Determinants of Corporate Cash Policy: A Comparison of Public and Private Firms*

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Abstract

In this paper, we provide one of the first large sample comparisons of cash policies in public and private US firms. We first show that on average private firms hold less than half as much cash as public firms do. The higher cash holdings of public firms are partially caused by the fact that public firms add more to their cash reserves in a given year, even controlling for a number of spending and savings factors, than do similar private firms. At the same time, however, we find that among firms with excess cash holdings, public firms spend more of it than do private firms. Thus, public firm managers are more aggressive in both accumulating and spending cash reserves. Finally, consistent with the presence of financing frictions, we find that private firms' cash-to-cash flow sensitivity is higher than that of public firms. Overall, our evidence supports both the agency conflicts and the financing frictions views of corporate cash policy.

Keywords: cash holdings; cash-to-cash flow sensitivity; financing frictions; agency conflicts; private firms

JEL Classification: G30; G32

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1. Introduction

Corporate holdings of cash reserves have received increasing academic interest.[1] As of 2010, public firms in the US held on average 18.8% of their assets in cash or near-cash instruments.[2] Work explaining cash holdings has focused primarily on financing frictions and agency conflicts. Financing frictions lead firms to have a precautionary demand for cash holdings, which has been studied as early as Baumol (1952). A specific form of financing frictions, the wedge between internal and external costs of capital created by information asymmetry, can lead firms with greater information asymmetry about their investment opportunities to hold more cash. Evidence in favor of this explanation has been found by Harford (1999) and Opler, Pinkowtiz, Stulz, and Williamson (1999).

Agency conflicts would also be expected to affect cash policies. Dittmar, Mahrt-Smith, and Servaes (2003) study cash holdings across countries and conclude that in countries where investor protection is lower, firms hold more cash, while in countries where investors have more power, they use that power to force managers to disgorge the cash. Harford, Mansi, and Maxwell (2008) show that firms with more entrenched managers actually hold less cash than otherwise similar firms and conclude that managers would prefer to overinvest rather than maintain observably high cash levels. Nikolov and Whited (2010) estimate that typical agency problems increase cash holdings by 22%, resulting in a 6% drop in shareholder value.

In this study we exploit a database of private firms that, by their nature, would both be subject to greater financing constraints and have much lower agency problems than public firms. We construct tests to identify whether each effect matters as well as

[1] Starting from the seminal work by Baumol (1952), Miller and Orr (1966), and Jensen (1986), there has been a recent surge of papers including Opler, Pinkowitz, Stulz, and Williamson (1999), Dittmar and Mahrt-Smith (2007), Foley, Hartzell, Titman, and Twite (2007), Harford, Mansi, and Maxwell (2008), Bates, Kahle, and Stulz (2009), Nikolov and Whited (2010), Acharya, Davydenko, and Strebulaev (2011), and Gryglewicz (2011), examining determinants of corporate cash policy.

[2] This number is based on all public US firms listed on NYSE, AMEX, and NASDAQ in 2010. The corresponding numbers for 2007, 2008, and 2009 are 21.9%, 20.3%, and 19.7%, respectively.

their net effect on cash levels and cash-to-cash flow sensitivities. Using a sample of public and private US firms over the period 2000-2008, we first show that on average private firms hold less than half as much cash as public firms do. This is despite the fact that they arguably have less access to external financing and would be expected to have a stronger precautionary motive due to financing frictions. Even controlling for standard factors affecting cash reserves, we find that the agency costs effect of being public net of the financing frictions effect still leads public firms to hold cash reserves that are 3.9% to 6.5% of assets higher than are those of similar private firms. This key finding remains employing a reduced form model of cash holdings that account for the joint determination of leverage, investment, dividend, and cash holdings, accounting for the transitory component of cash holdings, and controlling for different levels of managerial ownership.

We then show that these higher cash holdings are partially caused by the fact that public firms add more to their cash reserves in a given year, even controlling for a number of spending and savings factors, than do similar private firms. At the same time, however, we find that among firms with excess cash holdings, public firms spend more of it than do private firms. Thus, public firm managers are more aggressive in both accumulating and spending cash reserves.

The fact that public firms accumulate more cash reserves does not speak directly to the financing frictions hypothesis. Almeida, Campello, and Weisbach (2004) show theoretically and empirically that one must examine the sensitivity of the firm's cash holdings to its cash flow—unconstrained firms will display savings behavior that is much less sensitive to their cash flow than will constrained firms. Consistent with the presence of financing frictions, we find that private firms' cash-to-cash flow sensitivity is higher than that of public firms.

We apply a treatment regression approach to addressing the selection issues that companies may choose to go public or stay private. We find that the difference in the level and change in cash holding is even greater between public and private firms after controlling for the selection effect of being a public firm.

Our study contributes to the literature by establishing a conservative estimate of the effect of agency costs on cash holdings through the use of a sample of private US companies. Previous investigations of the issue have been hampered by using data on public companies only. For example, Dittmar et al. (2003) show that one would expect US firms to hold less cash than firms in countries with weaker investor protection, and we extend that by showing that even given better investor protection, US firms still hold more cash than they would if their agency costs were mitigated by being private. We also show that despite the evidence that financing frictions such as the cost of external financing and information asymmetry are greater for private firms, the effect of agency conflicts is strong enough to lead to much higher cash holdings, as well as higher growth in those holdings, in public firms.

In using private firms, we join a recent surge of papers using data on private companies to draw new insights into public company behavior. Michaely and Roberts (2007) show that private firms smooth dividends significantly less than their public counterparts. They conclude that the scrutiny of public capital markets plays a central role in the propensity of firms to smooth dividends over time. Brav (2009) examines the financial policies of private and public UK firms and show that private firms tend to borrow more, resulting in higher leverage ratios. Asker, Farre-Mensa, and Ljungqvist (2010) contrast investment behavior of private firms with that of public firms and find that public firms invest less and are less responsive to changes in investment opportunities compared to observably similar private firms. They conclude that public market scrutiny distorts investment incentives, but the observed behavior is also

consistent with more severe agency problems in public firms than their private counterparts. In contemporaneous work, Farre-Mensa (2010) explores why most firms stay private. While not central to his study, he also finds that public firms hold more cash than private firms. He interprets the finding as driven by differential disclosure costs across public and private firms. Gao, Lemmon, and Li (2011) show that compensation practices are substantially different between private and public firms, reflecting differences in the contracting environments whereby public firm shareholders' objective is to maximize on-going shareholder value while private firm shareholders' objective is to maximize shareholder value at a major liquidity event such as IPOs or outright sales.

The plan of the paper is as follows. We review the literature and develop our hypotheses in the next section. We describe our sample and present summary statistics in Section III. We examine the difference in cash policies among public and private US firms in Section IV. Sample selection issues are addressed in Section V. We conclude in Section VI with a brief summary.

II. Literature Review and Hypothesis Development

There is a substantial literature examining firms' motives for holding cash (see Bates, Kahle, and Stulz (2009) for an excellent summary of the state of the literature). For our purpose, we only review papers directly related to our empirical investigation, namely the role of financing frictions and agency conflicts, then proceed to develop our hypotheses.

II.A. Related Research

Firms hold cash to better cope with adverse shocks when access to capital markets is costly. Empirical research on cash holdings has generally found support for the precautionary motive—especially among firms with greater information asymmetry with

external capital providers (for example, Opler et al. (1999)). Work by Bates et al. (2009) has provided partial explanations for the rising trend in cash holdings by public US firms, finding support for precautionary motives, but not for agency-based explanations. Duchin (2010) provides further support for the precautionary demand explanation by showing that increasing cash flow uncertainty can help explain the build-up in cash holdings by public firms. From a more direct angle, Brav (2009) shows that cash holdings of private UK firms are more sensitive to operating cash flows than those of public firms, and that the former do not increase their investments concurrent with an increase in performance. Similarly, Saunders and Steffen (2010) compare borrowing costs for private and public firms. They show that private firms must pay higher borrowing costs, *ceteris paribus*, than do public firms, thus providing evidence of greater financing frictions for private firms.

In addition to the precautionary motive of holding cash, Jensen (1986) argues that entrenched managers would rather retain cash than increase payouts to shareholders when their firms have poor investment opportunities. Stulz (1990) characterizes the shareholders' problem as providing sufficient internal slack to avoid underinvestment while not providing too much so as to fund overinvestment. These discretionary cash holdings are typically estimated as the excess cash holdings derived from models controlling for the transaction and precautionary motives for holding cash. A number of recent papers by Dittmar et al. (2003), Dittmar and Mahrt-Smith (2007), Pinkowitz, Stulz, and Williamson (2006), and Harford et al. (2008) have provided support for the agency perspective of corporate cash policy: Excess reserves aggravate agency problems by providing a pool of accumulated free cash flow. Harford et al. (2008) find that firms with poor governance spend cash quicker than those with better governance, often to the effect that their accumulated reserves are actually lower. In contrast, studies such as Bertrand and Mullainathan (2003) suggest a slightly more benign form of agency

problems—the CEOs' desire for a quiet life, would lead to higher-than-optimal buffer stock cash holdings.

II.B. Hypothesis Development

Cash reserve policy should balance the precautionary demand identified in Baumol (1952), and Miller and Orr (1966) against agency problems highlighted in Jensen (1986), and Stulz (1990).

One of the primary reasons given for going public is to have lower-cost access to capital. Being listed provides liquidity and a market price for a firm's equity that substantially lowers its cost of equity capital. The transparency provided by listing may also reduce its cost of debt (Saunders and Steffen (2010)) and increase access to public debt, which has been shown to be important by Faulkender and Petersen (2006), but the implication is less clear. Given higher costs of accessing external capital, the precautionary motive should be stronger for private firms, leading to our first hypothesis:

Hypothesis 1: Private firms hold higher cash reserves than otherwise similar public firms.

