in the cash holdings of private firms. By analyzing private firms, we are able to show that the relation between financing frictions and cash holdings is non-linear. The prior literature demonstrates that financially constrained firms accumulate more cash than unconstrained firms. Our results, however, suggest that in extreme cases, when external financing is significantly costlier, firms accumulate relatively little cash due to the high costs of holding cash.

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Table 1. Descriptive Statistics: Balance Sheet Data

The table presents balance sheet data for the firms in the matched sample in 2008. Details of the matching procedure are provided in the text. The data are from the 2011 version of Amadeus. The sample includes non-financial firms from Western European countries. Accounting items are scaled by total assets. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Listed		Unlisted		
	Mean	N	Mean	N	*Diff. in means*
Assets					
Fixed Assets	0.50	2,897	0.44	2,886	*0.05****
(of which)					
Intangible	0.19	2,893	0.06	2,782	*0.14****
Tangible	0.23	2,897	0.25	2,810	*-0.02***
Current Assets	0.50	2,897	0.56	2,887	*-0.05****
Cash and Cash Equiv.	0.14	2,734	0.09	2,428	*0.05****
Total Assets ($ mill.)	1,745	2,898	1,267	2,898	*478***
Liabilities					
Shareholders' Funds	0.47	2,833	0.38	2,685	*0.09****
Non-current Liabilities	0.21	2,873	0.24	2,846	*-0.04****
(of which)					
Long-term Debt	0.14	2,766	0.16	2,641	*-0.02****
Current Liabilities	0.34	2,898	0.43	2,888	*-0.09****
(of which)					
Loans	0.08	2,789	0.13	2,756	*-0.06****

Table 2. Descriptive Statistics: Cash Holdings across Countries

The table presents mean cash holdings of listed and unlisted firms across counties for the matched sample over the 1996-2011 period. Details of the matching procedure are provided in the text. We present pooled sample means and sample size for each country. The data are from the 2011 version of Amadeus. The sample includes non-financial firms from Western European countries. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Cash/Total Assets				
	Listed		Unlisted		
	Mean	N	Mean	N	*Diff. in means*
Austria	0.09	151	0.08	152	*0.01*
Belgium	0.14	785	0.13	771	*0.01*
Denmark	0.11	344	0.08	356	*0.03****
Finland	0.11	732	0.07	610	*0.04****
France	0.18	3,095	0.10	2,943	*0.08****
Germany	0.15	3,178	0.11	2,107	*0.04****
Greece	0.07	1,807	0.07	1,636	*0.00*
Ireland	0.21	233	0.09	148	*0.13****
Italy	0.10	1,486	0.06	1,266	*0.04****
Netherlands	0.12	966	0.10	757	*0.02****
Norway	0.14	907	0.11	960	*0.03****
Portugal	0.04	212	0.04	169	*0.00*
Spain	0.09	869	0.10	802	*0.00*
Sweden	0.17	945	0.09	966	*0.08****
Switzerland	0.12	249	0.08	211	*0.04****
United Kingdom	0.14	7,302	0.10	7,005	*0.04****

Table 3. Differences in Cash Holdings across Public and Private Firms: Regression Analysis

The table presents results of OLS regressions for the matched and unmatched samples (Panel A), and for listed and unlisted firms where listed firms are partitioned into firms that have paid a dividend in that year and firms that have not paid a dividend in that year (Panel B). The dependent variable is cash and cash equivalents divided by total assets. *Listed* is an indicator variable for the firm being listed on a major stock exchange. *Leverage* is measured as total debt divided by the sum of total debt and shareholder funds. *Total debt* is the sum of long term debt plus short term loans. *Sales Growth* is computed as the one-year change in sales divided by beginning-of-period sales. *Standard deviation of cash flows* is the standard deviation of current and the past four cash flows to assets. If two or more cash flows to assets are missing, then the variable is set to missing. *Investment in tangible assets* is the one-year change in the value of tangible fixed assets divided by lagged assets. *Investment in intangible assets* is the one-year change in the value of intangible fixed assets divided by lagged assets. *Net working capital* is current liabilities minus current assets minus cash divided by lagged assets. *Firm age* is years since incorporation. The estimation procedures correct standard errors for clustering at the firm level. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A.

