Analysts and Corporate Liquidity Policy

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Abstract:

This paper examines how equity analysts' roles as information intermediaries and monitors affect corporate liquidity policy and its associated value of cash, providing new evidence that analysts have a direct impact on corporate liquidity policy. Greater analyst coverage (1) reduces information asymmetry between a firm and outside shareholders and (2) enhances the monitoring process. Consistent with these arguments, analyst coverage increases the value of cash, thereby allowing firms to hold more cash. The cash-to-assets ratio increases by 5.2 percentage points when moving from the bottom analyst-coverage decile to the top decile. The marginal value of $1 of corporate cash holdings is $0.93 for the bottom analyst-coverage decile and $1.83 for the top decile. The positive effects remain robust after a battery of endogeneity checks. I also perform tests employing a unique dataset that consists of public and private firms, as well as a dataset that consists of public firms that have gone private. A public firm with analyst coverage can hold approximately 8% more cash than its private counterpart. These findings constitute new evidence on the real effect of analyst coverage.

Keywords: cash holdings, analyst, information asymmetry, intermediaries, monitoring, private firms

JEL Classification: D82, G14, G30, G32, G34, N22

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1. **Introduction**

Prior studies have established the role of equity analysts as information intermediaries and as monitors. Papers related to the role of information intermediaries examine the effect of information content on stock performance. With respect to the monitoring view, the existing literature mainly focuses on the relation between earnings management activities and analyst coverage. Cash holdings by US companies have generated plentiful attention from academia, professionals, and the media over time. The driving force behind the considerable attention on cash holdings is the liquid feature of cash. With noticeable increase of cash holdings in corporations over the past two decades, the liquid feature of cash is subject to significant information asymmetry and potential agency costs. The information intermediary and monitoring functions of analysts can reduce information asymmetry and possible agency conflicts between a manager and outside shareholders, respectively. This paper examines the direct impact of analysts on corporate cash policy and its associated value of cash.

Endogeneity represents a first-order impediment when research involves analyst activities, and it may cause regression estimates to be biased. This paper addresses this endogeneity concern through a variety of different rigorous techniques. Following standard convention, this paper first uses a two-stage least squares method with the industry median number of analysts as the instrument, and a lagged-value method to address the concern of endogeneity. This paper also examines the effect of change in analyst coverage on change in corporate cash holdings, while applying the two-stage least squares approach to study the time-series effect of analysts. In addition, this paper incorporates the experiment of the impact of Regulation Fair Disclosure (Reg FD) on analysts' activities as an alternative way to take account of endogeneity. To further substantiate the robustness of the results, I explore the benefit and economic significance of the

influence of analyst coverage on public firms' cash policy by employing a unique dataset comprised of a set of public and private firms. In addition, I undertake a novel experiment that examines cash policy before and after public firms go private. All else being equal, given a company's status, private firms, including those that were public at one time, have no analyst coverage. The clear identity of public and private firms gives us a distinct setting in which to examine the effects of information and monitoring on corporate cash holdings.

Analysts have been recognized as both information intermediaries and monitors. Through their professional training and dedication to information gathering, analysts accumulate relevant financial and operational information and distill the information content of financial statements and operational decisions. Analysts also closely follow a firm and interact with management on various occasions, raising questions regarding the firm's financial performance, operations and future prospects. On the one hand, their skills and experience allow analysts to uncover major corporate frauds (Dyck, Morse, and Zingales, 2008). Empirical evidence from testing the magnitude of earnings management with different levels of analyst coverage supports the governance view of analysts. Theoretically, Jensen and Meckling (1976) indicate security analysts can serve as monitors in helping align the interests of managers and shareholders.

On the other hand, analysts' primary responsibility is to generate profits for their brokerage houses through information distribution such as issuing research reports and making earnings forecasts or recommendations to the market. The literature has found evidence regarding the influence of analysts' reports on stock price (e.g., Schipper, 1991; Givoly and Lakonishok, 1979; and Womack, 1996). The information distribution improves the credibility of management disclosure and investor informedness (Abarbanell, Lanen, and Verrecchia, 1995; Healy and Palepu, 2001). Empirical evidence from Chung and Jo (1996) suggests R&D,

advertising, and Tobin's Q increase with the number of analysts following the firm. More importantly, Chung and Jo further suggest analysts are an important channel through which the information regarding R&D and advertising is incorporated into firm value. A comprehensive survey by Graham, Harvey, and Rajgopal (2005) shows CFOs consider meeting analysts' benchmarks one of their major tasks. CFOs might be willing to trade off long-term sustainability for a short-term external earnings target. CFOs further argue that meeting the earnings target reduces investors' uncertainty regarding firms' future prospects, which creates credibility and maintains the stock price. Based on the analyses from the survey, Graham, Harvey, and Rajgopal (2005) conclude that analysts are one of the most important groups in setting stock price. The evidence on monitoring and information intermediary functions of analysts suggests analysts serve as a value-enhancing driver for firms. Studies and news articles[1] focusing on the negative side of analysts have argued that the excessive pressure security analysts create could weaken analysts' value-creation activities for the firm (Fuller and Jensen, 2010; Chapman and Steenburgh, 2011). Analysts' conflicts of interests and career advancement might partially reduce the speed and accuracy of information reaching the market.[2] The conflicting statements regarding the influence of analysts' activities from previous work raise questions about the net effect of analysts on the firm. More importantly, the literature has not thoroughly discussed how analysts affect corporate policies and their associated value to shareholders.[3]

Corporate cash policy seems to be an ideal laboratory for answering these questions. As opposed to external financing, cash gives a firm flexibility without releasing much critical

[1] See Browning, E.S, "The Downside of Optimism on Earnings," *Wall Street Journal*, April 12, 2010

[2] Relative works, for example, include Michaely and Womack (1999), O'Brien, McNichols, and Lin (2005), Barber, Lehavy, and Trueman (2007), and Hong and Kubik (2003).

[3] Derrien and Kecskés (2010) study the impact of a decrease in analyst coverage on corporate investment, financing, and payout policies. Yet they do not address the impact of these policies on firm valuation.

information to the market. Cash policy is mostly liquid in that managers can either choose to disgorge cash to shareholders or use it for internal or external organization expansion. The flexibility associated with cash is related to considerable information asymmetry and its associated potential agency concerns. Numerous media have also documented that firms have been building up cash reserves.[4] The increase in cash holdings can exacerbate the information asymmetry and potential agency concerns resulting from the liquid nature of cash.

Agency theory predicts cash may increase a manager's discretion and reduce the scrutiny from the capital market, both of which prove to be even more critical when cash represents a non-negligible amount to corporate capital. Hence the potential conflict between managers and outside shareholders tends to be profound under this setting. As Jensen and Meckling (1976) propose, due to the separation of ownership and control, self-interested managers could pursue their own interests or spend cash on organizational inefficiencies at the expense of shareholders. Empirical evidence consistent with the agency costs of cash includes Harford (1999) who finds that cash-rich firms are more likely to make value-decreasing acquisitions. Thus analysts serve as one of the external monitoring mechanisms on behalf of outside shareholders through closely following and analyzing a company's allocation of cash reserves. The monitoring mechanism of analysts enhances the alignment of interests between managers and outside shareholders and prevents managers from inefficient usage of cash.[5] It also predicts a positive relation between analyst coverage and corporate cash holdings.

[4] For example, Non-financial firms hold $1.93 trillion in cash and other liquid assets as of September 2010, and these cash holdings account for 7.4% of total assets, the largest share since 1959 (LaHart, Justin, "Companies Cling to Cash—Coffers Swell to 51-year High as Cautious Firms Put Off Investing in Growth," *Wall Street Journal*, December 10, 2010; see also McGinty, Tom, and Cari Tuna, "Jittery Companies Stash Cash—After Crisis, Big Businesses Hoard Most Bucks in 40 Years; Google's $22 Billion Cache" *Wall Street Journal*, November 2, 2009).

[5] See Barry and Brown (1984) for a differential information model based on the quality of information across securities.

Alternatively, companies may hold cash for legitimate reasons. Bates, Kahle, and Stulz (2009) find precautionary motives largely explain the non-negligible increase in cash holdings from 1980 to 2006. Mikkelson and Partch (2003) examine companies with extreme amounts of cash holdings and find these sample companies do not underperform relative to their peers. Based on a theoretical framework, Morellec and Nikolov (2009) show that under intense market competition when companies are financially constrained, cash holdings can be a buffer against the unexpected operating loss and provide a refuge from inefficient closure. However, in a world with incomplete information and investors' reactions depending on the nature of information and speed at which it evolves, misevaluation may persist for a considerable period. Correspondingly, due to the liquid nature of cash and the considerable amount held by firms over time, it can generate considerable information asymmetry and uncertainty among investors about the factors that drive the phenomenon.

Information asymmetry leads to investors valuing firms at a discount. Merton (1987) shows that if investors only have a subset of information and their portfolio selection is based on the knowledge about a certain security, they will undervalue the security due to different distributions of information among investors. This finding is especially true if the cost to gather, examine, and distribute the information is potentially high. The analyst's role as information intermediary increases firm value by largely reducing information asymmetry and enhancing the recognition of investors, who rely on analysts collecting and disseminating firms' public and private information, evaluating corporate performance, and making recommendations.[6] Further, to the extent that lower information asymmetry reduces the cost of capital, the reduced cost of capital can help managers accumulate precautionary cash reserves through access to the external

[6] See also Brennan and Hughes (1991), Brennan et al. (1993), and Brennan and Subrahmanyam (1995).

capital market. Taken together, these arguments suggest a positive relation between analyst coverage and corporate cash holdings.[7] Otherwise, managers conveying information by taking different actions, such as distributing cash, may be optimal for the company. Fayele (2004) argues that because of concerns about agency conflict possibly resulting from information asymmetry, holding more cash will lead to a higher likelihood of a proxy fight as well as subsequent executive turnover.

In this paper, I first examine how analyst coverage affects corporate cash policy. I hypothesize that greater analyst coverage reduces information asymmetry and enhances monitoring. Reduced information asymmetry and enhanced monitoring increase the value of cash holdings. According to the trade-off model, firms will increase cash holdings because the benefits outweigh the costs of holding cash. To disentangle how information and monitoring effects contribute to the positive relation between analyst coverage and cash holdings, I follow Faulkender and Wang's (2006) model to study how the change in corporate cash holdings results in a change in corporate market valuation. This model helps us verify the information intermediary and monitoring functions of analysts from shareholders' standpoint.

To construct the data, I take analyst information from Thomson Reuters I/B/E/S Detail History file. I then merge the data with CRSP and Compustat data. The final sample covers a total of 94,636 firm-year observations from 1984 to 2009. I follow Bates, Kahle, and Stulz's (2009) methodology to study the relationship between cash holdings and analyst coverage. The results show cash holdings increase with analyst coverage. When moving from the lowest to the highest analyst coverage decile, the cash-to-assets ratio increases by 0.052 or roughly 31% of the sample mean of cash holdings. The evidence survives under various model specifications and

[7] Reduced information asymmetry could lead to a decrease in financial constraints. This suggests firms may hold less cash as they can easily visit the market when they need cash. However, how likely this will affect firm's cash holdings is an empirical question.

suggests analysts play a critical role as information intermediaries and monitors when managers determine the liquidity policy.

I apply the approach by Faulkender and Wang (2006), who estimate the marginal value of a dollar in cash in the view of shareholders, through investigating the marginal value of cash interacted with analyst coverage. Ideally, if analysts' information intermediary and monitoring functions have value, the marginal value of an additional dollar amount of cash should increase with analyst coverage. The regression estimation suggests analysts have an economically significant positive effect on how shareholders value the additional amount of cash a firm holds. Moving from lowest coverage to the highest-coverage decile, the value of an additional dollar of cash is worth 90 cents more. The evidence confirms that overall analysts' activities are value-enhancing to the firm. The results are robust after controlling for institutional ownership holdings and the managerial entrenchment index. More importantly, I find the positive impact to the marginal value of cash is consistent with the roles of information intermediaries and monitors under the sub-sample tests, which ascertain that analysts create value through reducing information asymmetry and supervision.

Early evidence indicates that analyst coverage tends to vary with certain firm characteristics such as business risk, size, and quality (e.g., Bhushan, 1989; Chung and Jo, 1996; and Lang, Lins, and Miller, 2004). These observable firm characteristics and/or an unobservable latent factor could possibly affect corporate cash policy and analyst coverage simultaneously, resulting in a biased coefficient estimation and incorrect inference. This paper endeavors to identify means for mitigating this endogeneity concern. First, I use the expected analyst coverage from the two-stage least squares method using the industry median number of analysts

as an instrument variable and the lagged values of analyst coverage as alternatives.[8] The positive relationship between cash holdings and analyst coverage is robust to these two model alternatives. Second, I study the time-series effect of analyst coverage by examining the effect of a change in analyst coverage on the change in cash holdings, while using the two-stage least squares method to control for the potential endogeneity issue. The regression result shows a positive incremental effect of a change in analyst coverage on a change in cash holdings. Third, I relate the impact of analyst coverage on cash holdings with the experiment of Regulation Fair Disclosure (Reg FD). A temporary reduced impact of analyst coverage on corporate cash policy in the short-term post-Reg FD period combined with the gradual increase of the impact in the long-term period also confirms the positive relationship between cash holdings and analyst coverage.

Most importantly, to fully overcome the endogeneity issue that could potentially bias the estimations, I employ a non-standard approach from a unique dataset to perform a novel comparison of cash holdings between public and private firms. Given private firms have no analyst coverage, this clear identity allows us to mitigate the possible endogeneity concern. With a lower degree of information disclosure, private firms suffer from greater information asymmetry, which results in higher cost of capital. The cost of risk hedging can be relatively high, given a higher level of financial frictions (Brav, 2009; Bigelli and Sánchez-Vidal, 2011). Presumably, private firms tend to rely more on internal financing by stockpiling cash. However, from the regression estimates, I find the striking result that public firms hold roughly 8% more cash than their private counterparts (significant at the 1% level). The decision of whether to be public or private can be endogenous to the fundamental differences in firm characteristics (e.g.,

[8] In addition, I augment the main model with additional instruments such as prior trading volume and volatility to verify the validity of the choice of instrument.

sales, R&D, capital expenditure, and leverage). I further apply the propensity score matching technique to control for such differences. The results are robust to this alternative technique. In addition, using the novel sample that consists of private firms that were public at one time, the regression estimate shows firms tend to hold more cash while public than after going private. Evidence from the comparison of public and private firms and the analysis of going-private firms supports the notion of analyst coverage on corporate cash policy. Greater analyst coverage reduces information asymmetry and possible agency concerns, resulting in a higher valuation of holding cash. The trade-off framework suggests firms will hoard more cash given the benefits of doing so (e.g., precautionary motives) outweigh the costs of holding cash. Reduced information asymmetry lowers the cost of equity financing. Public firms can also raise precautionary cash reserves from the external market, which results in the significant difference between their cash holdings and those of their private counterparts.