At the same time, private firms have much fewer agency problems than public firms. Private firms often have owner-managers and at a minimum have concentrated illiquid ownership and large private lenders providing greater monitoring incentives (Gao et al. (2011)). The greater separation of ownership and control, along with the free-rider problem from dispersed highly liquid ownership, significantly increases agency problems in public firms. Fewer agency problems will reduce private firm managers' incentives to maintain a large supply of accessible funds. This leads to our second, opposing hypothesis:

Hypothesis 2: Private firms hold lower cash reserves than public firms and cash accumulation is greater in public firms.

Examining how private firms allocate accumulated cash can also provide insight into understanding cash allocation decisions of public firms. Assuming that agency problems help explain cash allocation by public firms, the difference in agency problems between public and private firms has implications for how private firms will allocate their cash. Harford et al. (2008) find that public US firms with poor governance deploy their excess cash quickly rather than allowing it to build up. They interpret this as support for the spending hypothesis—specifically that poorly governed managers prefer excess investment over pure slack accumulation. If agency problems explain cash deployment, then excess cash will be spent more slowly by private firms than it will for public firms. Thus, even though public firms hold more cash and accumulate it faster, once accumulated, they will attempt to spend it more quickly.

Hypothesis 3: Conditioning on excess cash, public firm CEOs deploy it faster than private firm CEOs.

Almeida et al. (2004) establish that constrained firms should and do show greater sensitivity of cash holdings to operating cash flows. Given that private firms should be more constrained than public firms in accessing external capital markets, we have the following hypothesis:

Hypothesis 4: Private firms exhibit higher cash-to-cash flow sensitivities than public firms.

The predictions for the sensitivity of cash holdings to investing and financing cash flows are less clear.[3] Positive financing cash flows imply that corporate managers have chosen to undergo external scrutiny in order to secure the funding. Firms that have made that choice are less likely to be characterized by severe agency problems. Net investing

[3] Cash flow from financing activities is defined as [(total debt issued – total debt repaid) + (total equity issued – total equity repurchased) – total dividend payment] scaled by total assets. Cash flow from investing activities is defined as [(sale of property, plant, and equipment) – capital expenditures – cash used in acquisition + cash from other investment] scaled by total assets.

cash flows are usually negative for growing firms and so firms do not generally save out of these flows, but can use cash reserves to fund their investments.

In our empirical analysis, we test these hypotheses and also attempt to distinguish between some of the alternative explanations for the differences. In the next section we describe our data and present summary statistics.

III. Our Sample

III.A. Sample Formation

Our primary data source is the Capital IQ (CIQ) database. Capital IQ is an affiliate of Standard & Poor's which produces the Compustat database. Starting from the late 1990s, CIQ provides data on some private US firms. When available, CIQ provides data on firm accounting information and CEO compensation with a similar level of detail as provided by Compustat and ExecuComp for public firms. It is worth noting that the private firms in our sample are large firms with some access and/or intend to gain access to the public debt market, and are more comparable to public firms than private firms as examined by Brav (2009), Asker et al. (2010), and Farre-Mensa (2010), in terms of disclosure and information asymmetry. Relatedly, one could also argue that our sample of private firms does not have as large of financing constraints as do private firms that do not have access to public debt.

We start with all private and public US firms with non-missing values for total assets in CIQ from 2000 to 2008. We require that public firms be traded on NYSE, AMEX, or NASDAQ. CIQ classifies a firm's public versus private status based on its most recent status. For example, Google is classified as a public firm throughout the firm's history in CIQ even though it became a public firm only in 2004. We search all the key dates for each firm in CIQ's IPO and delisting databases, to help classify a firm's

private (or public) status by back-filling. In the Google example, given that its IPO was in August 2004, Google is in our sample as a private firm from 1999 to 2003 and it becomes a public firm from 2004 onward. To clearly capture any difference in cash policies for public versus private firms, we omit the transitioning firm-year observation when a firm changes from being a private firm to becoming a public firm and vice versa.[4] We also note that as such, none of our results on higher cash holdings for public firms are due to capital-raising at the IPO date. We require that both our private and public firms have available financial information and CEO information. We also exclude financial firms and utilities following prior work such as Opler et al. (1999).[5]

CIQ only provides the CEO's most recent ownership information. Therefore, we manually collect historical CEO ownership. For private firms, we hand collect the ownership data from the firm's annual reports and proxy statements. For public firms, we first collect the ownership data from ExecuComp, Corporate Library, and RiskMetrics; for firms not covered in those databases, we hand collect the ownership data from the firm's annual reports and proxy statements. Ownership is the firm's shares owned by the CEO normalized by the total number of shares outstanding

In our final sample, we have 23,634 firm-year observations from 3,791 unique firms from the public side, and 3,836 firm-year observations from 1,093 unique firms from the private side. Data for a vast majority (92%) of the private firm-year observations in our sample come from Form 10-K (annual reports) filed with the SEC, and the remainder (7.8%) comes from Form S-1 (and its supplemental Form 424B) filed with the SEC due to public debt issuances or IPOs of stock.

[4] Within our sample, there are 63 instances of private firms transitioning to public firms via IPOs; and 39 instances of public firms transitioning to private firms.

[5] Financial firms' business involves holding marketable securities that are counted as cash, and they also need to meet statutory capital requirement. In a number of states, utilities' cash holdings are subject to regulatory oversight (Opler et al. (1999)).

III.B. Summary Statistics

Table 1 provides summary statistics for our sample. We have two samples of public firm-years. The first is all public firms for which we have data. The second is a sample of public firm-years matched to our private firms by industry and size. Prior work including Miller and Orr (1966), Harford (1999), Opler et al. (1999), and Dittmar et al. (2003) has shown that cash holdings tend to vary systematically by industry and larger firms tend to have lower cash holdings due to economies of scale in the transaction motive for cash. These findings motivate us to industry- and size-match our sample of private firms. Specifically, for each private firm-year observation in our sample, we match to a public firm-year observation in the same industry and closest in total assets. Matching is done with replacement so that the same public firm-year observation can be matched with multiple private firm-year observations. The matching procedure helps mitigate the large difference in the size distribution between the two samples and the smaller, but potentially important difference in sample firm distribution across industries. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles.

Cash is the ratio of cash and short-term investments to total assets. The first row shows that public firms hold substantially more cash. The mean (median) cash holdings is 21.37% (12.17%) for the all public firm sample, the mean (median) cash holdings is 19.23% (9.84%) for the matched public firm sample, while the mean (median) cash holdings is 11.89% (4.19%) for the private firm sample. The two-sample t-test and median-test both reject the null that cash holdings in public firms (using either the full or matched public firm sample) is the same as that in private firms at the 1% level. On average, cash holdings in public firms are approximately twice that in private firms.

One might argue that the difference in cash holdings between public and private firms is driven by the different industry representation across public and private firms. To

mitigate that concern, we compute industry-adjusted cash holdings as the difference between firm-specific cash holdings and its industry median based on Fama and French's (1997) 48 industry classification involving all sample public and private firms. We show that the contrast between public and private firms in terms of cash holdings is even more striking. The mean (median) industry-adjusted cash holdings is 5.29% (0.48%) for the all public firm sample, the mean (median) industry-adjusted cash holdings is 8.28% (1.76%) for the matched public firm sample, while the mean (median) industry-adjusted cash holdings is 1.01% (−1.79%) for the private firm sample. The two-sample t-test and median-test both reject the null that industry-adjusted cash holdings in public firms (using either the full or matched public firm sample) is the same as that in private firms at the 1% level.

Change in cash is simply the difference between this year's and last year's cash. We show that public firms' change in cash is positive and two to three times as large as private firms', indicating that, on average, public firms add to their cash reserves each year and do so by significantly more than do private firms. The univariate statistics thus far are consistent with the agency conflicts hypothesis of cash policy whereby there are more serious agency problems in public firms compared to private firms.

The mean (median) value of total assets is $2,296 million ($329 million) for the all public firm sample, the mean (median) value of total assets is $866 million ($217 million) for the matched public firm sample, and the mean (median) value of total assets is $1,047 million ($228 million) for the private firm sample.[6] The two-sample t-test and median-test both reject the null that public firms (using either the full or matched public firm sample) are of the same size as private firms at the 1% level (both p-values < 0.001). The fact that our private firm sample tends to consist of larger private firms actually

[6] Using the Sageworks database, Asker et al. (2010) shows that the sample average total assets is $144.7 million and $120.0 million for their matched public and private sample, respectively. The difference in firm size between the two samples is not statistically different at the 5% level.

makes our sample more comparable to public firms. The reader should bear in mind the sample selection criteria imposed on us by the data when deciding how our results might generalize.

In terms of profitability, public firms are more profitable than private firms: Their median operating cash flow is five times private firms'. The cash flow distribution is, however, significantly skewed, as shown by the negative mean cash flows.

Cash flow from financing is positive if net securities (including both debt and equity) issuance exceeds dividend payout. Row 6 of the table shows that cash flow from financing is slightly bigger for private firms compared to public firms, consistent with the fact that private firms pay less dividends than public firms do (shown by row 14 dividend numbers).[7]

Cash flow from investing is positive if sales of property, plant, and equipment exceed capital expenditures and acquisitions. For most firms, this is not the case and cash flow from investing is negative. Row 7 of the table shows that it is more negative for public firms on average, even though row 11 shows that capital expenditures are similar for public and private firms. Upon further investigation, we find that on average, private firms spend 3.2% of total assets on acquisitions, and public firms spend 2.7% on acquisitions (the median is 0% for both private and public firms). The private firms in our sample receive more cash from sales of property, plant, and equipment, which makes the cash flow from investing less negative for private firms.[8]

[7] Easterbrook (1984) suggests that dividends may help reduce the agency costs associated with the separation of ownership and control because they force managers to raise funds in the public capital markets more frequently than they would in the absence of dividends, thereby subjecting managers to frequent scrutiny by the markets. Given that public firms are subject to more severe agency problems than private firms, we expect that private firms will have lower dividend payouts than otherwise identical public firms. Both Michaely and Roberts (2007) and Brav (2009) show that empirically public firms pay out more dividends than private firms do.

