THREE ESSAYS ON ACTUAL SHARE REPURCHASES

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Abstract

This document comprises three essays regarding actual share repurchases. In Chapter 1, I show that external pressure in the form of equity analysts asking questions about a firm's actual repurchases can lead firms to more extensively follow through on their recently announced open market share repurchase programs. Such a phenomenon cannot be explained by mere firm characteristics. Instead, only analysts' questions that are shorter, more focused on share repurchases, and blunter in language appear to drive firms for greater follow-throughs. The second essay, detailed in Chapter 2, presents another motivation for firms to actually buy back shares under their active open market share repurchase programs. Specifically, firms with higher accounting quality will likely repurchase more shares to signal their accounting superiority after another firm operating in the same product market issues a financial restatement. As a result, the repurchasing firms separate from the pooling equilibrium with lower accounting quality firms and thus incur lower accounting-related litigation risks. Finally, in the third essay, located in Chapter 3, we compare cash dividends with share repurchases. Firms with greater heterogeneity in beliefs between insiders and outsiders, and among outside equity holders more likely prefer share repurchases to cash dividends for payout. Importantly, this finding can partially explain the disappearing dividend puzzle where rising heterogeneity in beliefs in the economy may have contributed to the substitution of cash dividends with share repurchases in the past two decades.

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Introduction

Share repurchases are one of the most important elements in the financial market for its crucial role in payout policy. According to classic corporate finance theory like Modigliani and Miller (1961), a firm's payout policy should not matter for its firm value. In reality, there is quite a contrast between different payout methods and their respective effects on firm value. In particular, once firms announce dividend payments, they will try their very best to maintain the dividends even after the obligated first payment. A subsequent dividend cut would largely impair their firm value. On the other hand, if firms announce open market repurchase programs as the means to payout cash, not only do they not have to commit, but the firms also have much freedom and discretion in when and how much to repurchase without obvious repercussions. Even if the firms do not buy back a single share after announcing such share repurchase programs, they do not seem to incur much impairment on firm value. Although the literature on open market share repurchase announcements is abundant, there is less work done on the actual fulfillment of the announced programs.[1] Within this space, there is even less work that connects open market repurchase announcements and the subsequent fulfillment, and how that compares with cash dividend payouts. Thus, this dissertation aims to partially fill this void.

From Chapter 1 to Chapter 3, I provide empirical evidence to establish connections between repurchase announcement and actual fulfillment, the non-traditional motivations for actual repurchases, and the choice between cash dividends and share repurchases. Each chapter comprises an essay corresponding to a specific topic mentioned above. Collectively, the three essays in this dissertation detail new knowledge regarding actual share repurchases that have not been documented before.

[1] Please see Allen and Michaely (2003) for a comprehensive review of the earlier literature on open market share repurchase announcements.

Specifically, in Chapter 1, I apply textual analysis on form 10Ks and 10Qs, and conference call transcripts between equity analysts and firm managers to construct a new database about actual share repurchases following announcements, and the discussions on actual share repurchases during conference calls. As a result, I show that firms who receive greater pressure from equity analysts about their lack of actual repurchases in the form of more discussions and more aggressive discussions by analysts during public conference calls are likely to follow through on their recently announced share repurchase programs to a greater extent. Corroborative tests and identification tests using an instrumental variable both confirm such a result. Thus, this essay helps financial economists understand that one of the motivations for firms to follow through with their announced share repurchase programs is to respond in accordance with external pressure for such an action.

Chapter 2 proceeds to provide another motivation for firms to fulfill their previously announced share repurchase programs, which is to alleviate accounting-related litigation risks triggered by the financial restatements of other firms operating in the same industry. Using financial restatements from 2003 to 2020 and the actual repurchase data obtained as in Chapter 1, I empirically show that firms with better accounting quality repurchase (more) shares under their active open market repurchase programs after a focal firm operating in the same product market issues a financial restatement. Importantly, I document that the mechanism for such a phenomenon is for higher accounting quality firms to distinguish from the firms with lower accounting quality in the pooling equilibrium. Consequently, higher accounting quality firms that repurchase shares face lower litigation risks related to their accounting practices. I also conduct a series of robustness tests to address the concern that market timing opportunities (Baker and Wurgler, 2002; Dittmar and Field, 2015) might be the primary driver for this finding.

Next, Chapter 3 compares cash dividends with actual share repurchases as the preferred payout

methods. This essay, which is joint work with Dr. Thomas J. Chemmanur and Dr. Debarshi Nandy, utilizes the theoretical framework presented by Bayar et al. (2021) and empirically shows that firms prefer to use share repurchases when there is greater heterogeneity in beliefs between firm insiders and outsiders, and among outside equity investors about the firms' future prospects. As a result, we provide a partial explanation for the disappearing dividend puzzle (Fama and French, 2001) where rising heterogeneity in beliefs between insiders and outsiders, and among firm outside equity investors overtime partially contributes to the rising trend of substituting cash dividends with share repurchases.

Hence, the three essays delineated in Chapter 1 through 3, respectively tabbed into previously unexplored areas in actual fulfillment of share repurchases following their firms' announcements. I present new evidence using new data to connect the dots between open market share repurchase announcements and the actual follow-throughs, and with the alternative payout method of cash dividends.

1 Chapter 1

When firm managers make corporate decisions, they balance their interests against those of investors, employees, the media, the board of directors, and equity analysts. As financial economists, we often do not observe the preferences of these external agents.[2] As a result, it is challenging to study how external agents affect corporate decision making. Further, researchers typically do not observe the choices managers make to reach their decisions. For instance, we cannot tell if a firm

[2]Corporate theories suggest shareholders want long-term prosperity (Berglöf and von Thadden, 1994; Derrien et al., 2014; Cremers et al., 2020); environmental, social, and corporate governance (ESG) investors want socially conscientious corporate actions (Pedersen et al., 2021); and short-term investors want immediate cash or stock returns (Shleifer and Vishny, 1990; Gompers and Metrick, 2001; Gaspar et al., 2005). However, we often do not observe these demands directly. Consequently, we do not know with certainty whether these objectives truly represent stakeholders' preferences.

has low profits because the managers explored all venues for profit maximization but failed or because they did not exert any effort into improving profits; thus, we often observe the outcomes but not the *choices* for corporate decisions.[3] Even if we did observe the previous two dimensions, we rarely witness the negotiations – the back-and-forth between managers and external parties – by which the equilibrium decisions are reached (Soltes, 2013; Solomon and Soltes, 2015).[4]

In this chapter, I parse the transcripts of conference calls to investigate how the back-and-forth negotiations between managers and equity analysts affect the *choices* of managers making corporate decisions. In particular, I study the corporate decision of firms' tendency to follow through on recently announced open market repurchase programs (i.e., actual repurchases) from 2003 to 2020 under external pressure. My sample consists of only firms with open market repurchase announcements. Actual share repurchases represent not only an outcome of corporate decisions but also managers' *choice*. I measure external pressure using equity analysts' questions on share repurchases in the *questions and answers section* of public conference calls. The transcripts of these conference calls enable me to directly observe the preferences of individual analysts and firm managers.[5] They allow me to examine how public interactions between analysts and managers when their preferences diverge affect the *choices* of managers on share repurchases. I show firms follow through on recently announced repurchase programs when pressured to do so by analysts during conference calls. Importantly, firms that do not repurchase share under pressure likely face downgrades and bad publicity from the same pressuring analysts.

My baseline models regress actual share repurchases on the (frequency of) share repurchase

[3]Extant literature such as Yu (2008), He and Tian (2013), Guo et al. (2019), and Cookson et al. (2022) study firm decisions regarding earnings management, profit margins, innovation, and merger withdrawals; however, these variables are all outcomes rather than choices. In turn, we do not observe the choices that managers make to reach the earnings, profits, innovation level they have, or the merger withdrawal.

[4]Soltes (2013) and Solomon and Soltes (2015) show analysts can pressure firms to act during private meetings, which are not observable to the general public.

[5]This differs from Degeorge et al. (2013), who infer an analyst's preferences using the corporate policies of firms the analyst covers.

mentions in the conference calls. The mention of share repurchases increases the firm's likelihood (dollar amount) of actual repurchases in the next month by 2.6%, a 17.6% (42%) increase from the unconditional mean when including firm and industry by time fixed effects. A one-standard-deviation increase in the overall *frequency of* mentioning share repurchases leads to a 4.4% (11%) increase in firms' subsequent likelihood (dollar amount) of actual repurchases.[6]

To combat the concern where firms that are going to repurchase shares likely talk more about it during conference calls, I decompose the (frequency of) share repurchase mentions into those made by equity analysts and those by firms. When analysts mention share repurchases, firms increase the likelihood (dollar amount) of share repurchases in the subsequent month by 2.8%, a 19% (37%) increase from the unconditional mean. A one-standard-deviation increase in analysts' frequency of mentioning this topic raises firms' likelihood (dollar amount) of repurchasing shares by 4.7% (10%) relative to the mean. In contrast, firms' own mentions of and frequency of mentioning share repurchases have no such effects. Regressions with analysts' employer dummies and those with firm by analysts' employer *pair* dummies produce similar coefficients and statistical significance, alleviating worries about selection bias.

One question here is that other unobservable factors might simultaneously motivate firms to repurchase shares and analysts to ask about it. I conduct a variety of tests to address this issue. When analysts are the first to mention share repurchases, firms increase the likelihood and dollar amount of subsequent actual repurchases. If firms mention share repurchases first, the effect disappears; thus, when firms control the flow of the conversations, no effect arises. This result reflects analysts' questions matter for firms' actual repurchases. Further consistent with this hypothesis, the earlier analysts mention share repurchases, and the more negative tones they use when asking

[6]Regressing the frequency of share repurchase mentions on analyst and firm characteristics shows analysts whose employers have more holdings in a firm's stock, those who revised a firm's earnings per share (EPS) upward in the previous quarter, and firms with lower leverage, greater profitability and cash holdings, and lower returns in the previous six months incur more frequent discussions of share repurchases.

about share repurchases, which suggest bigger concerns regarding the firms' actual repurchases, the greater the effect. Conversely, the earlier timing and negative tones when firms mention share repurchase show no positive effects on their subsequent actual repurchases. In addition, the differences in coefficients between analysts and firms on these dimensions are statistically significant. These findings suggest that the questions themselves, and thus external pressure from analysts, drive firms' corporate decisions regarding share repurchases.

Next, I measure the rudeness (bluntness) of analysts' questions. If analysts' questions and thus external pressure drive firms' actual repurchases, I expect blunter and ruder questions from analysts, representing greater pressure, to receive bigger responses. I show consistent results. When analysts' questions about share repurchases are shorter and contain fewer non-share repurchase-related topics, and when they bluntly question why the firm's pace of share repurchases is behind schedule, the effect on firms' subsequent actual repurchases is stronger.[7] The more explicitly and rudely analysts demand that a firm repurchases shares, the greater the pressure exerted and the stronger the firm's response in subsequent corporate decisions regarding actual repurchases. They also corroborate with the findings above that unobservable fundamentals unlikely drive the results. Moreover, blunter questions get bigger responses also challenges an alternative explanation where firms orchestrate the whole show by telling their analysts to ask these questions.[8]

Given analysts' questions, pressure can matter either because it represents a threat of future punishment by the analysts if the firm does not respond or because it represents the consequences directly, where the punishment is bad publicity in the form of rude and blunt questions in front of a large audience. I find evidence consistent with both mechanisms. First, asking questions represents

[7]Examples of analysts' blunt questions include "You are sitting on a lot of cash, but repurchasing shares at a lackluster pace since your announcement. Have you considered repurchasing more?" and "You haven't repurchased any shares since your announcement a year ago. Why is that?"

[8]Cohen et al. (2020) show firms work hard to pick which analysts to ask questions so that they can have easy questions to answer. My findings show blunter and harder questions have a bigger impact on firms' subsequent actual repurchases, making it unlikely that firms tell their analysts to ask hard-to-avoid questions in calls.

a threat of future downgrades. Analysts who ask about a firm's share repurchases are more likely to downgrade the firm if it does not repurchase shares after the call. Second, the degree of rudeness in the questions does not appear to fill the same role. Despite the previous results showing ruder questions get a bigger response in firms' actual repurchases, they do not correlate with individual analysts' downgrades had the firms not followed through.[9] In this case, ruder questions appear as the direct consequences.

This finding implies a publicity channel is at work whereby firm managers care about how others view them. Given the nature of these public conference calls, the potential wide reach of audience (Heinrichs et al., 2019) imposes a publicity component. Managers being confronted publicly with rude and hard-to-avoid questions regarding a decision they previously promised but have not delivered could induce the feelings of embarrassment, reflecting bad publicity for the managers. Consequently, they are more likely to direct their firms to follow through on the announced repurchase programs.

To more formally address the endogeneity concern that unobservable firm fundamentals drive analysts' questions about and firms' actions regarding actual repurchases, I adopt an instrumental variable approach. I use the percentage of analysts in a firm's conference call who asked about *other* firms' share repurchases in the past year as an instrument for the frequency of mentioning share repurchases in the current call. Two-stage-least-square (2SLS) regressions estimate coefficients of interest similar in magnitude with smaller t-statistics. Hausman tests cannot reject the null that the ordinary-least-squares (OLS) coefficient and 2SLS coefficient are similar. Hence, I confirm that analysts' questions rather than underlying firm fundamentals are what pressure firms to follow through on recently announced open market repurchase programs.

[9]This set of results conditions on an analyst's *rudeness or bluntness* when mentioning share repurchases, which is different from the previous results conditioning on whether an analyst mentions share repurchases. See Section 1.4 for detailed comparisons.

My findings help financial economists pin down the effects of the particular, yet crucial, factor of external pressure on corporate decision-making. Brav et al. (2008), Firth et al. (2013), Bebchuk et al. (2015), Brav et al. (2015), Lin et al. (2018), and Lowry et al. (2020) document how interactions between firm insiders and outsiders (regulators, institutional investors, and activist investors) can affect corporate decisions. Nonetheless, most of the interactions studied in these seminal papers are not publicly observable, and the corporate decisions of interest are outcomes rather than *choices*. I contribute to this literature by investigating the impact of a publicly observable medium of bilateral communications on a specific corporate decision (i.e., actual repurchases), representing a *choice* firms make.

