Master's Thesis

OWNERSHIP STRUCTURE AND FIRM CASH HOLDINGS: EVIDENCE FROM THE PUBLIC FLOAT IN IPOS

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Abstract

I examine the effect of insider ownership on the level of cash holding by measuring the percentage of shares issued to the public, namely public float. Using a sample of 4,402 IPOs between 1990 and 2013, I find that public float has significantly negative relation with the level of firm's cash holdings. Specifically, the reduced insider ownership by large percentage of shares issued to the public seems to motivate insiders to waste more cash, resulting in decrease in the level of cash holding. This relation persists even after controlling for various firm characteristics. High public float (or small insider ownership) also exacerbate agency problem evidenced by public float being positively associated with discretionary accrual proxy for agency problem. The level of cash holding reduced further when we interact public float with discretionary accrual term. Collectively, this finding suggests that large sales in insider ownership in IPO market worsen the agency problem and consequently motivate insider to squander firm's cash holding.

JEL classification: Initial public offerings, public float, cash holdings, corporate governance

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I. Introduction

While IPOs have been researched widely through time, the implications of public float have received little attention in the literature. One of the most notable researches about public float was done in consideration with underpricing. More specifically, Habib and Ljungqvist (2001) and Bradley and Jordan (2002) argue that underpricing is highly likely to depend on how much insiders sell their shares at the IPO. The more shares they sell, the greater incentive they put to reduce underpricing. Another paper related to public float is about long-term performance written by Michel et al. (2014). They find a U-shaped relation between the number of published shares and post-IPO returns. In particular, long-run returns will decrease as public float increases, but this relation only happens for low levels of public float. As firm publishes high levels of float, long-term performance will improve in positive relation with public float. They explain this relation based on a trade-off between insiders' incentive and monitoring of outside shareholders.

In this paper, I examine the potential effect of public float on cash holdings caused by separation of ownership and control. When firm publishes more shares, the ownership of outside shareholders will increase, but the ownership of insiders will decrease accordingly. This decrease in insiders' ownership may cause negligence and profusion in the management of such firm (Jensen and Meckling (1976)). To examine that effect, I focus on researching a specific aspect: firm cash holdings because of three following reasons. First, managerial insiders can easily access to cash reserves with little scrutiny and use it by their discretion (Amy Dittmar and Jan Mahrt-Smith (2007)). Second, IPO firms usually hold substantial amount of cash and do not face financial constrains after IPO, so cash becomes highly attractive for insiders to extract. Lastly, firm-level governance itself is usually changing slowly. Therefore, IPO provides a good test ground to observe a significant change in firm's governance and its impact on firm-level cash holdings after IPO.

In particular, I am interested in clarifying the following three questions. (i) Does higher public float lead insiders to deplete cash reserves?, (ii) Does the level of public float truly affect corporate governance through the segregation between ownership and control after IPO?, and (iii) How does public float in correlation with corporate governance affect firm cash holdings? These hypotheses are developed based on the logic that firms with higher public float will have weaker corporate governance (hypothesis (ii)). Furthermore, firms with weaker governance structures truly hold smaller amount of cash (Hardford et al. (2008)). Instead of increasing cash dividends to shareholders, firms with weaker governance will repurchase to avoid future payout commitments. These firms also use cash quickly in capital expenditure and acquisitions, rather than stockpile it (Amy Dittmar and Jan Mahrt-Smith (2007)). Therefore, it is reasonable to hypothesize that insiders in firm with higher public float tends to deplete and remain cash at a lower level.

I define the public float as the percentage of shares held by the public immediately after IPO (both individuals and institutions). To determine the level of cash holdings in IPO firms, I follow J. Harford et al. (2008) to use three different measures. They are ratio of cash to sale, ratio of cash to net assets, and industrial-adjusted cash to sale ratio. In all three regression models, I use cash holdings as dependent variable and public float as key explanatory variable. Using a sample of 4,402 IPO firms with total 15,719 firm-year observations from IPO year to third fiscal year after IPO, I find that public float is highly significantly negative related to cash holdings. Every 1% increase in public float will cause approximately 2.2% decrease in firm cash holding. This result holds for all three regression models.

With purpose of examining whether the effect of public float on firm cash holdings is associated with corporate governance, I investigate the corporate governance in low and high public float firms. Following Yael V. Hochberg (2012), I employ discretional current accrual as proxy for corporate governance in newly public firms. I find that IPO firms with high public float actually have weaker corporate governance. With 1% increase in public float, insiders will manage earnings upward about 3.36% (or 4% after controlling for effects).

To confirm the effect of public float on firm cash holdings in association with corporate governance, I run another regression model in which includes both public float and discretional current accruals together with an interaction term between these two variables as independent variable. Results show that coefficient of the interaction term is negative, meaning that an increase in discretional current accruals causes higher decrease in firm cash holdings for large public float. However, the coefficient is not statistically significant. I suppose that there exists an endogenous effect between discretional current accruals and firm cash holdings which effects significance of the coefficient of the interaction term. Further tests are suggested to clarify this issue.

This paper contributes to literature by pointing out a new implication of public float which is researched in relation with firm cash holdings. Particularly, high public float may predict low firm cash reserves after IPO due to decreased incentive of insiders caused from reduce of their ownership. My paper is also of significance in examining level of corporate governance in newly public firms. The result is notable that firms with high public float tend to have weaker corporate governance with symptom of upward management in earnings. However, the effect of public float on cash holdings in association with corporate governance remains hard to confirm and requires further examinations.

The structure of the rest of this paper is as follows. Section 2 is review of related literature. Section 3 is hypotheses development and methodology. In section 4, I will describe my data and descriptive statistics. Section 5 shows the empirical results, and section 6 concludes.

II. Literature

There is a body of literature devoted to studying factors that may affect level of cash holdings. T. Opler et al. (1999) show that firms with strong growth opportunities, riskier activities or small capitalization hold more cash than other firms. Moreover, large firms and those firms with good credit ratings tend to hold less cash due to their greatest access to the capital market. These results are consistent with the view that firms hold more cash to ensure enough capital for investment in case cash flow is too low relative to investment, and cost of outside financing is very high. Myers and Majluf (1984) also points out that firms have incentive to hold more cash as raising external finance is more costly due to asymmetric information between firms and outside investors. The optimal amount of liquidity is determined according to Kim et al. (1998) by a tradeoff between the benefit of reducing costly external finance to a lowest level and the low income of internal liquidity assets. They also indicate that US firms decide optimal level of investment in cash based on the cost of external financing, the uncertainty of future cash flows, and the perspective of investment opportunities in the future. Considering impacts on cash balance from outside institutes, Pinkowitz and Williamson (2001) documents that determining cash level of firms in United States, Germany, and Japan is also impacted substantially by the monopoly power of banks.

However, in many other cases, level of corporate cash holdings is not determined to meet investment need or in the other word to maximize shareholder's wealth. Instead of that, cash is spent based on discretion of managers to serve their own purpose. J. Harford et al. (2008) indicates that firms with weaker corporate governance reserve less cash then those with stronger governance. Instead of distributing cash dividend to shareholder, firm with weaker governance structures will repurchase to avoid future payout commitments. These firms also spend cash quickly on capital expenditures and acquisitions. Agency problem also causes inefficient use of cash when managers implement underinvestment and asset substitution (Myers (1977); Jensen and Meckling (1976)). Managers can use cash to serve their own interests at the expense of shareholders.

The relationship between corporate structure and cash holdings is also examined directly by V. Subramaniam et al. (2011). They examine whether cash holdings is affected by firm's organizational structure (i.e., whether a firm is focused or diversified) and find that firms with diversified structure hold significantly less cash than their matched focused ones. The lower cash holdings among diversified firms is explained by supplemental growth opportunities across various segments of those firms and the activeness of internal capital market within diversified firms. Ozkan and Ozkan (2004) also contend that ownership structure of firms affects significantly cash holdings in their UK samples. They find that cash holdings is non-linearly related to managerial ownership in form of cubic equation. Particularly, cash holdings will fall as management ownership increases up to 24%, and then rise until

managerial ownership inclines up to 64%, and decline after that.

III. Hypothesis development

3.1. Hypotheses development

I test the following three hypotheses. My first hypothesis argues how public float may be associated with cash holdings. My second hypothesis tests whether the increase in public float is positive related to weak corporate governance in firm after IPO, and my third hypothesis examines how public float with differing corporate governance may be associated with cash holdings.

Before a firm goes public, there is no shares hold by the public. Total shares in the firm at that time belong to the ownership of its insiders. Therefore, the insiders have strongest incentive to devote themselves to improve firm's performance as well as to benefit themselves. However, after IPO, insiders have to share their ownership with outside shareholders. The more shares a firm issues, the less ownership insiders come to hold. This appearance of outside shareholders and decrease of insiders' ownership introduce an agency problem in new public firms. Insiders will have less incentive work as hard as they can because total profits now will not benefit only them. Rather than that, insiders will implement empire building and waste firm's resources to benefit themselves at costs shared by outside shareholder (A. Michel et al. (2014)).