[8] Using the Sageworks database, Asker et al. (2010) shows that private firms invest significantly more, as captured by the annual change in either gross or net fixed assets, than do public firms. Using the plant level

We calculate the cash flow volatility of public firms using the standard deviation of annual operating cash flows over the previous five years.[9] Private firms have more limited data coverage, so we use the entire period from 2000-2008 with a minimum of three data points to calculate the cash flow volatility of private firms. We show that cash flow volatility is actually higher for private firms. A standard precautionary demand model for cash holdings would predict a higher average level of cash holdings in the face of greater cash flow volatility, but the univariate results from row 1 indicate the opposite.

Public firms' sales growth is somewhat higher, while leverage is drastically higher in private firms, consistent with the fact that private firms must rely on debt and internally generated equity, while public firms are able to tap the public equity markets (as shown by Brav (2009), and Asker et al. (2010)). As with the greater cash flow volatility, the effect of greater leverage would be to increase cash holdings both to reduce net debt and to provide a buffer to meet interest obligations.

Net working capital is defined as the difference between current assets and current liabilities excluding cash. Net working capital can be a substitute for cash (Opler et al. (1999)) or it may compete for the available pool of resources (Fazzari and Petersen (1993)). We show that the median value of net working capital for public firms is significantly lower than private firms, consistent with row 1 numbers where public firms hold more cash and the view that holding liquid assets besides cash as a substitute means of raising liquidity (Opler et al. (1999)). Private firms spend less in R&D and dividend payout, while public firms have a slightly higher tendency to have multiple segments, and are older. The former set of results is consistent with information asymmetries/transaction costs models of cash holdings that firms with lower R&D expenses and dividend payouts will hold less more liquid assets (Opler et al. (1999)). The latter set of results does not

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data, Maksimovic, Phillips, and Yang (2010) show that public firms are more acquisitive and more likely to sell assets than private firms.

[9] One reason for us not to use quarterly earnings to compute the standard deviation of earnings is seasonality exhibited in the quarterly earnings numbers.

support the notion that selling non-core assets is another viable substitute to holding cash (Lang, Poulsen, and Stulz (1995)).

Foley, Hartzell, Titman, and Twite (2007) find that US companies that would incur tax consequences associated with repatriating foreign earnings hold higher levels of cash. We define MNC, an indicator variable to take a value of one if the fraction of foreign sales to total sales of a firm exceeds 20%, and zero otherwise. We find that the fraction of multinational companies is highest among the all public firm sample (at 26%), the second highest among the matching public firm sample (at 18%), and the lowest among the private firm sample (11%).

Turning to the governance variables, we see that public firms are more likely to have a joint CEO and Chairman of the Board. As expected, CEOs of public companies have lower ownership, but higher equity-based compensation (EBC).[10]

Bates et al. (2009) note that the average cash ratio (relative to assets) for US firms more than doubles from 1980-2006. In Table 2, we present cash ratios over time for the all public firm sample, the matched public firm sample, and the private firm sample. For all public firms, the average (median) cash ratio increases from 18.71% (7.52%) in 2000 to 20.28% (11.51%) in 2008. For the matched public firms, the average (median) cash ratio increases from 17.54% (9.25%) in 2000 to 23.59% (12.65%) in 2008. In contrast, for the private firm sample, the average (median) cash ratio only increases from 13.94% (4.43%) in 2000 to 14.68% (5.20%) in 2008. We show that despite the evidence that

[10] We follow Gao et al. (2011) to estimate the value of equity-based compensation. For public firms, we calculate the dollar value of each option grant, based on ExecuComp's modified Black-Scholes approach. When private firms in our sample pay their CEOs with restricted stock, we take the value of restricted stock as reported by the firm. With respect to the value of option grants for private firm CEOs, we hand collect relevant information and make the following assumption to compute the value : (1) the volatility is the median volatility of public firms in the same industry and size decile; (2) the risk-free rate is the seven-year Treasury bond yield prevailing on the grant date; (3) the grant-date stock price is the exercise price (the option is granted at-the-money); (4) the dividend yield is zero; and (5) the time to maturity is 70% of the stated maturity.

financing frictions are greater for private firms than for public firms, the effect of agency conflicts is strong enough to lead to higher growth in cash holdings of the latter.

Table 3 presents the correlation matrix for the variables used in this study. None of the correlations are high enough to present collinearity problems for our multivariate analysis. In the next section, we will implement multivariate analyses to test our hypotheses.

IV. Main Results

IV.A. Excess Cash Holdings

Table 4 Panel A presents the regression results of a model for normal levels of cash holdings based on the extant literature (for example, Kim, Mauer, and Sherman (1998), Opler et al. (1999), Dittmar and Mahrt-Smith (2007), Foley et al. (2007), and Harford et al. (2008)):

$$Cash = \alpha + \beta_1 Public + \beta_2 Firm\ Size + \beta_3 Cash\ Flow + \beta_4 CF\ Volatility$$
$$+ \beta_5 Other\ Firm\ Characteristics + \beta_6 CEO\ Characteristics + Year\ FE + Industry\ FE + \varepsilon. \quad (1)$$

The results confirm the univariate findings from Table 1. Specifically, public firm cash holdings are still abnormally high controlling for a host of factors from the literature on cash holdings. We present results using the full sample of public firm-years (Columns (1)-(2)) as well as the matched public firm sample (Columns (3)-(4)). The inferences are the same for the two samples, with the public firm effect being about 50% larger in the matched sample: The coefficient on the public indicator variable is 0.039 for the full sample of public firms together with private firms; and the coefficient on the public indicator variable is 0.065 for the matched public firms together with private firms. In brief, public firms hold cash reserves that are 3.9% to 6.5% of assets higher than are those of similar private firms.

The coefficients on the control variables are consistent with prior findings: Larger firms and those with greater cash flows hold lower cash reserves, while firms with more volatile cash flows and greater sales growth hold more. Leverage and capital expenditures have negative effects on cash reserves and there is a substitution effect between non-cash working capital which can easily be converted into cash and cash. Multinational firms due to tax considerations hold more cash; while older, dividend-paying firms with multi-segments hold less cash.

Finally, the governance results are consistent with the seemingly counterintuitive results (found in Harford et al. (2008)) that better governance in public firms leads to higher cash reserves. The estimates show that greater CEO ownership and higher equity-based CEO compensation are associated with higher cash reserves. One possible interpretation offered by Opler et al. (1999) is that due to managerial risk aversion, managers with higher equity ownership/incentives may wish to protect their human capital with a bigger cash buffer. We will investigate the net effect of the propensity of self-interested managers to both accumulate and invest cash in later tests. Notably, the positive effect of CEO ownership does not hold in the private-only sample.

We also present separate regressions for the private firms and matched public firms (Columns (5)-(6), respectively). For the most part, the factors have similar effects on the cash policies of private and public firms. However, the effect of firm size on cash is about twice as large for private than public firms, and the effects of cash flow level and cash flow volatility are substantially greater for private firms (they are even insignificant for public firms). On the other hand, the effect of leverage is smaller and there is no substitution effect for non-cash working capital in private firms. The reduced variation for some of the explanatory variables reduces their significance. For example, private firms typically have high CEO ownership and only one segment, so we find no effect from the number of segments or CEO ownership on cash in private firms. Similarly,

matched public firms are less likely to be multinational, so the coefficient becomes smaller and of no significance.

Since firms may choose leverage, cash holdings, payout policy, and investment policy simultaneously, following Opler et al. (1999), and Dittmar et al. (2003), we estimate a reduced form model of cash by removing leverage, capital expenditures, and dividend from the set of explanatory variables. Table 4 Panel B presents the results.

We show that most of firm characteristics remain to have the same significant effects on the level of cash holdings. Importantly, the coefficient on the public indicator variable is 0.087 for the full sample of public firms together with private firms; and the coefficient on the public indicator variable is 0.084 for the matched public firms together with private firms. Using the reduced form model of cash, public firms hold cash reserves that are 8.4% to 8.7% of assets higher than are those of similar private firms.

Another robustness check we implement is to remove the transitory component of cash holdings, that is, the portion of cash holdings that will be spent in the near time, to see if our main findings on the excess cash holdings by public firms remain. To capture the transitory component of cash holdings, following Opler et al. (1999), we use the next year's cash spending, defined as the difference between normalized cash holdings in year t and year t+1, and add it to the set of explanatory variables. Table 4 Panel C presents the results.

We show that most of firm characteristics remain to have the same significant effects on the level of cash holdings, except that the coefficients on CEO ownership and equity-based incentive are no longer significant. Importantly, the coefficient on the public indicator variable is 0.032 for the full sample of public firms together with private firms; and the coefficient on the public indicator variable is 0.056 for the matched public firms together with private firms. Controlling for the existence of transitory cash holdings,

public firms hold cash reserves that are 3.2% to 5.6% of assets higher than are those of similar private firms.

Prior work has shown that managerial equity ownership might mitigate agency conflicts: Firms with inside ownership between 5% and 25% are traded at higher market valuation than other firms (see for example, Morck, Shleifer, and Vishny (1988)). Following Harford (1999) and Opler et al. (1999), we introduce three CEO ownership variables using the 5% and 25% cutoffs. Table 4 Panel D presents the results.

We show that firm characteristics remain to have the same significant effects on the level of cash holdings. Notably, the coefficient on CEO ownership ≤ 5% is positive and significant, suggesting that poorly governed firms as captured by relatively low CEO equity ownership are associated with higher cash holdings. Importantly, the coefficient on the public indicator variable is 0.040 for the full sample of public firms together with private firms; and the coefficient on the public indicator variable is 0.063 for the matched public firms together with private firms. Controlling for different levels of CEO equity ownership, public firms hold cash reserves that are 4.0% to 6.3% of assets higher than are those of similar private firms.