This chapter is also relevant to the literature on analyst tone and pressure mechanisms. Unlike Huang et al. (2014), Allee and DeAngelis (2015), Cohen et al. (2020), and Mayew et al. (2020), who establish the impact of high-level analyst tone on corporate actions, I focus on *individual* questions analysts ask about a particular issue and the impact on firms' corporate decision-making on the same issue.

Another related paper is Becher et al. (2015), who document that analysts' post-merger announcement stock recommendations can change the probability of merger completion. The distinction between this chapter and their paper is that they look at the outcome of merger completion, whereas this chapter focuses on the decision of actual repurchases, which is a choice (in addition to outcome) managers make. They also investigate the effect of analysts' stock recommendations, while I look at what analysts say through their live conversations with firms in public conference calls. Thus, I provide a more direct setting looking into how analysts influence corporate actions.

Finally, I provide novel evidence to the puzzle why some firms fulfill a much larger fraction of their announced open market repurchase programs than others. This question is an outstanding puzzle in corporate finance because many firms announce such programs but do not follow through

(see Table 1 Panel B) without incurring obvious consequences, given that firm managers have considerable control over the execution of share repurchases. Although numerous studies investigate open market repurchases, they do not answer this question.[10][11] To my best knowledge, only Manconi et al. (2019) document the relationship between announcements and actual repurchases. This chapter differs from Manconi et al. (2019) in that I uncover new insights to this puzzle: external pressure by equity analysts when applied in public can discipline firms to more extensively follow through with their recently announced repurchase programs.

Overall, this chapter contributes to the literature by answering how public negotiations between firm outsiders and firm managers affect the *choices* of managers making corporate decisions. My setting of share repurchases, an action that is both a choice and highly controllable by firm managers, provides a clean scope to document the effect of external pressure exerted in a public setting on the process of corporate decision-making.

1.1 Data and Summary Statistics

1.1.1 Data

I use publicly accessible conference calls to measure the presence and extent of public shaming for two reasons. First, conference calls are one of the forums in which bilateral conversations

[10] Jagannathan et al. (2000) and Brav et al. (2005) document firms' share repurchases as a flexible way to distribute the transient influx of cash. Dittmar (2000) and Kahle (2002) find firms repurchase shares to reduce dilution from employee stock options. Dittmar (2000), Grullon and Michaely (2002), and Lie (2005), among others, present evidence of firms repurchasing shares to correct undervaluation. Bayar et al. (2021) and Chemmanur et al. (2022) study the choice between repurchases and dividends as the preferred payout policy under heterogeneous beliefs. Brockman and Chung (2001), Baker and Wurgler (2013), and Dittmar and Field (2015) document managers' market-timing capabilities when executing share repurchases.

[11] Of course, this chapter is also related to the broad literature on open market repurchase announcements. See Allen and Michaely (2003) for a review of the literature. This chapter is distinct from the aforementioned literature because I do not study impacts such as operating performance, stock returns (Vermaelen, 1981; Ikenberry et al., 1995; Peyer and Vermaelen, 2009), or the credibility of (Babenko et al., 2012; Bonaimé, 2012) and rationale (Bagwell and Shoven, 1988; Bagwell, 1991; Comment and Jarrell, 1991; Baker et al., 2003) in *announcing* open market repurchase programs. Instead, I focus on how analysts' pressure affects firms' subsequent *actual* repurchase behaviors.

between firm insiders and outsiders can take place. Many other types of communications between a firm and the public, such as press releases, are more unilateral, wherein the firm tells the public whatever they want, and usually take a few questions with no back-and-forth conversation. The calls in my sample include earnings calls, investor day calls, and analyst calls among others.[12] The wide variety of the types of calls covered elicits a more representative sample. Second, the consumers of these calls are not just the participating analysts and investors, as anyone can access transcripts and even audio recordings ex post. Thus, the range that analyst public pressure can reach from these calls is broad and provides a perfect setting to analyze the corresponding effects on specific firm actions.

Capital IQ provides the data on all conference call transcripts. I apply textual analysis on these transcripts to extract the data related to the overall, analysts', and companies' mentions of share repurchases during the questions and answers section.[13] Since I can directly observe who mentions share repurchases and keywords alike, I am able to measure the frequency of an entity mentioning repurchases relative to all the other words spoken.[14] This measure produces a direct and clean proxy for equity analyst pressure and thus the presence of public shaming, with respect to a firm's actual share repurchase behaviors. I aggregate this data on conference calls to the firm-year-month level because the most granular data on actual share repurchases are at the monthly level.[15] I merge the firm-year-month conference call data by lagging it 1-month relative to the actual repurchase

[12]The remaining calls constitute mergers and acquisitions (M&A) announcement conference calls and other non-standard conference calls.

[13]Throughout the paper, all measures only pertain to the questions and answers section of the conference calls because this is where bilateral conversations occur.

[14]Keywords include "share repurchase," "share repurchases," "share repurchased," "stock repurchasing," "stock buyback," "stock buybacks," "buy back stock," "stock buy-back," "buys back stock," "buying back stock," "bought back stock," and the same set replacing "stock" with "shares," both before and after different versions of "repurchase" and "buyback."

[15]If a firm conducts more than one conference call in a given month, I sum the number of times that analysts, the firm, and their combined mentions of share repurchase-related keywords divided by the total number of words spoken by all entities on all calls in the month.

data constructed above. Thus, for each firm's open market repurchase announcement, the actual repurchase data lead the conference call data by 1-month.

I collect open market repurchase announcements between January 2001 to September 2020 from the SDC Platinum Merger&Acquisition Database. For each open market repurchase announcement, I obtain the dollar amount and the number of shares to be bought back announced by the firm. Most firms announce open market repurchase programs in dollar amounts, while a small portion announce in the number of shares. For those that only announce the number of shares, I estimate the announced dollar amount by multiplying the number of shares for repurchase *announced* by the average closing price of the announcing firm's stock in the month of the announcement. I assume that each announcement is in effect for three years (36 months), unless a new open market repurchase program is announced in the interval, which then replaces the old announced program as the effective program in place.[16] The rationale for keeping the most recently announced program as the active program follows the behavioral literature that equity market participants have limited attention and short memories, i.e., they remember the most recent information better (Hirshleifer and Teoh, 2003; Hirshleifer et al., 2013; Hirshleifer, 2015). I start the announcements from 2001 such that the programs announced in 2001 have at least one year of actual repurchase disclosure data starting in January 2003.

As of 2003, the Securities and Exchange Commission (SEC) required all firms to disclose share repurchase activities at a monthly level in quarterly and annual filings, called 10-Qs and 10-Ks, respectively (Dittmar and Field, 2015). I use Python to scrape the actual monthly share repurchases from all 10-Ks and 10-Qs downloaded from the SEC EDGAR Database. I calculate the cumulative dollar amount of actual repurchases in a given month by summing actual monthly repurchases from the announcement month to the given month. I scale this value by the total

[16]The assumption of three years or 36 months comes from Stephens and Weisbach (1998), who show that the average length for a firm to complete its announced repurchase program is three years.

dollar amount announced in the original repurchase program. The 1-month lagged variable for this measurement is called *Lagged_cumulative* in the paper, serving as a control variable for a firm's progress regarding the announced open market repurchase program. I then merge the monthly actual repurchase data with each open market repurchase announcement with a 3-year active period as described above. This construction produces my main sample with the unit of observation at the firm-year-month level.

I use the Thomson Reuters Refinitiv Database for 13-F data on institutional holding and I/B/E/S for analysts' EPS forecasts. Firm level control variables come from Compustat Quarterly. All control variables are matched to the firm-year-month sample by the previous quarter-end. CRSP provides the data on stock prices. I merge these data sets to form the final sample of 236,654 observations (firm-year-month) with 4,080 firms from 69 two-digit SIC industries.

1.1.2 Summary Statistics

The conference call transcripts used span from 2003 to 2020. There are 9,124 conference call transcripts mentioning share repurchases (and associated keywords), constituting about 4% of the total sample. The distribution of the discussions on share repurchases within these 9,124 transcripts is in Table 1 Panel A. All continuous variables are winsorized at 1% and 99% levels. Transcripts in which someone mentions share repurchases have a mean of 0.05%, with a standard deviation of 0.025%. In calls mentioning share repurchases, analysts have a mean frequency of 0.04% and standard deviation of 0.022% in mentioning the related keywords. On average, companies spend 0.007% of their speech talking about share repurchases. Around 35.6% of the time, analysts mention share repurchases first in the conference call questions and answers section, whereas 61.2% of the time the company mentions the topic first.

The main sample of 236,654 firm-year-month observations constitutes 10,247 announced open

market repurchase programs from 2001 to 2020, with descriptive statistics presented in Table 1 Panel B. Among them, only 8.6% are completed within three years or before another open market repurchase program announcement. In contrast, more than half (54.3%) of the announced open market repurchase programs are not attempted by the announcing firms in a three-year period or before they announce another open market repurchase program.[17] Conditional on the 8.6% of completed programs, it takes an average of 14.8 months (approximately 1 year and 3 months) to complete the program. The minimum time taken for a firm in my sample to complete an announced open market repurchase program is two months and there are 21 such programs.

Table 2 presents the summary statistics of the full sample. I winsorize all continuous variables at 1% and 99% levels. The unconditional mean for *Repurchase*, which is an indicator that equals one if a firm spends a non-zero dollar amount in actual share repurchases in a month and zero otherwise, is 14.8%. The average firm spends about $3.85 million in actual share repurchases in a given month. Scaling the monthly dollar amount of actual share repurchases by a firm's previous quarter-end market value yields an unconditional mean of 0.06. *Lagged_cumulative* has an unconditional mean of 16.4%. Analysts have an unconditional probability of 3.8% for mentioning share repurchases in conference calls with a firm in a given month, whereas firms have an unconditional probability of 1.8% of doing so.

Analyst_firstdistance is the distance between the first time that an analyst mentions share repurchases and the end of the last analyst's speech in that call divided by the total length of speech by all analysts. The larger the *Analyst_firstdistance*, the earlier in the conference call that analysts mention share repurchases. Similar definitions apply to *Company_firstdistance*. *Mentioning Analysts' Holding (%)* measures the percentage of outstanding shares of a firm held by the employers of

[17] This represents a much lower completion rate than previously documented in Stephens and Weisbach (1998). One likely reason is due to the large difference in sample period and size. Another plausible reason is that they estimate the actual shares repurchased using Compustat data, whereas I directly obtain firms' actual share repurchases from disclosures to the SEC.

analysts who ask about the firm's share repurchases in that month. *Mentioning Analysts' Holding (million shares)* measures the raw number of shares held by the same analysts' employers. *Prior EPS Upward Revision* is an indicator that equals one if at least one of the analysts participating in a firm's conference call(s) in a given month conducted an upward revision for the firm's EPS in the quarter prior to the conference call month. This mean value is zero, indicating that on average, analysts who ask questions regarding a firm's share repurchases have not revised the firm's EPS upward in the previous quarter. *Analysts Asked Other Firms' Repurchases (%)* is the percentage of analysts participating in a firm's conference call(s) in a given month who have asked questions about *other* firms' share repurchases in the prior year. The resulting unconditional mean value of 0.002 suggests that only 0.002% of the analysts that an average firm encounters in conference calls in a given month asked about other firms' share repurchases in the past year. Thus, it is not widely common for a given analyst to talk extensively about share repurchases. *Market_Cap* is the dollar value of a firm's market value in millions. *Prev_6month_return* is the cumulative return in the six months prior to the first day of a month for a given firm, presented in decimals.

1.2 Discussions of Share Repurchases in Conference Calls

1.2.1 Mentioning Share Repurchases and Subsequent Actual Repurchases

When analysts expect a firm to buy back shares after it announces an open market repurchase program, they are able to monitor how much the firm has been repurchasing since the program announcement until a given point in time from its 10-K and 10-Q filings. If they think the firm is behind schedule with respect to the announced repurchase program, they can participate in conference calls to inquire about the firm's share repurchase activities. By directly communicating with management, analysts can publicly pressure the firm to follow through with the recently an-

nounced open market repurchase program. Compared to conference calls in which no mention of share repurchases occurs, the former should compel firms to execute more share repurchases in the subsequent period. I test this hypothesis using the following specification:

$$Y_{i,j,t+1} = \beta Mention\_Variables_{i,j,t} + \delta Lagged\_cumulative_{i,j,t-1} + \alpha X_{i,j,t} + \gamma FE + \varepsilon_{i,j,t+1} \quad (1)$$

where $Y_{i,j,t+1}$ is the outcome variable that takes two forms. When $Y_{i,j,t+1}$ is $Repurchase_{i,j,t+1}$, the variable equals one if firm i in industry j spends a positive dollar amount repurchasing shares in the open market in month $t+1$. When $Y_{i,j,t+1}$ is $Scaled\ Dollar\ Repurchase_{i,j,t+1}$, the variable measures the dollar amount that firm i spends on repurchasing shares in the open market in month $t+1$ divided by firm i's market value in the quarter-end prior to month $t+1$. The independent variable of interest is $Mention\_Variables_{i,j,t}$, which also takes two forms, $Mention\_Repurchase_{i,j,t}$ and $Frequency\_of\_Mention_{i,j,t}$. $Mention\_Repurchase_{i,j,t}$ is an indicator variable equal to one if someone mentions share repurchases in the questions and answers section of the conference call that firm i in industry j conducts in month t, and zero otherwise. $Frequency\_of\_Mention_{i,j,t}$ is the total number of keywords associated with share repurchase mentions in the questions and answers section of firm i's conference call in month t divided by the total number of words spoken by all participants in the same setting.[18] $Lagged\_cumulative_{i,j,t-1}$ is the cumulatively dollar amount of repurchases by firm i from the month when the latest open market repurchase program is announced to month $t-1$ divided by the total amount that firm i originally *announced* to repurchase. Thus, I control for the progress of firm i's fulfillment to the latest announced open market repurchase program. For robustness, I also show results without this variable. $X_{i,j,t}$ is the set of firm level controls for firm i in industry j in the quarter-end prior to month t. FE stands for a series of

[18] Please refer to Section 1.1.1 for the definition of keywords related to share repurchases.

fixed effects used in the regressions. $\varepsilon_{i,t+1}$ is the error term. Industry j refers to two-digit SIC code. All regressions double cluster standard errors by industry and year-quarter.[19] Table 3 exhibits the regression results.