Next, this paper studies the monitoring role of analysts on firms' accumulation and spending of excess cash, given excess cash is subject to potential agency conflict. The findings show analysts not only prevent firms from holding too much excess cash, but also deter firms from squandering excess cash reserves. This investigation suggests the marginal value of cash can be diluted when firms hold a considerable amount of excess cash. However, given the monitoring effect of analysts, this negative impact of excess cash can be lessened, confirming the impact of analysts' monitoring on firms' accumulation and spending of excess cash. In addition, this paper examines the nonlinear relationship between cash holdings and analysts. The results suggest a hump-shaped relation between cash holdings and analysts. However, the impact of analysts on cash holdings remains positive and economically significant across different decile groups.

This paper contributes to the literature in the following ways. First, it examines how analysts influence the corporate liquidity decision. If shareholders view analysts' role as important, the impact analysts have on the principal and agent relation in a corporation should be apparent. This paper identifies such a direct impact, seen in an increase in analyst coverage and a resulting increase in cash holdings. Second, this paper investigates the net value of analysts as seen by shareholders to shed light on the controversial impact of analysts' activities. This paper substantiates a channel through which analysts can improve firm value by increasing the value of cash holdings. This finding also verifies that equity holders recognize the marginal value of cash reserves related to analysts' activities. Third, this paper contributes to the growing literature on precautionary motives and corporate cash policy and provides empirical supports regarding how information asymmetry and its associated agency concern affect precautionary cash savings. Finally, this paper is one of the first studies on cash policy for both US public and private firms and for going-private firms alone. By exploring cash policy between public and private firms, this paper discovers how precautionary motives would drive the differences in cash policy between public and private firms as well as before and after firms go private, which highlights a discrepancy of financing hierarchy theory. This paper also contributes to the analyst literature by emphasizing the extent and economic significance of analyst coverage on the cash policies of public firms.

The remainder of this paper is organized as follows. Section 2 develops hypotheses. Section 3 describes the data and sample selection. Section 4 presents and discusses the findings. Section 5 studies the impact of analysts on excess cash accumulation and dissipation, and examines the nonlinearity relation between analysts and corporate cash holdings. Section 6 concludes.

2. Hypotheses development and related literature

2.1 *Analysts and Monitoring*

Managers may have incentives to expand their businesses and gain control power from such expansions. If managers' compensation is tied to short-term performance, the potential conflict between principals and agents will be amplified; that is, the stock-based compensation will result in managerial myopia. As Jensen and Meckling (1976) propose, self-interested managers' rent-seeking behavior can include spending cash reserves on riskier investments or other activities to maximize their own objectives at the expense of shareholders. Similarly, Myers and Rajan (1998) propose that greater liquidity can provide an incentive for managers to increase the probability of self-dealing via a variety of asset transformations; in other words, self-interested managers can use cash to pay themselves excessively, use it for perquisites, or transform it into specific assets to reduce investors' possible liquidation. Empirical findings include Dittmar and Mahrt-Smith's (2007) assertion that the value of cash is lower when a firm is poorly governed, and poorly governed firms tend to disperse cash easily. From a study of international data, Pinkowitz, Stulz, and Williamson (2006) find the value of cash holdings is lower in countries with poor investor protection. Masulis, Wang, and Xie (2007) show that acquiring firms with less disciplinary power from the market experience lower announcement abnormal returns, and the authors relate this finding with the empire-building behavior of entrenched managers. Therefore, corporate cash policy provides a natural experiment for examining the monitoring role of analysts.

Yu (2008) shows that firms with more analyst coverage have lower earnings management activities. Lindsey and Mola (2010) show that compared with their peer groups, dropped coverage firms tend to manage their earnings upward in the years after loss of analyst coverage. When firms regain coverage, the upward earnings management activities decrease. However, the decreased earnings management activities are only for firms that regain coverage by many analysts. Hence the authors conclude that competition among analysts can induce analysts' monitoring behavior. Dyck, Morse, and Zingales (2008) also offer evidence from a detailed survey suggesting analysts contribute to the detection of major corporate fraud. Therefore, to the extent that management decisions and operations are closely scrutinized by analysts, the presence of analysts prevents management from making poor investments and reduces the expropriation from shareholders' wealth. I therefore refer to this oversight as the "monitoring effect hypothesis". This hypothesis predicts the cash level will increase with analyst coverage due to the efficient use of liquid assets.

2.2 *Analysts and Information*

Even when companies hold cash for legitimate reasons and in the best interests of outside shareholders (Bates, Kahle, and Stulz, 2009), the liquid nature of cash and the enormous amount of cash holdings by US corporations can generate significant information uncertainty and concerns about what factors can explain the pattern of such large holdings. Under Merton (1987)'s framework, when all investors have only a subset of information and their portfolio selections depend on this information, firms holding a large amount of cash would spur a considerable amount of uncertainty, decreasing their valuations. Analysts routinely collect

relevant information through directly interacting with management and raising questions regarding a firm's policies. With professional training and experience, analysts can better analyze all earnings information, distribute information and concerns regarding firms' prospects and operations, and make recommendations and forecasts public via various channels. Analysts can improve the information environment as well as investor cognizance by providing information about the utilization of corporate cash reserves. The improved information environment will increase firm value through the valuation of cash holdings. In addition, given the cost of capital increases with information asymmetry,[9] reduced information asymmetry can facilitate firms' ability to obtain proceeds from external financing as their precautionary cash reserves. Chang, Dasgupta, and Hilary (2006) show that firms with greater analyst coverage utilize more equity financing than debt financing. Hertzel and Li (2010) show that firms use issue proceeds for stockpiling cash. In a similar vein, McLean (2010) shows that share issuance-cash savings have increased over time, and this increasing trend of cash savings is a result of precautionary motives. Thus, if a manager's performance measure is tied to firm valuation, the information intermediary mechanism of analysts can encourage managers to seek long-term growth potential, search for new projects, and hedge for business risk, which results in more cash holdings.

Having sufficient cash holdings is even more critical when outside funds are scarce, for example, during economic recession. When a manager observes a private signal regarding a firm's prospects, she might want to hoard more cash to preserve the company's growth opportunities and to insure against unexpected losses from operations due to the economic downturn (Campello, Graham, and Harvey, 2010; Hugonnier, Malamud, and Morellec, 2011).

[9] See, for example, Merton (1987), Lucas and McDonald (1990), and Easley and O'Hara (2004) for information asymmetry and cost of capital.

Analysts' information will enhance the integrity of a manager's decision and reduce the information gap between that manager and the shareholders. Hence a manager will be able to hold a sufficient amount of cash in expectation of such an unfavorable event as an economic downturn. Otherwise, if the costs of information asymmetries and associated agency concerns, reflected in a trading discount or possible shareholder control contests, exceed the benefits of holding cash, the manager might have to abstain from positive NPV investments or engage in inefficient project termination (Fayele (2004)). The information intermediary function of analysts can reduce information asymmetry and thus increase the benefits of holding cash (i.e., precautionary motives such as risk hedging, capturing growth/investment opportunities, or minimizing transaction costs).[10] As predicted by trade-off theory, firms will increase their cash holdings when the benefits of doing so outweigh the costs of holding cash. I refer to this correlation as the "information effect hypothesis".

Related studies on analyst coverage and information environment include Lang, Lins, and Miller (2003) who find cross-listed firms have better information environment in terms of more analyst coverage and higher forecast accuracy, which enhance firm value. Mehran and Peristiani (2010) use analyst coverage as one of the proxies for financial visibility. They find the lack of analyst coverage reduces visibility and lowers investor interests. Thus the costs might outweigh the benefits of staying public, leading firms to go private. With regard to cash holdings and idiosyncratic risk, Lai, Sodjahin, and Soumaré (2010) find firms' cash holdings increase with non-business idiosyncratic risk, and this relation increases with analyst coverage. Grüninger and Hirschvogl (2007) use data from more than 45 countries also support the view that information asymmetry might decrease the marginal value of cash.

[10] Lowered information asymmetry could result in a decrease in financial constraints. Accessing the market will be easier for firms when they need cash, which suggests a lower level of cash holdings. However, the effect of this possibility will be an empirical question.

Although the information effect and monitoring effect hypotheses predict a positive relation between cash holdings and analyst coverage, evaluating how the information and monitoring effects of analysts contribute to this positive relation is not easy. Hence I follow Faulkender and Wang (2006) in estimating the marginal value of cash and its interaction with analyst coverage. In particular, based on these two hypotheses, one would expect to observe a positive relation between analyst coverage and the incremental value of a dollar. I go further in my estimation by segregating the sample into two subgroups based on the level of information asymmetry and potential agency conflict to verify the impact of analysts as information intermediaries and monitors.

3. Sample selection, data, and summary statistics

I retrieve analyst information from Thomson Reuters I/B/E/S Detail History file. Accounting variables are from CRSP/Compustat Merged database and stock returns are from CRSP. The sample period is from 1984 to 2009. As this paper intends to study the overall impact of analysts on firm cash policy, the sample includes firms with no analyst coverage, because we should see a larger impact between firms with no coverage and those with at least one analyst covered.[11] Also, all observations must have all required variables. Following previous literature, I exclude financial firms (SIC codes 6000 - 6999) and utilities firms (SIC codes 4900 - 4999) because of special capital requirements and regulations, respectively. I further require firms to have positive total assets (Compustat item #6) and positive sales (Compustat item #12). The final sample contains 94,636 firm-year observations.

[11] In untabulated results, I utilize a sample using only firms with at least one analyst covering them. The results are similar to those reported in all tables.

In the first part of the regression analysis, I study the relation between cash holdings and analyst coverage using the following model:

$$Cash_{i,t} = \mu_t + \mu_j + \beta_1 Coverage_{i,t} + \beta_2 Industry\ Sigma_{i,t} + \beta_3 M/B_{i,t} + \beta_4 Firm\ Size_{i,t} + \beta_5 Cash\ flow_{i,t} + \beta_6 NWC_{i,t} + \beta_7 CAPX_{i,t} + \beta_8 Leverage_{i,t} + \beta_9 R\&D_{i,t} + \beta_{10} Dividend\ Dummy_{i,t} + \beta_{11} AQC_{i,t} + \varepsilon_{i,t} \quad (1),$$

where

1. Cash is cash and marketable securities divided by book assets (#1 / #6).
2. μ_t are year fixed effects.
3. μ_j are industry fixed effects.[12]
4. Coverage is analyst coverage, which is the sum of all analysts following a firm for a given fiscal year.
5. Industry sigma is computed as follows. First, for each firm in a given year, I obtain the standard deviation of its cash flow to net assets ratio ((#13 - #15 - #16 - #21) / (#6 - #1)) for the previous 10 years, requiring at least 3 observations. Second, I take the average of cash flow standard deviation based on the two-digit SIC code and treat this averaged cash flow standard deviation as the measure of cash flow volatility for a given firm.

[12] In some models and unreported tables, I include firm fixed effects instead in the regression analysis. The results are robust to this alternative.

6. M/B is the market-to-book ratio computed as the book value of assets minus the book value of equity plus the market value of assets divided by the book value of assets ((#6 - #60 + (#199 * #25)) / #6).
7. Firm size is measured as the logarithm of the book value of assets in 2004 dollars (log(#6)).
8. Cash flow is defined as earnings before depreciation minus interest, dividends, and taxes divided by book assets ((#13 - #15 - #16 - #21) / #6).
9. NWC is net working capital minus cash plus marketable securities divided by book assets ((#179 - #1) / #6).
10. CAPX is computed as capital expenditure divided by book assets (#128 / #6).
11. Leverage is long-term debt plus short-term liabilities divided by book assets ((#9 + #34) / #6).
12. R&D is computed as (#46 / #12) and set to zero if missing.
13. Dividend dummy equals 1 if the firm pays a dividend for a given year.
14. AQC is computed as acquisitions to book assets (#129 / #6).

Additional variables include the G-index, constructed as the number of anti-takeover provisions between 0 and 24, which is from RiskMetrics, and institutional ownership holdings from Thomson-Reuters Institutional Holdings (13F) Database. Following Cremers and Nair (2005), I compute institutional block holdings as the sum of all institutional owners that hold more than 5% of a firm's equity. To improve the interpretation of the impact of analyst coverage, I rank firms into deciles and set them from 0 to 1. I also sort firms into deciles based on the G-index and institutional holdings, respectively, and transform the deciles from 0 to 1, where 0 represents

the worst governance (highest G-index group and lowest institutional block holdings group) and 1 represents the best governance (lowest G-index group and highest institutional block holdings group). All financial variables are winsorized at the 1st and 99th percentiles to mitigate the impact of outliers.

Table 1 presents the descriptive statistics. The average cash holding is 16.6% of total assets and the median is 8.4%, which shows that the distribution of cash holdings is skewed to the right. Additionally, the median firm is covered by three analysts, has approximately 31% institutional ownership, and has a G-index of 9. Figure 1 shows the average cash holdings for different levels of analyst coverage in each firm size tercile. I divide firms into three size groups (small, medium, and large) based on the book value of assets. Figure 1 confirms that small firms hold more cash in general as in Bates, Kahle, and Stulz (2009). Given the information and monitoring effect hypotheses, one would expect the impact of analysts to be more pronounced for the small-size group. For the small-size group, we indeed observe the clear upward trend of the level of cash holdings when moving from the lowest- to the highest-analyst coverage decile, and this trend supports the hypotheses. The medium- and large-size groups also reveal the positive relationship between analyst following and cash holdings. The positive relation for the large-size group seems to be flatter due to the scaling issue. A simple regression of cash holdings on a constant and analyst coverage for each size group finds a significant and positive coefficient for each.