Simultaneously, cash appears as the most attractive source for insiders to serve their own interest.

According to Michel et al. (2014), most of firms (59%) in his IPO sample from 1996 to 2006 issued about 20-40% of its total shares; 24% of firms published less than 20% float. However, in many cases, firms need to issue much more shares than these ranges. For example, when firm needs significant funds to feed its good investment opportunities, but it cannot borrow in creditable manners due to its small firm size and low reputation before public. Because public float is positive related to IPO proceeds, the amount of cash gained during the public will increase as firm issues more shares. Moreover, the proceeds in short term will make firm cash reserves increased because firm needs a certain time to allocate this amount of proceeds to specific purposes mentioned in their filings. As a result, cash easily becomes inviting for private purposes of insiders, especially when their ownership decreased significantly through IPO. According to J. Harford et al. (2008), cash reserves in firms with agency problem are less than in firms with stronger governance. Insiders in weak governance firms tend to use cash quickly on capital expenditure and acquisitions. They also prefer repurchasing to distributing cash dividend to shareholder to avoid future payout commitments with outside shareholders. Agency problem also causes inefficient use of cash when managers implement underinvestment and asset substitution (Myers (1977), Jensen and Meckling (1976)).

Therefore, I test hypothesis 1: Whether the increase in public float leads IPO firm to hold less cash than firm with lower public float.

On the other hand, it could be argued that at high level of public float, agency problem will become negative related to increase of the float due to increased efficiency in monitor of outside shareholders. Holding a large amount of float enables outside shareholders easier to observe firm's activities and establish policies to prevent waste actions of insiders. Therefore, cash reserves in high public float firms may not be affected by weakness in corporate governance after IPO. However, this argument is disputable if most of outside shareholders are individual investors, not financial institution. If so, it is even harder for those separate investors to scrutinize firm's policies which were established and enhanced by insiders from foundation date of the firm.

In order to clarify whether and how public float affects corporate governance, I test hypothesis 2: Increase in public float is positive related to weak corporate governance in firm after IPO.

Furthermore, I also test hypothesis 3 to confirm whether the effect of public float on firm cash holdings is associated with corporate governance or not.

3.2. Regression specification

Hypothesis 1: Whether the increase in public float in accordance with weaker corporate governance leads IPO firm to hold less cash than firm with lower public float

To test this hypothesis, I use a regression model in which public float is main independent variable, and cash holdings is dependent value. Other variables is included and calculated according to J. Harford et al (2008).

Following the literature to research long-term performance of IPO stocks, I measure all of the variables except for public float by using yearly data within 3 years after IPOs (from the end of IPO fiscal year to third fiscal year after IPO). I choose a period of 3 years because of an argument that cash holdings is affected strongest by insiders only within 3 years after IPO as level of firm cash holdings is relatively high. After this 3-year period, cash reserves may not be as high as before due to cash from IPO proceeds was allocated partial to specific areas. At that time, level of cash holdings is highly likely to be affected by firm's cash policy rather than insider's discretion. I use cash holdings variable which is calculated every year because cash can be influenced by insiders at any year after IPO.

The regression model is:

$$\textbf{Cash holdings}_{i,t} = \beta_0 + \boldsymbol{\beta_1}\ \textbf{x Public Float}_i + \beta_2 \text{ x Size}_{i,t} + \beta_3 \text{ x Leverage}_{i,t} + \beta_4 \text{ x Market-to-Book}_{i,t} + \beta_5 \text{ x Cash Flow/Assets}_{i,t} + \beta_6 \text{ x Working Capital/Assets}_{i,t} + \beta_7 \text{ x R\&D/Sales}_{i,t} + \beta_8 \text{ x CapEx/Assets}_{i,t} + \beta_9 \text{ x Acquisition/Sales}_{i,t} + \beta_{10} \text{ x Dividend Indicator}_{i,t} + \beta_{11} \text{ x Bond Indicator}_{i,t} + \varepsilon_{i,t,} \quad (1)$$

where $\text{Cash holdings}_{i,t}$ is cash holding for firm i at the end of fiscal year t (t from 0 to 3). Public Float_i is public float of firm i immediately after IPO. Other control variables, signed as Xi,t, stand for value of firm i at the end of fiscal year I after IPO.

Hypothesis 2: Public float is positively related to corporate governance through the separation of ownership and control after IPO.

To test this relationship between public float and corporate governance, I follow Yael V.Hochberg (2012) to use Discretional Current Accruals as proxy for symptom of weak corporate governance. In his paper, Yael V.Hochberg examines the effects of venture capital backing on firm's corporate governance after IPO. He finds that venture-backed firms have stronger corporate structure presented by a lower level of earnings management than their counterpart not backed by venture before IPO. This effect results from the monitoring function of the venturer. BiaoXie et al. (2003) also indicate that firms with more independent outside directors seating on the board are less likely to manage earnings. Based on this setting, it could be hypothesize that discretional current accruals are likely to be managed upward in firms with weaker corporate governance.

Similar to cash holdings, discretional current accruals and control variables are computed annually within 3 years after IPO. The model is as follow:

$$\text{Discretional Current Accruals}_{i,t} = \beta_0 + \beta_1 \text{ x Public Float}_i + \beta_2 \text{ x SIZE\_1}_{i,t} + \beta_3 \text{ x ROE\_1}_{i,t} + \beta_4 \text{ x GROWTH\_1}_{i,t} + \beta_5 \text{ x LEV\_1}_{i,t} + \varepsilon_{i,t} \quad (2)$$

Hypothesis 3: Public float with differing corporate governance affects corporate cash holdings. The regression model is specified as following:

$$\text{Cash holdings}_{i,t} = \beta_0 + \beta_1 \text{ x Public Float}_i + \beta_2 \text{ x Discretional Current Accruals}_{i,t} + \beta_3 \text{ x Public Float}_i \text{ x Discretional Current Accruals}_{i,t} + \beta \text{ x Control variables}_{i,t} + \varepsilon_{i,t}, \quad (3)$$

in which control variables are those included in model (1).

β_3 is expected to have negative coefficient so that an increase in discretional current accruals causes higher decrease in firm cash holdings for large public float.

IV. Data description

4.1. Cash holdings

The primary ratio that I use as proxy for cash holdings is ratio of cash to sales, measured as log of cash and cash equivalents to total sales. I use this ratio as main ratio of cash holdings because one of the important reasons for firms to go public is raising money for their future investment activities. Therefore, for my analysis, I treat cash as a liquid investment used to meet the working capital needs of the firm, which is highly related to its sales. Working capital as a percentage of sales can tell a

business how much of every sales dollar must be re-used to meet operational expenses and short-term debt obligations in the working capital cycle. Sufficient working capital replies on sales revenues, business segment, inventory level, or business cycle. Therefore, cash plays a vital role in supporting working capital for firms to expand their business, meet short-term business targets and finance business expenses.

However, due to specific business characteristics of every single firm, cash to sale ratio could be useful to measure cash holdings for this firm, but not proper for the other firms. Therefore, I use two additional measures of cash holdings. First method is to use ratio of cash and marketable securities to net assets. Net assets is calculated as total assets minus cash and marketable securities, similar to Opler et al. (1999). I follow J. Harford et al. (2008) to generate the second method so-called industry-adjusted cash to sales ratio because industry classification is considered as a significant determinant of cash holdings. This method will reduce the effect of disparity in cash among different industries. I compute this ratio by two steps. First, I compute the median industry levels of the ratio of cash to sales within the Fama and French 48 industry categories. After that, the industry-adjusted cash to sales ratio is computed by taking the firm's variable minus the median industry level of the cash to sales ratio. Using these two later methods, I find similar results as those estimated by using ratio of cash to sales.

4.2. Public float

The public float is defined as the fraction of post-IPO shares held by the public (both individuals and institutions) immediately after IPO. Thus, the higher the public float is, the less shares held by insiders.

4.3. Corporate governance

In order to examine whether the relation between cash holdings and public float results from corporate governance issues, I conduct measure of corporate governance to test its relationship with public float. This issue would ideally be addressed by applying famous G-index described by Gompers, Ishii, and Metrick (2003), and by using comprehensive governance database provided by the Investor Responsibility Research Center (IRRC). However, the IRRC only offers the annual lists of the largest corporations, and data of those companies in list of Standard & Poor's 500. Because of lack in comprehensive public database to measure corporate governance of newly published firms, I follow a method of Yael V. Hochberg (2012).

They use discretional current accruals to examine a potential of weak governance structure at the firm level. Firms with weak corporate governance are highly likely to manage earnings more aggressively, while good governed firms are less likely to manage earnings. The method to calculate discretional current accruals is shown in Appendix 1.