The dependent variables are $Repurchase_{i,j,t+1}$ in Panel A and $Scaled\ Dollar\ Repurchase_{i,j,t+1}$ in Panel B of Table 3. In both panels, columns (1)–(3) include $Mention\_Repurchase_{i,j,t}$ as the independent variable of interest, whereas columns (4)–(6) use $Frequency\_of\_Mention_{i,j,t}$ as the independent variable of interest.

The coefficients on $Mention\_Repurchase$ and $Frequency\_of\_Mention$ are positive and statistically significant in Panel A of Table 3. If someone mentions share repurchases in a conference call, the firm is 2.6% more likely to repurchase shares in the next month, which is an 17.6% increase from the unconditional mean.[20] More frequent discussions of share repurchases also increase the firm's likelihood to repurchase shares in the subsequent month. A one standard deviation increase in the frequency of conference participants talking about share repurchases in the questions and answers section of a given conference call leads to a 4.2% surge in the firm's likelihood to repurchase shares from the unconditional mean in the next month.[21] Varying fixed effects from firm and time to firm and industry by time does not largely change the magnitudes or the t-statistics on $Mention\_Repurchase$ or those on $Frequency\_of\_Mention$, alleviating concerns for omitted variable bias in the specifications.

The stable positive and statistically significant coefficients on $Mention\_Repurchase$ and $Frequency\_of\_Mention$ also persist in Panel B of Table 3. Mentions of share repurchases in the ques-

[19] I choose to include the second cluster at the year-quarter level because earnings conference calls and 10-Q/10-K filings, where information on monthly actual share repurchases are extracted, occur on a quarterly basis; thus, the error term might be correlated from one quarter to the next.

[20] The unconditional mean for the *Repurchase* indicator is 0.148 and the regression coefficient from Panel A column (2) of Table 3 is 0.026; thus, the change from the unconditional mean is $\frac{0.026}{0.148} = 0.176$ or 17.6%.

[21] The standard deviation for $Frequency\_of\_Mention$ is 0.011 and the regression coefficient from Panel A column (5) of Table 3 is 0.568; thus, the economic magnitude is $\frac{0.011*0.568}{0.148} = 0.042$ or 4.2%.

tions and answers section of a conference call increases the firm's dollar amount spent on actual repurchases in the next month by 42% from the unconditional mean.[22] A one standard deviation increase in the frequency of conference participants mentioning share repurchases on a call corresponds to a 10.7% increase from the unconditional mean in the firm's dollar spending on actual repurchases in the next month.[23] Similarly, changing the set of fixed effects does not largely affect the magnitudes or the t-statistics on the coefficients of interest.

All the economic magnitudes are non-trivial, suggesting the significant impact of public pressure on firms' subsequent actual repurchase behaviors.[24] In columns (3) and (6) of Table 3 Panels A and B, the coefficients on β remain stable in both magnitude and statistical significance without controlling for the *Lagged_cumulative* variable. Hence, the lagged variable does not introduce biases into the regression estimates. Control variables bear coefficients that are consistent with the extant literature. Larger firms (Grullon and Michaely, 2004; Ben-Rephael et al., 2013; Kahle and Stulz, 2021), firms with lower leverage ratios (Hirshleifer et al., 2013), more profitable and higher cash holding firms (Jagannathan et al., 2000; Grullon and Michaely, 2004; Almeida et al., 2016; Kahle and Stulz, 2021), and firms incurring lower returns in the previous six months (Baker and Wurgler, 2002; Huang and Thakor, 2013; Dittmar and Field, 2015) are more likely to repurchase (a higher dollar amount of) shares.

This section demonstrates the positive and statistically significant coefficients on *Mention_Repurchase* and *Frequency_of_Mention*. The results confirm the positive relationship between these pressure proxies on share repurchases and firms' subsequent corporate decisions on share repur-

[22] The unconditional mean for *Scaled Dollar Repurchase* is 0.06 and the regression coefficient from Panel B column (2) of Table 3 is 0.025; thus, the change from the unconditional mean is $\frac{0.025}{0.06} = 0.42$ or 42%.

[23] The standard deviation for *Frequency_of_Mention* is 0.011 and the regression coefficient from Panel B column (5) of Table 3 is 0.582, but the unconditional mean for *Scaled Dollar Repurchase* is 0.06; thus, the economic magnitude is $\frac{0.011*0.582}{0.06} = 0.107$ or 10.7%.

[24] I use columns (2) and (5) in both panels of Table 3 to calculate economic magnitude because the specifications are the most conservative and robust.

chases. In Section 1.3, I decompose these two measures into speaking entities to show that it is analysts' questions, not unobservable firm characteristics, that drive these results.

1.2.2 What Incentivizes the Discussions of Share Repurchases

One natural question to follow is: why are there discussions of share repurchases in a conference call? To answer this question, I conduct two tests. First, at individual analyst level, I regress an analyst's frequency of mentioning share repurchases in a given call on whether this analyst revised the firm's EPS upward in the previous quarter (*Prior EPS Upward Revision*), and on whether this analyst's EPS forecast is above the consensus forecast (*EPS Forecast Above Consensus*). I include firm by time fixed effect to absorb time varying firm characteristics. Table 4 Panel A presents the results. The positive and significant coefficients on both independent variables show that analysts with more aggressive forecasts for a firm's EPS in the positive direction are likely to mention share repurchases more during conference calls.

Second, at the firm level, I regress the frequency of mentioning share repurchases (i.e., the intensity of the discussion) on analyst and firm characteristics with the following specification:

$$\begin{aligned} Frequency\_of\_Mention_{i,j,t} = \beta\, Information\_onAnalyst\_i,j,t + \alpha\, Firm\_Characteristics_{i,j,t-1} \\ + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t} \end{aligned} \tag{2}$$

where $Information\_onAnalyst_{i,j,t}$ has two variables: *Mentioning Analysts' Holding (million shares)* sums the total number of shares held by the employers of analysts who ask about firm i's share repurchases and *Prior EPS Upward Revision* is an indicator equal to one if at least one of the analysts asking about firm i's share repurchases in conference calls in month t revised firm i's EPS upward in the previous quarter and zero otherwise. Firm level characteristics are as defined in Section

1.2.1. γ_i and $\delta_{j,t}$ represent firm and industry-time fixed effects and I double cluster standard errors by industry and year-quarter. Table 4 Panel B presents the results.

Intuitively, if analysts' employers have more holding inside a firm, these analysts have more incentive to push the firm to repurchase shares to benefit their employers' investment portfolios; thus, they are likely to conduct more frequent discussions of share repurchases in conference calls. The positive and significant coefficients on *Mentioning Analysts' Holding (million shares)* in columns (1) and (3) support this hypothesis. The coefficient on *Prior EPS Upward Revision* is positive and statistically significant in both columns (2) and (3). If an analyst revised a firm's EPS upward in the previous quarter, more frequent discussions regarding the firm's share repurchases occur during the month's conference call. The rationale for this observation is that employers evaluate equity analysts by the discrepancy of their EPS forecast and their covered firms' actual EPS (i.e., the forecast error on firm EPS). Thus, an analyst who hears a firm announcing an open market repurchase program bakes the expectation of actual repurchases into the resulting estimation of the firm's EPS, likely conducting an upward revision on the forecast. The analyst subsequently has an incentive to pressure the firm to follow through with the announced program so that the firm's actual execution of share repurchases raises its actual EPS, shrinking the gap between the revised estimate and the actual value on the firm's EPS.

The remaining variables in Table 4 show results consistent with common intuition. Firms with lower leverage ratio (i.e., those with more equity and less debt in their capital structure) likely incur more frequent discussions about share repurchases during conference calls because share repurchases generally benefit equity holders. Firms with greater profitability, cash, and lower prior stock returns also likely experience more frequent discussions of share repurchases during conference calls. These firms are likely to have the resources and timing advantage in buying back shares in the open market. Conference call participants can observe these resources and

advantages, which encourages them to pressure the firm to act.

To answers the question of how the additional incentive variables for analysts to mention share repurchases during conference calls (*Mentioning Analysts' Holding* and *Prior EPS Upward Revision*) affect the firm's subsequent response in actual share repurchases, I add these variables as controls in the baseline regression model (Equation 1) and present the results in the Online Appendix Table A1. The coefficients on *Frequency_of_Mention* remain highly stable both in magnitudes and t-statistics for both outcome variables (*Repurchase* and *Scaled Dollar Repurchase*), confirming the robustness of the baseline results.

Importantly, the interpretation for this particular section is purely correlational. This section presents suggestive evidence that analysts indeed have incentives to ask about share repurchases during conference calls; however, the core goal of the paper, is to investigate *how* analysts push firms to repurchase shares via public pressure and *how* firms react to such pressure. Thus, the remainder of the paper will primarily focus on *how* rather than why analysts publicly pressure firms on the corporate decision making in share repurchases.

1.3 How Equity Analysts Talk About Share Repurchases

1.3.1 Mentioning Share Repurchases by Different Entities

Discussions of share repurchases during conference calls directly increase a firm's likelihood and dollar amount of actual repurchases in the next month under ongoing open market repurchase program. However, understanding the effects of the origin of the discussions and the entity that is exerting the pressure on the firm will expand our knowledge of the mechanism. In particular, if equity analysts are asking questions about the firm's share repurchases in the presence of public audience, it will explicitly show the link between public pressure from equity analysts and firms'

corporate decision on actual repurchases.

In any given public conference call, there are no restrictions on who can *listen* to the call. Usually, however, the people who speak during a conference call are representatives from the host company (e.g., CEO, CFO, and other executives or high level managers), the operator, and analysts from different broker and dealer firms.[25] The operator is a neutral party that acts as the moderator for the call to cue who to speak next and keep the call on pace. Operators do not engage in conversations between the firm and the equity analysts.

Therefore, equity analysts constitute the vast majority, if not all, the speaking entities that are not from within the firm. $Mention\_Repurchase$ and $Frequency\_of\_Mention$ during conference calls measure general pressure on share repurchases, and analysis of difference categories of entities mentioning share repurchases should reveal differential effects. In particular, I expect external public pressure to originate from equity analysts, whereas company executives are unlikely to pressure themselves. This intuition implies that only share repurchases mentioned by analysts act as a public pressure tool to drive the firm's subsequent actual repurchases, and more frequent mentioning of share repurchases by analysts should have a marginally stronger effect in influencing firms' subsequent actual repurchase decisions. I use the decomposed measures to run the following regression specifications:

$$Y_{i,j,t+1} = \beta_1 Mention\_byAnalyst_{i,j,t} + \beta_2 Mention\_byCompany_{i,j,t} + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \quad (3)$$

$$Y_{i,j,t+1} = \beta_1 Frequency\_Analyst_{i,j,t} + \beta_2 Frequency\_Company_{i,j,t} + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \quad (4)$$

where $Mention\_byAnalyst_{i,j,t}$ is an indicator equal to one if an analyst mentions share repurchases (and associated keywords) in the questions and answers section of firm i's conference call in month

[25] As almost all the analysts asking questions in conference calls are sell-side analysts, this chapter does not distinguish between sell-side and buy-side analysts.

t and zero otherwise. Similarly, $Mention\_byCompany_{i,j,t}$ is set to one if a representative from firm i mentions share repurchases. $Frequency\_Analyst_{i,j,t}$ refers to the total number of times analysts mention share repurchases (and associated keyword) in firm i's conference call in month t divided by the total number of words spoken in the same call.[26] $Frequency\_Company_{i,j,t}$ follows the same definition but refers to the talking by the representatives of firm i. All regressions include firm (γ_i) and industry by time ($\delta_{j,t}$) fixed effects and double clustering of robust standard errors by industry and year-quarter. The remainder of the variables, including the outcome variables and the full set of control variables, are as defined in Equation (1). Table 5 presents the results.

Columns (1)–(3) use the *Repurchase* indicator as the dependent variable, whereas columns (4)–(6) use the *Scaled Dollar Repurchase*. When *Mention_byAnalyst* and *Mention_byCompany* are the set of right hand side variables of interest in columns (1) and (4), only *Mention_byAnalyst* has positive and statistically significant coefficients. If an analyst talks about share repurchases in the questions and answers section of a firm's conference call, it increases the firm's subsequent likelihood to repurchase shares in the open market by 2.8%, representing a 19% increase from the unconditional mean. It also increases the firm's dollar spending on subsequent actual repurchases by 37% from the unconditional mean. Both economic magnitudes are significant. Conversely, such effects do not exist when firms talk about share repurchases.

In columns (2), (3), (5), and (6), I regress on the frequency of mentioning share repurchases by the two entities. Only *Frequency_Analyst* has positive and significant coefficients across all four specifications, whereas *Frequency_Company* is not statistically significant, regardless of controlling for broad investor attention on actual share repurchases (*Log_attention*_10*KQ* and

[26] As a reminder, this study only pertains to the questions and answers section of public conference calls.

Log_attention_other).[27] One standard deviation increase in the frequency of analysts mentioning share repurchases corresponds to a 4.7% and 10% increase from the unconditional mean in the firm's subsequent likelihood and dollar amount of actual repurchases, respectively.[28]

To address concerns regarding selection bias, I include dummy variables for the companies that employ analysts. Ideally, I want to create a dummy variable for each of the analysts participating in conference calls in my sample; however, that procedure yields more than 20,000 dummy variables (i.e., more than 20,000 individual analysts), which poses computational difficulty for an OLS regression in STATA. As a result, I create dummy variables at the employer level for each participating analyst. There are 232 employer firms represented by all the analysts participating in the conference calls in my sample. Online Appendix Table A3 presents the results with these dummy variables. The addition of analysts' employer dummies does not largely change the magnitude or statistical significance of *Mention_byAnalyst* and *Frequency_Analyst*. Firms' own (frequency of) mentioning stock repurchases remains insignificant.