4. Empirical results

To analyze the impact of analysts on corporate cash holdings, I first present the results from regression analyses using Bates, Kahle, and Stulz's (2009) cash holdings model. Second, to verify the overall effect of analysts on the firm value, I apply Faulkender and Wang's (2006) model to estimate the marginal value of cash holdings conditional on analyst coverage. Third, analysts can more greatly influence firms suffering from severe information asymmetry and potential agency conflict. By segregating my sample twice into two subgroups—first based on the level of information asymmetry and then again based on agency conflict—I examine the equality of coefficients on the interaction term between change in cash and analyst coverage between these subgroups. Some of the regressions control for the managerial entrenchment index and institutional block holdings, whereas others do not. Also, I consider the endogeneity issue that could drive the results between analysts and corporate cash policy, using various techniques including expected coverage from the 2SLS method, the lagged analyst coverage, the impact of change in analyst coverage on the change in cash holdings under the 2SLS framework, and the analyst coverage in conjunction with post-Reg FD periods. To further address the robustness of the results, I compare the cash policies between public and private firms, as well as between the pre- and post-periods of going-private firms, to extract the extent and benefits of analyst coverage on public firms, given that analysts do not cover private firms, even if they were once public. Note that for most of regression analyses, I control for industry and year fixed effects.

4.1 Analyst following and the level of cash holdings

4.1.1 Relation between corporate cash holdings and analyst coverage

Using Eq. (1), Table 2 presents the regression results of cash holdings on analyst coverage and other control variables. Without adding the analyst coverage effect, Model 1 shows the result identical to Bates, Kahle, and Stulz (2009) with expected signs. For example, firms with higher market-to-book ratios or cash flow volatility hold more cash because of better investment opportunities and other precautionary reasons, respectively. Net working capital can be considered a substitute for cash, reflected in its negative relationship to cash. Capital expenditure can be treated as collateral or a source for temporary investment shock, which creates a negative relation with cash. Given the financing hierarchy model, firms prefer cash over debt, which results in a negative relation between cash and leverage. Further, considering economies of scale, we expect the sign of the coefficient on size to be negatively related to cash.

Model 2 examines the relation between corporate cash holdings and analyst coverage using the number of analysts following a firm in a given year. The result points to a significant and positive relation between analyst following on a firm's cash holdings, all else being equal. All other control variables are with expected signs.

Model 3 considers the impact of analyst coverage on cash holdings using the analyst coverage deciles. Based on the cross-sectional analysis, the result from Model 3 confirms cash holdings are positively related to analyst coverage. The findings from models 2 and 3 support the hypotheses that firms with more analyst coverage have lower information asymmetry and potential agency conflict, which lead to more cash holdings. More importantly, based on the coefficient of analyst coverage in Model 3, an increase in analyst coverage from the lowest- to the highest-coverage decile in turn increases cash holdings by 5.2 percentage points, or

approximately 31% of the sample average of cash balances.[13] Therefore, the impact of analyst coverage is not only statistically significant but economically important.

Numerous papers have shown that well-informed institutional investors serve as an external monitoring mechanism,[14] and that institutional investors and analysts might be interrelated because of analysts' customer relationship with various financial institutions (O'Brien and Bhushan, 1990). Furthermore, Gompers, Ishii, and Metrick (2003) construct an index of anti-takeover provisions that are often viewed as a measure of shareholder rights as well as the degree of managers' opportunism/entrenchment. If firms are better governed in terms of the level of institutional block holdings and entrenchment, we could see a reduction in the overall misuse of cash by managers and therefore a positive relation between cash holdings and both institutional block holdings and the anti-takeover index. Thus Model 4 takes institutional ownership as well as the G-index into account. Consistent with previous literature, the sign on the coefficient estimate for institutional investors is positive (though not statistically significant), which is consistent with institutional holders enhancing manager discipline.[15] The regression coefficient on the G-index resembles the finding of Harford, Mansi, and Maxwell (2008) that poorly governed firms tend to have lower cash reserves. Moreover, the influence of analyst coverage remains unchanged and significant at the 1% level while controlling for the other two corporate governance mechanisms. Therefore, given the monitoring effect hypothesis, one may infer analysts and institutional investors serve as different external governance functions for the firm.

[13] 0.052/0.166 = 0.313. Based on the sample mean of cash holdings 0.166.

[14] See, for example, Sheleifer and Vishy (1986) who argue that large shareholders play an important role in monitoring. Karpoff, Malatesta, and Walkling (1996) find that firms that perform poorly in the past tend to attract proxy proposals initiated by shareholders. This finding is stronger for firms with greater institutional ownership.

[15] In an unreported test, I include institutional holdings only with analyst coverage and all other control variables. The regression result on the coefficient of institutional holdings shows a significant and positive relation.

Instead of industry fixed effects, Model 5 considers the analyst coverage using the number of analysts while controlling for firm fixed effects. Controlling for firm fixed effects enables us to understand the relation between the change of corporate cash holdings and the change of analyst coverage. Including firm fixed effects can also partially mitigate the concern about unobservable firm heterogeneity. Model 6 uses analyst coverage deciles instead while controlling for firm fixed effects. As seen in models 5 and 6, the positive relation between cash holdings and analyst coverage is robust to these firm fixed effects model specifications, which concludes analyst coverage has a time-series effect on corporate cash holdings.

Finally, Model 7 includes institutional holdings and the G-index. The result still confirms a positive impact of analyst coverage on cash holdings. In untabulated results, I also adopt the Fama-Macbeth regression approach similar to the Opler, Pinkowitz, Stulz, and Williamson (1999) model and employ the logarithm of cash-to-net assets ratio as an alternative proxy for cash level. Overall, the results based on these different specifications show the coefficient on analyst coverage is significantly positive and robust.

4.1.2 Endogeneity

Although this study examines the impact of analyst coverage on corporate liquidity policy, there can be an endogeneity concern that a potential unobserved latent factor or other observable firm characteristics could affect both cash holdings and analyst coverage. To account for this concern that could possibly produce a biased estimation, I employ the two-stage least

squares estimation using the industry median number of analysts as the instrument variable.[16] Presumably, some industries tend to attract more analysts due to the incremental value of information analysts can generate (e.g, due to their greater marginal value of information, high-tech industries will likely attract more analysts than manufacturing industries). Based on the results from a survey of 2,000 financial analysts, Chugh and Meador (1984) show that analysts place more emphasis on the long-term prospects than on the short-term prospects in terms of a broad set of determinants, for example, management quality, market dominance of a company, industry long-term prospects, and economic factors. Hence analysts might decide to follow a firm in an industry with higher incremental information value that is less likely to relate with firm-specific characteristics or short-term industry variation in performance. The first-stage F-statistic is 154.90 (Table 3, Panel A, column 1), which rejects the null hypothesis that the coefficient on the instrument is not significantly different from zero. Table 3, Panel A, column 2 presents the second-stage regression result. The coefficient of analyst coverage is positive and significant at the 1% level, which confirms analyst coverage has a positive impact on a firm's cash holdings.

In addition, to further address the potential endogeneity issue, I employ the lagged number of analysts following the firm. Prior works indicate that with a sufficient lag (e.g., Chang, Dasgupta, and Hilary, 2006 and Harford, Mansi, and Maxwell, 2008), the endogeneity concern can be reduced. In Panel B of Table 3, models 1–3 use the number of analysts following with a one-, two- or three-year lag, respectively. The positive relation between cash holdings and analyst coverage is apparent in all three lagged-analyst-coverage models.

[16] In untabulated regression analyses, I perform several estimations using different combinations of additional instruments such as trading volume and return volatility, enabling tests of statistical exogeneity. In the specification augmented with trading volume, for example, the Hansen J statistic for over-identification fails to reject the null hypothesis that the instruments are valid (P value = 0.54) which raises our confidence level that the instruments are exogenous. Results are similar to those in Panel A. In addition, I estimate the models using LIML and GMM, and results are robust to these alternative methods.

As shown in Panel C, I examine the incremental effect of analyst coverage by studying the impact of the change in analyst coverage on the change in cash holdings. The analyst coverage could be static in that the number of analysts following a given firm every year might not change significantly. Hence I examine the impact of the change in analyst coverage on the change in cash holdings for every two-year window. To control for the potential endogeneity issue, I adopt a two-stage least squares approach using the change of industry median number of analysts as an instrument. The first-stage F-statistic is 258.41 (Model 1 of Panel C), which rejects the null hypothesis that the coefficient of the instruments is not significantly different from zero.[17] The regression estimate from Model 2 shows that an increase in cash holdings is associated with an increase in analyst following, which demonstrates a positive association between a change in cash holdings and a change in analyst following. This finding suggests that with a greater positive change in analyst coverage, firms can benefit from a higher level of cash holdings as the information environment is improved and the associated potential agency concern is reduced. The positive association from studying the incremental effect model specification confirms that analyst coverage has the time-series effect on cash holdings and that analyst coverage is an important consideration for a firm determining its cash policy.

A fourth way to overcome the potential endogeneity concern is to study the impact of Regulation Fair Disclosure (Reg FD), an exogenous event affecting the companies' information environment. In late 2000, the US Securities and Exchange Commission approved a number of rules requiring firms to disclose any material information to all investors rather than selectively disclosing to analysts and others in the market. Bailey, Li, Mao, and Zhong (2003) show that

[17] In untabulated results, I also include change in trading volume as an additional instrument. The Hansen J statistic for over-identification fails to reject the null hypothesis that the instruments are valid (P value = 0.23).

although Reg FD levels the playing field among investors through increasing the quantity of current earnings information flow to the public, it also increases the analyst forecast dispersion and hinders analysts' ability to form long-term forecasts (the "chilling effect" as managers try to avoid litigation issues and releasing information to benefit their competitors). By studying a sample of NASDAQ securities around the imposition of Reg FD, Sidhu, Smith, Whaley, and Willis (2008) find that Reg FD induces the chilling effect (reducing the quality of information flow to the public) and imposes greater information discrepancy. The greater information discrepancy thus increases the cost of adverse selection as the market demands more compensation. A survey by the Security Industry Association (SIA) shows the quality of information flow has decreased after the implementation of Reg FD. However, Mohanram and Sunder (2006) show that when conducting an information analysis, analysts have placed more emphasis on the discovery of firm idiosyncratic information to compensate for the shift of information environment after Reg FD. Due to the increased variety of information and lower information quality after Reg FD,[18] we would expect the influence of analyst coverage on cash policy to be reduced for a definite time period. Yet, considering analysts' adjustments to this change of information environment, the increased variety of information and lower information quality induce the market to rely more intensively on analysts as information producers, thereby increasing the influence of analysts.

For all models in Panel D, I include an interaction term between analyst coverage and a Post-FD dummy to consider the impact of Reg FD on analysts' influence on the firm. In Model 1, I denote dummy equal to one for the six months after Reg FD. The negative coefficient of the interaction term between analyst coverage and the Post-FD dummy indicates the adverse impact

[18] Gintschel and Markov (2004) find that Reg FD has decreased the analysts' informativeness.

of Reg FD on analysts, which also suggests the impact of analyst coverage on a firm's cash holdings is diluted. In models 2–4, I denote the Post-FD dummy equal to one for the 12, 18, and 24 months after Reg FD, respectively. Considering the coefficients of interaction term between analyst coverage and the Post-FD dummy through these four model specifications, the results on the coefficients of the interaction term reveal a flip in sign when moving from the 6- to the 24-month window. The results suggest the impact of Reg FD may have a temporary instead of long-term effect on analysts' activities. The finding is consistent with the view that analysts put effort into discovering new channels for generating useful information in order to reverse the unfavorable impact of the implementation of Reg FD. In particular, this finding also suggests analyst coverage has real effect on firms' cash policy.

4.1.3 Public and private firms and going-private firms

Using the two-stage least squares method, and lagged analyst following model has demonstrated the robustness of the impact of analyst coverage on corporate cash holdings. The study of the incremental effect of analyst coverage on a firm's cash holdings, as well as the incorporation of the Reg FD experiment in the regression analysis, further supports the positive relation between cash holdings and analyst coverage. Nonetheless, this paper emphasizes rigorous considerations of the endogeneity issue to study the causality of analyst coverage on corporate cash holdings. Thus, as a further test, I study cash holdings policy in public and private companies as well as in going-private firms, given that private firms, including those that were public at one time, have no analyst coverage.

Private firms are more opaque given their lower degree of information disclosure. The opaqueness comes with a considerable information asymmetry from the market participants' perspective. The information asymmetry resulting from the information advantage managers have can lead to higher adverse selection costs, especially for information-sensitive securities such as equity. Thus firms would prefer less information-sensitive securities (given that the cost of these information-sensitive securities is relatively less) such as debt when accessing the external capital market. However, as managers will utilize more debt until the marginal cost of debt equals the marginal cost of equity, the leverage ratio will eventually rise, which increases the cost of debt financing due to a higher probability of financial distress. Given that the cost of accessing the external capital market is costly, the cost of risk hedging will also increase. Thus firms would ultimately prefer internal financing over external financing, which leads firms to hold more cash.

The financing hierarchy framework starts from the pecking order theory proposed by Myers and Majluf (1984). Myers and Majluf (1984) study the effect of information asymmetry on corporate capital structure. Bharath, Pasquariello, and Wu (2008) show information asymmetry, the core assumption of the pecking order theory, is indeed an important determinant of firms' financing decisions, especially under severe adverse selection conditions. Brav (2009) finds private firms tend to have a higher leverage ratio than public firms and are reluctant to visit external markets, and that private firms tend to stockpile cash in good times. Hence, under the financing hierarchy framework, private firms should hold more cash, considering the cost of raising capital from the external market is more expensive. Bigelli and Sánchez-Vidal (2011) argue that as the levels of uncertainties and risks are relatively high in private firms, private firms should hold more cash. In addition, the ownership structure is more concentrated in private

firms in which a few shareholders have majority control, which means the potential agency conflict should be lower, resulting in higher cash holdings. Given the higher cost of capital resulting from information asymmetry and a more concentrated ownership structure, we would observe higher cash holdings in private firms. However, if analysts' information and monitoring effects have the expected impact, we would find public firms with analyst followings can have higher cash holdings than their private counterparts, thereby demonstrating the impact of analysts on corporate cash holdings.

The data source of private firms is Capital IQ. I exclude private firms with public debt as well as private investment firms, as their information and business environments could be different from that of stand-alone private companies. I also exclude financial and utility firms from the sample. In addition, firms could self-select to go public or private based on considerations of information production, monitoring, access to the market, liquidity, or corporate control. I therefore exclude going-public and going-private firms, and address the latter in a later test. In other words, I only include companies whose current status is public or private incorporated entities. As market valuation is not available for private firms, I use three-year sales growth as a proxy for investment opportunities and require at least two years of observations for a given firm.