4.4. The sample

To assemble my data set of IPOs between 1990 and 2013, I combine data from several sources. The initial number of IPOs is 8,613 during this period from SDC. Following prior IPO literature, I exclude all financial firms and utility firms (SIC codes between 6000 to 6999, and between 4900 and 4999, respectively), Closed-end Fund/Trust, Limit Partnership, Unit offerings since the institutional structure and payout policy decisions of these samples are likely to be fundamentally different from that of a typical IPO firms. I also delete small offerings with IPO proceeds less than $10 million or with offer price less than $5. These securities are subject to Regulation A, less stringent disclosure requirements. IPOs without either offer price or offer amount is also excluded from my sample, which leaves me 4,923 IPO firms from SDC database.

In order to calculate Public float, the SDC data, then, are matched with CRSP daily stock database to find the number of share outstanding immediately after IPO. I require IPO firms to be listed on CRSP immediately or at most 1 day after offering. I eliminate IPOs which do not offer ordinary common shares (share code in CRSP different from 10, 11 and 12). I delete 203 firms missing data in CRSP.

Finally, to calculate the main dependent variable and control variables, I obtain information for the analysis from the Annual Compustat database from three years after firms' IPO. Control variables are calculated by following Harford, Mansi, and Maxwell (2012) and described clearly in Appendix 2. I don't include standard deviation of cash flows for the past ten years (CF Volatility) in my sample due to lack of firm's data before IPO. I eliminated 325 firms because of missing Compustat data.

The final sample includes 4,395 IPO firms, and 15,672 firm-year observations.

I winsorize my dependent variable Cash Holdings, key independent variable Public float and firm specific factors including Leverage, Market-to-Book, CF/Assets, Working Capital/Assets, R&D/Sales, CapEx/Assets, and Acquisition/Sales at the 1% level on either tail using full sample, to reduce the impact of outliers and data coding errors. Winsorizing has no qualitative effect on any of my results.

4.5. Descriptive statistics

Table 1 shows descriptive statistics including the mean, median, standard deviation, and 25th and 75^{th} percentiles. My dependent variable, ratio of cash to sales, has a mean of 181% and median of 14.89% with a standard deviation of nearly 970%. This large difference between mean and median indicates that most of firms in the sample hold small amount of cash within 3 years after IPO, but there are a small number of firms which hold very large amount of cash compared to their sales. Because of its skewness, I use the log of cash holdings for regression. The post-IPO public float averaged 33.79%, with a median of 29.02% and a standard deviation of 19.58%, meaning that an

Table I: Descriptive statistics for the 1990-2013 Sample

This table provides summary statistics for the sample. The data set comprises 15,672 firm-year observations from 4,395 firms covering the period from 1990 to 2013. The descriptive statistics include: ratio of cash to sales (Cash/Sale), log of cash to sales ratio (Log_Cash/Sale), ratio of cash to total assets (Cash/TA), log of cash to total assets ratio (Log_Cash/TA), industry adjusted ratio of cash to sales (Cash/Sale_adj), public float (PF), Sales, Assets, firm Leverage, ratio of the market value to book value of assets (Market-to-Book), ratio of cash flow to net assets (Cash Flow/Assets), ratio of net working capital to net assets (Working Capital/Assets), ratio of research and development to sales (R&D/Sales), ratio of capital expenditures to net assets (CapEx/Assets), and ratio of acquisition to sales (Acquisition/Sales). Net assets equal total assets minus cash holdings. The variables Cash Holdings, Leverage, Market-to-Book, CF/Assets, Working Capital/Assets, R&D/Sales, CapEx/Assets, Acquisition/Sales are winsorized at the 1% level on either tail.

Variable	Mean	Median	Std. Dev.	25th Percentile	75th Percentile
Cash/Sale	0.3379	0.2902	0.1958	0.2174	0.3882
Log_Cash/Sale	1.8119	0.1489	9.6986	0.0327	0.5270
Cash/AT	-1.9848	-1.8800	2.2053	-3.3581	-0.6272
Log_Cash/AT	0.5697	0.1485	1.6383	0.0348	0.4359
Cash/Sale_adj	-2.0951	-1.8867	1.9201	-3.3076	-0.8190
Log_Cash/Sale_adj	1.6771	0.0484	9.6475	-0.0189	0.3643
PF (Public float)	-1.4354	-1.4637	2.0925	-2.7146	-0.2347
Sales ($ millions)	464.6022	92.6200	2887.9200	30.4610	277.9180
Assets ($ millions)	541.6836	115.0750	3118.1100	49.9330	313.2310
Leverage	0.2270	0.1043	0.3067	0.0031	0.3634
Market-to-Book	2.8361	1.9618	2.7822	1.2903	3.2952
Cash Flow/Assets	-0.3312	0.0130	1.2559	-0.2601	0.0810
Working Capital/Assets	1.0392	0.7145	1.6229	0.3782	1.1016
R&D/Sales	1.0254	0.0148	5.7956	0.0000	0.1952
CapEx/Assets	0.0952	0.0593	0.1066	0.0290	0.1186
Acquisition/Sales	0.0626	0.0000	0.2201	0.0000	0.0228

average firm has nearly 34% of its total shares outstanding after IPO held by the public (both primary and secondary offerings). Other variables are reported yearly at the end of firms' fiscal year. An average firm in the sample has sale of about $0.47 billion, lower than total assets of about $0.54 billion, leverage ratio averages of 22.7%, market to book value of about 2.84, cash flows to assets of about -0.32%, capital expenditures to assets of about 9.5%, and acquisition to assets of about 6.25%.

Table II: Frequency and mean of cash holdings and asset levels by industry from 1990 to 2013

The sample consists of 4394 IPO firms from 1990 to 2013. Industries are defined as the Fama and French 48 industries. This table shows means of cash holdings, sales, and assets of groups of IPO firms divided by industry though the whole period from 1990 to 2013. Ratio of cash to sale, ratio of cash to assets, and industries-adjusted cash to sale ratio are used to proxy for cash holdings. Sales and assets are reported in millions. Only 10 firms at the top and 10 firms at the bottom sorted by cash/sale are shown below.

By industry	Fre-quency	Percent	Cash/ Sale	Sales (Net)	Cash/ Assets	Assets	Cash/ Sale_Adj
Top 10 firms with largest cash to sale ratio							
Pharmaceutical Products	379	8.64	9.78	56.93	1.75	156.79	9.22
Trading	31	0.71	3.92	154.19	0.82	414.74	3.80
Medical Equipment	201	4.58	3.84	73.44	0.83	99.18	3.70
Precious Metals	4	0.09	3.52	83.72	1.22	322.01	3.25
Communication	205	4.67	3.14	372.01	0.41	1301.77	3.05
Measuring and Control Equipment	86	1.96	2.20	193.95	0.56	219.11	2.10
Agriculture	12	0.27	1.89	1291.74	0.15	1590.25	1.84
Electrical Equipment	39	0.89	1.64	359.03	0.75	515.85	1.58
Entertainment	73	1.66	1.50	434.89	0.17	980.61	1.41
Business Services	1112	25.35	1.34	217.83	0.70	356.95	1.19
Chemicals	42	0.96	1.20	1067.06	0.22	1112.83	1.15
Bottom 10 firms with smallest cash to sale ratio							
Automobiles and Trucks	44	1	0.09	5802.25	0.13	5366.54	0.06
Tobacco Products	4	0.09	0.09	1109.65	0.05	1135.95	0.06
Consumer Goods	52	1.19	0.08	416.77	0.21	374.90	0.05
Utilities	2	0.05	0.07	603.24	0.04	1219.75	0.06
Apparel	54	1.23	0.07	382.15	0.18	253.41	0.04
Shipping Containers	14	0.32	0.06	709.71	0.11	713.88	0.04
Business Supplies	20	0.46	0.04	962.08	0.05	762.53	0.02
Fabricated Products	8	0.18	0.03	293.57	0.03	285.13	-0.01
Textiles	18	0.41	0.02	439.65	0.04	388.11	0.01
Candy & Soda	4	0.09	0.02	3114.97	0.02	3113.28	-0.02

Table II shows the frequency of IPO firms from 1990 to 2013 by industry. I use the Fama and French 48 industries for industry classification. As shown in the table, 25.35% of IPO firms (1,112 firms) are in business services, followed by 8.64% of pharmaceutical products industry, 6.88% of

electronic equipment industry, 6.61% of retail industry, and 6.06% of computer industry. The industries with the highest levels of cash holdings (in term of both cash to sale ratio and cash to asset ratio) during my thirteen years of sample period are pharmaceutical products, medical equipment, precious metals, trading, and communication in term of cash per sale or electronic equipment in term of cash per assets. These firms hold very high level of cash holdings compared to the average level of 181%. For example, an average firm in pharmaceutical products industry has 978% of cash to sales and 1.75% of cash to total assets. The high level of cash holdings in these industries may result from the fact that these are most profitable industries in the market. However, industries with the highest level of assets and sales are automobiles and trucks, candy & soda, food products, coal, and agriculture.