There is also the question of whether analysts' discussions of share repurchases will push firms that have not repurchased any shares under their announced open market repurchase programs

[27] I use the SEC EDGAR Log File Database to extract the number of downloads in a given month for a particular firm's most recently filed 10-K or 10-Q. I follow Loughran and McDonald (2017) and exclude robot downloads and web crawlers. Any observation containing flags for a web crawler index page request, or a server code not less than 300 is removed. If one IP address downloads more than 50 files on a given day, it is labeled a robot download, which is also removed (see details at *https://sraf.nd.edu/data/edgar-server-log/*). I follow the same procedures, but do not use the data posted on the website by Loughran and McDonald. I use this as a noisy proxy for general investor attention to actual repurchases (Bauguess et al., 2018; Iliev et al., 2021) because, to acquire information on actual repurchases, one must access the company's 10-K or 10-Q. Accompanying the number of downloads of 10-K and 10-Qs in a given month, I control for the total number of downloads of a given firm in the same month for all the other filings that the firm has on the SEC. These filings include Form 4, 5, 8-K, and 144, among many others (please see *https://www.sec.gov/forms* for a complete list and their descriptions). Arguably, one can find material information unrelated to actual repurchases contained in a 10-K or 10-Q in at least one of these other filings; thus, by including the total attention that all of these other filings of a given firm receive in a given month, I reduce the noise in the measure of general investor attention to actual share repurchases using SEC 10-K/Q downloads. I use these two variables as controls.

[28] I also test the robustness of the results using net shares repurchased as a dependent variable referencing McLean et al. (2009). The results, presented in Online Appendix A2, are consistent.

to start executing those programs. I adopt a hazard model methodology and reduce the sample to observations of announced open market repurchase programs since the announcement until the month of the first actual repurchase. Online Appendix Table A4 shows the results. The coefficients on all the variables of different entities mentioning share repurchases show similar magnitudes and statistical significance as in Table 5. The positive and significant coefficients on analysts' (frequency of) mentioning share repurchases suggest that for firms that announced open market repurchase programs but have not actually started repurchasing shares, the pressure they exert publicly can compel these firms to start executing the announced repurchase programs.[29]

1.3.2 Who Mentions First

If analysts want to pressure the firm publicly to follow through with a previously announced program, they are likely to bring up this topic first (before the firm does) in a given call.[30] I hypothesize that if analysts are the first ones to mention share repurchases, there will be a stronger effect on the firm's subsequent actual repurchases. To test this hypothesis, I adopt the following

[29] In addition, I test robustness with an alternative sample for all the firms in the Compustat/CRSP Merged database who have not announced any open market repurchase programs in Online Appendix Table A7. The positive effect of public pressure continues. However, the economic magnitudes are smaller (8% in repurchase likelihood and 19% in dollar amount from their respective unconditional means). Importantly, public pressure from analysts only affects the firm's subsequent actual repurchases but not announcements of open market repurchase programs. This contrast indicates that analysts know open market repurchase announcements are not commitments. For firms without active repurchase programs, if analysts want to pressure them to buy back shares, they will pressure those firms to actually repurchase shares in the open market instead of announcing empty promises.

[30] Conversely, the company mentioning share repurchases first may occur for various reasons. A possible explanation is that when the firm mentions share repurchases first in its conference call, it is usually in response to questions regarding M&A activities or real investments. The firm mentioning share repurchases first does not evidently represent external pressure to repurchase more shares.

regression model:

$$Y_{i,j,t+1} = \beta_1 FirstMention\_byAnalyst_{i,j,t} + \beta_2 FirstMention\_byCompany_{i,j,t} + \beta_3 Mention\_byAnalyst_{i,j,t} + \beta_4 Mention\_byCompany_{i,j,t} + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \quad (5)$$

where $FirstMention\_byAnalyst_{i,j,t}$ is an indicator that equals one if analysts mention share repurchases first in firm i's conference call in month t and zero otherwise. Similarly, $FirstMention\_byCompany_{i,j,t}$ equals one if firm i talks about share repurchases first. I control for $Mention\_byAnalyst_{i,j,t}$ and $Mention\_byCompany_{i,j,t}$ to avoid omitted variable bias because Section 1.3.1 shows they are important in determining a firm's subsequent actual repurchases. The rest of the specification follows Equation (3). Table 6 columns (1) and (4) display the results.

The coefficient of β_1 is positive and statistically significant at the 5% level in column (1) but not statistically significant in column (4). The coefficient of β_2, however, is negative and statistically significant at the 10% level in column (1) but not statistically significant in column (4). Importantly, their differences (i.e., $\beta_1 - \beta_2$) are statistically significant in both columns (1) and (4) with F-statistics (p-value) at 13.09 (0.0006) and 16.02 (0.0002), respectively. When analysts mention share repurchases (and associated keywords) first in the questions and answers section of a firm's conference call, it increases the firm's likelihood to repurchase shares in the next month by 2.7%, representing an 18.2% increase from the unconditional mean. In contrast, if the company talks about share repurchases first in the questions and answers section of its conference call, it is less likely to repurchase shares subsequently.

FirstMention_byAnalyst having larger and positive coefficients than *FirstMention_byCompany*, and their differences being statistically significant also alleviate concerns on reverse causality. If it is the firm's discussions of share repurchases driving analysts' mentions and its subsequent ac-

tual repurchases, the firm mentioning it first should have positive and significant coefficients on its subsequent actual repurchases. The fact that only analysts mentioning share repurchases first has a positive and significant effect on the firm's subsequent actual repurchases reduces such a possibility.

1.3.3 Timing of Mentioning Share Repurchases

Since conference calls usually have time limits and not every analyst can ask all the questions they have prepared, it is crucial for them to ask the most important questions in the earlier parts of the call. If analysts want to publicly pressure a firm to make a specific decision, they will seek to do so earlier in the call. Following this argument, the earlier that analysts mention share repurchases, the greater the effect of public pressure should be on the firm's subsequent actual repurchases. I test this hypothesis by adding two additional variables that measure how early in a conference call the analysts and the company mention share repurchases to Equation (5):

$$\begin{aligned} Y_{i,j,t+1} = {} & \beta_1 FirstMention\_byAnalyst_{i,j,t} + \beta_2 FirstMention\_byCompany_{i,j,t} + \beta_3 Analyst\_firstdistance_{i,j,t} \\ & + \beta_4 Company\_firstdistance_{i,j,t} + \beta_5 Mention\_byAnalyst_{i,j,t} + \beta_6 Mention\_byCompany_{i,j,t} \\ & + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \end{aligned} \tag{6}$$

where $Analyst\_firstdistance_{i,j,t}$ and $Company\_firstdistance_{i,j,t}$ capture the timing of the analysts and the firm mentioning share repurchases.[31] The larger the values for these two variables, the *earlier* the corresponding entity mentions share repurchases in the questions and answers section of the conference call. The remaining parts of the specification follow Equation (5).

The results in columns (2) and (5) of Table 6 reveal that β_3 bears positive and statistically

[31] Please see Section 1.1.2 for a detailed description for the construction of these two variables.

significant coefficients at the 1% level in both columns, whereas β_4 is negative. Thus, the earlier analysts first mention share repurchases, the stronger the effect of public pressure on the firm's corporate decision making in the likelihood and dollar amount of actual repurchases in the subsequent month. Conversely, the timing of the company's first mention of share repurchases does not positively affect its subsequent actual share repurchases. One standard deviation increase in $Analyst\_firstdistance$ (i.e., one standard deviation earlier in the timing of analysts' first mentioning of share repurchases) corresponds to a 6.3% increase from the unconditional mean in the firm's likelihood to repurchase shares in the next month. The economic magnitude on the scaled dollar amount of actual repurchases is about 14% higher than the unconditional mean. Consistent with the hypothesis, analysts introduce the questions and topics of most importance to them earlier in a conference call. When they mention share repurchases earlier, this exerts greater pressure on the firm's subsequent actual repurchases.

As discussed in Section 1.3.2, the distinct effect between how early *analysts* first talk about share repurchases and how early the *firm* talks about share repurchases on the firm's subsequent actual repurchases alleviates concerns regarding reverse causality and simultaneity. It is challenging to conceive of an economic factor that would simultaneously drive how early analysts, and not the firm, talk about share repurchases and the firm's actual repurchase behaviors in the next month.

1.3.4 Broad Tone of Mentioning Share Repurchases

When analysts want to publicly pressure a firm to act on share repurchases, they can exhibit harsh and negative tones when discussing this topic with the firm. Cohen et al. (2020) and Mayew et al. (2020) both show that the tone of analysts' questions affects a firm's responses and post-call actions. Thus, the more aggression and negativity when analysts question a firm's share repurchases, the sharper the public pressure, and the stronger the response should be for the firm's sub-

sequent actual repurchases. I test this hypothesis by running regression specifications similar to Equation (6), while replacing $Analyst\_firstdistance$ and $Company\_firstdistance$ with two other variables to measure the tone of the speeches regarding share repurchases delivered by analysts and the company. The specification is as follows:

$$\begin{aligned} Y_{i,j,t+1} = {} & \beta_1 FirstMention\_byAnalyst_{i,j,t} + \beta_2 FirstMention\_byCompany_{i,j,t} + \beta_3 Tone\_Analyst_{i,j,t} \\ & + \beta_4 Tone\_Company_{i,j,t} + \beta_5 Mention\_byAnalyst_{i,j,t} + \beta_6 Mention\_byCompany_{i,j,t} \\ & + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \end{aligned} \tag{7}$$

where $Tone\_Analyst_{i,j,t}$ is the number of positive words minus the number of negative words (Cohen et al., 2020) in analysts' *speeches regarding share repurchases* divided by the total number of words spoken by analysts in those particular speeches, in the questions and answers section of firm i's conference call in month t. Positive and negative words follow the dictionary developed by Loughran and McDonald (2015). $Tone\_Company_{i,j,t}$ adopts the same definition but pertains to the firm's speeches on share repurchases.[32] The greater the value of $Tone\_Analyst_{i,j,t}$ and $Tone\_Company_{i,j,t}$, the more positive the tone of that entity's speeches on share repurchases. The remaining parts of the specification follow Equation (6). Table 6 columns (3) and (6) present the regression results.

The coefficients on $Tone\_Analyst$ (β_3) are negative and statistically significant in both columns (3) and (6) of Table 6. This result implies a negative relationship between analysts' tone when questioning share repurchases and the firm's subsequent action in actual repurchases. When analysts talk about share repurchases with a more negative tone, there is a higher effect in pressuring

[32] Please note that these two measures only pertain to each entity's questions and answers containing share repurchases, not all of that entity's speech.

the firm to repurchase (more) shares in the subsequent period. One standard deviation decrease in analysts' tone regarding share repurchases is associated with about 1% and 3% increase from the unconditional mean in the likelihood and the dollar amount of the firm's actual repurchases in the next month, respectively. Conversely, the coefficients on *Tone_Company* (β_4) are positive and only significant in column (6). This contrast indicates that the tone when the company talks about share repurchases does not affect its likelihood of repurchasing shares and a positive tone slightly increases its dollar spending on buying back shares in the following month.

The results make sense because when analysts question why the firm is lagging behind schedule after announcing the open market repurchase program in public conference calls, they likely exhibit negative tones. The harsher the analysts' tone, the higher pressure the firm experiences. This subsequently pushes the firm to increase its share repurchases, both in terms of the likelihood and the dollar amount. Conversely, when a firm talks about share repurchases with negative tones, they likely express the reasons why they are not repurchasing shares and will likely continue to allocate free cash to other priorities. When it talks positively about share repurchases, the firm is likely bragging about the amount of cash it distributes back to its shareholders, making the management look good; thus, the firm will likely continue repurchasing shares when they brag about it in this way. As a result, the tone of analysts' discussions on share repurchases negatively and significantly pressures the firm to repurchase (more) shares, whereas the tone of the company does not. One key distinction of this result from the existing literature is that I consider the tone of questions *specifically* about a firm's share repurchases, not the generic tone of analysts throughout a given call. Consequently, I provide a more precise measure of analysts' public pressure for the particular corporate action of share repurchases.

1.3.5 Directness and Bluntness of Mentioning Share Repurchases

When analysts publicly pressure a firm to follow up on a recently announced open market repurchase program, in addition to the negative tones they exhibit, they can also ask questions in a direct, focused, blunt, and non-diplomatic manner. These dimensions will help capture the acuteness of public pressure that analysts exercise on a firm's corporate action in share repurchases. I adopt three variables to measure these dimensions.

The first measure is $Analyst\_questionlength$. The shorter a question on share repurchases, the more direct the analyst is, and thus the more acute the public pressure exercised. Since there can be multiple analysts asking questions about share repurchases in the questions and answers section of a call, I calculate the average number of words for all analysts' questions about share repurchases in the call.[33]

The second measure, $Percentage\_othertopics$, refers to the percentage of the number of topics in analysts' questions pertaining to issues *other than* share repurchases. I use topic modeling techniques from Huang et al. (2018) to extract the number of topics in a given analyst's speech. If the analyst asks about share repurchases in a particular speech, the number of other topics in that speech is then the total number of topics minus one. Dividing that by the total number of topics in the speech derives the percentage of non-share repurchase related topics in the analyst's speech. Averaging them across all analysts' speeches in the questions and answers section of the same conference call yields the variable $Percentage\_othertopics$. The smaller the value of $Percentage\_othertopics$, the less diluted and more focused the analysts' questions on share repurchases are, and the more focused the public pressure is on the firm's follow through with the recently announced open market repurchase program, and vice versa.

[33] Please note that this measure only computes the average number of words for questions regarding share repurchases asked by *analysts*. It does not include any other questions that analysts asked, nor does it include the company's response.

The third variable, *Blunt Question*, measures whether analysts pointedly ask why the firm is behind schedule with its announced program. It is an indicator variable equal to one if at least one analyst asks a blunt question regarding the firm's share repurchases in the questions and answers section of the firm's conference call and zero otherwise.[34] I hypothesize that the more concise (shorter), more focused, and more blunt analysts are when asking about a firm's share repurchases, the stronger the pressure they exert on the firm to repurchase (more) shares subsequently. I apply these three measures to the following specification:

$$\begin{aligned} Y_{i,j,t+1} = {} & \beta_1 Analyst\_questionlength_{i,j,t} + \beta_2 Percentage\_othertopics_{i,j,t} + \beta_3 Blunt\ Question_{i,j,t} \\ & + \beta_4 Mention\_byAnalyst_{i,j,t} + \beta_5 Mention\_byCompany_{i,j,t} + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \end{aligned} \tag{8}$$

where $Analyst\_questionlength_{i,j,t}$, $Percentage\_othertopics_{i,j,t}$, and $Blunt\ Question_{i,j,t}$ are as defined above. All the other variables follow Equation (7). Table 7 presents the results.