Table 4 separates the data into public and private firms and provides the descriptive statistics for both and the comparison of key firm characteristics between these two types of firms. Panel A provides the number of public and private firms each year. The data range is from year 2003 to 2009, with 26,853 firm-year observations. The number of public firms is approximately four times larger than the number of private firms. The number of unique private

firms is decreasing in more recent years as Capital IQ continues to backfill the data for early years, focusing less on collecting stand-alone private firms.

To understand whether a company's status (public or private) can result in a difference of its cash policy, in Panel B of Table 4, I present the result of univariate test of cash holdings between public and private firms, which examines whether the level of cash holdings differs significantly between these two types of firms. The first column reports the level of cash holdings and other key firm characteristics for public firms. The second column reports the same information for private firms. The third column provides the t-stat (z-stat based on Wilcoxon's rank sum test) for the differences in mean (median) of key firm characteristics between public and private firms. The results based on the comparison of mean and median show a significant difference in cash holdings between public and private firms. Public firms generally hold more cash, with an average of 21% and a median of 12.9%, whereas private firms hold less cash with an average of 10.8% and a median of 4.5%. The t-stat and z-stat confirm the differences (10.2% and 8.4%) in mean and median are significant at the 1% level.

Although this preliminary comparison of cash holdings between public and private firms shows strong evidence that public firms tend to have higher cash holdings, the results may simply reflect the potential fundamental differences in firm characteristics between public and private firms. In Panel B, I also compare the differences of key firm characteristics between public and private firms. Public firms are larger when comparing both mean and median values. The difference is at the 1% significance level. Private firms have higher cash flow, which could reflect their high three-year sales growth (the highly right-skewed distribution indicates that on average, private firms have better investment opportunities). Public firms and private firms also differ in their net working capital, R&D, and leverage. Public firms have higher net working

capital (5.6% vs. 2%) and higher R&D (27.1% vs. 20.4%). However, private firms have higher leverage, which suggests they prefer debt financing to equity financing when they have access to the external capital market. This finding is consistent with Brav (2009)'s finding. Similar results can be obtained when comparing the differences in medians among variables.

Hence the results of the univariate tests provide strong support that public firms hold more cash than do private firms. The results also suggest the systematic differences in many key firm characteristics, raising the possibility that the differences of the fundamental characteristics may affect the difference in cash holdings between public and private firms. Accordingly, I apply the multiple regression analysis to control for these fundamental differences.

Table 5, Panel A, Model 1 presents the regression estimates in which I include a private-firm dummy and control for industry and year fixed effects. The private-firm dummy equals one when a firm's status is private. I also require public firms to have at least one analyst following it. The data range is from year 2003 to 2009, with 21,994 firm-year observations. The estimated coefficient of the private-firm dummy is negative and economically significant since this finding suggests, all else being equal, private firms hold roughly 7.9% less cash than public firms. The finding is consistent with the argument that although private firms could hold more cash due to information asymmetry consideration and concentrated ownership, public firms with analyst followings can have higher cash holdings than their private counterparts due to information and monitoring effects. All other variables are with expected sign. Model 2 expands the sample to all public firms and includes a public-firm dummy equal to one when a public firm has no analyst coverage. The regression estimates show striking evidence that not only do private firms hold less cash but so do public firms with no analyst coverage. The F-test, used to examine the equality of the coefficients of these two dummies, rejects the null that these coefficients are equal,

possibly because although these public firms have no coverage, they may be able to obtain a certain degree of transparency and supervision from other channels. Most importantly, the difference in cash holdings between public and private firms demonstrates the economic importance and benefit of analyst coverage on the impact of firms' cash holdings policies. Given that the difference of mean in cash holdings between public and private firms from the univariate test is 10.2%, the regression estimate indicates a company's status can account for approximately 77% (65% if including the public-firm dummy) of this difference. In an untabulated result, I include only public firms with analyst followings above the sample median, and reproduce the analysis as in Model 1. The coefficient estimate of the private-firm dummy displays a greater discrepancy of cash holdings between public and private firms.

Although the multiple regression tests have demonstrated that public firms with analyst coverage can have higher cash holdings, the extent to which firms might self-decide to stay private or go public is endogenous to some observable firm characteristics. One plausible way to take account of this self-selection issue is to incorporate the propensity score matching methodology (e.g., Heckman, Ichimura, and Todd, 1997, and Smith and Todd, 2005). The propensity score matching method computes the predicted value (probability) of being in the treatment group versus the control group (i.e., private or public firms) based on many observable determinants under the Probit model specification. Therefore, I use this propensity score matching technique to calculate the probability of being private for each company based on the following model:

$$\begin{aligned} Private\ firm_{i,t} = {} & \beta_0 + \beta_1 log(sales)_{i,t} + \beta_2 R\&D_{i,t} + \beta_3 CAPX_{i,t} + \beta_4 Dividend\ dummy_{i,t} \\ & + \beta_5 3\text{-}yr\ sales\ growth_{i,t} + \beta_6 Cash\ flow_{i,t} + \beta_7 Leverage_{i,t} \\ & + \beta_8 AQC_{i,t} + \beta_9 term\ premium_t + \beta_{10} Default\ premium_t \end{aligned}$$

$$+ \textit{Industry fixed effects} + \varepsilon_{i,t} \quad (2),$$

where the dependent variable is a private-firm dummy equal to one if a company is private. Except where noted, all variables are defined as in Table 1. Log(sales) is the logarithm of sales plus one. 3-yr sales growth is defined as three-year compound sales growth. Term premium is the difference of yield spreads between 10-year and 1-year treasury bonds at the fiscal year end. Default premium is the difference in yield spreads between BBB and AAA corporate bonds at the fiscal year end. I also include industry fixed effects in the control. After obtaining the estimated probability of being private firm, I match each private firm with a set of public (non-private) firms with the closest propensity scores. The one-to-one estimator selects for each private firm a public firm with the closest propensity score. The nearest neighbor estimator selects for each private firm the *n* number of public firms with the closest propensity scores (*n* = 10, 25, or 50). The nearest neighbor estimator uses an arithmetic average of cash holdings from the *n* number of public firms. The Gaussian estimator chooses for each private firm all public firms and takes a kernel-weighted average of cash holdings that gives more weight to public firms with closer propensity scores. The Epanechnikov uses a similar kernel-weighted average but specifies bandwidth equal to 0.01 to set an upper bound on the number of matched public firms. In unreported tests, I also replace the bandwidth of 0.01 with 0.05 and 0.1 and obtain similar results. These various propensity score matching methods can mitigate the possible endogeneity concern arising from the observable firm characteristics.

Panel B reports the mean difference of cash holdings between private and public firms. Across all different estimators, we can observe that private firms hold approximately 7.5% less cash than their matched public counterparts (the differences are significant at the 1% level, and

standard errors are computed by bootstrapping with 50 replications). These findings demonstrate the robustness of the findings from multiple regression tests in Panel A. A potential concern of using the propensity score method is that an unobserved variable could simultaneously affect both being-private decision and cash holdings. If the unobserved variable has such an effect, the results from the propensity score matching may have biased statistical inferences. Hence, following Rosenbaum (2002), I employ a sensitivity analysis and find an unobserved variable is unlikely to alter the findings.[19] Overall, given that analyst coverage reduces information asymmetry and its associated agency concerns, public firms can hoard more cash for their precautionary motives. Lowered information asymmetry also lessens the cost of adverse selection. Public firms can obtain more precautionary cash savings through equity financing from the market. The findings from comparisons between public and private firms support the view that precautionary motives can elicit a significant difference in cash holdings between public and private firms.

Bharath, Pasquariello, and Wu (2008) show the level and change of information asymmetry can both lead to a time series effect on firms' financing behaviors. A firm's decision to go private can not only increase the level of information asymmetry but induce a change in the severity of information asymmetry, which spurs a firm to use less information-sensitive alternatives. After firms go private, the cost of raising external capital related to the information sensitivity and more concentrated ownership will ultimately lead to higher cash holdings for going-private firms relative to when they were still public. Hence I study cash holdings of

[19] The essence of Rosenbaum sensitivity analysis is to understand the extent to which an unobserved factor could impair the inferences regarding the effect of the treatment on the outcome variable. In other words, we would like to understand the likelihood an unobserved factor can simultaneously affect the assignment process of the treatment (being-private) and the outcome variable (cash holdings). If the assignment process of the treatment is endogenous, propensity score matching estimators are not consistent estimators. Hence, based on the sensitivity analysis, this helps us to reduce concerns about an unobserved factor might weaken the implications of matching results. Results from Rosenbaum sensitivity analysis are available upon request.

going-private firms with analyst followings and look for a discrepancy in cash policy before and after the firms go private. However, considering the impact of analysts' information and monitoring effects on corporate cash policy, we would expect to see a lower level of cash holdings for firms after they go private, provided they received analyst coverage while public.

Following Borden and Yunis (2004) and Bharath and Dittmar (2010), I construct the going-private firms sample based on the legal definition from SEC. The SEC explains the legal definition of a going-private transaction as such: "If the transaction is initiated by an affiliate (an insider) of the company, or the company could be deemed to be making an acquisition of its own shares Rule 13e-3 of the Securities Exchange Act of 1934 requires the affiliate and/or the company to file a Schedule 13E-3 with the SEC. When Rule 13e-3 applies, the company is said to be "going private" under SEC rules…". Hence I search all SEC filings for forms SC 13E3, DEF13E3, and PRE13E3 to identify going-private transactions. To confirm the completion of these transactions, I search SEC filings for forms 15 and 25 (the certification of termination of security registration). Finally, I use the CRSP security database to verify the sample firms are no longer available on the security's exchanges. Bharath and Dittmar (2010) explain that using CRSP as a verification procedure that can eliminate concerns about including firms that have "gone dark". As company financial information on Capital IQ is only available beginning in 2001, I retrieve all going-private firms' information between 2000 and 2007. The initial sample consists of the number of firms similar to what Engel, Hayes, and Wang (2007) report and similar to Bharath and Dittmar (2010), with some screening procedures. After gathering all necessary information and excluding firms with no analyst following, the final sample consists of 316 firm-year observations with an average of 11 years and 5 years in their public and private

life, respectively.[20] In the regression model, I include a post-private dummy equal to one for years after going private. I also include firm fixed effects to control for time-invariant unobserved firm heterogeneity.

Panel C of Table 5 shows the regression estimate of the post-private dummy is negative and significant. Based on the estimated coefficient, firms overall hold 2.6% less cash the period after going private. The resulting estimate supports the hypotheses that although firms prefer internal financing after going private, which should result in higher cash reserves, firms with analyst followings can have relatively higher cash holdings during their public life. In an untabulated result, I exclude the transitioning year when a firm moves from public to private. The result is robust to this additional screening.

We have ascertained a positive relationship between analyst coverage and corporate cash policy and confirmed the extent and benefit of analyst coverage on the cash policies of public firms. However, the positive relation is consistent with both the information and monitoring effect hypotheses of analysts. Accordingly, in the following subsection, I employ the model from Faulkender and Wang (2006) who regress excess security returns on the change in cash and other control variables that would also affect the cash level to estimate the marginal value of cash. This approach not only can identify the overall value-creation impact of analysts but can verify the significance of analysts' information and monitoring effects.

4.2 Analyst following and the value of cash

[20] Although Capital IQ collects private firms' financial information from different resources, going-private firms must provide their financial information to the public through some channels for Capital IQ (or its data provider) to have access to it.

4.2.1 The marginal value of cash and analysts

According to the information effect hypothesis, managers may hold cash for legitimate reasons such as precautionary motives. Yet if such motives cannot be revealed fully to the market, investors will punish managers with lower firm valuation and may act to guard their own wealth. Hence, if holding cash is costly, managers would prefer to distribute it through dividends or share repurchase. Analyst coverage can reduce the information asymmetry and enhance investor cognizance of a firm. If firm value is an increasing function of the breadth of investor cognizance, we would see overall firm value increase through the valuation of cash holdings. Alternatively, based on the monitoring effect hypothesis developed in section 2, analysts can improve the efficient use of cash and constrain the misbehavior of managers, thereby increasing cash valuation.

Therefore, to gauge the value of analyst coverage on cash holdings, I follow Faulkender and Wang's (2006) approach to estimate the marginal value of cash holdings, conditional on analyst coverage. This method allows us evaluate the overall effect of analyst coverage on the valuation of corporate cash balances to shareholders. If analysts act as information intermediaries and monitors, thereby positively impacting a firm, we would expect to see the value of cash increase with analyst coverage from shareholders' point of view. The model is as follows:

$$r_{i,t} - R_{i,t}^{B} = \mu_t + \mu_j + \beta_1 AC_{i,t} + \beta_2 AC_{i,t} * \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_3 \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_4 \frac{\Delta E_{i,t}}{M_{i,t-1}} + \beta_5 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \beta_6 \frac{\Delta RD_{i,t}}{M_{i,t-1}}$$
$$+ \beta_7 \frac{\Delta I_{i,t}}{M_{i,t-1}} + \beta_8 \frac{\Delta D_{i,t}}{M_{i,t-1}} + \beta_9 \frac{NF_{i,t}}{M_{i,t-1}} + \beta_{10} \frac{C_{i,t-1}}{M_{i,t-1}} + \beta_{11} \frac{C_{i,t-1}}{M_{i,t-1}} * \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_{12} L_{i,t}$$
$$+ \beta_{13} L_{i,t} * \frac{\Delta C_{i,t}}{M_{i,t-1}} + \varepsilon_{i,t} \quad (3),$$

where $r_{i,t}$ is the stock return for firm i during fiscal year t and $R_{i,t}^{B}$ is the matched portfolio return at year t based on Fama-French (1993) size and book-to-market benchmark.[21] μ_t denote year fixed effects and μ_j denote industry fixed effects. The term ΔX indicates changes in the variable X. The X variables include (AC) defined as analyst coverage; cash holdings (C) defined as cash plus marketable securities; earnings (E) defined as earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits; net assets (NA) defined as total assets minus cash, (I) as interest expense; (D) as dividend payment; financial leverage (L) defined as long-term debt plus short–term debt over long-term debt plus short-term debt plus market value of equity; and net financing (NF) defined as total equity issuance minus repurchase plus debt issuance minus redemption. To measure the marginal value of one additional dollar of cash holdings, both the dependent and the independent variables are standardized by lagged market value. The coefficient of interest is β_2, the regression estimate of the interaction term between change in cash and analyst coverage. Based on the information and monitoring effect hypotheses, we would expect the coefficient of the interaction term to be positive.