Campello, Giambona, Graham, and Harvey (2010) demonstrate that one important source of liquidity is unused credit lines—a measure of external liquidity (vis-à-vis measures of internal liquidity in terms of cash holdings that we focus on in this paper and profitability). As such, one possible explanation for our findings of excess cash holdings by public firms is that private firms might have better access to credit lines. However, Agarwal, Chomsisengphet, and Driscoll (2011) show that lines of credit are more expensive for private firms, so credit lines cannot explain private firms' lower cash holdings.

In summary, our results reject Hypothesis 1 that financing frictions would lead private firms to hold more cash and support instead Hypothesis 2 that reduced agency

problems would lead private firms to hold less cash. In fact, given that it is unlikely that financing frictions are irrelevant, the results can be viewed as the net effect of the reduction in agency problems and the increase in financing frictions. Thus, the conclusion that agency problems associated with public status increases cash reserves by, on average, about 3.9% to 6.5% of assets is conservative.

IV.B. Changes in Cash

Table 5 presents the regression results of a model explaining annual changes in cash. Consistent with the univariate results in Table 1, on average, public firms add to their cash reserves in a given year and by more than do private firms: The coefficient on the public indicator variable is between 0.014 to 0.015 for the full sample of public firms and the matched public firms (together with private firms). Cash flow level has a negative effect on the change in cash holdings (Columns (1)-(2)), but the subsample results suggest that this is due only to the larger public firms (Columns (5)-(6)). Cash flow volatility leads firms to add more to their cash holdings, an effect which is stronger in public firms.[11] Overall, the regression results reveal that explaining the change in cash is much more difficult than explaining the level of cash.

We conclude that public firms add more to their cash reserves in a given year, even controlling for spending and savings factors, than do similar private firms. Next, we examine whether, among firms with excess cash holdings, public firms spend more of it than do private firms.

IV.C. Accumulation and Dissipation of Excess Cash

[11] Please note that there is no estimate for cash flow volatility in Column (5), because each private firm only has one cash flow volatility computed based on the whole sample period. There is no within-firm variation in private firm cash flow volatility employing firm fixed effects in Column (5).

Given that we find that public firms accumulate cash faster than their private firm counterparts, their agency conflicts may also lead them to disgorge cash faster (as shown by Harford et al. (2008) for poorly governed public US firms). For that purpose, we examine the subsample of firms that accumulate excess cash. We define excess cash as a positive residual from Table 4 Column (1), where we provide a model of cash. Similar to Dittmar and Mahrt-Smith (2007), we focus on firms that have excess cash at time *t* and examine both the accumulation of that excess cash (excess cash at *t* minus excess cash at *t-1*) and the dissipation of that excess cash (excess cash at *t+1* minus excess cash at *t*). Table 6 presents the results.

Panel A presents the transition matrix for positive excess cash, that is, the fraction of public firms (using the all public firm sample, versus private firms) with excess cash at *t* that also have it at *t+1* and the fraction without it at *t* that have it at *t+1*. We find that private firms are slightly more likely (81% versus 79%) to remain in the positive excess cash group once there. Private firms without positive excess cash are more likely (19% versus 16%) to enter the positive excess cash group the following year than public firms are. The transition matrix is a useful baseline, and we explore the dynamics of cash further in Panel B.

Panel B presents the regression results where we include the industry average (median) change in excess cash to capture the impact of industry wide changes in investment opportunities, profitability, and other needs as drivers of cash changes. In Columns (1)-(2), the dependent variable is the past change in excess cash relative to assets (cash ratio at *t* minus ratio at *t-1*). We show that the accumulation moves almost one for one with what is happening at the industry level: The coefficient on the lagged industry average (median) change in excess cash is around one. Notably, the coefficient on the public firm indicator variable is positive and significant, suggesting that public firms display a stronger accumulation of excess cash than private firms do.

In Columns (3)-(4), the dependent variable is the future change in excess cash relative to assets (cash ratio at *t+1* minus ratio at *t*). We show that the dissipation also moves almost one for one with what is happening at the industry level: The coefficient on the industry average (median) change in excess cash is around one. The coefficient on the public firm indicator variable is negative and significant, suggesting that public firms display a stronger dissipation of excess cash than private firms do.

Harford et al. (2008) hypothesize that, as in the quiet life hypothesis of Bertrand and Mullanathan (2003) self-interested managers may prefer flexibility and freedom from capital market discipline that large cash reserves affords them. If so, greater agency problems would result in managers accumulating and holding cash. Harford et al. (2008) alternatively hypothesize that self-interested managers' preference for investment could lead them to spend cash reserves as soon as they accumulate. Additionally, as found in papers such as Faleye (2004), in the US, large cash reserves attract activist attention, which is inconsistent with a quiet life for managers. Our finding that, compared to private firms, public firms accumulate and dissipate cash more quickly, while holding generally larger cash reserves is consistent with this view of the agency problems in the firm. At any given time, with some firms accumulating and some firms dissipating, the average observed cash level will be somewhere in the middle, above the low point, which corresponds to the amount that private firms without agency problems hold.

Overall, the results in Table 6 continue to support the dominance of the agency effect over that of financing frictions. Public firms add more to their cash reserves in a given year and, once they have accumulated excess reserves spend more than do private firms, consistent with our Hypothesis 3. In our final investigation to help assess the relative effect of agency conflicts vis-à-vis financing frictions, we estimate cash-to-cash flow sensitivities that have been more successful in the cash literature.

IV.D. Cash-to-Operating Cash Flow Sensitivities

In Table 7, we estimate the cash-to-operating cash flow sensitivity for the sample firms. The dependent variable is the change in cash ratio. The key variable of interest is the interaction between the public firm indicator variable and the cash flow level variable.

The first two rows show that public firms still have a regular tendency to add to their cash reserves, but that their sensitivity to operating cash flow—the portion of operating cash flow that they save—is significantly lower than it is for private firms. In the full sample (as shown in Columns (1)-(2)), the total effect is even negative, but in the matched sample (as shown in Columns (3)-(4)), public firms' cash-to-operating cash flow sensitivity is essentially zero. Overall, the cash-to-cash flow sensitivities are quite similar in magnitude as shown in Almeida et al. (2004). On the other hand, the coefficients capturing cash-to-cash flow sensitivities for their constrained firms are substantially higher, suggesting that our sample of private firms is not as constrained as their constrained firms, which might not be surprising given that 249 (24%) of our private firms have access to public debt as of December 31, 2008.[12]

We conclude that the results in Table 7 support the effect of financing frictions in cash policy as captured in Hypothesis 4: Private firms' savings behavior will be more sensitive to operating cash flows.[13]

IV.E. Cash-to-Financing Cash Flow Sensitivities

Table 8 presents the results of examining the sensitivity of cash holdings to financing cash flows. We show that public firms save much more out of financing cash

[12] CIQ only records the firm's current public debt status; it does not have the historical information on public debt. Therefore, the above number may underestimate the number (percentage) of private firms with public debt.

[13] One could imagine that agency problems would affect the degree to which managers choose to stockpile cash from cash flows as a large number of papers have shown. However, it is not obvious what the directional effect of agency problems on cash-to-cash flow sensitivities: Managers could prefer a stockpile of cash or immediate spending. As a result of this ambiguity, our interpretation of the results on cash-to-cash flow sensitivities is mainly from the financing frictions perspective.

flows, but this does not fully explain their higher savings rate in general as the coefficient on the public firm indicator variable itself is still positive. The difference is bigger in the full sample than in the matched sample, suggesting that larger public firms save the most out of financing cash flows. This result is broadly consistent with Kim and Weisbach (2008) and McLean (2011), who show that public firms save a substantial fraction of cash raised in equity issuance deals and equity issuance has become the primary source of capital for public firms to build cash reserves. In summary, Tables 7 and 8 suggest that, due to fewer financing frictions, public companies rely more on external financing to accumulate cash while private firms' cash balances are more sensitive to their ability to generate operating cash flows and save out of those cash flows.

IV.F. Cash-to-Investing Cash Flow Sensitivities

In Table 9 we estimate cash sensitivity to investing cash flows. We do this separately for positive and negative investing cash flows as we would expect that firms may respond differently to net investment outlays as opposed to net inflows from sales of property, plant, and equipment.

We show that cash reserves are more sensitive to investment outflows (as compared to Table 7), indicating that companies spend from cash reserves to fund investments. In the full sample, public companies spend less out of cash reserves to fund investments than do private companies, but this effect reverses in the matched sample, where the coefficient is positive, but insignificant.

V. Dealing with Endogeneity

Going public, of course, is not an exogenous event: Most firms go public for reasons that correlate with their financing or investment decisions (see for example, Brav (2009), Asker et al. (2010), and Maksimovic et al. (2010)). To account for the possible

selection effect, the processes of cash holdings and the public status of a firm can be modeled as follows:

$$Cash = X\beta + \beta_1 Public + \varepsilon,$$

$$Public^* = Z\gamma_2 + \omega,$$

$$Public = 1, if\ Public^* > 0; = 0, if\ otherwise \qquad (2)$$

In Equation (2), *Cash* is cash holdings. *X* is a list of control variables that include firm and corporate governance characteristics. The coefficient of key interest is β_1, in front of the indicator variable *Public*. Variable *Public** indicates the latent propensity of a firm becoming public. For the purpose of identification, we need instrumental variables that affect a firm's propensity of going public, but do not affect its cash holdings directly other than through the effect of being public. That is, the vector of *Z* in Equation (2) must contain variables in addition to a full overlap with the vector of *X*. The *Public* status variable is allowed to be endogenous in the sense that $corr(\varepsilon, \omega) \neq 0$. A positive (negative) association indicates that cash holdings of public firms are larger (smaller) based on unobservable heterogeneity. Thus, an estimate for β_1 is upward (downward) biased if the endogeneity is not properly accounted for.