In columns (1), (2), (3), (5), (6), and (7), I test each of the three measures separately in the regressions while controlling for whether analysts and the company mentions share repurchases (to avoid omitted variable bias as discussed in Section 1.3.2). In columns (4) and (8), I integrate all three measures together as specified in Equation (8). The left four columns use the *Repurchase* indicator in the next month as the dependent variable, whereas the right four columns use *Scaled Dollar Repurchase* as the dependent variable.

Across all columns, the coefficients on $Analyst\_questionlength$ (β_1) are negative and statistically significant. The shorter analysts' questions about share repurchases are, the greater the firm's

[34]The definition of a "blunt question" is that an analyst's question *about share repurchases* contains keywords from the list "why not, none, few, did not any, didn't any, lackluster pace, have not repurchased (bought back), haven't repurchased (bought back), we want more aggressive," combined with the keywords list on share repurchases described in Section 1.1.1.

subsequent likelihood and dollar amount of actual repurchases. Similarly, the consistently negative and significant coefficients of β_2 except for column (8), imply that the more focused analysts' questions are regarding share repurchases (fewer other topics asked in the same questions), the greater the effect on the firm's subsequent actual repurchases. Finally, the positive and significant coefficients on *Blunt Question* (β_3) indicate that analysts asking questions that are more pertinent and pointed regarding the firm's lackluster pace in share repurchases will pressure the firm to repurchase (more) shares in the subsequent month. If one analyst asks a direct question like "why is the firm behind on its repurchase schedule after announcing an open market repurchase program?" the firm is 8% more likely to repurchase in the next month, a 54% increase from the unconditional mean. Receiving such a blunt question from analysts increases the firm's dollar spending on actual repurchases in the next month by almost 1.8 times from the unconditional mean. These large economic magnitudes are consistent with the hypothesis that more direct public pressure on a particular corporate action (share repurchases, in this context) leads to a stronger response in the firm's corporate decision making.

In addition, the universally strong effects of these three variables regarding the directness and bluntness of analysts' questions on share repurchases, combined with the results from Section 1.3.1 to Section 1.3.4, further reduces endogeneity concerns regarding reverse causality and omitted variables. It is puzzling to imagine an omitted variable that only drives analysts' mentions of share repurchases, the timing, tone, and bluntness of such discussions, and the firm's subsequent actual repurchases, while not affecting the firm's own discussions of this issue at all. Instead, the evidence strongly validates that public pressure exercised by equity analysts pushes firms to repurchase (more) shares under their active open market repurchase programs.

These results also imply a shaming mechanism through which analysts' public pressure becomes effective. After equity analysts publicly ask firms to repurchase more shares, these firms

respond by buying back more shares under recently announced open market repurchase programs. The nature of these sharp and blunt questions, asked by analysts in front of a large audience, can make firm managers feel ashamed or embarrassed. As a result, they behave accordingly by repurchasing more shares as a partial antidote to the embarrassment. Direct evidence on the effect of shaming is difficult to come by unless a study surveys firm managers for how they feel after each conference call and they truthfully report their feelings. Nevertheless, the public shaming mechanism discussed here, implied by the variables used, is rather consistent with general public opinion of what shaming or embarrassment looks like.

1.3.6 Completed Programs

A core assumption for analyst public pressure to affect a firm's actual repurchases is that the firm has an unfulfilled open market repurchase program. Their lack of actual repurchases against the active program is grounds for analysts to question the firm in public about this particular corporate decision. However, after the firm completes the announced open market repurchase program, it no longer has any previously indicated "obligation" (with respect to share repurchases) to fulfill.[35] As a result, conditional on a firm completing the announced open market repurchase programs, analyst pressure should no longer influence the firm's subsequent actual repurchases.

Table 8 displays the results. For the subsample of firms with completed open market repurchase programs, $Mention\_Repurchase$, $Frequency\_of\_Mention$, $Mention\_byAnalyst$, and $Frequency\_Analyst$ do not affect firms' subsequent actual repurchases. Thus, after a firm completes its most recently announced open market repurchase program, it is no longer subject to the public pressure from analysts to follow through with the soft promises it has made. Hence, public pressure only influences firms' corporate decision making of actual repurchases for the announced repurchase

[35]The term "obligation" here is loosely used. It does not refer to a legal obligation or commitment.

programs are still ongoing.

1.4 Analyst Pressure Through Changing Stock Rating

Analyst public pressure in the form of negative, blunt, and embarrassing questions during publicly accessible conference calls can influence corporate decision making. When firms react immediately, they respond to that pressure, potentially also to reduce the shame and embarrassment felt during the conference calls when those questions arose; thus, these direct questions from analysts are themselves punishment for the pressured firms.

However, such questions could also be considered a "threat of punishment," wherein firms (executives) fear other potential penalties from analysts if they do not react to the tasks they are pressed to perform. One such penalty is analysts downgrading firm stock ratings. A particular analyst asking sharp and embarrassing questions during a conference call with a firm to publicly pressure the firm to follow through with a previously announced repurchase program more extensively can also downgrade the firm's stock afterward if the firm does not respond to this pressure. Conversely, if the firm reacts by repurchasing shares in the subsequent month, the analyst will likely recognize that the firm is attempting to fulfill more of the announced open market repurchase program, cutting the firm some slack by not downgrading its stock. I test this hypothesis by constructing a new data set at the firm–month–analyst level. With this more granular data set, I run the following regression specification:

$$\begin{aligned} Analyst\_Downgrade_{k,i,j,t+1+n} = {} & \beta_1 Analyst\ Mentioning\ Repurchases_{k,i,j,t} + \beta_2 Repurchase_{i,j,t+1} \\ & + \beta_3 Analyst\ Mentioning\ Repurchases_{k,i,j,t} \times Repurchase_{i,j,t+1} \\ & + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \zeta_k + \varepsilon_{k,i,j,t+1+n} \end{aligned} \tag{9}$$

where $n \in \{1,3,6,9,12\}$ in months. The dependent variables are $Analyst\_Downgrade_{i,j,t+1+n}$, which is an indicator equal to one if analyst k covering firm i downgrades firm i's stock rating in month $t+1+n$. $Analyst\ Mentioning\ Repurchases_{k,i,j,t}$ equals one if analyst k talks about share repurchases in firm i's conference call in month t (firm i belongs to industry j). $Repurchase_{i,j,t+1}$ is set to one if firm i from industry j repurchases shares from the open market in month $t+1$ and zero otherwise. ζ_k represents analyst fixed effect. The remaining components of the specification follow Equation (3). The coefficient of interest is on the interaction term β_3, which estimates the marginal effect of share repurchases when firm i experiences public pressure from analyst k's questions. Table 9 presents the results.

All coefficients on β_3 from columns (1)–(5) in Table 9 are negative and statistically significant. If a firm has an ongoing open market repurchase program, when an analyst pressures the firm to repurchase more shares by talking about it in a publicly accessible conference call, *and* the firm responds to such pressure by actually buying back shares in the next month, this analyst is less likely to downgrade the firm's stock rating in the next year. Taking column (3), for instance, the analyst is 0.5% less likely to downgrade the firm's stock in the next 6 months, representing a 100% decrease from the unconditional mean. Firms reacting to analyst public pressure are less likely to receive stock downgrades by the same analysts. Hence, analysts asking pointed and blunt questions is also a "threat of punishment" for firm executives.

However, I urge caution when interpreting this set of results. Whether to repurchase shares is an endogenous decision for the firm; thus, the goal of the results in Table 9 is not to establish causality between repurchases and analyst rating. Instead, it reveals the association between repurchasing shares after firms are pressured by specific analysts and these analysts' subsequent stock ratings for firms. Through this association, with the results in Section 1.3, I show that public pressure from equity analysts can act as both a punishment itself and a threat of punishment for firms when

making corporate decisions.

For robustness, I regress each analyst's future firm stock rating on the different dimensions how the analyst questions for share repurchases. Online Appendix Table A5 shows the results without conditioning on firm responses, whereas Table A6 presents the results when conditioning on firm responses. Analysts' stock ratings are not correlated with questions regarding share repurchases with or without not conditioning on the firm's actions. Hence, the results suggest that analysts' blunt and embarrassing questions about a firm's share repurchases can be a way of publicly shaming the firm and considered to be punishment for firm managers.

1.5 Identification

1.5.1 Instrumental Variable and Two Stage Least Squares

To address endogeneity concerns regarding reverse causality and omitted variables more directly, I use an instrumental variable approach for *Frequency_of_Mention* on share repurchases relative to the baseline results in Section 1.2.1. The instrumental variable is the percentage of analysts participating in a firm's conference call who asked *other* firms about share repurchases in the past year. I run the following 2SLS specifications:

First stage:

$$\begin{aligned} Frequency\_of\_Mention_{i,j,t} = \beta_1 \, Analysts\ Asked\ Other\ Firms'\ Repurchases\ (\%)_{i,j,[t,t-12]} \\ + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t} \end{aligned} \tag{10}$$

Second stage:

$$Y_{i,j,t+1} = \beta_2 \, \widehat{Frequency\_of\_Mention}_{i,j,t} + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \tag{11}$$

In the first stage, $Analysts\ Asked\ Other\ Firms'\ Repurchases\ (\%)_{i,j,[t,\,t-12]}$ instruments for $Frequency\_of\_Mention_{i,j,t}$. It measures the percentage of analysts in firm i's conference call in month t who have asked other firms' actual repurchases from month $t-12$ to month t. In the second stage, I regress the outcome variables of firm i's actual repurchases in the next month on the predicted value of $\widehat{Frequency\_of\_Mention}_{i,j,t}$. In both stages, I include all firm level controls, firm and industry by time fixed effects, and double clustering at the industry and year-quarter level.

I contend that this instrument meets the two conditions as a valid instrument. First, for the relevance condition, analysts who have asked about other firms' share repurchases will likely inquire about firm i's repurchase activities. Second, the exclusion restriction requires that the only way analysts' prior discussions on other firms' share repurchases can affect firm i's subsequent actual repurchases is through their conversations with firm i in its conference call. It is unlikely an analyst's prior discussions on *other* firms' share repurchases influence firm i's corporate characteristics such as cash holdings, profitability, or actions that the analyst can take such as changing firm i's stock rating.[36]

Table 10 presents the results. Column (1) shows the first stage, while columns (2) and (3) show the second stage with two different outcome variables on actual repurchases. The first stage results are strong and the F-statistics of 16.38 confirms that the instrument passes the weak instrument test. The coefficients on β_2 are positive and statistically significant in both columns (2) and (3). The predicted value of $\widehat{Frequency\_of\_Mention}_{i,j,t}$ produces positive and significant estimates with respect to the firm's likelihood and scaled dollar amount of actual repurchases in the next month. Notably, the magnitudes of β_2 in columns (2) and (3) resemble those in column (5) of Table 3 in Panel A and Panel B (the OLS specification), respectively. I conduct a Hausman test between each

[36] It is possible that analyst A asked about firm j's share repurchases in the past year and changed the stock rating or other evaluations of firm j; however, there is no clear reason why analyst A would change the evaluation of firm i from their previous conversation with firm j.

of the OLS specifications and the corresponding 2SLS specification. χ^2 values of 0.30 when the dependent variable is firms' likelihood to repurchase shares in the next month and of 0.24 when the dependent variable is firms' scaled dollar amount of actual repurchases in the next month confirm the similarity in magnitudes for the independent variable of interest, *Frequency_of_Mention*. This evidence supports that the OLS specification does not incur omitted variable bias, justifying the OLS specifications throughout Section 1.2, 1.3, and 1.4.

1.5.2 Total Analyst Pressure and Firms' Actual Repurchases

In addition to the channel of public pressure through conference calls and potential associated consequences like stock downgrades, analysts can also pressure firms to perform corporate actions through other means such as private meetings (Soltes, 2013; Solomon and Soltes, 2015) or through their influence on the firm's cost of capital (Fracassi et al., 2016).[37] Hence, it is essential to estimate the total effect of analyst pressure on corporate decision making such as share repurchases.

I construct a new variable to measure broad analyst pressure, *Common_Coverage*, which is set to one if a firm shares an equity analyst with another firm who just announced an open market repurchase program in the previous month and zero otherwise.[38] The rationale is that all the firms in my sample have active open market repurchase programs. If any of them has an analyst who just covered another firm announcing an open market repurchase program, this firm is likely to

[37] Fracassi et al. (2016) document that the subjectivity of *credit* analysts can determine a firm's cost of debt; thus, it is possible that equity analysts might influence a firm's cost of capital in these unobservable channels. As they are unobservable, it is worth more investigation in future work. Nevertheless, their results imply that there are other channels through which analysts can pressure firms to act.

[38] For example, $Common\_Coverage_{i,j,t}$ is one if firm i is covered by analyst k in month t, and analyst k covered firm z in month $t-1$, and firm z announced an open market repurchase program in month $t-1$, otherwise, $Common\_Coverage_{i,j,t}$ is set to zero. Importantly, analyst k has been covering both firm i and z from month $t-3$ to $t-1$; thus, it excludes the possibility that informed analysts can pick firms announcing open market repurchase programs to cover. One can think of this variable as the first time that a firm with an active open market repurchase program has its analyst(s) alerted by other firms' recent announcements of such programs with respect to its own repurchase program.

be scrutinized by the same analyst for its ongoing repurchase program. In turn, this variable can estimate the broader analyst pressure on a firm's subsequent actual repurchases.

The identification assumption here is that analysts do not choose which announcing firms to follow, which is satisfied by requiring the analyst for *Common_Coverage* to have covered both firms for at least three months. Second, I assume that the general assignment between an analyst and the covered firm is random. I argue that this is a reasonable assumption because the assignment between an analyst's coverage and the covered industry can be due to selection because analyst specialty is usually defined at the industry level, but is less subject to selection at the firm level.

I also construct a second variable, *Percent_Common_Coverage*, to measure the percentage of analysts a firm shares with those that have announced an open market repurchase program in the previous month. I run the following regression specification:

$$Y_{i,j,t+1} = \beta_1 Pressure\_Measure_{i,j,t} + \beta_2 Lagged\_cumulative_{i,j,t-1} + \alpha X_{i,j,t} + \gamma_i + \delta_{j,t} + \varepsilon_{i,j,t+1} \tag{12}$$

where the independent variable of interest is $Pressure\_Measure_{i,j,t}$, which is $Common\_Coverage_{i,j,t}$ or $Percent\_Common\_Coverage_{i,j,t}$. Table 11 presents the results.