Table 6 presents the regression results using Eq. (3). Model 1 shows the result identical to Faulkender and Wang (2006) who argue larger cash holdings and a higher leverage ratio would lower the marginal value of cash. According to the estimates in Model 1, an average firm with a leverage ratio of 22.5% and a cash level of 17.5% will have a marginal value of cash equal to \$1.27 (1.862 – 2.105 * 0.225 – 0.665 * 0.175). Model 2 incorporates the analyst coverage (No. of) into the regression. The coefficient on the analyst coverage interacted with

[21] The size and book-to-market portfolio data are from Kenneth French's website. I thank him for kindly providing the data. Please also see Faulkender and Wang's (2006) footnote 12 for details regarding the excess return computation.

change in cash is significantly positive, which suggests that the monitoring and information intermediary functions of analysts increase overall firm value. This evidence is consistent with Chung and Jo (1996) who find that the firm's Tobin's q increases with analysts' monitoring as well as marketing functions.

Model 3 instead incorporates analyst coverage (Deciles) into the regression. The coefficient is 0.901 and significant at the 1% level. Using coefficients from Model 3, the marginal value of cash for an average firm is worth \$1.39.[22] Yet if one considers moving from the lowest to the highest analyst coverage, the marginal value of cash increases from \$0.93 to \$1.83, which generates the difference of close to one dollar between the lowest and highest coverages. This approximate one dollar difference suggests analyst coverage impacts a firm economically.

Further, in Model 4, I use a dummy variable to proxy for analyst coverage. In particular, I define the analyst coverage dummy variable equal to one if the number of analysts covering a firm is higher than the sample median. The positive impact of analyst coverage on a firm's cash valuation is robust to this alternative. Using the coefficients of the interaction term between the change in cash and analyst coverage from Model 4, one can find that a firm with the highest coverage has a value of cash worth approximately \$1.73.[23]

Dittmar and Mahrt-Smith (2007) find that firms with good governance in terms of managerial entrenchment or institutional block holdings could have positive impact on the marginal value of cash. In models 5 and 6, in which we use an analyst coverage dummy, I first

[22] (1.514 – 2.147 * 0.225 – 0.575 * 0.175 + 0.901 * 0.506) where 0.506 is the sample mean of analyst coverage as I transform deciles to the range from zero to one.

[23] In unreported results, I also set a dummy variable equal to one for firms with at least one analyst covering it. The result still holds and confirms analyst coverage has a positive effect on cash holdings.

sort firms into terciles according to the G-index and institutional block holdings, respectively. Second, to be consistent with Dittmar and Mahrt-Smith (2007), I drop the middle governance group and set firms in the bottom tercile of the G-index and the top tercile of institutional block holdings equal to one. Thus the governance dummy variable equals one for the well-governed group in terms of the G-index and institutional block holdings. I define the analyst coverage dummy in conjunction with these governance dummy variables. Model 5 presents the regression estimates while controlling for institutional ownership holdings. As seen in Model 5, the coefficient on the institutional holdings interacted with change in cash holdings is negative, although not significantly different from zero.[24] This finding is the reverse of that in Dittmar and Mahrt-Smith (2007). Although the finding may suggest some short-term incentive institutional shareholders induce the myopia behavior of managers, which outweighs the benefit from institutional investors' monitoring (e.g., Froot, Scharfstein, and Stein, 1992, and Bushee, 1998), the result may be due to different time periods and different sample selections. Considering the regression result from Model 6, where I control for the G-index, the coefficient on the G-index interacted with the change in cash holdings is positive. The positive coefficient on the G-index interacted with change in cash suggests well-governed firms have a higher marginal value of cash.[25] Most importantly, the coefficients on the interaction between change in cash and analyst coverage stay the same through these two different model specifications.[26]

[24] Liu and Mauer (2011) also report a negative coefficient on the interaction between change in cash and institutional block holdings.

[25] The results stay similar when keeping the middle governance group.

[26] In untabulated results, I include the G-index and institutional block holdings in models 2 and 3, and the results are robust to these alternative specifications. I also replace institutional block holdings with total institutional holdings or pension fund holdings, and the results are generally similar. Also, when controlling for firm fixed effects, the results are qualitatively consistent.

4.2.2 Information and monitoring effects

I develop further evidence on the effect of analysts on the level and incremental value of cash holdings, based first on the information hypothesis and then the monitoring effect hypothesis. In particular, according to the information effect hypothesis, analysts work as information intermediaries that collect and disseminate information on behalf of investors, which results in an enhanced information environment, thereby leading to a more pronounced information effect for firms with greater information asymmetry. Hence we would expect analysts' influence on the level of cash and the resulting additional marginal value of cash to be greater when the information asymmetry is higher. Accordingly, to examine the impact of analyst coverage on firms' cash holdings under varied information asymmetry, I first incorporate an interaction term between analyst coverage and R&D based on Eq. (1) (the cash holdings model following Bates et al. (2009)). Second, I sort firms into two subgroups based on the sample median of R&D each year to estimate the marginal value of cash for both subgroups.[27] Further, according to the monitoring hypothesis, analysts' monitoring function will be more valuable for firms with greater self-dealing possibilities.[28] Consequently, I include an interaction term between analyst coverage and the G-index in the cash holdings model. Then I sort firms into two subgroups based on the sample median of the G-index each year to estimate the marginal value of cash for both subgroups. The high G-index group (firms whose G-index value is above the sample median) refers to the subgroup with high potential agency conflict.

[27] I also use the Amihud illiquidity measure and bid-ask spread as alternative proxies for information asymmetry. The results are qualitatively similar to the results that follow.

[28] Gompers, Ishii, and Metrick (2010) show that dual-class firms could suffer from greater agency costs. Hence, in untabulated results, I separate firms based on the dual-class status. I obtain qualitatively similar results in which the marginal value of cash associated with analyst coverage is higher for dual-class firms. I also use excess cash level and the number of independent directors as alternative proxies for agency conflict and obtain the same conclusion.

With regard to the information effect hypothesis, Panel A of Table 7 presents the regression result of the coefficient on the interaction term between analyst coverage and R&D. The positive coefficient (significant at the 1% level) indicates analyst coverage has greater influence on the cash policy when the information asymmetry is higher. Panel B of Table 7 provides the regression estimates from estimating the marginal value of cash. With the highest analyst coverage, the value of cash reserves increases by an additional $1.043 ($0.524) for the high (low) information asymmetry subgroup. When testing the equality of coefficients between these two subgroups, the z statistic is 5.83, which rejects the null hypothesis that the difference of the coefficients is zero (at the 5% significance level). These findings, based on the results from the level and value of cash regression, support the view of analysts' information effect.

In Panel C, using the G-index as a proxy for potential agency conflict, I present the regression estimates based on the cash holdings model. The positive coefficient (significant at the 5% level) on the interaction term between analyst coverage and the G-index confirms the impact of analyst coverage on cash holdings increases with agency conflict. In Panel D, by estimating the marginal value of cash, I provide the regression results. With the highest analyst coverage, analysts can increase the marginal value of cash by an additional $1.813 and $0.824 for the high and low agency conflict subgroups. The Wald test also rejects the null hypothesis that the coefficients of these two interaction terms are equal, which validates the monitoring hypothesis.

Given that analysts can have a greater impact on cash holdings and generate a higher marginal value of cash from the higher information asymmetry or the higher agency conflict subgroup, the findings confirm the analysts' information and monitoring effect hypotheses. In addition, based on previous findings that suggest analyst coverage has an overall positive impact

on firm value through increased cash valuation, we confirm shareholders can recognize the value created from analysts' activities.

5. Cash accumulation, dissipation, and nonlinearity effects

5.1 The accumulation and dissipation of excess cash and its valuation

Excess cash, defined as the cash reserves not required for investments, operations, and possible hedging purposes, is subject to potential agency conflict. Given weak governance mechanisms, managers could build up excess cash reserves and dissipate them quickly under certain forms of self-benefiting activities (Jensen and Meckling (1976)). Harford (1999) shows cash-rich firms tend to engage in value-destroying acquisitions. Similarly, Harford, Mansi, and Maxwell (2008) find poorly governed firms squander cash easily through acquisitions and capital expenditures, and the likelihood of spending increases with excess cash. As a result, one would expect investors' valuation of firms' cash holdings to be lower for firms with higher level of excess cash. Based on various perspectives of shareholders' protection, Pinkowits, Stulz, and Williamson (2006), Dittmar and Marht-Smith (2007), and Fresard and Salva(2010) show the value of cash (excess cash) increases with the quality of governance.

Accordingly, similar to Dittmar and Marht-Smith (2007), to better assess the monitoring effect of analysts, I first study the impact of analysts on firms' accumulation and dissipation of excess cash. Second, I re-estimate the marginal value of an additional dollar in cash that is associated with excess cash, and see how analysts' monitoring interacts with it.

I define excess cash as the portion of cash reserves held by firms that is above the predicted level based on the precautionary and transaction cost model (Eq. 1). Specifically, I

perform Fama-MacBeth regression using Eq. 1 and obtain the predicted level of cash holdings based on the average coefficients. The residual, constructed as actual cash holdings minus predicted cash holdings, is excess cash holdings.[29] I retain only firms with positive excess cash in any given year, as such firms could suffer from greater potential agency conflict, which could lead to a significant impact from the monitoring effect. Panel A in Table 8 shows the results on how analyst coverage at time t-1 affects the change in excess cash from time t-1 to t. I include the industry's average change in excess cash to control for possible industry-wide variation on factors that could affect the change.[30]

In the first model, the coefficient on the analyst coverage is negative and significant at the 1% level. This result suggests analysts, through enhancing a corporate governance structure, can prohibit managers from accumulating too much excess cash, which could lower the propensity of self-dealing. To gauge the magnitude of analysts' monitoring effect, the second model replaces the number of analysts with analyst coverage deciles. The results suggest that with the highest coverage, the change in excess cash decreases by an economically large 24% (0.006 / 0.025).

Figure 2 shows the impact of analysts on firms' dissipation of excess cash. I again include only firms with positive excess cash and then separate firms into two groups based on whether they are covered by at least one analyst. I define firms with positive excess cash in a given year as year 0, and examine the time-series pattern of the use of excess cash over the next five years. In particular, I compute the ratio of excess cash at t+n as the amount of excess cash at t+n divided by the amount of excess cash at t (year 0), where n ranges from 1 to 5.

[29] In untabulated results, I perform different measures of excess cash such as including firm fixed effects in the calculation or using a logarithm of cash/net assets as cash ratio. I also perform a 10-year rolling regression to obtain the average coefficients to allow for the possibility of time-varying effects on the determinants. The results are robust under these different model specifications.

[30] In untabulated results, I also include firm fixed effects to mitigate the omitted variable concern. The results are robust to this model specification. Further, when I include firms with negative excess cash, the results remain robust.

The result is consistent with the monitoring effect hypothesis. A median firm covered by analysts holds more excess cash in the following years, whereas a median firm without coverage squanders its excess cash more rapidly. The difference between these two groups in each year is significant at the 1% level.

Overall, the results demonstrate analysts' ability to deter managers from holding and spending excess cash to pursue private benefits. Given that this excess portion of cash exhibits a greater probability of agency conflict, the marginal value of cash should decrease when firms' excess cash reserves increase, which leads to a negative coefficient on the interaction between change in cash and the amount of excess cash. However, if analysts serve as monitors in detecting managers' rent-seeking, the negative impact of excess cash on the marginal value of cash should be mitigated as the number of analysts increases. To investigate this conjecture, I incorporate the three-way interaction term in the model based on Model 3.[31]

Table 8, Panel B, Model 1 uses excess cash dummy which equals one if a firm's excess cash is above the sample median. As shown in the panel, the regression coefficient on the interaction term between change in cash and excess cash is negative and significant. This finding suggests that due to possible agency conflicts, investors place a discount on the value of cash holdings when firms hold a sizeable amount of excess cash. In addition, the positive coefficient (significant at the 1% level) on the interaction term between change in cash, excess cash, and coverage suggests that given analysts' monitoring aligning the interests of a manager and outside shareholders, the negative impact of excess cash on the marginal value of cash will be reduced. This finding suggests that firms can manage excess cash more efficiently when a

[31] I also apply the value regression model similar to Fama-French (1998) to examine the impact of analysts' monitoring on the value of excess cash, while controlling for other variables that could affect firm valuation. The results are robust under this setting as well as under different measures of excess cash.

stronger governance mechanism is present. In Model 2, I take only firms with positive excess cash in a given year and rerun the analysis. The results remain robust under this model specification.

5.2 Nonlinearity impact of analysts

The OLS regression assumes cash holdings are a linear function of analyst coverage and other control variables which suggests the marginal impact of analysts is constant. However, it might be plausible to infer that there exists a nonlinear relationship between cash holdings and analyst coverage, given the benefits of adding more analysts could be diminished when a firm has been covered by a considerable number of analysts.

To test this conjecture, I employ coverage dummy for each decile to examine the marginal effect of each. Table 9 reports the regression estimates for each decile. As shown in the table, there is a hump-shaped relation between cash holdings and analyst coverage. The impact of analyst coverage reaches its maximum at the sixth decile group. This finding supports the nonlinearity impact of analysts on cash holdings. Although given its hump-shaped relation with cash holdings, the analysts' impact is considered economically significant. For example, when switching from zero coverage to the first decile group and the sixth decile group, cash holdings can increase by 1.6% (10% of the sample mean) and 4.5% (28%) , respectively.[32]

6. Conclusions

[32] 0.016 / 0.162 = 10% and 0.045 / 0.162 = 28%, given the average cash ratio is 0.162 for zero coverage group.

The literature provides inconclusive evidence on the economic importance of analysts' activities for the firm. Previous work has relied on the study of stock performance to provide support on how analysts' information, under the context of earnings forecasts and recommendations, drives outside investors' behavior, which affects the stock price. However, the conflicts of interest resulting from various perspectives of analysts' career concerns may reduce the validity of analysts' opinions. In addition, research concerning analysts' monitoring function and how this function affects firm behavior is limited. In other words, do analysts have a direct impact on corporate policies in terms of acting as information intermediaries and monitors? Second, how do shareholders perceive the impact of analysts' activities on corporate policies? Do shareholders recognize the value of the functions analysts provide? This paper aims to answer these questions by examining the relation between analyst coverage and corporate cash policy and the value of cash. Specifically, by studying how analysts' information intermediary and monitoring functions affect corporate cash holdings, this paper contributes to an understanding of the relation between corporate cash policy and the variation of information asymmetry and its associated potential agency concern.