To allow for time-varying unobserved heterogeneity across firms, we resort to the treatment regression using the maximum likelihood estimator developed by Maddala (1983, Chapter 5), where the indicator variable *Public* is treated endogenous.

Our choice of the instrumental variable is theoretically as well as econometrically driven. The first variable is industry median market-to-book (M/B) ratio of public firms. Pagano, Panetta, and Zingales (1998) show that industry median M/B is one of the variables that have the biggest effects on a firm's IPO decision. Our second instrument is the number of IPOs in the industry. Boehmer and Ljungqvist (2004) show that the number of IPOs reflects the overall market condition, which is an important consideration for going public decisions. Most importantly, these two variables are unlikely to directly

impact a firm's cash policy due to the exogeneity of industry-wide conditions to individual firms.

The results from estimating Equation (2) using the treatment regression method on the all public firm and private firm sample are reported in Table 10. The identification relies on both the instrumental variables and the non-linearity of the propensity of going public. As shown in Column (1), both the industry median M/B and Ln(# of IPOs) have positive and significant coefficients in the first stage probit regression.

In Column (2) the dependent variable is *Abcash*. The coefficient on *Public* captures the effect of being a public firm, taking into account the possible selection of going public decisions. The effect is, again, positive, and the magnitude is now 6.6% of assets (significant at the 1% level), which is much larger than that of the coefficients in Column (2) of Table 4 without controlling for the selection effect. Such a difference indicates that $\rho = corr(\varepsilon, \omega) < 0$, where ε and ω are disturbances in equations of cash holdings and the propensity of becoming a public firm, respectively, as specified in Equation (2). The exogeneity test rejects the null hypothesis that $\rho = 0$ at the 1% level.

Results in Table 10 Column (2) indicate that there is a selection effect associated with being a public firm. In our sample, firms that go public tend to have lower cash holdings conditional on observable firm and governance characteristics. That is, these firms would otherwise be associated with *lower* cash holdings (after controlling for observable characteristics) had they not been public firms. To the extent that the treatment regression framework is valid, such a selection effect makes the interpretation of a causal effect stronger as it renders the effect of being public under-estimated using an OLS regression (as in Table 4). It provides further support for the effect of agency conflicts instead of financing frictions on cash policies. Similar results can also be found in Column (3), where the dependent variable is $\Delta Cash$. The coefficient on *Public* is

0.032, about two times bigger in magnitude than the one in Table 5 without controlling for the selection effect.

In Columns (4)-(7), we examine the sensitivities of cash to operational cash flow, financing cash flow, and investing cash flow, respectively. Similar to the prior results that did not control for the selection issues, the change of cash in public firms, as opposed to private companies, are less sensitive to operational cash flow and investing outflow, but more sensitive to financing cash flow.

VI. Conclusions

In this paper, we provide a large sample comparison of cash policies in public and private US firms. The use of private firms provides a conservative estimate of the effect of agency costs on cash holdings.

Using a sample of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, we first show that despite the fact that financing frictions are greater for private firms, the effect of agency conflicts is strong enough to lead to much higher cash holdings and growth in those holdings for public firms.

Upon further investigation, we show that these higher cash holdings are partially caused by the fact that public firms add more to their cash reserves in a given year, even controlling for a number of spending and savings factors, than do similar private firms. At the same time, however, we find that among firms with excess cash holdings, public firms spend more of it than do private firms. Thus, public firm managers are more aggressive in both accumulating and dissipating cash reserves. Nonetheless, the net effect is that they hold more cash on average.

Finally, consistent with the presence of financing frictions, we find that private firms' cash-to-cash flow sensitivity is higher than that of public firms. Overall, despite

clear evidence of financing friction effects in private firms, we find that the net effect of the reduced agency conflicts and increased financing frictions is for private firms to hold less cash than similar public firms. The implication of this is that the observation that public firms hold about twice as much cash relative to assets as do private firms is a very conservative estimate of the agency costs effect on cash policy.

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Table 1. Summary Statistics

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. Cash is the cash and short-term investments scaled by total assets. Industry-adjusted cash is the industry median-adjusted cash ratio. ΔCash is the change in the cash ratio. Total assets is the book value of total assets. CF from operating activities is the operating cash flow scaled by total assets, where the operating cash flow is computed as earnings after interest, dividends, and taxes but before depreciation. CF from financing activities (Financing CF) is defined as [(total debt issued – total debt repaid) + (total equity issued – total equity repurchased) – total dividend payment] scaled by total assets. CF from investing activities (Investing CF) is defined as [(sale of property, plant, and equipment) – capital expenditures – cash used in acquisition + cash from other investment] scaled by total assets. For public firms, we calculate cash flow (CF) volatility using the standard deviation of annual operating cash flows over the previous five years. For private firms, due to limited data available we use the entire period from 2000-2008 with a minimum of three data points to calculate CF volatility. Sales growth is the change in sales. Leverage is the total debt scaled by total assets. Capex is the capital expenditures scaled by total assets. R&D is the R&D scaled by total assets. Net working capital is defined as (current assets – current liabilities – cash) scaled by total assets. Dividend is an indicator variable, equal to one if the firm pays dividend, and zero otherwise. # of segments is the number of segments a firm has. Firm age is the number of years since the firm's incorporation. MNC takes a value of one if the fraction of foreign sales to total sales exceeding 20%, and zero otherwise. CEO Chairman is an indicator variable, equal to one if the CEO is also the Chairman of the Board, and zero otherwise. CEO ownership is the firm's shares owned by the CEO scaled by the total number of shares outstanding. For private firms, we hand collect the ownership data from the firm's annual reports and proxy statements. For public firms, we first collect the ownership data from ExecuComp, Corporate Library, and RiskMetrics; and for firms not covered in those databases, we hand collect the ownership data from the firm's annual reports and proxy statements. CEO equity-based pay (EBC) is the fraction of the CEO's annual compensation paid in the form of restricted stock and option grant. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles.

	All public firms			Matched public firms			Private firms		
	Mean	Median	StdDev	Mean	Median	StdDev	Mean	Median	StdDev
Cash	21.37%	12.17%	23.11%	19.23%	9.84%	22.51%	11.89%	4.19%	19.25%
Industry-adjusted cash	5.29%	0.48%	18.94%	8.28%	1.76%	20.02%	1.01%	-1.79%	17.45%
ΔCash	2.31%	0.90%	10.12%	1.80%	0.67%	11.29%	0.94%	0.21%	9.37%
Total assets	2296	329	6409	866	217	2246	1047	228	3649
CF	-1.41%	4.19%	23.25%	-6.24%	3.55%	30.93%	-11.15%	0.70%	32.78%
Financing CF	3.29%	-0.15%	20.45%	7%	-0.07%	32.99%	7.59%	0%	29.16%
Investing CF	-7.02%	-5.49%	14.43%	-6.98%	-5.43%	16.81%	-5.41%	-2.83%	14.74%
CF volatility	6.43%	3.82%	10.11%	9.01%	3.78%	16.37%	12.02%	5.35%	15.83%
Sales growth	24.17%	10.00%	67.45%	25.43%	8.73%	88.57%	24.31%	6.74%	84.96%
Leverage	18.11%	13.39%	19.81%	23.20%	15.93%	30.45%	46.90%	44.21%	37.55%
Capex	4.81%	3.06%	5.45%	5.52%	3.19%	6.58%	5.00%	3.05%	6.30%
R&D	4.90%	0	9.61%	4.57%	0	13.20%	3.03%	0	10.42%
Net working capital	-9.24%	-3.83%	31.29%	-9.06%	-3.84%	36.21%	-10.64%	-0.27%	27.18%
Dividend	0.30	0	0.46	0.28	0	0.45	0.21	0	0.41
# of segments	1.96	1	1.28	1.86	1	1.18	1.63	1	1.08
Firm age	37	23	34	35	23	32	30	16	34
MNC	0.26	0	0.44	0.18	0	0.38	0.11	0	0.27
CEO Chairman	0.65	1	0.47	0.65	1	0.48	0.53	1	0.41
CEO ownership	6.49%	1.74%	11.49%	8.79%	2.60%	13.84%	12.22%	3.70%	19.51%
CEO EBC	28.85%	18.36%	31.03%	21.07%	0	27.96%	8.18%	0	20.73%

Table 2. Cash Ratios Over Time

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. Cash is the cash and short-term investments scaled by total assets. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles.

	All public firms				Matched public firms				All private firms			
Year	# of Firms	Median Total Assets	Average Cash Ratio	Median Cash Ratio	# of Firms	Median Total Assets	Average Cash Ratio	Median Cash Ratio	# of Firms	Median Total Assets	Average Cash Ratio	Median Cash Ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2000	2244	318	18.71%	7.52%	279	72	17.54%	9.25%	279	67	13.94%	4.43%
2001	2648	294	19.69%	9.36%	451	135	16.11%	7.04%	451	145	9.64%	2.55%
2002	2753	294	20.74%	11.21%	492	224	16.57%	7.64%	492	226	9.57%	2.90%
2003	2816	320	22.38%	13.17%	498	242	18.49%	9.41%	498	242	11.19%	4.33%
2004	2879	359	22.85%	14.32%	515	259	20.69%	11.98%	515	261	12.40%	4.82%
2005	2704	372	22.68%	14.60%	467	295	20.96%	12.83%	467	312	12.46%	4.67%
2006	2755	432	22.38%	13.81%	399	289	20.51%	10.02%	399	305	11.96%	4.45%
2007	2381	445	21.94%	12.84%	379	309	19.09%	8.92%	379	312	12.90%	4.63%
2008	2454	441	20.28%	11.51%	356	294	23.59%	12.65%	356	295	14.68%	5.20%