	Matched (1)	Unmatched (2)
Listed	0.033***	0.032***
Leverage	-0.132***	-0.128***
Log(Total assets)	-0.009***	-0.011***
Sales growth	0.016***	0.011***
Cash flow/total assets	0.261***	0.286***
Standard deviation of cash flows	0.147***	0.055***
Investments in tangible assets	-0.161***	-0.181***
Investments in intangible assets	0.053*	0.009
Working capital (net of cash)	-0.138***	-0.165***
Firm age	-0.000***	-0.000***
Country dummies	Yes	Yes
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
N	16,377	379,065
Adjusted R^2	0.2175	0.2176

Table 3. (continued)

Panel B.

	Listed Firms that pay dividends (1)	Listed firms that do not pay dividends (2)	*Diff.*
Listed	0.036***	0.031***	*0.005*
Firm-level controls	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
N	12,991	10,408	
Adjusted R^2	0.2112	0.1927	

Table 4. Differences in Cash Holdings of Listed and Unlisted Firms and Private Debt Market Development

The table presents results of OLS regressions for the matched sample. We run regressions on two subsamples of firms: firms in countries with above median debt market development and firms in countries with below median debt market development. In Panel A we measure debt market development with Private Credit/GDP, which we get from Djankov et al., (2007). In Panel B we use an index on creditor rights from La Porta, et al., (1998). The dependent variable is cash and cash equivalents divided by total assets. *Listed* is an indicator variable for the firm being listed on a major exchange. Each regression includes the same set of control variables that is included in Table 3. Each regression includes country, year and industry dummies. The estimation procedures correct standard errors for clustering at the firm level. We test for the null hypothesis that the coefficients are equal across the two models using seemingly unrelated estimation. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A.

	Private Credit/GDP		
	Above median	Below median	*Diff.*
	(1)	(2)	
Listed	0.013**	0.052***	*-0.039****
Firm-level controls	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
N	8,439	7,938	
Adjusted R^2	0.2338	0.2143	

Panel B.

	Creditor Rights		
	Above median	Below median	*Diff.*
	(1)	(2)	
Listed	0.013**	0.045***	*-0.032****
Firm-level controls	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
N	7,245	9,132	
Adjusted R^2	0.2384	0.2148	

Table 5. Differences in Cash Holdings of Listed and Unlisted Firms and Agency Problems

The table presents results of OLS regressions for the matched sample. We run regressions on two subsamples of firms: firms in countries with above median anti-self-dealing and below median anti-self-dealing. The anti-self-dealing index is from Djankov et al., (2008). The dependent variable is cash and cash equivalents divided by total assets. Listed is an indicator variable for the firm being listed on a major exchange. Each regression includes the same set of control variables that is included in Table 3. Each regression includes country, year and industry dummies. The estimation procedures correct standard errors for clustering at the firm level. We test for the null hypothesis that the coefficients are equal across the two models using seemingly unrelated estimation. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Anti-self-dealing		*Diff.*
	Above median (1)	Below median (2)	
Listed	0.020***	0.046***	*-0.026***
Firm-level controls	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
N	7,701	8,676	
Adjusted R^2	0.2133	0.2281	

Table 6. Cash Holdings of Listed and Unlisted, and Legal and Financial Development

The table presents results of OLS regressions for listed and unlisted firms for the matched sample. Panel A explores cross-country differences in legal and financial institutions, while Panel B explores time variations in the cost of loan financing. The dependent variable is cash and cash equivalents divided by total assets. The anti-self-dealing index is from Djankov et al. (2006). The stock market development index is constructed from World Bank data following Dermiguc-Kunt and Levine (1996). Private Credit/GDP is from Djankov, McLiesh, and Shleifer (2006). GDP is from the World Bank. The dependent variable is cash and cash equivalents divided by total assets. Cost of loans is country-level interest rates from the European Central Bank calculated using all outstanding loans with a maturity of 1 year or less made by monetary financial institutions in a given country to non-financial corporations. Each regression includes the same set of control variables that is included in Table 3. The estimation procedures correct standard errors for clustering at the firm level. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A.