The findings are three-fold. First, I find that cash holdings increase with analyst coverage. This positive effect can be explained by both the monitoring and information intermediary functions of analysts. In particular, analysts' close scrutinization of managers can increase the overall efficient allocation of assets and enhance the alignment of managers' and outside shareholders' interests. Therefore, analysts' monitoring will result in a positive relation between cash holdings and analyst coverage. Analysts' broadcast of information lowers information asymmetry, thereby increasing firm value through cash holdings. With higher firm valuation and ease of access to the external market because of reduced information asymmetry, firms will be

able to increase their cash holdings for legitimate reasons such as precautionary cash reserves. Thus the information intermediary function of analysts also contributes to a positive relationship.

Second, this paper takes a set of various steps toward addressing the potential endogeneity issue as described by analyst literature. The observable firm characteristics or a potential common unobservable factor could simultaneously affect cash holdings and analyst coverage, producing biased estimations and incorrect statistic inferences. I first use the techniques including a two-stage least squares method, and a lagged-values method to account for this endogeneity possibility. In addition, I study the effect of a change in analyst coverage on a change in cash holdings and incorporate the experiment related to the effect of post-Regulation Fair Disclosure on analysts to confirm the robustness of the positive relationship between cash holdings and analyst coverage.

By using a unique dataset that comprises a set of public and private firms, I strengthen the evidence by examining the extent and economic significance of the impact of analyst coverage on corporate cash policy. I also incorporate a novel experiment of going-private firms and find that firms hold relatively more cash during their public life than during their private life. All of the findings provide direct evidence that information and monitoring have a direct impact on corporate cash policy.

Third, by estimating the marginal value of an additional dollar in cash associated with analyst coverage, I find strong support that, in general, analyst coverage increases the marginal value of cash holdings, which suggests analysts generally create value for the firm. I further analyze the impact of the monitoring and information intermediary functions of analysts under the framework of subgroup tests. In particular, I segregate firms into two subgroups based first

on the level of information asymmetry and then on potential agency conflict. I find the impact of analysts is more pronounced under the environment with higher information asymmetry as well as higher agency conflict. The results confirm shareholders do recognize the economic significance of the information intermediary and monitoring functions of analysts.

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Figure 1: Average cash holdings for different levels of analyst following for each firm size tercile

The figure represents the average cash ratio for different levels of analyst following for each firm size tercile. Cash ratio is defined as cash and marketable securities divided by book assets (Compustat items #1 / #6) and firm size is measured by book assets (Compustat item #6). N1 and N10 refer to the lowest and highest analyst coverage deciles, respectively.

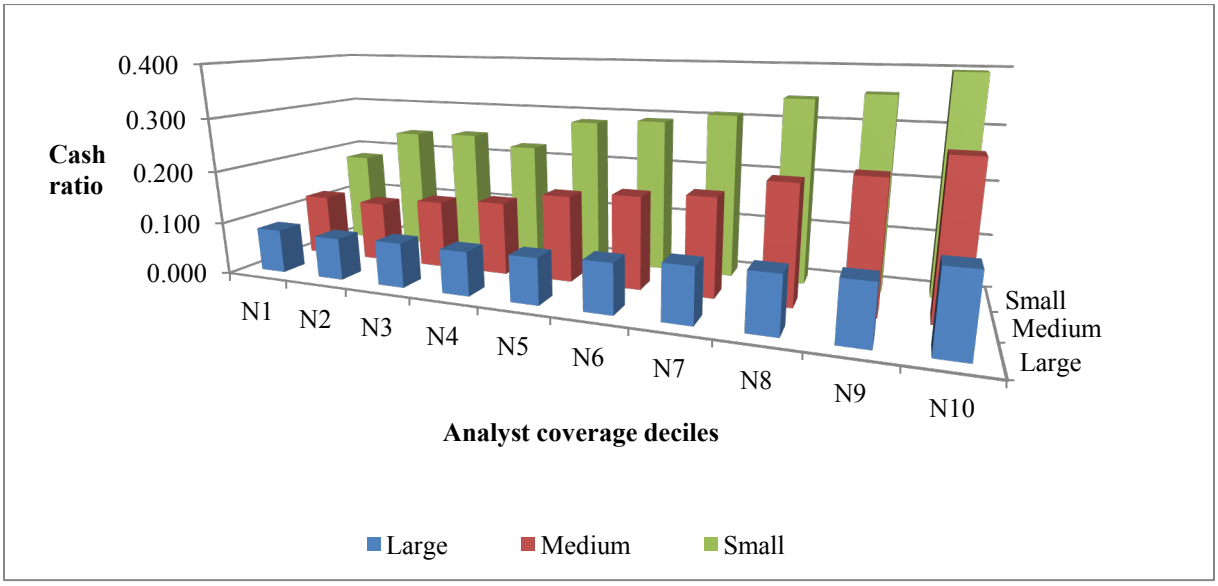
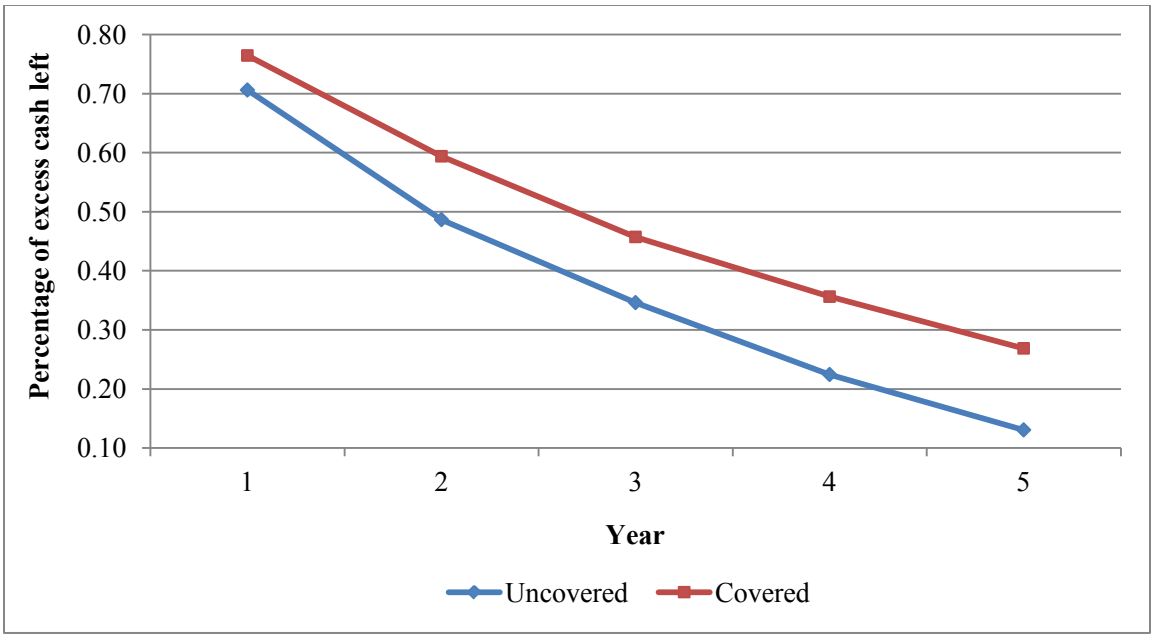


Figure 2: Firms' dissipation of excess cash by analyst coverage

This figure presents the time-series change in excess cash of a median firm over five years. Excess cash is the residual based on the average coefficients from the Fama-MacBeth regression using equation 1 without analyst coverage. All firms must have positive excess cash in year t to be considered in the sample. The percentage of excess cash left is the ratio of the excess cash level held by a median firm in year t over the excess cash level in year 0, where t = 1 – 5. The figure separates firms into two groups based on whether they are covered by at least one analyst. The bottom row reports the z-stat based on Wilcoxon's rank sum test for the difference in medians between the first two rows. ***, **, and * indicate the significance levels of 1%, 5%, and 10%, respectively.



	1	2	3	4	5
Uncovered	0.71	0.49	0.35	0.22	0.13
Covered	0.76	0.59	0.46	0.36	0.27
z-statistics	(-5.929***)	(-6.39***)	(-5.302***)	(-4.531***)	(-3.843***)

Table 1: Summary Statistics

This table presents the summary statistics for all variables in the panel sample. I include only US companies from 1984–2009 and exclude all financial firms (SIC codes between 6000 and 6999) and utility firms (SIC codes between 4900 and 4999). Cash is defined as cash plus marketable securities to the book value of assets (#1 / #6). Industry Sigma is the average of cash flow standard deviations of firms within the same two-digit SIC industry for a given year. M/B is market-to-book ratio, calculated by the book value of assets minus the book value of equity plus the market value of equity to the book value of assets ((#6 - #60 + (#199 * #25)) / #6). Firm Size is the logarithm of the book value of assets in 2004 dollars. Cash flow is defined as earnings after interest, dividends, and taxes but before depreciation divided by book value of assets ((#13 - #15 - #16 -#21) / #6). NWC is defined as net working capital minus cash to the book value of assets ((#179 - #1) / #6). CAPX is capital expenditures to the book value of assets (#128 / #6). Leverage is computed by long-term debt plus short-term debt book assets over the book value of assets ((#9 + #34) / #6). R&D is research and development expenses to sales and set to zero if missing (#46 / #12). Dividend dummy equals one in years in which a firm pays a dividend (#21). AQC is acquisitions to the book value of assets (#129 / #6). Coverage is the number of analysts following a firm for a given fiscal year from Thomson Reuters I/B/E/S database. Inst. Block Holdings refers to the sum of all institutional ownership positions greater than 5% from Thomson-Reuters Institutional Holdings (13F) Database. Inst. Holdings refers to the sum of all ownership positions held by institutional investors from Thomson-Reuters Institutional Holdings (13F) Database. Pension Fund Holdings are the ownership positions held by the 12 largest pension funds from Thomson-Reuters Institutional Holdings (13F) Database. G-index refers to Gompers, Ishii, and Metrick managerial entrenchment index from RiskMetrics. All ratio variables are winsorized at the top and bottom 1 percentiles. The final sample covers 94,636 firm-year observations.

Variable	Number of Observations	Mean	Q1	Q2	Q3	Std
Cash	94636	0.166	0.024	0.084	0.236	0.197
Industry Sigma	94636	0.073	0.051	0.071	0.096	0.027
M/B	94636	1.859	1.047	1.371	2.041	1.524
Firm Size	94636	5.372	3.800	5.227	6.794	2.144
Cash flow	94636	0.025	0.011	0.064	0.107	0.173
NWC	94636	0.102	-0.024	0.085	0.227	0.188
CAPX	94636	0.063	0.021	0.043	0.080	0.066
Leverage	94636	0.217	0.040	0.193	0.343	0.188
R&D	94636	0.185	0.000	0.000	0.055	1.154
Dividend dummy	94636	0.345	0.000	0.000	1.000	0.475
AQC	94636	0.020	0.000	0.000	0.005	0.055
Coverage	94636	6.219	0.000	3.000	9.000	8.567
Inst. Block Holdings	91977	0.115	0.000	0.076	0.184	0.127
Inst. Holdings	91977	0.360	0.095	0.306	0.588	0.290
Pension Fund Holdings	91977	0.011	0.000	0.003	0.017	0.018
Gindex	19966	9.051	7.000	9.000	11.000	2.737

Table 2: Regression analysis of cash holdings and analyst coverage

This table presents regression results for all US companies from 1984–2009. A firm must have a positive book value of total assets and positive sales to be included in the sample. Financial firms (SIC codes between 6000 and 6999) and utility firms (SIC codes between 4900 and 4999) are excluded. Except as noted, the dependent variable and independent variables are defined as in Table 1. Model 1 is the baseline regression. Models 2 and 5 use Analyst coverage (No. of) as coverage that is defined as the logarithm of the number of analysts plus one. Models 3, 4, 6, and 7 use Analyst coverage (Decile) as coverage that is defined as the deciles of analyst coverage. Models 1–4 include industry and year fixed effects. Models 5–7 include firm and year fixed effects. The final sample covers 94,636 firm-year observations. All ratio variables are winsorized at the top and bottom 1 percentiles. T-stats, based on standard errors robust to heteroskedasticity and firm-level clustering, are in parentheses. *** indicates significance at 1%, ** at 5%, and * at 10%.