The positive and significant coefficients on *Common_Coverage* (β_1) in columns (1) and (4) indicate that if a firm shares an analyst with another firm that just announced an open market repurchase program, it is 6.9% more likely to repurchase shares (46.6% increase from the mean) and will spend more money repurchasing shares (81.7% increase from the mean) in the next month under its ongoing open market repurchase program.[39] The magnitudes on *Common_Coverage* in columns (1) and (4) are about two times larger than the coefficients of *Mention_byAnalyst* in Table 5 columns (1) and (4). Thus, the total effect of analyst pressure on a firm's subsequent actual

[39]The unconditional mean for *Repurchase* is 0.148. Thus, the economic magnitude is $\frac{0.069}{0.148} = 0.466$ or 46.6%. The unconditional mean for *Scaled Dollar Repurchase* is 0.06. Thus, the economic magnitude is $\frac{0.049}{0.06} = 0.817$ or 81.7%.

repurchases about two times bigger than that through the channel of public pressure in conference calls alone.

The coefficients on *Percent_Common_Coverage* in columns (2) and (5) are also positive and statistically significant at the 1% level. One standard deviation increase in *Percent_Common_Coverage* corresponds to a 4.1% and 6.3% increase from the unconditional mean for the firm's subsequent likelihood and dollar amount of actual repurchases, respectively. Hence, if a firm shares more analysts with other firms that have just announced open market repurchase programs, the total effect of analyst pressure on the firm's subsequent actual repurchases is greater.[40]

I test the robustness of my measurement for broad analyst pressure with a placebo independent variable called *Common_Coverage_M&A*, which equals one if a firm shares a common analyst with another firm that just announced a *Merger and Acquisition (M&A)* deal in the previous month. Thus, the common coverage focuses on M&A announcements *not* open market repurchase announcements. I embed this variable in the regressions of Equation (12). The results are in Online Appendix Table A8. *Common_Coverage_M&A* is not positively associated with firms' subsequent actual repurchases.[41] Hence, it is not that sharing an analyst drives a firm to repurchase shares as a follow-through with its recently announced repurchase program. Instead, the pressure comes from analysts who are aware of and monitor a firm's active open market repurchase programs. This helps validate that *Common_Coverage* and *Percent_Common_Coverage* can sufficiently estimate the direct effect of broad analyst pressure on corporate decision making.

[40] Concerns may arise that controlling for *Lagged_cumulative* may introduce bias in the estimated coefficients. In columns (3) and (6), I exclude *Lagged_cumulative* from the regressions and the positive and significant coefficients at the 1% level persist for *Percent_Common_Coverage*, alleviating concerns for biased coefficients. Control variables are consistent with those in Section 1.2.1.

[41] Unreported results also conduct two-way t-tests for firm characteristics between firms with *Common_Coverage* and those with *Common_Coverage_M&A*. These two groups of firms show no statistical differences on firm characteristics.

2 Chapter 2

This chapter shows that high quality firms use stock repurchases to separate themselves from low-quality peers after investors have received adverse industry-level signals. When a firm issues a financial restatement, it sends a negative signal on the accounting quality of all the firms in its industry (Gleason et al., 2008; Durnev and Mangen, 2009). Upon receiving such an industry-level signal, since investors do not observe firms' true accounting quality, they pool together firms of above average accounting quality with those of below average accounting quality. As low accounting quality induces unwanted repercussions such as accounting-related class action lawsuits, firms with better accounting quality want to separate themselves from the ones with lower accounting quality. One way to accomplish this objective is via stock repurchases because it is a costly action where lower accounting quality peers cannot simply mimic (Oded, 2005). Consequently, peer firms on average will have higher propensity to repurchase shares than unaffected non-peer firms.

This mechanism describes a spillover effect in which financial restatements issued by public firms (restating or focal firms from here on) increase the propensity of peer firms (e.g., firms in the same product market as the restating firms) to repurchase shares. The key underlying assumption is that investors cannot sufficiently recognize peer firms' true accounting quality by their accounting data alone and undervaluation is not the main determinant. The accounting literature has shown that accounting quality is an obscure concept where no definitive variables can directly and saliently represent firms' accounting quality (i.e., Gleason et al. (2008)). Instead, academic scholars construct accounting quality measures such as earnings management and earnings smoothness (e.g., Lang et al. (2006)), the level of accruals (e.g., Dechow and Dichev (2002)), timeliness and conservativeness of accounting (e.g., Lang et al. (2003)) based on reported accounting data. If it is difficult for academics to measure firm accounting quality, it should present similar challenges for investors. This challenge in observing accounting quality provides incentives for peer firms

with better accounting quality to use stock repurchases as a mechanism to reveal their superior accounting practices after being affected by focal firms' financial restatements.

To provide a credible signal, firms' stock repurchases must be costly such that those with lower accounting quality cannot simply mimic. As open market stock repurchase announcements are not a commitment, any firm can announce stock repurchases without actually paying for them. Conversely, actual stock repurchases have higher credibility and induce greater costs for the participating firms because they need to devote monetary resources to do so. Hence, the spillover effect of financial restatements on peer firms' stock repurchases analyzed in this chapter pertains only to firms' actual stock repurchases.

Peer firms that repurchase shares are the ones with above average accounting quality. Thus, conditional on the stock repurchases, their superior accounting quality should be reflected in the corresponding measures. One common measure for firm accounting quality is the quality of accruals (Dechow and Dichev, 2002; Francis et al., 2005). Peer firms that repurchase shares should have better quality of accruals than those that do not repurchase shares. Similarly, financial restatements directly reflect the accounting quality of a firm. In the peer effect setting, peer firms with stock repurchases should have lower likelihood of restating their own financials than those without stock repurchases in periods after focal firms' restatements.

Furthermore, an important incentive for peer firms with better accounting quality to reveal their robust accounting practices is to avoid the unwanted repercussions such as accounting-related litigation risks associated with having lower accounting quality. Prior work like Hanley and Hoberg (2012) has documented that firms actively try to mitigate their litigation risks. If stock repurchases can separate peer firms with better accounting quality from the pooling equilibrium, within peer firms, the ones that repurchase shares should have lower accounting-related litigation risks than

those that do not repurchase shares.[42]

I apply a difference-in-differences approach to identify the peer (spillover) effect of financial restatements on peer firms' stock repurchases. I define firms that release financial restatements as the focal or restating firms. These financial restatements are the triggering events for the treatment effect on peer firms' stock repurchases. Peer firms refer to firms in the same product market as the restating firms because sharing a product market captures more operating similarity between firms than alternative industry measures such as the SIC code (Hoberg and Philips, 2010, 2016). All the other firms not in the same product market as the focal firms are the non-peer firms. I extract data on actual repurchases for all firms in the Compustat/CRSP Merged Database from 2003 to 2020 via their 10-K and 10-Q filings on the SEC EDGAR database (Dittmar and Field, 2015).

To evaluate the association between firm accounting quality and stock repurchases, I compare peer firms' ex post accounting quality conditional on the stock repurchase action. I use the same measure of accruals quality developed by Francis et al. (2005) as a proxy for firm accounting quality. I also investigate peer firms' likelihood in restating their own financial statements conditional on their actual stock repurchases. Finally, to establish the relationship between peer firms' stock repurchases and their strategy in mitigating accounting-related litigation risk, I obtain all class action lawsuits filed against the accounting practices of U.S. public firms from the Stanford Law School's *Securities Class Action Clearinghouse* (Hanley and Hoberg, 2012).

With this data, I identify the spillover effect of financial restatements on peer firms' stock repurchases. Peer firms have a higher propensity to repurchase shares and will repurchase more shares

[42] A potential concern is that stock repurchases take resources away from a firm. Thus, the firm needs to sacrifice its real investment and other activities to signal its superior accounting quality via stock repurchases. Why would a good accounting quality firm do this? I argue that it is indeed these opportunity costs embedded in actual repurchases that makes them a credible signal for the investors. Given the obscurity of accounting quality, it is likely investors file class action lawsuits before they fully recognize the accounting quality of the good firms. At that point, these firms will incur litigation related costs and reputation costs, which they wanted to avoid in the first place. By conducting the costly action of stock repurchases immediately after the focal firm's financial restatement, higher accounting quality peer firms can achieve this objective by avoiding potential accounting-related litigation.

(and in more dollars) than non-peer firms after they are affected by focal firms' financial restatements. Peer firms increase their propensity to repurchase shares by 12.9% from the unconditional mean in the post-focal firms' financial restatement period. The economic significance increases to 17% in the intensive margin. By decomposing the reasons cited for the financial restatements, those issued for aggressive accounting drive this spillover effect. The spillover effect originated from financial restatements ascribed to aggressive accounting dominates over that from the restatements attributed to other reasons such as fraud or clerical errors. Announcement returns on *peer firms* around the release of the focal firm's financial restatement do not drive the results. Thus, market timing incentives do not appear to contribute to the spillover effect (Baker and Wurgler, 2002; Dittmar and Field, 2015).

A natural argument against these results would claim undervaluation as the driving factor. I rule out the undervaluation channel by conducting two robustness tests. When I bifurcate the sample by the direction of revision in the financial restatements, the spillover effect persists for both peer firms to financial restatements with positive revisions and those with negative revisions. I also divide the sample by peer firms with positive announcement returns and those with negative announcement returns. I find consistent results where both groups of peer firms are more likely to repurchase shares subsequently than non-peer firms. When I restrict the sample to peer firms with positive announcement returns who are affected by financial restatements with positive revisions, the spillover effect also persists. Hence, the spillover effect is not driven by undervaluation or the information content of the financial restatements. Instead, it is driven by the occurrence of the restatements.

Next, I test whether higher accounting quality peer firms repurchase shares to separate themselves from the pooling equilibrium with lower accounting quality peer firms as a mechanism to mitigate accounting-related litigation risk. Focusing on the quality of accruals, I find results con-

sistent with this hypothesis. Peer firms with stock repurchases have higher accruals (earnings) quality than peer firms without stock repurchases. The former are also less likely (33% decrease from the unconditional mean) to restate their own financials than the latter. To ensure that it is the accounting quality that drives stock repurchases, I test among the subsample of peer firms with positive announcement returns. Even within peer firms of positive announcement returns upon exposure to focal firms' financial restatements, those with stock repurchases have higher accounting quality than the others without stock repurchases.

Importantly, peer firms who repurchase shares have lower accounting-related litigation risk than those who do not repurchase shares. The economic significance is large such that peer firms with stock repurchases have 89% lower likelihood in receiving accounting-related litigation in the next 6 months than their counterparts. Collectively, these results support that the spillover effect of focal firms' financial restatements on peer firms' subsequent stock repurchases is due to peer firms with greater accounting quality trying to separate from those with lower accounting quality. As a result, repurchasing peer firms reduce accounting-related litigation risk.

One inquiry here is that why would good accounting quality peers would incur or fear of incurring accounting-related litigation at all? I argue that any class action lawsuit is costly for the firm, including the ones that are eventually withdrawn or thrown out by the court. Ex ante, investors cannot sufficiently differentiate peer firms with higher accounting quality from those with lower accounting quality. In turn, peer firms incur equal likelihood to receive accounting-related litigation from their investors, ceteris paribus. For peer firms with higher accounting quality, they want to reduce costs like attorney's fees and administration fees from a filed class action lawsuit. Thus, they repurchase shares prior to the revelation of their true accounting (which is also difficult for investors to realize) as a credible signal. In this way, they can potentially avoid having investors filing a costly class action lawsuit against them in the first place.

The distinction and thus, contribution of this chapter, hinges on peer firms using stock repurchases to signal accounting quality and fend off litigation against their accounting practices. It is important in two aspects. First, no other literature has looked at peer firms' stock repurchases after focal firms' financial restatements as a direct outcome.[43] Two, using stock repurchases to reduce unnecessary cost embedded in class action lawsuits against good quality firms' accounting practices presents a novel motivation for firms to repurchase shares.

In summary, I find, for the first time in the literature, the spillover effect of financial restatements on peer firms' stock repurchases. I also provide evidence attributing this spillover effect to peer firms of greater accounting quality using stock repurchases to separate from those of lower accounting quality. Consequently, the former mitigate accounting-related litigation risks. Undervaluation or market timing does not drive the spillover effect.

2.1 Relation to the Existing Literature and Contribution

This chapter is related to several strands of literature. The first strand of related literature focuses on financial restatements. The accounting literature has established that restatements (e.g., financial restatements, accounting restatements, and cash-flow restatements etc.) have negative implications on the restating firm's accounting quality (e.g., Kravet and Shevlin (2010); Srinivasan et al. (2015)). Other papers like Gleason et al. (2008) and Durnev and Mangen (2009) find the contagion effect of one firm's financial restatement on other firms' stock prices, real investments, and their accounting quality. This chapter's contribution rests on the spillover effect of focal firms' financial restatements on peer firms' subsequent stock repurchases, which has not been explored in the literature. I also contribute to the restatement literature with novel findings that this financial

[43]There are papers talking about focal firms' own stock repurchases after their financial restatements such as Badertscher et al. (2011). Section 2.1 provides a more detailed literature review.

restatement-induced spillover effect on peer firms' stock repurchases is associated with lower accounting accruals, lower likelihood of subsequent self-restatement, and lower litigation risk among repurchasing peer firms, all of which have not been documented in the literature in a peer effect setting.

The second strand of literature related to this study is on open market repurchase programs, especially in terms of firms' actual repurchases. This literature has argued that firms repurchase shares to adjust undervaluation (Vermaelen, 1981; Baker et al., 2003; Babenko et al., 2012), signal promising firm prospects (Comment and Jarrell, 1991; Grullon and Michaely, 2004; Chemmanur et al., 2016), fund employee stock options (Kahle, 2002), reduce disagreement and heterogeneity between firm insiders and outsiders (Huang and Thakor, 2013; Chemmanur and Wu, 2022), for market timing (Baker and Wurgler, 2002; Dittmar and Field, 2015), or to distribute cash in a flexible and efficient manner (Jagannathan et al., 2000; Brav et al., 2005). This chapter distinguishes from the existing literature in that the spillover effect on stock repurchases is for peer firms with greater accounting quality to separate from those with lower accounting quality as a mechanism to mitigate accounting-related litigation risk. Numerous robustness tests confirm that undervaluation is not the primary driver for this spillover effect. This is the first paper in the literature that documents the relationship between stock repurchases and accounting-related litigation.