To see whether there is a significant difference between firm cash holdings before and after IPO, I report the means of cash holdings for every single year before and after IPO in panel A of table III. Due to the limitation of data before IPO, I report cash holdings only up to 2 years prior to their IPO, and to 3 years after IPO. All measures of cash holdings are winzorised at 1% each tail before taking means to prevent the effect of some abnormal firms with very high cash reserves. Panel A shows that firms hold a significant amount of cash both before and after IPO with high t-statistics. A average firm holds cash at nearly 2.91 times to its sale prior to going public 2 years. However, this ratio reduces substantially to 1 year prior to IPO at just around 175% of cash to sales. Interestingly, cash holdings in offering year get back to as high as it is in second year before IPO at around 2.93. Nevertheless, it reduces gradually in 3 years after that. This pattern holds for two other proxies of cash holdings. The statistical differences of firm cash holdings before and after IPO are shown in Panel B. In particular, the difference of average cash to sale ratio in 2 years after and before IPO is 0.62. Similarly, they are 0.25 of increase for cash to total assets ratio, and 0.64 of increase for industry adjusted cash to sale ratio.

Table IV reports the distribution of the sample by public float ranges (columns) and by year (rows) from 1990 to 2013. One thing to note is that the distribution is uneven. The number of IPOs peaks at the range 20–40% and then decreases. This pattern holds across all years in the sample. About 56.7% of the IPOs fall in the 20–40% range of public float. The number of IPOs is significantly high before 2000 with average of 1091 firms going public every year, but this number decreases significantly of nearly 75% to 290 IPOs per year from 2001.

Another remarkable point in this table is that public float reduces significantly in the 1999 – 2000 period. Only about 40% of firms issue shares in float range of 20-40%, much lower than the average percentage of firms issue in this float range for the whole period of 15 years (approximately 57%). The number of firms going public with float higher than 40% also decreases to less than 10% in 2000. However, the number of firms publishes float less than 20% increase surprisingly from 22% in 1998

Table III: Cash holdings sorted by years before and after IPO

The sample consists of 4394 IPO firms from 1990 to 2013. The sample is sorted by time order from 2 years before to 3 years after IPO. There are 3,114 firms having data of cash holdings prior IPO 2 years, 4,394 firms have data in year of IPO, and 3368 firms having data up to 3 years after IPO. Panel A reports means and t values for 3 proxies of cash holdings for 6 continuous years. Panel B report the differences of cash holdings before and after IPO for many time intervals together with their t-tests.

Panel A: Means of cash holdings by time order

		CashSale		CashAT		Cashsale_adj	
	Obs	Mean	t-value	Mean	t-value	Mean	t-value
2 years prior to IPO	3114	2.9066	8.89	0.9414	16.44	2.7709	8.51
1 year prior to IPO	4315	1.7506	10.90	0.6056	22.84	1.6375	10.24
IPO year	4394	2.9343	14.49	0.9117	26.72	2.8083	13.92
1 year after IPO	4149	1.6456	11.37	0.4703	21.50	1.5126	10.51
2 year after IPO	3761	1.3260	9.75	0.4533	18.49	1.1886	8.79
3 year after IPO	3368	1.3243	8.61	0.4063	17.86	1.1799	7.72

Panel B: Differences of cash holdings before and after IPO

	CashSale		Cash AT		Cashsale_adj	
	Diff(1-2)	t-value	Diff(1-2)	t-value	Diff(1-2)	t-value
diff year -2 vs 2	1.5806	4.46	0.4881	7.83	1.5823	4.49
diff year -1 vs 1	0.1049	0.49	0.1353	3.93	0.1249	0.58
diff year -1 vs 0	-1.1837	-4.54	-0.3061	-7.05	-1.1708	-4.51
diff year 0 vs 1	1.2886	5.13	0.4414	10.75	1.2958	5.19
diff year [-2,-1] vs [1,2]	0.6213	3.44	0.2516	8.23	0.6363	3.53

Table IV: Number of IPOs by public float and by year

The table reports the distribution of the sample from 1990 to 2013 by public float ranges (columns) and by year (rows). The sample of IPOs is sorted into five groups by public float percentage in 20% ranges. Each column in the panel represents a different range of public float in ascending order. The first five columns report the number of IPOs in each of the years 1990–2013, respectively. The last column reports the yearly totals over all public float ranges. The last row reports total number of IPOs from 1990 to 2013 by ranges.

	PF0020		PF2040		PF4060		PF6080		PF8010		Total
1990	9	(11.8%)	48	(63.2%)	13	(17.1%)	3	(3.9%)	3	(3.9%)	76
1991	17	(7.9%)	147	(68.4%)	37	(17.2%)	8	(3.7%)	6	(2.8%)	215
1992	18	(6.5%)	182	(65.5%)	58	(20.9%)	7	(2.5%)	13	(4.7%)	278
1993	37	(9.6%)	225	(58.1%)	90	(23.3%)	13	(3.4%)	22	(5.7%)	387
1994	33	(11.6%)	167	(58.6%)	55	(19.3%)	10	(3.5%)	20	(7.0%)	285
1995	43	(12.6%)	216	(63.2%)	59	(17.3%)	8	(2.3%)	16	(4.7%)	342
1996	81	(15.6%)	296	(57.1%)	85	(16.4%)	18	(3.5%)	38	(7.3%)	518
1997	43	(12.5%)	209	(60.8%)	67	(19.5%)	10	(2.9%)	15	(4.4%)	344
1998	46	(22.0%)	114	(54.5%)	28	(13.4%)	4	(1.9%)	17	(8.1%)	209
1999	186	(46.0%)	173	(42.8%)	15	(3.7%)	6	(1.5%)	24	(5.9%)	404
2000	157	(50.0%)	129	(41.1%)	16	(5.1%)	2	(0.6%)	10	(3.2%)	314
2001	16	(27.6%)	30	(51.7%)	8	(13.8%)	2	(3.4%)	2	(3.4%)	58
2002	6	(12.0%)	28	(56.0%)	7	(14.0%)	5	(10.0%)	4	(8.0%)	50
2003	8	(17.0%)	26	(55.3%)	7	(14.9%)	0	(0.0%)	6	(12.8%)	47
2004	23	(17.3%)	87	(65.4%)	18	(13.5%)	1	(0.8%)	4	(3.0%)	133
2005	10	(8.7%)	65	(56.5%)	26	(22.6%)	4	(3.5%)	10	(8.7%)	115
2006	16	(14.3%)	78	(69.6%)	15	(13.4%)	0	(0.0%)	3	(2.7%)	112
2007	31	(25.6%)	77	(63.6%)	10	(8.3%)	0	(0.0%)	3	(2.5%)	121
2008	2	(14.3%)	8	(57.1%)	3	(21.4%)	0	(0.0%)	1	(7.1%)	14
2009	10	(27.0%)	18	(48.6%)	6	(16.2%)	1	(2.7%)	2	(5.4%)	37
2010	17	(25.4%)	35	(52.2%)	11	(16.4%)	0	(0.0%)	4	(6.0%)	67
2011	27	(39.1%)	35	(50.7%)	4	(5.8%)	0	(0.0%)	3	(4.3%)	69
2012	28	(34.1%)	37	(45.1%)	7	(8.5%)	1	(1.2%)	9	(11.0%)	82
2013	29	(24.8%)	66	(56.4%)	8	(6.8%)	2	(1.7%)	12	(10.3%)	117
Total	893	(20.3%)	2496	(56.8%)	653	(14.9%)	105	(2.4%)	247	(5.6%)	4394

to 46% in 1999. Consistent with prior IPO literature, firms go public much more often in the bubble period of 1999-2000 with low public float. This special phenomenon is attributed to high market valuation as firms can issue smaller number of shares than one they planned, but still raise sufficient desirable proceeds (Loungran and Ritter (2002); Dolvin and Jordan (2008)). This reason becomes more transparent as firms need to issues higher number of shares in the period of 2001-2004 to get planned proceeds due to the reversal in valuations.

V. Empirical results

5.1. Public float and cash holdings

5.1.1. Effects of public float on cash holdings

Table V reports the cash holdings (Cash/sale) in the different public float ranges for various holding periods. Cash holdings is calculated at the end of fiscal years using annual data from Compustat. Columns (1) through (8) report the mean and t-stat of cash holdings by each range at the end of fiscal IPO and after firm goes public one, two, and three years. I first sort the IPO sample into five public float ranges: 0–20%, 20–40%, 40–60%, 60–80%, and 80–100% for each range. I then measure the cash holdings for IPO year, and one, two, three years after that. To control for outliers, cash holdings are winsorized at 1%.

In Table V, cash holdings are reported as a function of the percentage of the public float for different horizons. The general picture that evolves for the cash holdings for all horizons is that the cash holdings always negatively relate to public float. Moreover, when firms publish more shares, or when public float range move from lower range to higher range, mean of cash holdings reduces more sharply. All cash holdings are significantly different from zero at the 1% level.