Dependent variable: Cash / Assets							
		Coverage Defined As:					
	(1) BKS	(2) Analyst Coverage (No. of)	(3) Analyst Coverage (Decile)	(4) Analyst Coverage (Decile) w/ Inst. Block Holdings & G index	(5) Analyst Coverage (No. of)	(6) Analyst Coverage (Decile)	(7) Analyst Coverage (Decile) w/ Inst. Block Holdings & G index
Coverage		0.013***	0.052***	0.051***	0.007***	0.029***	0.030***
		(11.02)	(12.18)	(4.99)	(5.27)	(6.21)	(3.34)
Industry Sigma	0.526***	0.505***	0.500***	0.338***	0.127	0.127	-0.012
	(7.52)	(7.25)	(7.18)	(2.86)	(1.61)	(1.61)	(-0.10)
M/B	0.016***	0.014***	0.014***	0.022***	0.010***	0.010***	0.011***
	(20.12)	(18.40)	(18.27)	(11.49)	(14.56)	(14.50)	(6.62)
Firm Size	-0.006***	-0.012***	-0.012***	-0.029***	-0.003	-0.003*	-0.014***
	(-9.20)	(-14.19)	(-14.75)	(-16.02)	(-1.42)	(-1.66)	(-3.62)
Cash Flow	-0.055***	-0.057***	-0.058***	-0.184***	0.016**	0.016**	-0.003
	(-8.04)	(-8.33)	(-8.47)	(-7.41)	(2.26)	(2.25)	(-0.12)
NWC	-0.296***	-0.300***	-0.301***	-0.323***	-0.275***	-0.275***	-0.295***
	(-41.21)	(-41.75)	(-41.84)	(-20.87)	(-34.07)	(-34.10)	(-14.52)
CAPX	-0.337***	-0.357***	-0.359***	-0.445***	-0.285***	-0.286***	-0.364***
	(-25.49)	(-26.88)	(-27.04)	(-12.51)	(-23.28)	(-23.33)	(-13.04)
Leverage	-0.356***	-0.347***	-0.348***	-0.228***	-0.259***	-0.259***	-0.126***
	(-55.42)	(-53.50)	(-53.70)	(-16.37)	(-34.83)	(-34.90)	(-9.54)
R&D	0.025***	0.025***	0.025***	0.023***	0.009***	0.009***	0.002
	(18.78)	(18.68)	(18.68)	(3.64)	(7.27)	(7.26)	(0.42)
Dividend	-0.025***	-0.023***	-0.022***	-0.023***	0.005*	0.005*	0.002
Dummy	(-9.69)	(-8.84)	(-8.68)	(-5.48)	(1.88)	(1.87)	(0.39)
AQC	-0.212***	-0.223***	-0.225***	-0.260***	-0.181***	-0.181***	-0.200***
	(-24.31)	(-25.14)	(-25.34)	(-17.40)	(-23.36)	(-23.37)	(-14.82)
Inst. Block Holdings				0.007			0.004
				(1.22)			(0.72)
G index				0.026***			0.009
				(4.63)			(1.02)
Observations	94,636	94,636	94,636	19,966	94,636	94,636	19,966
Adjusted R^2	0.507	0.510	0.510	0.564	0.766	0.766	0.830
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes			
Firm FE					Yes	Yes	Yes

Table 3: Robustness check – endogeneity of analyst following

The following panels of this table present regression results for all U.S. companies from 1984–2009. A firm must have positive book value of total assets and positive sales to be included in the sample. Financial firms (SIC codes between 6000 and 6999) and utility firms (SIC codes between 4900 and 4999) are excluded. Except as noted, the dependent variable and independent variables are defined as in Table 1. All regressions include industry and year fixed effects. All ratio variables are winsorized at the top and bottom 1 percentiles. T-stats, based on standard errors robust to heteroskedasticity and firm-level clustering, are in parentheses. *** indicates significance at 0.1%, ** at 1%, and * at 5%. Panel A presents regression estimates using a two-stage least squares (2SLS) method with the industry median number of analysts as an instrument variable. Panel B presents regression estimates using the lagged coverage, which is the logarithm of the number of analysts plus one from year t-1, t-2, and t-3, separately. Panel C presents regression estimates for change of cash holdings with change of analyst coverage and change of other control variables for every two-year time span. Change of analyst coverage is instrumented by change of the industry median number of analysts. Panel D presents regression estimates with the consideration of the impact of Regulation Fair Disclosure (Reg FD) on analyst coverage. The Post-FDdummy equals one for the 6-, 12-, 18-, and 24-month periods after Reg FD.

Panel A: Two-stage least squares regression

	2SLS	
	First Stage	Second Stage
Dependent variable:	Analyst Coverage (No. of)	Cash/Assets
Coverage		0.005***
		(4.17)
Industry median No. of analysts	0.474***	
	(12.45)	
Industry Sigma	12.442**	0.488***
	(2.39)	(6.50)
M/B	0.838***	0.012***
	(24.53)	(8.64)
Firm Size	3.004***	-0.022***
	(49.97)	(-5.70)
Cash Flow	-0.243	-0.053***
	(-1.01)	(-7.69)
NWC	0.322	-0.298***
	(1.11)	(-40.24)
CAPX	6.731***	-0.375***
	(9.38)	(-22.21)
Leverage	-4.785***	-0.331***
	(-17.44)	(-37.08)
R&D	-0.031	0.025***
	(-0.96)	(18.61)
Dividend Dummy	-1.067***	-0.019***
	(-7.71)	(-6.45)
AQC	0.199	-0.215***
	(0.40)	(-23.07)
Observations	94,636	94,636
Adjusted R-squared	0.500	0.483
Year FE	Yes	Yes
Industry FE	Yes	Yes
First-Stage F-stat	154.90***	

Panel B: Lagged analyst coverage regression

Dependent variable: Cash / Assets			
	Lagged Coverage Defined As:		
	(1) Analyst Coverage (No. of) t-1	(2) Analyst Coverage (No. of) t-2	(3) Analyst Coverage (No. of) t-3
Lagged Coverage	0.010***	0.007***	0.005***
	(8.22)	(5.87)	(4.04)
Industry Sigma	0.531***	0.533***	0.545***
	(7.22)	(6.82)	(6.62)
M/B	0.016***	0.016***	0.017***
	(18.60)	(17.40)	(16.10)
Firm Size	-0.011***	-0.011***	-0.011***
	(-12.92)	(-11.93)	(-11.30)
Cash Flow	-0.050***	-0.055***	-0.060***
	(-6.85)	(-6.76)	(-6.69)
NWC	-0.296***	-0.297***	-0.299***
	(-39.02)	(-36.14)	(-33.69)
CAPX	-0.359***	-0.367***	-0.376***
	(-24.82)	(-23.20)	(-21.89)
Leverage	-0.344***	-0.340***	-0.338***
	(-49.88)	(-46.18)	(-43.21)
R&D	0.025***	0.025***	0.025***
	(18.24)	(17.00)	(15.85)
Dividend Dummy	-0.021***	-0.019***	-0.018***
	(-7.87)	(-6.92)	(-6.30)
AQC	-0.215***	-0.214***	-0.211***
	(-23.12)	(-22.02)	(-20.68)
Observations	84,087	73,871	65,011
Adjusted R-squared	0.505	0.501	0.497
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Panel C: Change of analyst coverage regression

	2SLS	
	(1) First-stage	(2) Second-stage
Dependent variable:	Δ Coverage	Δ Cash / Assets
Δ Coverage		0.006***
		(3.34)
Δ Industry median No. of analysts	0.266***	
	(16.08)	
Δ Industry Sigma	-2.309	0.317***
	(-1.14)	(3.42)
Δ M/B	-0.051***	0.010***
	(-2.66)	(11.31)
Δ Firm Size	2.172***	0.001
	(36.94)	(0.19)
Δ Cash Flow	-1.288***	0.053***
	(-10.50)	(5.86)
Δ NWC	0.986***	-0.284***
	(6.81)	(-29.99)
Δ CAPX	2.892***	-0.280***
	(9.48)	(-18.41)
Δ Leverage	-1.808***	-0.220***
	(-11.35)	(-24.59)
Δ R&D	0.014	0.007***
	(0.65)	(4.65)
Δ Dividend Dummy	0.453***	0.001
	(5.91)	(0.25)
Δ AQC	-0.390	-0.180***
	(-1.43)	(-18.13)
Constant	-0.219***	-0.008***
	(-12.82)	(-13.19)
Observations	36,876	36,876
Adjusted R-squared	0.095	0.113
First-Stage F-stat	258.41***	

Panel D: Post-FD dummy regression

Dependent variable: Cash / Assets				
	(1) Analyst Coverage (No. of) <= 6	(2) Analyst Coverage (No. of) <=12	(3) Analyst Coverage (No. of) <=18	(4) Analyst Coverage (No. of) <=24
Coverage	0.014***	0.014***	0.014***	0.013***
	(11.72)	(11.64)	(11.44)	(11.32)
Coverage*Post-FDdummy	-0.003*	-0.001	0.002	0.003**
	(-1.67)	(-0.44)	(1.23)	(2.12)
Post-FDdummy	-0.001	-0.005	-0.005*	-0.008**
	(-0.24)	(-1.52)	(-1.71)	(-2.54)
Industry Sigma	0.306***	0.308***	0.309***	0.311***
	(5.56)	(5.59)	(5.61)	(5.64)
M/B	0.014***	0.014***	0.014***	0.014***
	(17.82)	(17.81)	(17.77)	(17.74)
Firm Size	-0.012***	-0.012***	-0.012***	-0.012***
	(-14.87)	(-14.85)	(-14.82)	(-14.80)
Cash Flow	-0.059***	-0.059***	-0.059***	-0.059***
	(-8.67)	(-8.69)	(-8.69)	(-8.70)
NWC	-0.304***	-0.304***	-0.304***	-0.304***
	(-42.40)	(-42.40)	(-42.42)	(-42.42)
CAPX	-0.363***	-0.363***	-0.363***	-0.363***
	(-27.69)	(-27.69)	(-27.70)	(-27.70)
Leverage	-0.350***	-0.350***	-0.350***	-0.351***
	(-54.70)	(-54.71)	(-54.72)	(-54.74)
R&D	0.025***	0.025***	0.025***	0.025***
	(18.86)	(18.86)	(18.86)	(18.86)
Dividend Dummy	-0.023***	-0.023***	-0.022***	-0.022***
	(-8.88)	(-8.88)	(-8.85)	(-8.84)
AQC	-0.221***	-0.221***	-0.221***	-0.221***
	(-25.28)	(-25.28)	(-25.29)	(-25.30)
Observations	94,636	94,636	94,636	94,636
Adjusted R-squared	0.507	0.507	0.506	0.507
Industry FE	Yes	Yes	Yes	Yes

Table 4: Descriptive statistics and comparison of key firm characteristics – public vs. private

Panel A presents separately the number of public and private firms within the sample for each year, 2003–9. Panel B also separates private and public firms. Except as noted, all variables are defined as in Table 1. 3-yr. Sales Growth is defined as three-year compound sales growth. The first two columns provide the mean (median) values for key firm characteristics. The third column reports the t-stat (z-stat based on Wilcoxon's rank sum test) for the difference in means and medians between the first two columns. ***, **, and * indicate the significance levels of 1%, 5%, and 10%, respectively.

Panel A: calendar time distribution -- number of public and private firms

Year	No. of Public Firms	No. of Private Firms
2003	3549	960
2004	3429	876
2005	3260	815
2006	3094	727
2007	2954	584
2008	2873	480
2009	2818	434

Panel B: Comparison of key firm characteristics -- private vs. public

	Public (A)	Private (B)	Difference t-stat(z-stat) (A)-(B)
Cash	0.210	0.108	30.80***
	0.129	0.045	38.17***
Firm Size	6.073	5.219	24.92***
	6.003	5.588	19.28***
Cash Flow	0.028	0.047	-5.54***
	0.068	0.134	-37.20***
NWC	0.056	0.020	12.15***
	0.041	0.030	5.06***
CAPX	0.050	0.049	1.18
	0.031	0.029	5.10***
Leverage	0.183	0.510	-86.26***
	0.148	0.469	-55.52***
R&D	0.271	0.204	2.90***
	0.005	0.000	22.24***
3-yr. Sales Growth	0.568	0.843	-10.00***
	0.260	0.204	2.89 ***

Table 5: Public and private firms and going-private firms analyses

This table presents regression results and the average difference in cash holdings for US public and private companies from 2003–9. A firm must have positive book value of total assets and positive sales to be included in the sample. Financial firms (SIC codes between 6000 and 6999) and utility firms (SIC codes between 4900 and 4999) are excluded. Except as noted, the dependent and independent variables are defined as in Table 1. Panel A presents regression estimates for the public and private firms' sample. Firms that go public or private are not included in the sample. 3-yr. Sales Growth is defined as three-year compound sales growth. The private firm dummy equals one when a company's status is private. The public dummy equals one if public firms have no analyst coverage. Panel B presents the average difference in cash holdings of public and private firms. Cash holdings are cash plus marketable securities to the book value of assets (#1 / #6). To evaluate the difference in cash holdings, I apply the propensity score method to control for various firm characteristics under the probit model. The model is as follows:

$$Private\ firm_{i,t} = \beta_0 + \beta_1\, log(sales)_{i,t} + \beta_2 R\&D_{i,t} + \beta_3 CAPX_{i,t} + \beta_4 Dividend\ dummy_{i,t} + \beta_5 3\text{-}yr\ sale\ growth_{i,t} + \beta_6 Cash\ flow_{i,t} + \beta_7\, Leverage_{i,t} + \beta_8 AQC_{i,t} + \beta_9 term\ premium_t + \beta_{10} Default\ premium_t + \textit{Industry fixed effects} + \varepsilon_{i,t}$$

The dependent variable is the private-firm dummy, which equals one if a firm's status is private. Log(sales) is the logarithm of sales plus one (#12). Term premium is the difference of yield spreads between 10-year and 1-year treasury bonds at the fiscal year end. Default premium is the difference of yield spreads between BBB and AAA corporate bonds at the fiscal year end. The one-to-one estimator chooses for each private firm a public firm with the closest propensity score. The nearest neighbor estimator chooses for each private firm the n (n = 10, 25, and 50, respectively) public firms with the closest propensity scores and takes the arithmetic average of cash holdings for these public firms. The Gaussian estimator uses all matched public firms for each private firm and takes the weighted average of cash holdings for these public firms. The Gaussian estimator gives more weight to public firms with propensity scores that are closer to the corresponding private firm's propensity score. The Epanechnikov estimator uses a weighted average approach similar to the Gaussian estimator but specifies the bandwidth = 0.01 to limit the number of matched public firms for each private firm. Standard errors are in parentheses, calculated by bootstrapping with 50 replications. Panel C presents regression estimates for the going-private firms sample from 2001–7. The post-private dummy equals one for the time period after going private. Panel A includes industry and year fixed effects, and Panel C includes firm fixed effects. T-stats, based on standard errors robust to heteroskedasticity and firm-level clustering, are in parentheses. *** indicates significance at 1%, ** at 5%, and * at 10%.