This chapter also stands out from the market timing literature, which argues that firms conduct stock repurchases when their shares are cheaper than other times (Baker and Wurgler, 2002; Dittmar and Field, 2015). These papers find that when firms repurchase shares to time the market, their stock returns before the repurchases will be lower than the returns surrounding the repurchases. On the contrary, I do not find such patterns. I also do not find evidence suggesting peer firms' announcement returns around the dates of focal firms' financial restatements drive their stock repurchases under the spillover effect.

Another related paper is Badertscher et al. (2011), who find that prior stock repurchases alleviate the negative consequences of a later restatement. However, this chapter is different from theirs in that I study *peer firms'* subsequent stock repurchases *after* focal firms' financial restatements. Thus, I focus on the spillover effect of focal firms' financial restatements on peer firms' stock repurchases, not the repurchases of the restating firms.

This article also adds to the study of peer effects of adverse accounting events. Previous papers have looked into the peer effect of auditing quality (Francis and Michas, 2013), earnings management under boards' common ownership (Chiu et al., 2013), and the peer effect of financial reporting frauds on investments (Beatty et al., 2013). Notwithstanding, none of these papers investigate the peer effect with respect to firms' stock repurchases. Further, I find supporting evidence that attributes this peer effect as a mechanism to avoid accounting-related litigation.

Hence, this chapter contributes to the literature in two aspects. First, I establish a causal relationship between focal firms' financial restatements and their peer firms' subsequent stock repurchases, i.e, the spillover effect of focal firms' financial restatements on peer firms' stock repurchases. This is the first paper that documents such a spillover effect and studies the intersection of financial restatements and peer firms' stock repurchases. Second, I add onto the literature studying the signaling power of open market repurchase programs. Importantly, in a difference-in-differences setting, I present evidence that the spillover effect on peer firms' stock repurchases is ascribed to the higher accounting quality peer firms trying to fend off accounting related class action lawsuits. Consequently, this chapter is the first that connects the spillover effect of financial restatements on peer firms' stock repurchases with accounting-related litigation.

2.2 Theory and Hypothesis Development

The accounting literature documents that financial restatements have detrimental consequences for the restating firms (e.g., Palmrose et al. (2004); Desai et al. (2006); Kravet and Shevlin (2010)). A few additional papers look into the negative externalities of financial restatements on other firms in the same industry as the restating firms (e.g., Gleason et al. (2008); Durnev and Mangen (2009)). Thus, when one firm issues a financial restatement, it not only impacts itself but also its peers operating in the same market.

Importantly, financial restatements directly reflect firms' accounting quality (e.g., Gleason et al. (2008); Badertscher et al. (2011); Srinivasan et al. (2015)). Regardless of the information content of a restatement, its occurrence represents questionable accounting quality.[44] In turn, when investors in the equity market observe a firm issuing a financial restatement, they revise the expected accounting quality of peer firms operating in the same product market since those firms likely adopt similar accounting practices. The investors infer that peer firms in the same product market have lower average accounting quality than firms not in the same product market.

Investors in the equity market do not observe the true accounting quality of each peer firm. Hence, they pool the higher accounting quality peer firms (the ones with above average accounting quality) with lower accounting quality peers (the ones with below average accounting quality) together. This creates a pooling equilibrium among the peer firms after a focal firm's financial restatement. As lower accounting quality has undesirable repercussions such as receiving class action lawsuits against a firm's accounting standards, the pooling equilibrium increases the likeli-

[44] Positive or negative adjustments on the restated items refer to the information content of the financial restatements. Similarly, the announcement returns on the restating firms when they release the financial restatements also represent information content (Durnev and Mangen, 2009). Accounting quality, however, does not solely rely on the information content. If a firm has good accounting quality, it should not have needed to restate at all (even if the restatement embeds upward revision on the restated item). Good accounting practices should truthfully and timely reflect a firm's accounting information without any restatement.

hood of peer firms being targeted by investors, regulators, and watchdog groups. Given that peer firms know their own true accounting quality, those with greater accounting quality would want to separate themselves from the rest. One way to accomplish this objective is through open market stock repurchases, which is a costly action (Oded, 2005). In other words, higher accounting quality peer firms will likely repurchase shares to reveal their accounting quality to their investors and separate from lower accounting quality peer firms upon exposure to focal firms' financial restatements. In the pooling equilibrium, hence, peer firms jointly will have a greater propensity to repurchase shares than non-peer firms after being affected by focal firms' financial restatements. This describes a spillover effect from focal firms' financial restatements on peer firms' subsequent stock repurchases, generating my first hypothesis:

H2.1: *Focal firms' financial restatements will increase the propensity of subsequent stock repurchases among their peer firms.*

One important note to bear in mind is that the above hypothesis does not imply that high quality firms only use stock repurchases to separate themselves from the pooling equilibrium. I recognize other possible actions firms can take to send credible signals. Thus, hypothesis **H2.1** aims to establish that among the tools at firms' disposal, repurchasing shares is a tool difficult for lower quality firms to mimic that higher quality peer firms can use.

If focal firms' financial restatements motivate investors in the equity market to question the accounting quality of peer firms, the financial restatements occurred due to aggressive accounting should be more important than those occurred for other reasons that are not directly related to one's accounting practices. When a focal firm issues a financial restatement due to aggressive accounting, it is even more obvious for the investors to question the accounting quality of the peer firms, creating the pooling equilibrium mentioned above. Thus, peer firms with greater accounting

quality will be more likely to repurchase shares to signal their accounting superiority and separate from those with lower accounting quality, driving the spillover effect. Formally, I hypothesize that:

H2.2: *Focal firms' financial restatements occurred because of aggressive accounting drive the spillover effect on peer firms' subsequent propensity to repurchase shares.*

When the higher accounting quality peer firms repurchase shares to reveal their superior accounting quality to their investors, they separate from the pooling equilibrium with the low accounting quality peer firms. This should transpire in relevant measures of accounting quality. One common proxy for accounting quality is a firm's accruals quality where lower accruals correspond to higher accounting quality (e.g, Dechow and Dichev (2002); Francis et al. (2005)). Thus, peer firms' accruals quality should be higher for those that repurchase shares than for those that do not repurchase shares. This intuition leads to my next hypothesis:

H2.3: *Peer firms with stock repurchases have higher accruals quality than the peer firms without stock repurchases.*

Given that financial restatements directly reflect firms' accounting quality, it is reasonable to assume that higher accounting quality firms are less likely to restate their own financial reports. Higher accounting quality peer firms should have lower likelihood of restating their own financials in the future and vice versa. Stock repurchases should then reflect peer firms' subsequent likelihood of restating their own financial reports.

H2.4: *Peer firms with stock repurchases have lower likelihood in restating their own financial statements subsequently than the peer firms without stock repurchases.*

Peer firms with better accounting quality want to convey that information to market participants (e.g., equity investors, regulators, and watchdog groups) to avoid litigation against their accounting

practices.[45] Thus, the mechanism of higher accounting quality peer firms separating from the pooling equilibrium with lower accounting quality peers via stock repurchases should be related to their subsequent litigation risks. Hanley and Hoberg (2012) find that IPO firms use robust disclosure to mitigate litigation risks. Arguably, higher accounting quality peer firms would want to use stock repurchases to inform their good accounting standards and thus reduce accounting-related litigation risks. This implies that after exposure to focal firms' financial restatements, peer firms with stock repurchases, i.e., the higher accounting quality peers, are less likely to be sued for accounting malpractices and thus incur lower litigation risks than the peer firms without stock repurchases. This intuition formulates the final hypothesis:

H2.5: *Peer firms with stock repurchases have lower accounting-related litigation risk than the peer firms without stock repurchases.*

2.3 Data and Summary Statistics

2.3.1 Data Construction

The financial restatement data comes from the Audit Analytics Database for the period between 2003 and 2020, yielding a set of 16,230 financial restatements. Audit Analytics use the CIK code to identify firms. I merge the firms that issue financial restatements with firms in the CRSP/COMPUSTAT Merged Database by firm CIK and only retain those that can be identified by GVKEY in the CRSP/COMPUSTAT Merged Database. This step narrows to 7,038 financial restatements whose restating firms belong to the CRSP/COMPUSTAT Merged Database. Panel A of Table 12 presents the summary statistics for the characteristics of all restatements.

[45] Other papers like Bardos et al. (2013) and Hogan et al. (2013) have also documented the relationship between firms' restatements and accounting litigation. However, none of these papers study the litigation on other firms after one firm's restatement.

Upon extracting the financial restatements and the firms issuing them, I aggregate the data at the firm-quarter level to construct a panel for the universe of all firms in the CRSP/COMPUSTAT Merged Database. I call firms releasing financial restatements as *restating* or *focal firms*, which will be used interchangeably. Firms in the same product market as the restating firm in the year of the restatement are referred to as *peer firms*. Firms not in the same product market as the restating firm are the *non-peer firms*. The definition of product market and firm pairs in each product market follow Hoberg and Philips (2010, 2016). I use product market to identify peer firms because traditional industry classifications like SIC, NAICS, and GIC codes do not necessarily capture firms that operate in the same space (Hoberg and Philips, 2010, 2016) and they incur more noise. Table 12 Panel B presents the summary statistics on the number of peer firms for a given restatement.

I aggregate the peer firms at the firm-quarter level such that even if a peer firm is affected by multiple financial restatement in a given quarter, it only appears once for that quarter as a peer firm. I create an indicator variable *Peer 2 Quarters* that equals one for a firm in the same product market as a restating firm in the quarter of the restating firm's financial restatement and stays as one for another quarter (i.e., a total of two quarters), and zero otherwise.[46], [47] To control for the impact of a financial restatement itself on firms' subsequent stock repurchases, I create a similar indicator variable *Restate 2 Quarters* that equals one for a focal firm that issues a financial restatement in a given quarter and stays as one for another quarter (i.e., a total of two quarters), but zero otherwise.[48] Hence, the key independent variable of interest throughout the paper is *Peer 2 Quarters*, which compares between peer firms and non-peer firms in the periods after focal firms'

[46] I also use other windows for the peer indicator. For instance, *Peer 1 Quarter* equals one for the same definition of peer firms but only in the quarter when the focal firm's financial restatement occurs. This methodology applies to all windows from 1, 2, to 3 and 4 quarters. The results are consistent.

[47] One can think of *Peer 2 Quarters* as the interaction term between a treatment dummy and a post dummy, where treatment is a firm in the same product market as a restating firm and post dummy is one for the two periods after restating firm's release of its financial restatement.

[48] This is the same methodology for *Peer 2 Quarters*, but only applies to firms with financial restatements. Importantly, this restating firm indicator also extends to other windows as described earlier.

financial restatements with the periods before – i.e., a difference-in-differences setting.[49]

An important feature of *Peer 2 Quarters* deserves more explanation: it can overlap in multiple periods. Specifically, *Peer 2 Quarters* can be one for more than two consecutive quarters if a given firm is a peer firm to a series of financial restatements issued by different restating firms in consecutive quarters. Consider a setting with four firms – firm A, B, C, and D for eight quarters from t to $t+7$. Firm B issues a financial restatement at time $t+1$, firm C does so at time $t+2$, and firm D restates at $t+4$. Firm A is a peer firm to all the three financial restatements. Thus, *Peer 2 Quarters* is zero for firm A at time t but turns on to be one at $t+1$ and should continue till $t+2$. However, as C issues a financial restatement at $t+2$, firm A's *Peer 2 Quarters* stays at one from $t+2$ to $t+3$. At $t+4$, firm D restates, making firm A's *Peer 2 Quarters* continues as one in $t+4$ and $t+5$ before it turns back to zero at $t+6$. In other words, *Peer 2 Quarters* starts with zero at t, but is one from $t+1$ to $t+5$, and turns back to zero for $t+6$ and $t+7$. This overlapping feature extends to both indicator variables on peer firms and restating firms.

All the indicator variables described in this section are embedded in the firm-quarter panel structure. Utilizing this panel sample for all firms in the CRSP/COMPUSTAT Merged Database with their associated indicator variables on financial restatements and peer firms, I match the firm-quarter data with annual control variables to the previous fiscal year-end. Further, I merge the sample with next quarter's repurchase data. The repurchase data refers to firms' actual repurchase amounts, which I collect from their 10-K and 10-Q filings. In 2003, the SEC updated their Safe Harbor rule (Rule 10B-18) regarding the legal procedures for public firms to trade their own shares in the open market. The update mandates all publicly listed firms to disclose their open market repurchase activities in their quarterly (10-Q) and annual filings (10-K) at the monthly level. This provides the most accurate source of information regarding firms' actual stock repurchases in the

[49] Section 2.4.2 and Table 15 will explain the choice of two quarters as the treatment window.

open market (Dittmar and Field, 2015). Hence, I use Python to scrape this information from all the 10-K and 10-Q filings from 2003 to 2020 in the SEC EDGAR database, and aggregate them at the firm-quarter level. This constitutes the full sample of 412,582 firm-quarter observations with stock repurchases leading by one quarter.

Stanford Law School's *Securities Class Action Clearinghouse* provides the data on class action lawsuits against firms' accounting practices (Hanley and Hoberg, 2012). The accounting lawsuits pertain to Rule 10b-5, Section 11, and Section 12(a), as classified by the database.[50] I exclude privately held firms and firms with missing ticker symbols (the firm identifier in the database). I aggregate the litigation data at the firm-quarter level and merge it with the full sample contemporaneously.

2.3.2 Summary Statistics

Table 12 Panel A presents the characteristics of different financial restatements. There is a total of 7,038 financial restatements. Among them, 6,714 (95.40%) occur due to aggressive accounting, corroborating that restatements directly reflect firms' accounting quality. 126 (1.79%) of them have fraud, while 299 (4.25%) of them occur because of clerical errors. 411 (5.84%) financial restatements involve investigations from the SEC, and 2,410 of them (34.24%) have the company's board of directors involved in the process.[51] And 5,663 (80.46%) of the restatements have negative revisions on the restated item in the original financial reports.[52] Table 12 Panel B presents the

[50]For details, please see https://securities.stanford.edu/research-reports/1996-2020/Accounting-Class-Action-Filings-and-Settlements-2020-Review.pdf

[51]Board of directors involvement include board issuing press releases, board certifying the restated financial statements, and board participating in the SEC investigation if there is any, among many other forms of participation.