Table VI, VII, VIII examine the relation of public float to cash holdings. I use log of cash to sales ratio as proxy for cash holdings in table VI, and log of ratio of cash and marketable securities to net assets as proxy for cash holdings in table VII. Due to high skewness in industry-adjusted cash to sales ratio, I still apply log for this ratio as proxy for cash holdings in table VIII. Therefore, the sample for test in table VIII is limited to only 9557 firm-year observations with firms having cash holdings larger than average level of their industry. The data set for test in table VI and VII includes 15,672 firm-year observations from 4394 firms going public in the period from 1990 to 2013. The independent variables include public float (PF) and firm control variables as described in detail in Appendix 2, Dividend indicator, and Bond indicator. Net assets equal total assets minus cash holdings. All variables except for dummy variables are winsorized at the 1% level on either tail.

For the test of each proxy of cash holdings, I ran five regressions specified as follows. In regression (1), the only independent variable is public float (PF). Regression results from column (1) of all three tables show the same result that public float has significantly negative relation with firm's cash holdings. In average, if public float increases 1%, cash holdings will decrease about 2.63%. In regression (2) through regression (5) of all three tables, I include all other control variables. Additionally, I applied firm fixed effects for regression (3) to control for possibility of time variance of unobservable factors that might affect simultaneously the public float and cash holdings. Standard deviation clustered by firm is applied in regression (4) to control for the correlation of the residuals within a firm across years in the sample. Standard deviation clustered by time is applied in regression (5) to control for the correlation of the residuals in a given year across different firms. All regressions

Table V: Cash holdings (log) of IPO firms sorted by public float

This table reports the average cash holdings measured by ratio of cash to sales in the different public float ranges for various holding periods. Cash holdings are calculated at the end of IPO fiscal year, and at the end of first, second, and third fiscal year after IPO year. The complete sample consists of 4394 firms at the end of IPO fiscal year; 4149 firms at the end of first fiscal year after IPO; 3761 firms at the end of second fiscal year after IPO; and 3368 firms at the end of third fiscal year after IPO with total 15672 firm-years obs. Firstly, the IPO sample is sorted into 5 public float ranges: 0-20%, 20-40%, 40-60%, 60-80%, and 80-100% for each range. I then measure the cash holdings for IPO year, first, second, and third year after IPO. For each horizon, the mean cash holdings and the t-statistic of the mean cash holdings are reported. I winsorize cash holdings at 1% to control for outlier.

Public float range (%)	Year of IPO			1st year after IPO			2nd year after IPO			3rd year after IPO		
		(1)	(2)		(3)	(4)		(5)	(6)		(7)	(8)
	N	Mean	t Stat	N	Mean	t Stat	N	Mean	t Stat	N	Mean	t Stat
0-20	896	-0.86	-12.69	830	-1.37	-21.81	758	-1.53	-23.38	664	-1.62	-24.04
20-40	2503	-1.42	-29.62	2374	-1.85	-40.11	2144	-2.05	-43.28	1924	-2.19	-45.12
40-60	654	-2.61	-28.28	617	-2.91	-32.93	567	-3.08	-34.99	500	-3.11	-34.92
60-80	105	-2.65	-13.10	100	-2.85	-13.85	87	-3.21	-15.67	76	-3.47	-14.61
80-100	252	-2.54	-18.70	243	-2.92	-24.74	223	-2.87	-23.07	202	-2.92	-23.46
Total	4394		4149				3761			3368		

Table VI: Cash holdings (Log_Cash/Sales) – regression results

The sample consists of 15,672 firm-year observations from 4,395 domestic IPO firms going public in the period from 1990 to 2013. The table presents panel regression coefficients from

$$\text{Log\_Cash/Sales}_{i,t} = \beta_0 + \beta_1 \text{ x Public Float}_i + \beta \text{ x Control variables}_{i,t} + \varepsilon_{i,t},$$

in which log of cash to sales ratio is proxy for firm's cash holdings. Main independent variable is public float. Control variables include firm size, firm leverage, ratio of the market value to book value of assets (Market-to-Book), ratio of cash flow to net assets (Cash Flow/Assets), ratio of net working capital to net assets (Working Capital/Assets), ratio of research and development to sales (R&D/Sales), ratio of capital expenditures to net assets (CapEx/Assets), ratio of acquisition to sales (Acquisition/Sales), Dividend indicator, and Bond indicator. Net assets equal total assets minus cash holdings. The variables Cash Holdings, Leverage, Market-to-Book, CF/Assets, Working Capital/Assets, R&D/Sales, CapEx/Assets, Acquisition/Sales are winsorized at the 1% level on either tail. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

Y: Log_Cash/Sale	(1)	(2)	(3)	(4)	(5)
Intercept	-1.0966	-2.0719	-1.9887	-2.0664	-2.0719
	(-33.16)	(-25.93)	(-4.28)	(-3.89)	(-11.76)
PF	-2.6330	-1.5292	-0.9413	-1.5307	-1.5291614
	(-30.71)	(-18.75)	(-13.07)	(-6.39)	(-12.88)
Size		-0.0388	0.0005	-0.0392	-0.0388
		(-3.07)	(0.05)	(-0.69)	(-1.34)
Leverage		-1.0011	-0.8722	-0.9995	-1.0011
		(-14.44)	(-17.27)	(-4.40)	(-8.90)
Market-to-Book		0.1055	0.0628	0.1052	0.1055
		(19.04)	(12.34)	(5.24)	(7.45)
Cash Flow/Assets		-0.1330	-0.0703	-0.1324	-0.1330
		(-5.49)	(-4.68)	(-2.85)	(-3.99)
Working Capital/Assets		0.4977	0.4374	0.4973	0.4977
		(22.67)	(39.04)	(7.07)	(13.17)
R&D/Sales		0.1051	0.0844	0.1051	0.1051
		(28.74)	(35.17)	(21.73)	(45.36)
CapEx/Assets		1.4945	2.0021	1.4845	1.4945
		(9.18)	(14.08)	(2.11)	(4.15)
Acquisition/Sales		0.9249	0.5858	0.9219	0.9249
		(13.68)	(9.42)	(4.78)	(7.76)
Dividend Indicator		-0.6619	-0.2909	-0.6610	-0.6619
		(-14.02)	(-6.25)	(-3.91)	(-7.89)
Bond Indicator		-0.0842	-0.0763	-0.0848	-0.0842
		(-2.87)	(-2.86)	(-0.92)	(-2.03)
Adj R^2	0.0549	0.4004	0.5273	0.4002	0.4004
N	15107	13869	13842	13842	13869
Industry fixed effects	No	No	Yes	No	No
S.D. clustered by industry	No	No	No	Yes	No
S.D. clustered by time	No	No	No	No	Yes

Table VII: Cash holdings (Log_Cash/Assets) – regression results

The sample consists of 15,672 firm-year observations from 4,395 domestic IPO firms going public in the period from 1990 to 2013. The table presents panel regression coefficients from

$$\text{Log\_Cash/Assets}_{i,t} = \beta_0 + \beta_1 \text{ x Public Float}_i + \beta \text{ x Control variables}_{i,t} + \varepsilon_{i,t},$$

in which log of cash to assets ratio is proxy for firm's cash holdings. Main independent variable is public float. Control variables include firm size, firm leverage, ratio of the market value to book value of assets (Market-to-Book), ratio of cash flow to net assets (Cash Flow/Assets), ratio of net working capital to net assets (Working Capital/Assets), ratio of research and development to sales (R&D/Sales), ratio of capital expenditures to net assets (CapEx/Assets), ratio of acquisition to sales (Acquisition/Sales), Dividend indicator, and Bond indicator. Net assets equal total assets minus cash holdings. The variables Cash Holdings, Leverage, Market-to-Book, CF/Assets, Working Capital/Assets, R&D/Sales, CapEx/Assets, Acquisition/Sales are winsorized at the 1% level on either tail. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

Y: Log_Cash/Assets	(1)	(2)	(3)	(4)	(5)
Intercept	-1.31549	-1.7950	-1.7900	-1.7900	-1.7950
	(-45.37)	(-26.22)	(-31.23)	(-4.84)	(-10.78)
PF	-2.31343	-1.1633	-1.1649	-1.1649	-1.1633
	(-29.74)	(-16.66)	(-17.99)	(-8.08)	(-12.90)
Size		-0.1329	-0.1335	-0.1335	-0.1329
		(-12.81)	(-13.81)	(-3.62)	(-7.00)
Leverage		-0.9516	-0.9506	-0.9506	-0.9516
		(-15.66)	(-20.84)	(-6.05)	(-11.89)
Market-to-Book		0.0958	0.0955	0.0955	0.0958
		(19.74)	(20.52)	(4.74)	(5.10)
Cash Flow/Assets		-0.0576	-0.0569	-0.0569	-0.0576
		(-3.16)	(-4.14)	(-1.75)	(-1.61)
Working Capital/Assets		0.6317	0.6321	0.6321	0.6317
		(28.06)	(61.44)	(7.82)	(16.54)
R&D/Sales		0.0053	0.0052	0.0052	0.0053
		(2.27)	(2.47)	(0.75)	(2.28)
CapEx/Assets		0.8808	0.8783	0.8783	0.8807
		(6.68)	(7.36)	(1.56)	(3.10)
Acquisition/Sales		-0.0252	-0.0271	-0.0271	-0.0252
		(-0.46)	(-0.48)	(-0.32)	(-0.29)
Dividend Indicator		-0.2736	-0.2722	-0.2722	-0.2736
		(-6.36)	(-6.47)	(-2.60)	(-4.99)
Bond Indicator		-0.0725	-0.0717	-0.0717	-0.0725
		(-2.97)	(-2.92)	(-1.10)	(-1.73)
Adj R^2	0.0554	0.4282	0.428503	0.4282	0.4282
N	15439	13873	13846	13846	13873
Industry fixed effects	No	No	Yes	No	No
S.D. clustered by industry	No	No	No	Yes	No
S.D. clustered by time	No	No	No	No	Yes