	Unlisted (1)	Listed (2)
Anti-self-dealing	0.001	-0.030***
Private Credit/GDP	0.025***	0.001
Stock Market Development	-0.006	-0.024**
Log(GDP)	-0.005	0.049***
Firm-level controls	Yes	Yes
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
N	7,022	9,355
R^2	0.1624	0.2682

Panel B.

	Unlisted (1)	Listed (2)
Cost of Loans	-0.008***	0.002
Firm-level controls	Yes	Yes
Year dummies	Yes	Yes
Firm dummies	Yes	Yes
N	6,465	9,051
R^2	0.7897	0.7620

Table 7. Cash Flow, and Changes in Cash Holdings and Debt

The table presents results of the 3SLS regressions for the matched sample. *Change in Debt* is change in total debt scaled by beginning of period assets. Total debt is the sum of long term debt plus short term loans. *Change in Cash* is change in cash scaled by beginning of period assets. *Listed* is an indicator variable for the firm being listed on a major stock exchange. *Sales Growth* is computed as the one-year change in sales divided by beginning-of-period sales. We include country, industry and year dummies. The estimation procedures correct standard errors for clustering at the firm level. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Change in Debt (1)	Change in Cash (2)
Listed	-0.012***	0.001
Cash Flow/ Total Assets	-0.122***	0.129***
Listed x Cash Flow/Total Assets	0.123***	0.055***
Sales Growth	0.041***	0.006*
Log(Total assets)	0.005***	-0.002***
Change in Cash	0.159	
Change in Leverage		0.161**
Lagged Leverage	-0.013***	
Lagged Cash		-0.060***
Country dummies	Yes	Yes
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
N	24,771	24,771

Table 8. Precautionary Benefits and Cash Holdings

The table presents results of OLS regressions for the matched sample. Panel A includes separate regressions for listed and unlisted firms, while panel B includes both types of firms in the same regression, but separates firms based on whether they are in an industry with above or below median external equity dependence. We compute an industry's external equity dependence as in Rajan and Zingales (1998). The dependent variable is cash and cash equivalents divided by total assets. *Listed* is an indicator variable for the firm being listed on a major stock exchange. *Leverage* is measured as total debt divided by the sum of total debt and shareholder funds. *Total debt* is the sum of long term debt plus short term loans. *Sales Growth* is computed as the one-year change in sales divided by beginning-of-period sales. *Standard deviation of cash flows* is the standard deviation of current and the past four cash flows to assets. If two or more cash flows to assets are missing, then the variable is set to missing. *Investment in tangible assets* is the one-year change in the value of tangible fixed assets divided by lagged assets. *Investment in intangible assets* is the one-year change in the value of intangible fixed assets divided by lagged assets. *Net working capital* is current liabilities minus current assets minus cash divided by lagged assets. *Firm age* is years since incorporation. Firm-level controls in Panel B are the same as those in Panel A and in Table 3. We test for the null hypothesis that the coefficients are equal across the two models using seemingly unrelated estimation. The estimation procedures correct standard errors for clustering at the firm level. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8. (continued)

Panel A.

	Listed	Unlisted	Listed	Unlisted	Listed	Unlisted	Listed	Unlisted
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Leverage	-0.192***	-0.097***	-0.187***	-0.105***	-0.183***	-0.102***	-0.194***	-0.097***
Log(Total assets)	-0.005***	-0.012***	-0.006***	-0.012***	-0.004***	-0.012***	-0.004***	-0.014***
Sales growth	0.010*	0.016***	0.004	0.016*	0.011**	0.015**	0.015***	0.019***
Cash flow/total assets	0.291***	0.207***	0.291***	0.221***	0.321***	0.203***	0.273***	0.190***
Std. Dev. of cash flows	0.290***	-0.008	0.263***	0.023	0.250***	0.005	0.285***	-0.008
Inv. in tangible assets	-0.158***	-0.154***	-0.121***	-0.138***	-0.165***	-0.152***	-0.156***	-0.158***
Inv. in intangible assets	0.072**	-0.104*	0.056	-0.044	0.104***	-0.117*	0.041	-0.100
Working capital (net of cash)	-0.130***	-0.150***	-0.145***	-0.148***	-0.122***	-0.148***	-0.115***	-0.145***
Firm age	-0.000***	0.000	0.000***	0.000**	0.000***	0.000	-0.003***	-0.000**
Market-to-Book Industry			0.016***	-0.009				
Global PE ratio					0.0004**	0.000		
External Equity Dependence							0.021***	0.005
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	No	No
N	9,355	7,022	3,807	2,808	6,900	5,788	8,517	6,373
Adjusted R^2	0.2835	0.1666	0.2927	0.1733	0.2889	0.1649	0.2851	0.1524

Table 8. (continued)

Panel B.