Table 3. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Public	1																	
2 Ln(asset)	0.17	1																
	[0.00]																	
3 CF	0.14	0.41	1															
	[0.00]	[0.00]																
4 Financing CF	-0.07	-0.33	-0.50	1														
	[0.00]	[0.00]	[0.00]															
5 Investing CF	-0.04	-0.04	-0.16	-0.36	1													
	[0.00]	[0.00]	[0.00]	[0.00]														
6 CF Volatility	-0.19	-0.40	-0.38	0.28	0.05	1												
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]													
7 Sales growth	0.00	-0.10	-0.12	0.20	-0.08	0.14	1											
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]												
8 Leverage	-0.39	0.07	-0.14	0.01	0.05	0.04	-0.03	1										
	[0.00]	[0.05]	[0.00]	[0.14]	[0.74]	[0.00]	[0.00]											
9 Capex	-0.01	0.02	0.07	0.11	-0.28	-0.02	0.09	0.07	1									
	[0.05]	[0.00]	[0.00]	[0.88]	[0.00]	[0.00]	[0.00]	[0.00]										
10 R&D	-0.03	-0.20	-0.31	0.25	0.02	0.13	0.04	0.02	0.00	1								
	[0.00]	[0.00]	[0.00]	[0.82]	[0.00]	[0.00]	[0.00]	[0.00]	[0.83]									
11 Net Working Captial	0.01	0.40	0.17	-0.12	0.00	-0.17	-0.09	0.04	-0.05	-0.31	1							
	[0.00]	[0.00]	[0.00]	[0.09]	[0.56]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]								
12 Dividend	0.06	0.38	0.18	-0.18	-0.02	-0.18	-0.09	0.01	0.02	-0.09	0.10	1						
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]							
13 Number of Segments	0.09	0.40	0.17	-0.15	0.00	-0.17	-0.09	0.04	-0.05	-0.09	0.09	0.26	1					
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]						
14 Ln(Firm Age)	0.15	0.33	0.27	-0.26	0.04	-0.20	-0.21	-0.03	-0.06	-0.13	0.15	0.37	0.28	1				
	[0.00]	[0.00]	[0.00]	[0.06]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]					
15 MNC	0.13	0.18	0.05	-0.06	0.02	-0.06	-0.05	-0.10	-0.11	0.02	0.01	0.07	0.16	0.12	1			
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]	[0.00]	[0.00]	[0.00]				
16 Chairman	0.09	0.13	0.08	-0.04	-0.05	-0.08	-0.01	-0.01	0.02	-0.04	0.04	0.09	0.08	0.09	0.02	1		
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]			
17 Ownership	-0.15	-0.26	-0.01	0.01	0.01	0.06	0.00	0.06	0.02	-0.01	0.02	-0.08	-0.08	-0.08	-0.11	0.17	1	
	[0.00]	[0.00]	[0.00]	[0.07]	[0.09]	[0.00]	[0.00]	[0.10]	[0.00]	[0.18]	[0.0029]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]		
18 EBC	0.23	0.38	0.10	-0.07	-0.04	-0.08	-0.02	-0.13	0.01	-0.02	-0.04	0.09	0.11	0.10	0.14	0.06	-0.25	1
	[0.01]	[0.04]	[0.61]	[0.07]	[0.00]	[0.21]	[0.49]	[0.32]	[0.00]	[0.09]	[0.000]	[0.00]	[0.01]	[0.41]	[0.00]	[0.00]	[0.00]	

Table 4. The Cash Model

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. The dependent variable is the industry median-adjusted cash ratio. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Panel A presents the baseline models. Panel B present the reduced form models by removing leverage, capital expenditures, and dividend from the set of explanatory variables. Panel C controls for the transitory component of cash holdings by including the future year change in cash holdings. Next-year's cash spending = cash/total asset (t+1) – cash/total asset (t). Panel D controls for different levels of CEO ownership. CEO ownership ≤ 5% is equal to the actual ownership if CEO ownership ≤ 5%, and zero otherwise. CEO ownership > 5% to ≤ 25% is equal to the actual ownership if CEO ownership is between 5% and 25%, and zero otherwise. CEO ownership > 25% is equal to the actual ownership if CEO ownership > 25%, and zero otherwise. Industry and year fixed effects are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

Panel A: The Baseline Model of Cash

	All public firms and private firms		Matched public firms and private firms		Private firms only	Matched public firms only
	(1)	(2)	(3)	(4)	(5)	(6)
Public	0.039***	0.039***	0.065***	0.064***		
	[0.000]	[0.000]	[0.000]	[0.000]		
Ln(Total assets)	-0.009***	-0.009***	-0.016***	-0.015***	-0.019***	-0.007*
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.059]
CF	-0.086***	-0.087***	-0.039	-0.042*	-0.046**	-0.002
	[0.000]	[0.000]	[0.121]	[0.097]	[0.024]	[0.956]
CF volatility	0.122***	0.120***	0.136***	0.134***	0.161***	-0.003
	[0.000]	[0.000]	[0.001]	[0.001]	[0.001]	[0.967]
Sales growth	0.009***	0.009***	0.002	0.002	0.002	-0.006
	[0.000]	[0.000]	[0.555]	[0.518]	[0.484]	[0.419]
Leverage	-0.189***	-0.188***	-0.085***	-0.085***	-0.054***	-0.167***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Capex	-0.265***	-0.268***	-0.202***	-0.203***	-0.219***	-0.179**
	[0.000]	[0.000]	[0.001]	[0.001]	[0.000]	[0.044]
R&D	-0.017	-0.017	-0.007	-0.007	-0.002	0.029
	[0.510]	[0.510]	[0.547]	[0.572]	[0.749]	[0.612]
Net working capital	-0.053**	-0.052**	-0.014**	-0.014**	-0.001	-0.291***
	[0.014]	[0.014]	[0.044]	[0.045]	[0.603]	[0.000]
Dividend	-0.008*	-0.007*	-0.006	-0.006	0.005	-0.012
	[0.077]	[0.090]	[0.360]	[0.335]	[0.550]	[0.130]
# of segments	-0.011***	-0.011***	-0.009***	-0.009***	-0.004	-0.008***
	[0.000]	[0.000]	[0.001]	[0.000]	[0.196]	[0.007]
Ln(Firm age)	-0.022***	-0.022***	-0.012***	-0.012***	-0.010***	-0.007
	[0.000]	[0.000]	[0.005]	[0.004]	[0.005]	[0.298]
MNC	0.010**	0.010**	0.022***	0.022***	0.026*	0.015
	[0.036]	[0.043]	[0.009]	[0.009]	[0.054]	[0.114]
CEO Chairman		-0.005		0.006	0.007	0.008
		[0.222]		[0.483]	[0.459]	[0.469]
CEO ownership		0.036**		0.053**	0.015	0.138***
		[0.047]		[0.023]	[0.340]	[0.008]
CEO EBC		0.014**		0.015	0.037*	-0.014
		[0.016]		[0.254]	[0.053]	[0.328]
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.355***	0.355***	0.414***	0.395***	0.473***	0.277***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]
Observations	27470	27470	7672	7672	3836	3836
Adj R2	21%	21%	20%	20%	23%	40%

Panel B: The Reduced Form Model of Cash

	All public firms and private firms		Matched public firms and private firms	
	(1)	(2)	(3)	(4)
Public	0.087***	0.085***	0.084***	0.084***
	[0.000]	[0.000]	[0.000]	[0.000]
Ln(Total assets)	-0.013***	-0.014***	-0.016***	-0.015***
	[0.000]	[0.000]	[0.000]	[0.000]
CF	-0.049***	-0.049***	-0.007	-0.010
	[0.000]	[0.000]	[0.749]	[0.665]
CF volatility	0.126***	0.121***	0.132***	0.130***
	[0.000]	[0.000]	[0.002]	[0.002]
Sales growth	0.010***	0.010***	0.003	0.003
	[0.000]	[0.000]	[0.450]	[0.410]
R&D	-0.026	-0.026	-0.013	-0.012
	[0.325]	[0.318]	[0.215]	[0.230]
Net working capital	-0.056**	-0.055**	-0.012**	-0.012**
	[0.012]	[0.012]	[0.031]	[0.031]
# of segments	-0.011***	-0.011***	-0.009***	-0.009***
	[0.000]	[0.000]	[0.001]	[0.001]
Ln(Firm age)	-0.022***	-0.021***	-0.011***	-0.011***
	[0.000]	[0.000]	[0.010]	[0.009]
MNC	0.016***	0.015***	0.024***	0.024***
	[0.002]	[0.003]	[0.006]	[0.006]
CEO Chairman		-0.006		0.003
		[0.164]		[0.715]
CEO ownership		0.025		0.055**
		[0.181]		[0.025]
CEO EBC		0.025***		0.020
		[0.000]		[0.146]
Year & Industry FE	Yes	Yes	Yes	Yes
Constant	0.328***	0.345***	0.368***	0.352***
	[0.000]	[0.000]	[0.000]	[0.000]
Observations	27470	27470	7672	7672
Adj R2	16%	16%	17%	17%