Table VIII: Cash holdings (Industries adjusted Cash/Sales) – regression results

The sample consists of 15,672 firm-year observations from 4,395 domestic IPO firms going public in the period from 1990 to 2013. The table presents panel regression coefficients from

$$\text{Industries Adjusted Cash/Sales}_{i,t} = \beta_0 + \beta_1 \text{ x Public Float}_i + \beta \text{ x Control variables}_{i,t} + \varepsilon_{i,t},$$

in which industries adjusted cash to sales ratio is proxy for firm's cash holdings. Main independent variable is public float. Control variables include firm size, firm leverage, ratio of the market value to book value of assets (Market-to-Book), ratio of cash flow to net assets (Cash Flow/Assets), ratio of net working capital to net assets (Working Capital/Assets), ratio of research and development to sales (R&D/Sales), ratio of capital expenditures to net assets (CapEx/Assets), ratio of acquisition to sales (Acquisition/Sales), Dividend indicator, and Bond indicator. Net assets equal total assets minus cash holdings. The variables Cash Holdings, Leverage, Market-to-Book, CF/Assets, Working Capital/Assets, R&D/Sales, CapEx/Assets, Acquisition/Sales are winsorized at the 1% level on either tail. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

Y: CashSale_Adj	(1)	(2)	(3)	(4)	(5)
Intercept	-0.83739	-1.6332	-1.6332	-1.6332	-1.6332
	(-21.37)	(-3.56)	(-19.87)	(-3.56)	(-12.88)
PF	-1.89512	-1.1278	-1.1278	-1.1278	-1.1281
	(-17.94)	(-5.65)	(-11.55)	(-5.65)	(-6.95)
Size		-0.0744	-0.0744	-0.0744	-0.0752
		(-1.27)	(-5.24)	(-1.27)	(-1.95)
Leverage		-0.2066	-0.2066	-0.2066	-0.2094
		(-0.98)	(-3.14)	(-0.98)	(-1.82)
Market-to-Book		0.0538	0.0538	0.0538	0.0538
		(6.69)	(9.10)	(6.69)	(3.84)
Cash Flow/Assets		-0.0750	-0.0750	-0.0750	-0.0753
		(-1.60)	(-4.19)	(-1.60)	(-2.36)
Working Capital/Assets		0.4090	0.4090	0.4090	0.4095
		(7.07)	(32.92)	(7.07)	(12.22)
R&D/Sales		0.1017	0.1017	0.1017	0.1017
		(29.86)	(41.45)	(29.86)	(49.68)
CapEx/Assets		1.3062	1.3062	1.3062	1.3187
		(2.35)	(8.13)	(2.35)	(5.70)
Acquisition/Sales		0.8390	0.8390	0.8390	0.8440
		(4.66)	(10.78)	(4.66)	(6.35)
Dividend Indicator		-0.9820	-0.9820	-0.9820	-0.9769
		(-5.50)	(-14.63)	(-5.50)	(-10.90)
Bond Indicator		-0.0740	-0.0740	-0.0740	-0.0698
		(-0.83)	(-2.10)	(-0.83)	(-1.66)
Adj R^2	0.0283	0.3972	0.3972	0.3972	0.3974
N	9557	8828	8828	8828	8840
Industry fixed effects	No	No	Yes	No	No
S.D. clustered by industry	No	No	No	Yes	No
S.D. clustered by time	No	No	No	No	Yes

in table VI, VII and VIII show the same results that cash holdings have negative relation with public float and some control variables including firm size, leverage, cash holdings/assets, dividend payout, and bond indicator. On the other hand, cash holdings is positively related to market to book value, working capital/assets, R&D/sales, CapEx/Sales, and Acquisition/Sales.

5.1.2. Differences in uses of cash holdings

To check the determinants leading to the differences in cash uses between firms with high public float and firms with low float, I check how firms make their investment and payout policy in relation with public float. Specifically, I check how excess cash, public float, and their interaction are related to firm's investment decisions and payout policy. I focus on two internal investment decisions including capital expenditure and R&D expenditures and one external investment decisions, acquisitions. According to Gompers, Ishii, and Metrik (2003), firms have tendency in recent years to go public to raise money to finance their daily capital expenditure, but an overused amount of cash on this area is treated as sign of weak corporate governance. On the other hand, overusing excess cash in R&D expenditure increases firm value (Eberhart, Maxwell, and Siddique, 2004), especially when firms go public with a high float seeking funds for their hot development. Acquisitions is also one of the main decisions weak governed firms make when they hold a high insignificant cash amount. Such acquisitions further tend to have value-destroying (Harford, 1999; Masulin, Wang, and Xie, 2007).

Moreover, J.Harford et al. (2008) show that firm's decision of payout using excess cash depends on its governance. Strong governed firms are more likely to pay more dividends committing their payout policy in the long term. However, firms with weak governance choose repurchase to not bear payout commitment in the future.

Capital expenditure is adjusted annually by the industry median value using all firms having information available in Compustat during my testing period. The industries are classified into 48 industry level same as in previous section. However, due to the nature of newly public firms, I couldn't construct industry-adjusted variables for R&D expenditure and Repurchases. With 15,672 observations in the sample, nearly 365 observations have missing value for R&D expenditure; about 7000 observations don't spend money for R&D; only 8300 observations invest in R&D expenditures. Similarly, there are nearly 920 observations missing value for acquisitions in my sample, about 10,000 observations with negative or non-outflow in acquisition, only 5254 observations spending money on this area. Therefore, I construct dummy variables for R&D expenditure and Acquisition in which the values equal to 0 if firm doesn't use money for these two activities and 1 otherwise.

Moreover, there are 14,134 observations with non-cash payout and only 5254 observations with positive payout flow to shareholders. Only about 1630 observations have data for repurchase in which half of them does not carry repurchase within 3 years after IPO. Thus, I also construct dummy variables for these two proxies of payout policy with 0 for non-payout or repurchase and 1 otherwise.

Table IX: Public float and cash holdings in relation with firms' investment and payout decisions

This table shows the effects of cash holdings in relation with public float on firm's investment decisions and payout policy. The investment decisions include industry-adjusted capital expenditure, dummy variables for R&D and Acquisitions. Capital expenditure is adjusted yearly based on 48 Fama-French 48 industry classification system. Payout policy consists of dummy variables for dividend payout and repurchases. All dummy variables equals to 0 if main numeric variables have value of 0 and otherwise. The main explanatory variables are lagged cash residual, change in lagged cash residual, public float and interaction between public float and lagged cash residuals. Cash residual is residual from a regression of cash holdings on firm-specific characteristics including firm size, leverage, sales, cash flow, ratio of working capital to assets, R&D to sales, capital expenditures to assets, and acquisition to sales as well as industry and year indicator variables. Additional control variables include lagged sales growth, lagged net working capital, lagged leverage, and lagged firm size. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

	Investment Decisions			Payout policy	
	Ind. Adjusted Capital Exp. (1)	R&D Dummy (2)	Acquisitions Dummy (3)	Dividends Dummy (4)	Repurchases Dummy (5)
Cash residual$_{(t-1)}$	0.0012	10.2268	-0.0121	0.0028	0.0113
	(1.99)	(0.99)	(-2.62)	(3.12)	(1.85)
Change in cash residual$_{(t-1)}$	0.0001	10.7515	-0.0106	0.0020	0.0116
	(0.22)	(0.99)	(-2.67)	(2.41)	(2.49)
Public Float	-0.0199	-18.8839	0.0649	0.1330	-0.1041
	(-3.98)	(-1.12)	(2.09)	(6.29)	(-1.36)
Public Float * Cash residual$_{(t-1)}$	0.0001	1.9373	0.0017	-0.0001	0.0000
	(1.00)	(1.10)	(0.93)	(-2.70)	(-0.02)
Sale$_{(t-1)}$	0.0000	-0.0042	0.0000	0.0001	0.0000
	(-5.64)	(-0.97)	(-4.47)	(7.83)	(1.04)
Working capital$_{(t-1)}$	0.0033	3.5934	-0.0011	-0.0094	-0.0246
	(3.14)	(1.29)	(-0.25)	(-7.64)	(-1.91)
Leverage$_{(t-1)}$	0.0025	10.4254	0.0348	-0.0155	-0.1187
	(0.49)	(1.14)	(1.33)	(-1.30)	(-2.82)
Size$_{(t-1)}$	0.0022	-0.0555	0.0263	0.0236	0.0912
	(1.75)	(-0.05)	(3.85)	(6.11)	(5.85)
Intercept	0.0050	16.3759	-0.0921	-0.0888	0.0904
	(0.68)	(1.24)	(-2.71)	(-4.87)	(1.07)
Observations	9714	9714	9714	9711	1186
R-Square	0.0117	0.0288	0.0179	0.1026	0.0994
S.D. clustered by firm	Yes	Yes	Yes	Yes	Yes
S.D. clustered by time	Yes	Yes	Yes	Yes	Yes