Panel A: Effect of private status on the level of cash holdings

Dependent variable: Cash / Assets		
	(1) Exclude zero coverage Public firms	(2) Include zero coverage Public firms
Private Firm Dummy	-0.079***	-0.066***
	(-15.42)	(-13.18)
Public (zero coverage) Dummy		-0.042***
		(-8.30)
3-yr. Sales Growth	0.004***	0.004***
	(3.72)	(3.66)
Industry Sigma	0.549***	0.530***
	(4.81)	(4.75)
Firm Size	-0.019***	-0.017***
	(-17.21)	(-16.68)
Cash Flow	0.025**	0.002
	(2.15)	(0.19)
NWC	-0.281***	-0.281***
	(-20.62)	(-22.80)
CAPX	-0.391***	-0.404***
	(-13.52)	(-14.77)
Leverage	-0.182***	-0.214***
	(-22.69)	(-26.61)
R&D	0.026***	0.025***
	(13.16)	(14.93)
Dividend Dummy	-0.038***	-0.027***
	(-8.89)	(-6.81)
AQC	-0.270***	-0.271***
	(-15.48)	(-16.54)
Observations	21,994	26,853
Adjusted R-squared	0.524	0.493
Year FE	Yes	Yes
Industry FE	Yes	Yes

Panel B: Estimations from propensity score matching

Estimator	Difference in cash holdings (standard error)
One-to-one	-0.084***
	(0.010)
Nearest neighbor (n=10)	-0.077***
	(0.008)
Nearest neighbor (n=25)	-0.077***
	(0.007)
Nearest neighbor (n=50)	-0.066***
	(0.006)
Gaussian	-0.074***
	(0.007)
Epanechnikov	-0.081***
	(0.007)

Panel C: Effect of going private on the level of cash holdings

Dependent variable: Cash / Assets	
	going-private firms
Post-private Dummy	-0.026**
	(-2.32)
Industry Sigma	-0.758**
	(-2.06)
3-yr. Sales Growth	-0.008***
	(-3.25)
Firm Size	-0.023***
	(-3.51)
Cash Flow	0.286***
	(4.15)
NWC	-0.213***
	(-4.35)
CAPX	-0.150*
	(-1.76)
Leverage	-0.082***
	(-3.59)
R&D	-0.230
	(-0.46)
Dividend Dummy	0.017
	(1.37)
AQC	-0.006
	(-0.19)
Observations	316
Adjusted R-squared	0.503
Firm FE	Yes

Table 6: The marginal value of cash with analyst coverage

This table presents regression results of $r_{i,t} - R_{i,t}^{B}$ on analyst coverage and changes in firm characteristics over the whole sample period. Model 1, the baseline regression following Faulkender and Wang (2006), includes Cash (C_t), Earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits (E_t), Net assets (NA_t, total assets minus cash), R&D (RD_t), Interest expenses (I_t), Common dividends paid (D_t), Leverage (L_t, long-term debt plus short-term debt over long-term debt plus short–term debt plus market value of equity), and Net financing (NF_t, total equity issuance minus repurchase plus debt issuance minus redemption). All variables excluding analyst coverage, Inst. Block Holdings, G index, leverage, and excess return have been deflated by the lagged market value of equity of the firm. Model 2 includes analyst coverage (No. of) defined as the logarithm of the number of analysts following plus one in the regression. Model 3 includes analyst coverage deciles (Deciles) in the regression. Model 4 includes dummy coverage (Dummy) in the regression. Dummy equals one for firms with analyst coverage above the sample median each year. Models 5 and 6 include institutional block holdings and the G-index as controls, respectively. I first split sample into terciles based on institutional block holdings and G-index, separately. The middle tercile is dropped from the analysis. Second, I define governance dummy equal to one for firms in the top tercile of institutional block holdings and the bottom tercile of G-index. Δ indicates the change from the previous year. The subscript t-1 and t indicate the value of the variable is at the beginning or the end of fiscal year t. All variables are winsorized at the top and bottom 1 percentiles to mitigate the impact of extreme outliers. All regressions include industry and year fixed effects. T-stats, based on standard errors robust to heteroskedasticity and firm-level clustering, are in parentheses. *** indicates significance at 1%, ** at 5%, and * at 10%.

Dependent variable: excess return $r_{i,t} - R^B_{i,t}$						
	(1)	(2)	(3)	(4)	(5) Control for Inst. Block Holdings	(6) Control for G index
		Coverage Defined As:				
	FW	Analyst Coverage (No. of)	Analyst Coverage (Deciles)	Analyst Coverage (Dummy)	Analyst Coverage (Dummy)	Analyst Coverage (Dummy)
Coverage		0.009***	0.035***	0.009**	0.020***	-0.013
		(4.82)	(5.20)	(2.40)	(4.30)	(-1.45)
ΔC_t * **Coverage**		0.274***	0.901***	0.525***	0.534***	0.429*
		(9.72)	(8.37)	(7.06)	(5.89)	(1.91)
Inst. Holdings					-0.025***	
					(-5.25)	
ΔC_t * Inst. Block Holdings					-0.104	
					(-1.57)	
G index						-0.032***
						(-3.76)
ΔC_t * G index						0.530***
						(3.14)
ΔC_t	1.862***	1.628***	1.514***	1.791***	1.804***	1.472***
	(36.70)	(28.46)	(22.88)	(33.63)	(26.22)	(6.67)
ΔE_t	0.464***	0.464***	0.464***	0.465***	0.448***	0.536***
	(28.37)	(28.68)	(28.55)	(28.44)	(23.95)	(9.27)
ΔNA_t	0.219***	0.218***	0.218***	0.218***	0.215***	0.198***
	(23.59)	(23.58)	(23.50)	(23.49)	(20.41)	(6.88)
ΔRD_t	0.238	0.182	0.187	0.219	0.134	0.684
	(1.43)	(1.10)	(1.13)	(1.31)	(0.68)	(1.24)
ΔI_t	-1.877***	-1.884***	-1.886***	-1.885***	-1.851***	-1.907***
	(-14.24)	(-14.36)	(-14.34)	(-14.30)	(-12.30)	(-3.60)
ΔD_t	1.731***	1.760***	1.731***	1.729***	2.027***	2.654***
	(5.79)	(5.90)	(5.80)	(5.78)	(5.99)	(4.09)
NF_t	0.036**	0.030*	0.031*	0.035**	0.029	-0.167***
	(1.98)	(1.69)	(1.72)	(1.97)	(1.37)	(-2.62)
C_{t-1}	0.396***	0.406***	0.408***	0.402***	0.386***	0.378***
	(22.02)	(22.62)	(22.62)	(22.19)	(18.70)	(5.99)
ΔC_t * C_{t-1}	-0.665***	-0.593***	-0.575***	-0.613***	-0.611***	-0.641**
	(-8.72)	(-7.78)	(-7.49)	(-7.95)	(-6.85)	(-2.14)
L_t	-0.575***	-0.569***	-0.568***	-0.572***	-0.565***	-0.521***
	(-56.15)	(-54.99)	(-54.87)	(-55.34)	(-46.68)	(-17.99)
ΔC_t * L_t	-2.105***	-2.069***	-2.147***	-2.110***	-2.079***	-1.435***
	(-19.44)	(-19.19)	(-19.93)	(-19.50)	(-16.07)	(-3.03)

Observations	95,218	95,218	95,218	95,218	64,570	12,260
Adjusted R-squared	0.228	0.231	0.231	0.229	0.229	0.208

Table 7: Information and monitoring effects

Panel A and B present the regression results based on the information effect hypothesis using ratio of R&D to sales as a proxy for information asymmetry. Specifically, Panel A presents the results using the cash holdings model following Bates et al. (2009). Following Faulkender and Wang (2006), Panel B presents regression results of $r_{i,t} - R_{i,t}^{B}$ on analyst coverage and changes in firm characteristics for two subgroups based on the ratio of R&D to sales. Panel C and D present the regression results based on the monitoring effect hypothesis using the G-index as a proxy for potential agency conflict. Specifically, Panel C presents results using the cash holdings model following Bates et al. (2009). Following Faulkender and Wang (2006), Panel D presents the regression results of $r_{i,t} - R_{i,t}^{B}$ on analyst coverage and changes in firm characteristics for two subgroups based on the G index. For Panel A and C, the dependent and independent variables are defined as in Table 1. Control variables are subtracted from the table for brevity. For Panel B and D, firms are separated into two subgroups based on the sample median each year based on the ratio of R&D to sales and the G-index as proxies for information asymmetry and potential agency conflict, respectively. All variables (defined as in Table 6) excluding analyst coverage, leverage, and excess return have been deflated by the lagged market value of equity of the firm. Control variables are subtracted from the table for brevity. Δ indicates the change from the previous year. The last column of panels B and D presents the χ^2 statistics (p-value in parentheses) from the Wald test for testing the equality of coefficients of ΔC_t*Coverage of two subgroups. All variables are winsorized at the top and bottom 1 percentiles to mitigate the impact of extreme outliers. All regressions include industry and year fixed effects. T-stats, based on standard errors robust to heteroskedasticity and firm-level clustering, are in parentheses. *** indicates significance at1%, ** at 5%, and * at 10%.

Panel A: Information effect based on R&D – the level of cash

Dependent variable: Cash / Assets	Analyst Coverage (Decile)
Coverage	0.047***
	(11.14)
Coverage * R&D	0.026***
	(5.31)
R&D	0.014***
	(6.45)
Controls	Same as specification (1), Table 2
Observations	94,636
Adjusted R-squared	0.512

Panel B: Information effect based on R&D – the marginal value of cash

	(1) Low information asymmetry	(2) High information asymmetry	$\beta_H - \beta_L = 0$
ΔC_t	1.296***	1.655***	
	(29.60)	(32.53)	
Coverage	0.035***	0.040***	
	(3.91)	(3.90)	
ΔC_t * Coverage	0.524***	1.043***	5.83
	(6.34)	(11.71)	(0.02)
Controls	Same as specification (1), Table 6		
Observations	48,868	46,349	
Adj. R-squared	0.221	0.256	

Panel C: Monitoring effect based on the G-index – the level of cash

Dependent variable: Cash / Assets	Analyst Coverage (Decile)
Coverage	0.006
	(0.27)
Coverage * G-index	0.005**
	(2.20)
G-index	-0.007***
	(-3.49)
Controls	Same as specification (1), Table 2
Observations	19,966
Adjusted R-squared	0.565

Panel D: Monitoring effect based on the G-index – the marginal value of cash

	(1) Low agency conflict	(2) High agency conflict	$\beta_H - \beta_L = 0$
ΔC_t	1.795***	0.139	
	(12.99)	(0.90)	
Coverage	0.024	-0.006	
	(1.12)	(-0.27)	
ΔC_t * Coverage	0.824***	1.813***	3.19
	(4.45)	(9.26)	(0.07)
Controls	Same as specification (1), Table 6		
Observations	11,363	8,663	
Adj. R-squared	0.231	0.204	

Table 8: The accumulation of excess cash and its associated valuation

The following panels present the results on the impact of analysts on the accumulation of excess cash and its valuation. Excess cash is the residual based on the average coefficients from the Fama-MacBeth regression using equation 1 without analyst coverage. Panel A presents the results of analysts' impact on firms' accumulation of excess cash. All firms must have positive excess cash in year t to be considered in the sample. The dependent variable is the change in the excess cash ratio from year t-1 to t. Independent variables including industry average change in excess cash and analyst coverage are in year t-1. All variables excluding analyst coverage are deflated by book value of assets. Model 1 and Model 2 use Analyst coverage (No. of) and Analyst coverage (Decile) as coverage, defined as the logarithm of the number of analysts plus one and the deciles of analyst coverage, respectively. Following Faulkender and Wang (2006), Panel B presents the regression results of $r_{i,t} - R_{i,t}^{B}$ on analyst coverage, excess cash, and changes in firm characteristics. All variables (defined as in Table 6) excluding analyst coverage, excess cash, leverage, and excess return have been deflated by the lagged market value of equity of the firm. In Model 1, ExCash is an indicator variable which equals one if a firm's excess cash is above the sample median. Model 2 keeps only firms with positive excess cash at time t. Control variables are subtracted from the table for brevity. For both panels, Δ indicates the change from the previous year. All variables are winsorized at the top and bottom 1 percentile to mitigate the impact of extreme outliers. T-stats, based on standard errors robust to heteroskedasticity and firm-level clustering, are in parentheses. *** indicates significance at1%, ** at 5%, and * at 10%.

Panel A: Accumulation of excess cash

Dependent variable: $\Delta ExcessCash_t$	(1)	(2)
	Coverage (No. of)	Coverage (Deciles)
$Coverage_{t-1}$	-0.002***	-0.006***
	(-5.06)	(-4.19)
Ind. Average change in excess $cash_t$	0.841***	0.838***
	(27.63)	(27.57)
Constant	-0.003***	-0.002*
	(-2.88)	(-1.81)
Observations	33,729	33,729
Adjusted R-squared	0.042	0.042

Panel B: the marginal value of cash and excess cash

Dependent variable: : excess return $r_{i,t} - R^B_{i,t}$	(1)	(2)
	Coverage (Deciles)	Coverage (Deciles)
ΔC_t	1.899***	1.930***
	(39.24)	(34.26)
Coverage	0.034***	0.067***
	(3.21)	(4.60)
ExCash	-0.215***	-1.320***
	(-25.27)	(-24.09)
ΔC_t*Coverage	0.726***	0.443***
	(4.88)	(4.15)
ΔC_t*ExCash	-0.181***	-1.705***
	(-3.79)	(-6.83)
ExCash*Coverage	0.046***	0.225**
	(2.98)	(2.38)
ΔC_t*ExCash*Coverage	0.476***	4.897***
	(2.82)	(9.15)
Controls	Same as specification (1), Table 6	
Observations	62,501	41,773
Adjusted R-squared	0.248	0.321

Table 9: Results on the nonlinearity impact of analysts

This table presents regression results for all U.S. companies from 1984–2009. A firm must have positive book value of total assets and positive sales to be included in the sample. Financial firms (SIC codes between 6000 and 6999) and utility firms (SIC codes between 4900 and 4999) are excluded. Except as noted, the dependent variable and independent variables are defined as in Table 1. Coverage(*) is an indicator variable which equals one if a firm is in the * decile group of a given year, where * = 1 - 9. All regressions include industry and year fixed effects. All ratio variables are winsorized at the top and bottom 1 percentiles. T-stats, based on standard errors robust to heteroskedasticity and firm-level clustering, are in parentheses. *** indicates significance at 0.1%, ** at 1%, and * at 5%.

Dependent variable: Cash / Assets	
	Coverage (Decile dummies)
Industry Sigma	0.507***
	(7.35)
M/B	0.015***
	(19.15)
Firm Size	-0.011***
	(-12.63)
Cash Flow	-0.060***
	(-8.78)
NWC	-0.305***
	(-42.50)
CAPX	-0.362***
	(-27.32)
Leverage	-0.349***
	(-54.09)
R&D	0.024***
	(18.58)
Dividend Dummy	-0.023***
	(-8.82)
AQC	-0.233***
	(-26.35)
Coverage(1)	0.016***
	(5.74)
Coverage(2)	0.022***
	(7.85)
Coverage(3)	0.032***
	(10.81)
Coverage(4)	0.037***
	(12.32)
Coverage(5)	0.042***
	(13.47)
Coverage(6)	0.045***
	(13.81)
Coverage(7)	0.043***
	(12.25)
Coverage(8)	0.033***
	(8.54)
Coverage(9)	0.020***
	(4.24)
Observations	94,636
Adjusted R-squared	0.512
Year FE	Yes
Industry FE	Yes