Panel C: Controlling for the Transitory Component of Cash

	All public firms and private firms		Matched public firms and private firms	
	(1)	(2)	(3)	(4)
Public	0.032***	0.032***	0.056***	0.055***
	[0.000]	[0.000]	[0.000]	[0.000]
Ln(Total assets)	-0.009***	-0.009***	-0.013***	-0.013***
	[0.000]	[0.000]	[0.000]	[0.000]
CF	-0.087***	-0.088***	-0.053**	-0.054**
	[0.000]	[0.000]	[0.035]	[0.030]
CF volatility	0.095**	0.095**	0.144***	0.142***
	[0.011]	[0.010]	[0.000]	[0.000]
Sales growth	0.008***	0.008***	0.004	0.004
	[0.006]	[0.006]	[0.233]	[0.229]
Leverage	-0.185***	-0.185***	-0.095***	-0.095***
	[0.000]	[0.000]	[0.000]	[0.000]
Capex	-0.259***	-0.260***	-0.197***	-0.201***
	[0.000]	[0.000]	[0.000]	[0.000]
R&D	0.015	0.015	0.013	0.013
	[0.330]	[0.327]	[0.144]	[0.146]
Net working capital	-0.077	-0.077	-0.022	-0.022
	[0.142]	[0.143]	[0.250]	[0.253]
Dividend	-0.007	-0.007	-0.009	-0.009
	[0.124]	[0.130]	[0.196]	[0.187]
# of segments	-0.010***	-0.010***	-0.009***	-0.010***
	[0.000]	[0.000]	[0.001]	[0.001]
Ln(Firm age)	-0.020***	-0.020***	-0.007*	-0.007*
	[0.000]	[0.000]	[0.072]	[0.057]
MNC	0.009*	0.009	0.017*	0.017**
	[0.099]	[0.103]	[0.051]	[0.047]
Next-year's cash spending	-0.453***	-0.453***	-0.443***	-0.441***
	[0.000]	[0.000]	[0.000]	[0.000]
CEO Chairman		-0.003		0.004
		[0.457]		[0.594]
CEO ownership		0.031		0.029
		[0.101]		[0.117]
CEO EBC		0.009		0.018
		[0.218]		[0.179]
Year & Industry FE	Yes	Yes	Yes	Yes
Constant	0.356***	0.352***	0.361***	0.358***
	[0.000]	[0.000]	[0.000]	[0.000]
Observations	21832	21832	5834	5834
Adj R2	31%	31%	30%	30%

Panel D: Controlling for Difference Levels of CEO Ownership

	All public firms and private firms (1)	Matched public firms and private firms (2)
Public	0.040***	0.063***
	[0.000]	[0.000]
Ln(Total assets)	-0.009***	-0.015***
	[0.000]	[0.000]
CF	-0.082***	-0.042*
	[0.000]	[0.099]
CF volatility	0.122***	0.133***
	[0.000]	[0.001]
Sales growth	0.008***	0.002
	[0.000]	[0.497]
Leverage	-0.183***	-0.085***
	[0.000]	[0.000]
Capex	-0.252***	-0.201***
	[0.000]	[0.001]
R&D	-0.016	-0.007
	[0.550]	[0.568]
Net working capital	-0.055**	-0.014**
	[0.013]	[0.046]
Dividend	-0.008*	-0.007
	[0.068]	[0.301]
# of segments	-0.011***	-0.009***
	[0.000]	[0.000]
Ln(Firm age)	-0.022***	-0.012***
	[0.000]	[0.004]
MNC	0.011**	0.022***
	[0.024]	[0.010]
CEO Chairman	-0.004	0.007
	[0.397]	[0.425]
CEO ownership ≤ 5%	0.013**	0.014
	[0.032]	[0.315]
CEO ownership > 5% to ≤ 25%	0.008	-0.239
	[0.961]	[0.364]
CEO ownership > 25%	0.057	-0.022
	[0.183]	[0.757]
CEO EBC	0.047**	0.045**
	[0.021]	[0.044]
Year & Industry FE	Yes	Yes
Constant	0.344***	0.409***
	[0.000]	[0.000]
Observations	27470	7672
Adj R2	21%	20%

Table 5. Changes in Cash

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. The dependent variable is the change in the cash ratio, ΔCash. The first four columns report regression results with industry and year fixed effects and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. The last two columns report the regression results with firm fixed effects using private firms only and matched public firms only, respectively. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	All public firms and private firms		Matched public firms and private firms		Private firms only	Matched public firms only
	(1)	(2)	(3)	(4)	(5)	(6)
Public	0.015***	0.015***	0.014***	0.015***		
	[0.000]	[0.000]	[0.000]	[0.000]		
Ln(Total assets)	-0.001***	-0.001*	-0.001	-0.001	-0.004	-0.012
	[0.006]	[0.088]	[0.103]	[0.315]	[0.602]	[0.438]
CF	-0.023***	-0.024***	0.014***	0.013**	-0.018	-0.015
	[0.000]	[0.000]	[0.006]	[0.011]	[0.364]	[0.725]
CF volatility	0.023***	0.024***	0.059***	0.059***	0.000	0.127*
	[0.000]	[0.000]	[0.000]	[0.000]	[.]	[0.065]
Sales growth	-0.000	-0.000	-0.002*	-0.002*	-0.004	0.019**
	[0.655]	[0.645]	[0.071]	[0.067]	[0.235]	[0.030]
Leverage	-0.007***	-0.008***	0.014***	0.013***	0.029**	0.112***
	[0.006]	[0.004]	[0.000]	[0.000]	[0.038]	[0.000]
Capex	-0.012	-0.011	-0.015	-0.014	0.053	0.189
	[0.323]	[0.369]	[0.437]	[0.478]	[0.344]	[0.279]
R&D	0.020***	0.020***	0.010***	0.010***	0.004	0.066
	[0.000]	[0.000]	[0.000]	[0.000]	[0.700]	[0.569]
Net working capital	0.010***	0.010***	0.006***	0.006***	0.005**	0.141***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.011]	[0.000]
Dividend	-0.005***	-0.005***	-0.004	-0.004	-0.007	-0.020
	[0.002]	[0.001]	[0.181]	[0.177]	[0.206]	[0.184]
# of segments	-0.001**	-0.001**	-0.000	-0.001	0.002	-0.005
	[0.017]	[0.014]	[0.701]	[0.598]	[0.195]	[0.312]
Ln(Firm age)	-0.000	-0.000	0.000	-0.000	0.009	0.034
	[0.994]	[0.984]	[0.959]	[0.968]	[0.509]	[0.441]
MNC	0.004***	0.005***	0.007*	0.007*	-0.000	-0.026*
	[0.004]	[0.003]	[0.078]	[0.064]	[0.993]	[0.069]
CEO Chairman		-0.000		0.004	-0.010	-0.020
		[0.709]		[0.107]	[0.239]	[0.230]
CEO ownership		-0.000		0.007	-0.020	0.127
		[0.925]		[0.272]	[0.170]	[0.128]
CEO EBC		-0.005**		-0.008	-0.011	-0.017
		[0.026]		[0.136]	[0.393]	[0.324]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	No	No
Firm FE	No	No	No	No	Yes	Yes
Constant	0.048***	0.043***	0.038***	0.028*	0.072	0.110
	[0.000]	[0.000]	[0.009]	[0.065]	[0.636]	[0.738]
Observations	27470	27470	7672	7672	3836	3836
Adj R2	6%	6%	4%	4%	3%	13%

Table 6. Accumulation and Dissipation of Excess Cash

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. We define excess cash as a positive residual from Column (1) of Table 4 Panel A. The table is based on the firms that have excess cash at time *t*. The accumulation of excess cash is computed as excess cash at *t* minus excess cash at *t-1* (Columns (1)-(2)) and the dissipation of excess cash is computed as excess cash at *t+1* minus excess cash at *t* (Columns (3)-(4)). Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values based on robust standard error clustered at the firm level are reported in brackets.

Panel A: The Transition Matrix

	Public Firms	Private Firms
Fraction of firms with positive excess cash at *t* also have positive excess cash at *t+1*	79%	81%
Fraction of firms with non-positive excess cash at *t* have positive excess cash at *t+1*	16%	19%

Panel B: The Regression Result

	Accumulation of excess cash		Dissipation of excess cash	
	(1)	(2)	(3)	(4)
Public	0.009***	0.006***	-0.005**	-0.007***
	[0.001]	[0.000]	[0.029]	[0.004]
Industry average change in excess cash			1.159***	
			[0.000]	
Industry median change in excess cash				0.974***
				[0.000]
Lag(Industry average change in excess cash)	0.977***			
	[0.000]			
Lag(Industry median change in excess cash)		1.095***		
		[0.000]		
Constant	0.015***	0.014***	-0.021***	-0.022***
	[0.000]	[0.000]	[0.000]	[0.000]
Observations	12225	12225	12225	12225
Adj R2	2.1%	1.9%	2.7%	1.3%

Table 7. Cash-to-Operating Cash Flow Sensitivity

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. The dependent variable is the change in the cash ratio, ΔCash. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	All public firms and private firms		Matched public firms and private firms	
	(1)	(2)	(3)	(4)
Public × CF	-0.056***	-0.055***	-0.018**	-0.016**
	[0.000]	[0.000]	[0.023]	[0.037]
Public	0.011***	0.011***	0.013***	0.013***
	[0.000]	[0.000]	[0.000]	[0.000]
Ln(Total assets)	-0.001***	-0.001***	-0.001*	-0.001
	[0.000]	[0.002]	[0.055]	[0.178]
CF	0.018***	0.018***	0.023***	0.021***
	[0.000]	[0.001]	[0.000]	[0.001]
CF volatility	0.023***	0.024***	0.057***	0.057***
	[0.000]	[0.000]	[0.000]	[0.000]
Sales growth	-0.000	-0.000	-0.002*	-0.002*
	[0.565]	[0.554]	[0.083]	[0.078]
Leverage	-0.005*	-0.005**	0.014***	0.014***
	[0.053]	[0.041]	[0.000]	[0.000]
Capex	-0.005	-0.004	-0.013	-0.012
	[0.697]	[0.730]	[0.514]	[0.536]
R&D	0.021***	0.021***	0.010***	0.010***
	[0.000]	[0.000]	[0.000]	[0.000]
Net working capital	0.009***	0.009***	0.006***	0.006***
	[0.000]	[0.000]	[0.000]	[0.000]
Dividend	-0.004***	-0.004***	-0.004	-0.004
	[0.007]	[0.006]	[0.212]	[0.205]
# of segments	-0.001*	-0.001*	-0.000	-0.000
	[0.058]	[0.052]	[0.826]	[0.712]
Ln(Firm age)	0.000	0.000	0.000	-0.000
	[0.779]	[0.796]	[0.942]	[0.979]
MNC	0.005***	0.005***	0.007*	0.007*
	[0.002]	[0.001]	[0.067]	[0.056]
CEO Chairman		0.000		0.004*
		[0.916]		[0.094]
CEO ownership		-0.001		0.007
		[0.812]		[0.304]
CEO EBC		-0.003		-0.006
		[0.171]		[0.240]
Year & Industry FE	Yes	Yes	Yes	Yes
Constant	0.059***	0.056***	0.042***	0.033**
	[0.000]	[0.000]	[0.004]	[0.030]
Observations	27470	27470	7672	7672
Adj R2	6%	6%	4%	4%