To examine the effect of firm's cash holdings on investment decisions, I use Cash position defined as the difference between firm's actual cash holdings and its expected value, so-called unexplained

portion of cash holdings following the method of J. Harford et al. (2008). The unexplained cash is measured by the residual from a regression of cash holdings on firm size, leverage, market to book value as market options, cash flow as profitability, ratios of working capital to assets, R&D to sales, Capital expenditures to assets, and acquisition to sales as well as industry and year indicator variables.

Finally, main control variables include lagged cash residual, change in lagged cash residual, public float, interaction of public float and lagged cash residual. Other control variables include lagged sale, lagged working capital, lagged leverage, and lagged size following Comment and Schwert (1995). He used additional market model residual and average price-earnings ratio, as well as averaged values over the prior four years for sale, working capital, leverage, and size to examine the probability of acquisition activity. However, due to lack of information from IPO, I use four control variables with their lagged values. The results are shown in table IX.

The table shows that when firm have more cash than their need for usual activities, they will increase their spending on capital expenditure and payout, but decrease expenses for acquisitions. Firms with high public float will use less money on capital expenditure, instead of that they use more money on implement acquisition. Interestingly, firms going public with high float do not use their excess cash on development. All interactions between public float and cash residual are positive suggesting that firms with high public float increase investments in R&D relative to their peers as their cash residuals increase. However, these coefficients of interactions are insignificant.

Firms with high public float are also more like to pay dividend instead of repurchase. However, the interaction of public float with the cash residuals of the firms is negative and significant, which suggests that firms with high public float are less likely to pay out dividend as their cash positions increases.

5.1.3. Public float, excess cash, and profitability

Table IX shows how investment and payout decisions differ based on public float and the firm's excess cash. While these relations are instructive, it is hard to see their effects on shareholder wealth. Therefore, I continue to test the impact of these relations on firm performance. I check whether the difference in investment and payout decisions harm performance. Thus, I examine whether public float in relation with excess cash are related to future changes in firms' performance.

Specifically, I use industry-adjusted profitability and industry-adjusted market to book (calculated similar to industry-adjusted capital expenditures) as proxies for firm performance. I found that cash positions do not increase firm performance by themselves. For the public float, I find that the public float is significantly related to market valuation as the firms issue more shares as firms with higher public float have a significantly higher market to book ratio than those with lower public float. I also

Table X: Public float and cash holdings in relation with firms' profitability and market-to-book

This table provides regression results on whether the public float is related to changes in firms' profitability and market-to-book relative to industry peers. I include firms' lagged profitability or market-to-book in the models to control for endogeneity concerns. The dependent variable in models 1 and 2 are industry-adjusted profitability and industry-adjusted market-to-book, respectively. All the dependent variables are industry-adjusted on a yearly basis using the Fama-French 48 industry classification system. The main explanatory variables are lagged cash residual, change in lagged cash residual, public float and interaction between public float and lagged cash residuals. Cash residual is residual from a regression of cash holdings on firm-specific characteristics including firm size, leverage, sales, cash flow, ratio of working capital to assets, R&D to sales, capital expenditures to assets, and acquisition to sales as well as industry and year indicator variables. Additional control variables include lagged sales growth, lagged net working capital, lagged leverage, and lagged firm size. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

	Industry-adjusted Profitability (1)	Industry-adjusted MtB (2)
Industry-adjusted profitability (1) or MtB (2)$_{(t-1)}$	0.3814	0.4346
	(5.89)	(4.67)
Cash residual$_{(t-1)}$	-0.0157	-0.0188
	(-1.50)	(-0.80)
Change in cash residual$_{(t-1)}$	-0.0099	-0.0161
	(-1.07)	(-0.88)
Public Float	-0.0727	1.2559
	(-1.27)	(3.81)
Public Float * Cash residual$_{(t-1)}$	0.0001	0.0062
	(0.04)	(2.75)
Sale$_{(t-1)}$	0.0000	0.0003
	(-1.47)	(3.71)
Working capital$_{(t-1)}$	0.0643	-0.1955
	(4.08)	(-2.75)
Leverage$_{(t-1)}$	-0.1151	0.7947
	(-1.24)	(5.37)
Size$_{(t-1)}$	0.0990	-0.4872
	(3.25)	(-4.85)
Intercept	-0.1957	0.1590
	(-1.86)	(0.39)
Observations	9713	9707
R-Square	0.3092	0.3899
S.D. clustered by firm	Yes	Yes
S.D. clustered by time	Yes	Yes

find the interaction of public float and lagged cash residuals is significantly positive, meaning that firms with high public float increase their market value as their cash positions increases. However, the result does not hold for profitability, suggesting that the increase in market valuation when public float increases comes from the pressure and monitoring of outside investors.

5.2. Public float and corporate governance

5.2.1. Effect of public float on firm's corporate governance

To examine the reason why public float impacts on cash holding, I test the relation between public float and corporate governance of IPO firms. I employ a method of Yael V.Hochberg (2012) to use discretional current accruals as dependent variables. Main explainable variable is public float. Control variables are selected based on regression model of Al-Fayoumi, Nedal, Bana Abuzayed, and David Alexander (2010), including one-year lag of firm size, lag of ROE, lag of growth rate, and lag of leverage. Firm size is included to test whether large firms are less (more) likely to engage in earnings management to smooth income (Ashari et al. (1994)), or to avoid their political visibility (Moses (1987)). Firm size equals to log of total assets. Accruals could also relate to growth opportunity. It is expected that firms are more likely to manage earnings in high growth phase (Healy and Palepu (2003)). Therefore, I include growth rate, measured by change of sale year by year, as a control variable into the model to control for demand as well as product-cycle effects on profitability. Return on equity (ROE) stands for profitability. The more firm manage its earning, the less ROE it gains. I expect a negative relation between profitability and dependent variable. Finally, firm financial leverage is used to be a proxy for risk that firm will manage its earning more aggressive when it face default on debt covenants (Press and Weintrop (1990)). Leverage is computed by dividing debt to assets.

In regression (1), only public float (PF) is included in model as independent variable. In regression (2) through regression (4) of all three tables, I include all other control variables. Moreover, I applied firm fixed effects for regression (3), standard deviation clustered by firm in regression (4), standard deviation clustered by time in regression (5). As shown in all 5 regressions in the table, public float has positive relation with discretional current accruals. This means that when insiders' ownership decreases more and more, insiders tend to adjust discretional current accrual upward, signaling for weak corporate governance.

5.2.2. Effect of public float on firm cash holdings in correlation with corporate governance

Table X shows results of the regression examining the effect of public float on firm cash holdings in association with corporate governance. In all three regressions, log of cash to sales ratio is employed as dependent variable to stand for firm cash holdings. In column (1), I show the effect of public float on cash holdings again to compare with its effect on cash holdings after interacting with corporate governance proxy in column (3). In column (2), I run regression with key independent

Table XI: Discretional current accruals and public float – regression results

This table describes regression analysis results on the relation between the discretional current accrual and the public float, controlling for various performance variables and firm characteristics. The dependent variable is discretional current accruals, measured within 3 years after IPO, following a method of Jones (1991) described in Teoh, Welch, and Wong (1998). The main explanatory variable is public float (PF). Control variables are taken from annual Compustat database, including following variables. SIZE_1 is the size of the firm measured by the natural logarithm of total assets at the end of fiscal year immediately before IPO year. ROE_1 is return on equity of firm at the end of fiscal year immediately before IPO year. GROWTH_1 is the growth of the company calculated by percentage of change in sales before IPO year. LEV_1 is the leverage ratio calculated by total liabilities over total assets at the end of fiscal year immediately before IPO year. To control for outliers, dependent variable and all independent variables are winsorized at 1%. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

Y: DCA in IPO year	(1)	(2)	(3)	(4)	(5)
Intercept	0.0055	0.0186	0.0107	0.0107	0.0108
	(0.88)	(1.25)	(0.99)	(0.54)	(0.51)
PF	0.0436	0.0395	0.0492	0.0492	0.0492
	(2.79)	(2.68)	(3.17)	(3.85)	(2.81)
SIZE_1		-0.0069	-0.0062	-0.0062	-0.0062
		(-2.30)	(-3.00)	(-1.73)	(-1.66)
ROE_1		0.0031	0.0024	0.0024	0.0025
		(1.14)	(1.71)	(1.09)	(0.80)
GROWTH_1		0.0303	0.0408	0.0408	0.0409
		(2.59)	(11.46)	(2.92)	(3.01)
LEV_1		0.0174	0.0202	0.0202	0.0201
		(0.96)	(1.65)	(1.05)	(1.00)
Adj R^2	0.0005	0.0127	0.0129	0.0130	0.0130
N	14702	14672	14648	14648	14672
Firm fixed effects	No	No	Yes	No	No
S.D. clustered by firm	No	No	No	Yes	No
S.D. clustered by time	No	No	No	No	Yes

variable is discretional current accruals to examine whether this variable has direct effect on cash holdings or not. In column (3), I include both public float and discretional current accruals together with the interaction term of these two variables to examine the effect of public float on firm cash holdings in association with corporate governance.