	External industry equity dependence		
	Above median (1)	Below median (2)	*Diff.*
Listed	0.047***	0.019***	*0.028***
Firm-level controls	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
N	6,259	8,631	
Adjusted R^2	0.2185	0.2189	

Table 9. Change in Listing Status and Cash Holdings

This table presents results of OLS regressions for firms that have changed their listing status. The dependent variable is cash and cash equivalents divided by total assets. *Listed* is an indicator variable that equals 1 after a firm lists on a major stock exchange and 0 before its listing. The estimation procedures correct standard errors for clustering at the firm level. ***, **,* denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(Cash and Cash Equivalents) / Total Asset	
	(1)	(2)
Listed	0.029***	0.007***
Firm dummies	No	Yes
Year dummies	Yes	Yes
N	26,169	26,169

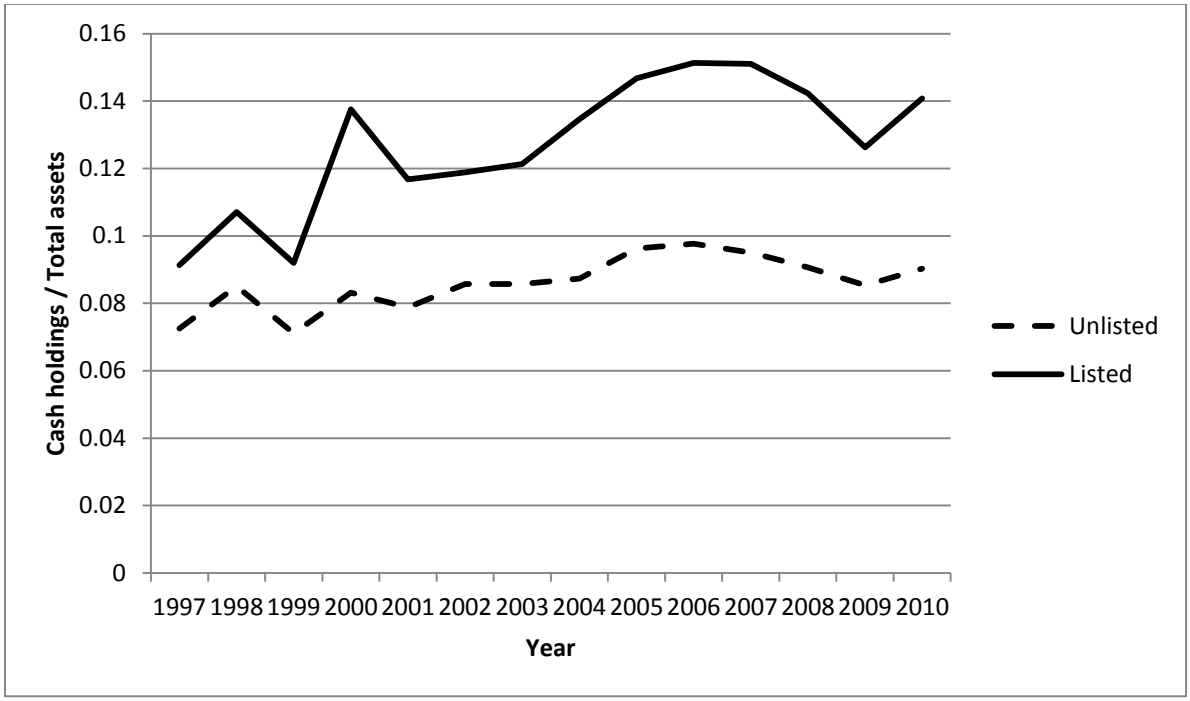

Figure 1. Cash Holdings for Listed and Unlisted Firms across Time
The figure contains average cash holdings to total assets ratio for listed and unlisted firms from 1997 through 2010