Table 8. Cash-to-Financing Cash Flow Sensitivities

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. The dependent variable is the change in the cash ratio, ΔCash. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	All public firms and private firms		Matched public firms and private firms	
	(1)	(2)	(3)	(4)
Public × Financing CF	0.091***	0.090***	0.034***	0.034***
	[0.000]	[0.000]	[0.000]	[0.000]
Public	0.008***	0.009***	0.012***	0.012***
	[0.000]	[0.000]	[0.000]	[0.000]
Ln(Total assets)	-0.000	0.000	0.000	0.001
	[0.527]	[0.614]	[0.927]	[0.452]
Financing CF	0.026***	0.026***	0.009**	0.009**
	[0.000]	[0.000]	[0.028]	[0.018]
CF volatility	0.004	0.005	0.048***	0.048***
	[0.535]	[0.422]	[0.000]	[0.000]
Sales growth	-0.003***	-0.003***	-0.003**	-0.003**
	[0.000]	[0.000]	[0.017]	[0.016]
Leverage	-0.002	-0.003	0.012***	0.012***
	[0.361]	[0.272]	[0.000]	[0.000]
Capex	-0.048***	-0.048***	-0.018	-0.017
	[0.000]	[0.000]	[0.347]	[0.377]
R&D	0.053***	0.054***	0.008	0.010
	[0.000]	[0.000]	[0.441]	[0.356]
Net working capital	0.009***	0.008***	0.006***	0.006***
	[0.000]	[0.000]	[0.000]	[0.000]
# of segments	-0.001**	-0.001**	-0.000	-0.000
	[0.020]	[0.015]	[0.854]	[0.718]
Ln(Firm age)	0.002**	0.002**	0.001	0.001
	[0.028]	[0.029]	[0.514]	[0.576]
MNC	0.005***	0.005***	0.006	0.006*
	[0.002]	[0.002]	[0.102]	[0.085]
CEO Chairman		-0.001		0.004*
		[0.519]		[0.100]
CEO ownership		0.005		0.011
		[0.305]		[0.100]
CEO EBC		-0.005**		-0.008
		[0.031]		[0.138]
Year & Industry FE	Yes	Yes	Yes	Yes
Constant	0.027***	0.020**	0.013	0.001
	[0.000]	[0.018]	[0.359]	[0.928]
Observations	27470	27470	7672	7672
Adj R2	9%	9%	4%	4%

Table 9. Cash-to-Investing Cash Flow Sensitivities

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. For each private firm, we match it to a public firm in the same Fama and French 48 industry and closest in total assets. The dependent variable is the change in the cash ratio, ΔCash. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	All public firms and private firms		Matched public firms and private firms	
	Investing CF≥ 0	Investing CF<0	Investing CF≥0	Investing CF<0
	(1)	(2)	(3)	(4)
Public × Investing CF	-0.008	-0.053**	0.008	0.071
	[0.852]	[0.011]	[0.922]	[0.166]
Public	0.021***	0.005**	0.012	0.018**
	[0.000]	[0.038]	[0.287]	[0.013]
Ln(Total assets)	-0.001	-0.001**	0.001	-0.001
	[0.650]	[0.022]	[0.758]	[0.574]
Investing CF	0.092***	0.110***	0.070**	0.112***
	[0.009]	[0.000]	[0.044]	[0.000]
CF volatility	0.026	0.017*	0.010	0.071**
	[0.126]	[0.091]	[0.682]	[0.047]
Sales growth	-0.000	0.001	-0.011**	0.002
	[0.848]	[0.656]	[0.033]	[0.495]
Leverage	-0.001	-0.004	0.016*	0.005
	[0.865]	[0.187]	[0.052]	[0.617]
R&D	-0.008	0.163***	0.004	0.027
	[0.725]	[0.000]	[0.921]	[0.392]
Net working capital	0.006**	0.009***	0.005*	0.005***
	[0.038]	[0.007]	[0.054]	[0.000]
Dividend	-0.006	-0.003***	0.008	-0.006**
	[0.137]	[0.006]	[0.416]	[0.022]
# of segments	0.000	-0.001***	0.003	-0.001
	[0.723]	[0.001]	[0.298]	[0.282]
Ln(Firm age)	0.003	-0.001**	0.001	-0.002
	[0.110]	[0.038]	[0.721]	[0.224]
MNC	0.001	0.003**	0.007	0.006
	[0.880]	[0.038]	[0.555]	[0.124]
CEO Chairman	0.007*	-0.001	0.014*	0.003
	[0.054]	[0.506]	[0.076]	[0.425]
CEO ownership	-0.007	0.001	-0.011	0.016*
	[0.645]	[0.835]	[0.509]	[0.062]
CEO EBC	-0.018***	0.000	-0.050***	0.008
	[0.001]	[0.961]	[0.001]	[0.226]
Industry & Year FE	Yes	Yes	Yes	Yes
Constant	0.036	0.058***	0.010	0.044*
	[0.170]	[0.000]	[0.830]	[0.092]
Observations	5009	22461	1700	5972
Adj R2	8%	8%	9%	8%

Table 10. Controlling for Selection Effects

The sample consists of 3,836 private firm-year observations and 23,634 public firm-year observations from 2000-2008, obtained from CIQ. Column (1) reports the first stage probit regression of treatment effect model with the indicator variable *Public* as the independent variable and *Industry M/B* and *Ln(# of IPO)* as the instrument variables. *Industry M/B* is the industry median market-to-book ratio of public firms in a given year. *Ln(# of IPOs)* is the natural logarithm of number of IPOs in an industry in a given year. Columns (2)-(7) report the second-stage treatment regressions. The dependent variable is *Abcash* in Column (2) and *ΔCash* in Columns (3)-(7). The heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	First stage predicting being *Public*	Level of Cash	Changes in Cash	Cash-to-Operating Cash Flow Sensitivity	Cash-to-Financing Cash Flow Sensitivity	Cash-to-Investing Cash Flow Sensitivity (Investing CF≥ 0)	Cash-to-Investing Cash Flow Sensitivity (Investing CF<0)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Public		0.066***	0.032***	0.018**	0.029***	0.017	0.020**
		[0.000]	[0.000]	[0.012]	[0.000]	[0.658]	[0.014]
Public × CF				-0.054***			
				[0.000]			
Public × Financing CF					0.015***		
					[0.000]		
Public × Investing CF						-0.007	-0.058***
						[0.840]	[0.000]
Ln(Total assets)	0.073***	-0.009***	-0.001**	-0.001***	0.000	0.000	-0.002***
	[0.000]	[0.000]	[0.021]	[0.001]	[0.836]	[0.968]	[0.000]
CF	0.31***	-0.09***	-0.025***	0.016***			
	[0.000]	[0.000]	[0.000]	[0.002]			
CF volatility	-1.53***	0.133***	0.032***	0.027***	0.019***	0.024	0.040***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.007]	[0.336]	[0.000]
Sales growth	0.069***	0.009***	-0.001	-0.001	-0.003***	-0.000	0.000
	[0.000]	[0.000]	[0.397]	[0.451]	[0.000]	[0.876]	[0.731]
Capex	-0.12	-0.266***	-0.010	-0.004	-0.056***		
	[0.477]	[0.000]	[0.401]	[0.740]	[0.000]		
Ln(Firm Age)	0.202***	-0.023***	-0.001	-0.000	0.000	0.004	-0.003***
	[0.000]	[0.000]	[0.324]	[0.851]	[0.531]	[0.120]	[0.001]
Industry M/B	0.198***						
	[0.000]						
Ln(# of IPOs)	0.136***						
	[0.000]						
Financing CF					0.080***		
					[0.000]		
Investing CF						0.091***	0.113***
						[0.001]	[0.000]
Leverage		-0.188***	-0.008***	-0.005**	-0.005*	-0.002	-0.007**
		[0.000]	[0.005]	[0.043]	[0.058]	[0.735]	[0.024]
R&D		-0.017***	0.020***	0.021***	0.012***	0.020***	0.027***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Net Working Capital		-0.052***	0.010***	0.009***	0.009***	0.009***	0.007***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Dividend		-0.007***	-0.005***	-0.004***		-0.007	-0.003**
		[0.007]	[0.002]	[0.007]		[0.159]	[0.032]
# of Segments		-0.011***	-0.001**	-0.001*	-0.002***	0.000	-0.001***
		[0.000]	[0.017]	[0.055]	[0.001]	[0.833]	[0.005]
MNC		0.011***	0.005***	0.005***	0.005***	-0.000	0.005***
		[0.000]	[0.003]	[0.001]	[0.001]	[0.987]	[0.001]
CEO Chairman		-0.005**	-0.000	0.000	-0.001	0.007**	-0.001
		[0.02]	[0.744]	[0.908]	[0.297]	[0.046]	[0.265]
CEO ownership		0.036***	-0.000	-0.001	0.004	-0.005	-0.004
		[0.000]	[0.936]	[0.818]	[0.396]	[0.707]	[0.417]
CEO EBC		0.015***	-0.005**	-0.003	-0.005**	-0.018***	0.001
		[0.000]	[0.033]	[0.178]	[0.013]	[0.003]	[0.577]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.41***	0.34***	0.034***	0.052***	0.010	0.027	0.071***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.279]	[0.239]	[0.000]
Observations	27470	27470	27470	27470	27470	5009	22461
Endogeneity Test							
Rho		0.089	-0.098	-0.043	-0.084	0.019	-0.077
Chi-sq(1) statistic		8.61***	6.92***	1.15	5.19**	0.01	2.79*
Lamda		-0.015	-0.009	-0.004	-0.008	0.002	-0.007