Results show that both public float and discretional current accruals have separate effects on cash holdings as shown in column (1) and (2). However, the coefficient of interaction term in column (3) is negative which means that an increase in discretional current accruals causes higher decrease in firm cash holdings for large public float. However, the coefficient is not statistically significant. I suggest

Table XII: Cash holdings (Log_Cash/Sales) and Public float with differing corporate governance – regression results

The sample consists of 15,672 firm-year observations from 4,395 domestic IPO firms going public in the period from 1990 to 2013. The table presents panel regression coefficients from

$\text{Log\_Cash/Sales}_{i,t} = \beta_0 + \beta_1 \text{ x Public Float}_i + \beta_2 \text{ x DCA}_{i,t} + \beta 3 \text{ x Public Float}_i \text{ x DCA}_{i,t} + \beta \text{ x Control variables}_{i,t} + \varepsilon_{i,t}$,

in which log of cash to sales ratio is proxy for firm's cash holdings. Main independent variable is public float. Discretional current accruals is proxy for corporate governance, measured within 3 years after IPO, following a method of Jones (1991) described in Teoh, Welch, and Wong (1998). Public Float x DCA is interaction term. Control variables include firm size, firm leverage, ratio of the market value to book value of assets (Market-to-Book), ratio of cash flow to net assets (Cash Flow/Assets), ratio of net working capital to net assets (Working Capital/Assets), ratio of research and development to sales (R&D/Sales), ratio of capital expenditures to net assets (CapEx/Assets), ratio of acquisition to sales (Acquisition/Sales), Dividend indicator, and Bond indicator. Net assets equal total assets minus cash holdings. The variables Cash Holdings, Leverage, Market-to-Book, CF/Assets, Working Capital/Assets, R&D/Sales, CapEx/Assets, Acquisition/Sales are winsorized at the 1% level on either tail. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

Y: Log_Cash/Sales	(1)	(2)	(3)	
Intercept	-2.0719	-2.5919	-2.0662	-2.0588
	(-25.93)	(-33.84)	(-29.12)	(-12.03)
PF	-1.5292		-1.5093	-1.5141
	(-18.75)		(-18.75)	(-11.30)
DCA		-0.2247		-0.1448
		(-4.56)		(-1.61)
*PF*DCA*			-0.5278	-0.2056
			(-4.62)	(-0.86)
Size	-0.0388	-0.0356	-0.0387	-0.0397
	(-3.07)	(-2.69)	(-3.22)	(-1.54)
Leverage	-1.0011	-1.1394	-1.007	-1.0054
	(-14.44)	(-15.56)	(-17.93)	(-8.57)
Market-to-Book	0.1055	0.1197	0.1049	0.1049
	(19.04)	(20.89)	(18.44)	(9.89)
Cash Flow/Assets	-0.1330	-0.1646	-0.1422	-0.1415
	(-5.49)	(-6.23)	(-8.32)	(-4.36)
Working Capital/Assets	0.4977	0.4964	0.4921	0.4920
	(22.67)	(21.02)	(38.77)	(14.11)
R&D/Sales	0.1051	0.1061	0.1052	0.1051
	(28.74)	(26.79)	(40.00)	(28.59)
CapEx/Assets	1.4945	1.4543	1.4289	1.4219
	(9.18)	(8.65)	(9.60)	(4.92)
Acquisition/Sales	0.9249	0.8704	0.9468	0.9467
	(13.68)	(11.57)	(13.12)	(8.94)
Dividend Indicator	-0.6619	-0.8050	-0.6883	-0.6857
	(-14.02)	(-16.92)	(-13.11)	(-9.64)
Bond Indicator	-0.0842	-0.0844	-0.0713	-0.0719
	(-2.87)	(-2.78)	(-2.36)	(-1.77)
Adj R^2	0.4004	0.3815	0.3981	0.3983
N	13869	13301	13277	13277

Table XIII: Cash holdings (Log_Cash/Assets) – regression result for sample without delisted firms

The sample consists of 15,304 firm-year observations from 4,393 domestic IPO firms going public in the period from 1990 to 2013, and active within 3 years after IPO. The table presents panel regression coefficients from in which log of cash to assets ratio is proxy for firm's cash holdings. Main independent variable is public float. Control variables include firm size, firm leverage, ratio of the market value to book value of assets (Market-to-Book), ratio of cash flow to net assets (Cash Flow/Assets), ratio of net working capital to net assets (Working Capital/Assets), ratio of research and development to sales (R&D/Sales), ratio of capital expenditures to net assets (CapEx/Assets), ratio of acquisition to sales (Acquisition/Sales), Dividend indicator, and Bond indicator. Net assets equal total assets minus cash holdings. The variables Cash Holdings, Leverage, Market-to-Book, CF/Assets, Working Capital/Assets, R&D/Sales, CapEx/Assets, Acquisition/Sales are winsorized at the 1% level on either tail. The t-statistics are reported in parentheses below the coefficient. Adjusted R^2 and the sample size for each regression are reported in the last rows of the table.

Y: Log_Cash/Assets	(1)	(2)	(3)	(4)
Intercept	-1.0727	-2.0416	-2.0358	-2.0358
	(-31.91)	(-24.69)	(-28.87)	(-11.79)
PF	-2.69369	-1.5544	-1.5560	-1.5560
	(-30.71)	(-18.61)	(-19.68)	(-12.40)
Size		-0.0435	-0.0439	-0.0439
		(-3.31)	(-3.68)	(-1.72)
Leverage		-1.0229	-1.0210	-1.0210
		(-13.88)	(-17.86)	(-8.23)
Market-to-Book		0.1044	0.1041	0.1041
		(18.57)	(18.46)	(9.85)
Cash Flow/Assets		-0.1683	-0.1676	-0.1676
		(-6.16)	(-9.23)	(-4.65)
Working Capital/Assets		0.4941	0.4937	0.4937
		(21.91)	(38.93)	(14.36)
R&D/Sales		0.1030	0.1030	0.1030
		(27.90)	(39.80)	(28.68)
CapEx/Assets		1.5259	1.5159	1.5159
		(9.38)	(10.50)	(5.29)
Acquisition/Sales		0.9359	0.9328	0.9328
		(13.72)	(13.54)	(9.91)
Dividend Indicator		-0.6546	-0.6538	-0.6538
		(-13.78)	(-12.87)	(-9.31)
Bond Indicator		-0.0818	-0.0823	-0.0823
		(-2.77)	(-2.77)	(-2.17)
Adj R^2	0.0567	0.4033	0.403077	0.4031
N	14779	13582	13555	13555
Industry fixed effects	No	No	Yes	No
S.D. clustered by industry	No	No	No	Yes
S.D. clustered by time	No	No	No	Yes

there exists an endogenous effect between discretional current accruals and firm cash holdings which impacts to the statistics significance of the coefficient of the interaction term. I suggest that further tests should be implemented to treat this issue.

5.3. Robustness tests

To check whether the relation between cash holdings and public float still holds in case of delisted firms, I exclude observations with firms delisted in that year and after that. The new sample without delisted observations consists of 15,304 firm year observations from 4,393 firms. The results of the test still remain and are shown in table XIII.

VI. Conclusion

In this study, I investigate the relation between the public float and firm cash holdings after IPO using a sample of 4394 IPOs between 1990 and 2013. I find that public float has very significant negative relation with firm cash holdings. I conjecture that decrease in ownership as firm publish more shares motivates insiders to use firm cash holdings more aggressive, resulting in lower level of cash holdings in higher public float firm after IPO.

I find that public float truly negatively affects corporate governance. Outsider shareholders seem to play unsubstantial role in scrutiny of corporate activities. A clear evidence is that insiders try to manage earnings upwardly by adjusting discretional current accrual. However, effect of public float on cash holdings in relation of corporate governance is hard to confirm and still require further tests.

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