[52]Importantly, these characteristics are *not* mutually exclusive such that one focal firm's financial restatement can have multiple characteristics simultaneously. An illustrative example would be the financial restatement issued by American International Group (Ticker: AIG) in the second quarter of 2005. The restatement resulted in a negative revision of its earnings and was due to aggressive accounting which was also fraudulent. It incurred investigation by the SEC and involved the board of directors during the investigation and restating process. The majority of the financial restatements have at least two characteristics.

summary statistics on the number of peer firms corresponding to each restatement. On average, there are 167 peer firms for a given financial restatement. The median value is 118, while the maximum is 773.

Table 13 displays the firm-level summary statistics for the full sample. It is a panel of 412,582 firm-quarter observations with 12,385 different firms from 2003 to 2020. Panel A describes the variables measured at the quarterly frequency, whereas Panel B describes the annual control variables matched to the previous fiscal year-end for a given firm-quarter. I include all the firms in the CRSP/COMPUSTAT Merged Database to avoid selection bias on the firms represented in the sample.

An average firm in the sample has a propensity of 9.76% to repurchase shares in a given quarter with a standard deviation of 29.68%. An average firm buys back 69.4 thousand shares in a given quarter in the sample. In terms of the dollar amount, the average quarterly dollar amount spent on stock repurchases by a firm in the sample is about $2.5 million dollars with a maximum of $125 million. As the number of shares and dollar amount repurchased can be driven by firm size, I scale them by total number of shares outstanding and market capitalization in the previous fiscal year-end, respectively. The corresponding variables are *Scaled Shares Repurchased* and *Scaled Dollar Repurchased*, with unconditional means at 0.0008 and 0.0007. The unconditional mean for a firm's accruals to be higher than its product market median in a given quarter is 50.4%. An average firm in the sample has an unconditional probability of 1.42% to issue a financial restatement. The unconditional probability for an average firm to receive an accounting-related class action lawsuit is 0.45%. Both of them are rare events.

2.4 Main Results

2.4.1 Identification of the Spillover Effect

Financial restatements directly reflect firms' accounting quality (e.g., Srinivasan et al. (2015)) and impose negative externalities on non-restating firms in the same industry (e.g., Gleason et al. (2008); Durnev and Mangen (2009)). Observing a focal firm's financial restatement, investors in the equity market adjust their opinions on the accounting quality of not only the restating firm but also other firms in the same product market (i.e., the peer firms). The focus is on peer firms because after a focal firm's financial restatement, the equity investors assume other firms in the same product market likely adopt similar accounting practices. Thus, without observing their true accounting quality, they pool higher accounting quality peer firms with lower accounting quality peer firms in a pooling equilibrium. It benefits the higher accounting quality peer firms if they can separate themselves from the pooling equilibrium and they can do so by signaling their accounting quality to the market via stock repurchases (**H2.1**). To test this hypothesis, I run the following difference-in-differences regression model:

$$\begin{aligned} FirmRepurchase_{i,t+1} = \beta_1 Peer2Quarters_{i,t} + \beta_2 Restate2Quarters_{i,t} \\ + \beta_3 X_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t+1} \end{aligned} \tag{13}$$

where $Peer2Quarters_{i,t}$ refers to the variable *Peer 2 Quarters* described in Section 2.3.1 for firm i in year-quarter (time) t. Similarly, $Restate2Quarters_{i,t}$ corresponds to *Restate 2 Quarters* described in Section 2.3.1. The dependent variable $FirmRepurchase_{i,t+1}$ takes three forms. When $FirmRepurchase_{i,t+1}$ is *Repurchase*, it is an indicator that equals one if firm i repurchases shares in the open market at time $t+1$ and zero otherwise. The other two forms of $FirmRepurchase_{i,t+1}$ are *Scaled Shares Repurchased* and *Scaled Dollar Repurchased* defined in Section 2.3.2. They

measure the size of firm i's stock repurchases in the open market at time $t+1$. The coefficient of interest is β_1, which estimates the treatment effect of the spillover on peer firms' stock repurchases after exposure to focal firms' financial restatements relative to non-peer firms in that same period. β_2 is a control variable on the restatements. $X_{i,t}$ is a vector of control variables at the previous fiscal year-end to time t. I include firm fixed effect (γ_i) and time fixed effect (δ_t), which is at the year-quarter level for all regressions. I also double cluster standard errors by firm and year.

The regression results for Equation (13) are reported in Table 14. Column (1) and (2) use the *Repurchase* indicator as the dependent variable. They show the treatment effect regarding peer firms' propensity to repurchase, i.e., the extensive margin. The positive and significant coefficients on *Peer 2 Quarters* suggest that peer firms have higher propensity to repurchase shares in the open market after being affected by focal firms' financial restatements than non-peer firms, consistent with **H2.1**. Importantly, peer firms subject to the spillover effect of a focal firm's financial restatement, increase their propensity to repurchase shares in the subsequent quarter by 12.9% from the unconditional mean.[53] Thus, there are both statistical and economic significance on the spillover effect of focal firms' financial restatements on peer firms' subsequent stock repurchases.[54]

The coefficients on the control variable related to the financial restatements are also worth noting. *Restate 2 Quarters* have negative but mostly insignificant coefficients in all columns, implying that if a firm issues a financial restatement, its propensity to repurchase shares in the post-

[53] Taking the coefficient on *Peer 2 Quarters* in column (2) with the full set of control variables, the increase from the unconditional mean is $\frac{0.01256}{0.0976} = 0.129$, or 12.9%.

[54] In unreported results, I change the definition of peer firms from sharing the same product market to sharing the same two-digit SIC, three-digit SIC, four-digit NAICS, and eight-digit GICS industries (Gleason et al., 2008). The results on the spillover effect are stronger.

restatement period does not differ from all the other firms in the sample.[55] This finding makes sense because financial restatements are generally detrimental to the restating firms. Thus, these restating firms will channel most of their resources to recuperate from the damage associated with the financial restatements (Desai et al., 2006), and repurchasing shares is not their priority. I include these firms as controls to alleviate the concern on selection bias. By keeping all the firms in the CRSP/COMPUSTAT Merged Database, the results are not subject to the concern where the treatment effect applies only to the firms in a filtered sample.[56][57]

Upon establishing the spillover effect of focal firms' financial restatements on peer firms' propensity to repurchase shares subsequently, I investigate whether this spillover effect extends to the size of peer firms' repurchases, i.e., the intensive margin. I proxy for the size of share repurchases by two variables *Scaled Shares Repurchased* and *Scaled Dollar Repurchased*, which are the dependent variables in columns (3) and (4), and columns (5) and (6) of Table 14, respectively.[58] The positive and significant coefficients on *Peer 2 Quarters* from column (3) through column (6) suggest that the spillover effect applies to how much peer firms repurchase as well. In other words,

[55] Seemingly, this result presents opposing evidence to Charkravarthy et al. (2014). Their paper finds a positive correlation between restatement and post-restatement *announcement* of open market repurchase programs of the same firm, whereas I focus on the *actual stock repurchases* in the post-restatement periods. Another possibility for the difference in this result is that the sample used in their paper largely differs from the one used in this study. Their restatement sample consists of only 94 financial restatements involving irregularities issued by firms who have sufficient resources for reputation repair from 1997 to 2006. Our sample period only overlaps by three years and I do not impose any restrictions in sample selection. However, since the comparison on restating firms' stock repurchases is not the main focus of this chapter, I do not discuss extensively in this regard.

[56] Another concern raised by keeping all the firms in the CRSP/COMPUSTAT Merged Database using a staggered difference-in-differences methodology is the biased estimates documented by Baker, Larcker and Wang (2022). I adopt their suggested solution using Stacked Regression Estimator to run the tests. The results are consistent such that the spillover effect of focal firms' financial restatements on peer firms' stock repurchases still exist. Due to space constraint, this chapter does not report the results but has them available upon request.

[57] Alternatively, in unreported results, I also use a matching technique where for each peer firm affected by a focal firm's financial restatement, I match it with a non-peer firm in the same two digit SIC industry but not the same product market with the closest proximity in size, retained earnings, dividend paid, market price, book leverage, profitability, and market-to-book ratio in the previous quarter. The results on the spillover effect is even stronger for matched peer and non-peer sample.

[58] Please see Section 2.3.2 for the definition of *Scaled Shares Repurchased* and *Scaled Dollar Repurchased*.

peer firms affected by focal firms' financial restatements will repurchase more shares both in terms of the number of shares repurchased and the dollar amount spent on buying these shares in the post-restatement period, as compared to non-peer firms. The economic significance is in the magnitude of 17.5% and 17.1% higher from the unconditional means for *Scaled Shares Repurchased* and *Scaled Dollar Repurchased*, respectively.[59] The economic significance on the intensive margin of the spillover effect is slightly higher than that on the extensive margin.[60]

2.4.2 Alternative Explanations for the Spillover Effect

This subsection addresses a few alternative explanations that can attribute to the spillover effect documented above. The first alternative explanation is market timing (Baker and Wurgler, 2002) where peer firms that repurchase shares simply because their stock prices are lower than their true value (Dittmar and Field, 2015). In the main regression of Equation (13) and the results in Table 14, I control for *Previous 6 Months' Return* (Dittmar and Field, 2015). It has statistically insignificant coefficients in columns (2) and (4), and significantly *positive* in column (6), the opposite direction than the market timing story suggests. Further, I embed announcement returns for peer firms and non-peer firms around the release dates of focal firms' financial restatements in Equation (13). I estimate announcement returns on *peer* and *non-peer* firms for each financial restatement using cumulative abnormal returns (CARs) with the market model, and aggregate it at the quarterly level by averaging across all the CARs within a firm in a given quarter. I include the quarterly CAR in the regression and interact it with the *Peer 2 Quarters* indicator. The results are presented in Table A10 of the Appendix. Conspicuously, all the interaction terms have statistically insignificant

[59] For *Scaled Shares Repurchased*, the increase from its unconditional mean is $\frac{0.00014}{0.0008} = 0.175$ or 17.5%. For *Scaled Dollar Repurchased*, the increase from its unconditional mean is $\frac{0.00012}{0.0007} = 0.171$ or 17.1%.

[60] Converting to the raw number of shares (dollar amount), a peer firm will repurchase additional $0.00014 \times 130.90 = 0.0183$ ($0.00012 \times 4,179.21 = 0.50$), i.e., 18,300 shares ($500,000 dollars) in the subsequent quarter.

coefficients.[61] Hence, among peer firms, announcement returns on their stocks following focal firms' financial restatements do not drive their subsequent stock repurchases, helping alleviate the concern that the market timing incentives are driving the spillover effect.

The second alternative explanation is the general correction of undervaluation, which is broader than just market timing. (Gleason et al., 2008) shows that negative financial restatement reduce the stock prices on peer firms, undervaluing their share prices. If peer firms repurchase shares to correct undervaluation instead of signaling their accounting quality, the spillover effect should only pertain to peer firms' whose announcement returns are negative upon the focal firms' financial restatements. Thus, I tackle this explanation by running the same regression in two subsamples that bifurcate the returns on peer firms by positive and negative CARs. Columns (4) through (6) in Appendix Table A11 and A12 display the results. The coefficients on *Peer 2 Quarters* are positive and statistically significant for both peer firms with positive CARs and those with negative CARs. It is unlikely peer firms with positive CARs repurchase shares to correct undervaluation. Thus, this set of tests help reduce the concern that undervaluation drives the spillover effect.

The third alternative explanation points to the possibility where only financial restatements with negative revisions drive the spillover effect. Thus, I bifurcate the sample by financial restatements with positive and negative revisions on the restated items. Thus, there are two sub-samples. In the first sub-sample, all triggering financial restatements revise the restated items upward. In the other sub-sample, all triggering financial restatements revise the restated items downward. In columns (1) through (3) of Appendix Table A11 and A12, the spillover effect from focal firms' financial restatements on peer firms' stock repurchases persists for both sub-samples. Thus, even peer firms affected by positive financial restatements would repurchase more shares in aggregate than non-peer firms. One can also argue peer firms to financial restatements with positive revisions can

[61] Except for column (5). However, as it is only marginally significant at the 10% level and is the one interaction term with such a significance, it does not affect the general interpretation of the results.

also incur undervaluation. For instance, Durnev and Mangen (2009) argue that peer firms will adjust their investment decisions based on the information content of the focal firm's financial restatement. In turn, a positive restatement can make peer firms' insiders more opportunistic about their future prospects, increasing the true value of the firms relative to their market value. To address this challenge, I restrict the sample to peer firms of positive financial restatements *and* have positive CARs. In unreported results, the coefficients on *Peer 2 Quarters* stay positive and statistically significant.

Collectively, this set of results implies that it is not the information content nor undervaluation that leads to the spillover effect. Instead, it is more likely that the peer firms of higher accounting quality repurchase shares to signal their better accounting practices and separate from the pooling equilibrium with peer firms of lower accounting quality. Section 2.5 will directly test for this hypothesis using the full sample and subsamples.

2.4.3 Choice of a Two-Period Window for the Spillover Effect

This section provides supporting evidence on the choice of using two quarters as the treatment window throughout the paper. I run similar regressions as in Equation (13) but only look at each individual quarter after a peer firm incurs the shock of a focal firm's financial restatement. Table 15 displays the results. In particular, I use *Peer First Quarter* to replace *Peer 2 Quarters* in Table 15 column (1). *Peer First Quarter* is defined as one if a firm belongs to the same product market as a focal firm in the quarter of the focal firm's financial restatement and zero otherwise. Similar procedures apply to *Restate First Quarter*, which replaces the control indicator *Restate 2 Quarters*. In column (2), instead of looking at the quarter of the restatement, I define these indicator variables for the second quarter after the restatement. The logic goes on for column (3) and (4). I include all individual windows in the same model for column (5).

The estimated coefficients for peer firms' stock repurchases are positive and significant for the first and second quarter in both the univariate and multivariate setting, the treatment effect stays statistically significant for the first two quarters (Table 15 column (1), (2), and (5)). *Peer Third Quarter* and *Peer Fourth Quarter* are statistically insignificant in both the univariate and multivariate tests, suggesting that the treatment effect only persists for two quarters. Thus, two quarters after peer firms' exposure to focal firms' financial restatements is the ideal window for the remaining analyses. In unreported results, I also test the robustness of this choice of the treatment window by running similar tests while changing the dependent variable to *Scaled Shares Repurchased* and *Scaled Dollar Repurchased*. Both of these additional tests confirm the choice of two quarters as the treatment window.

2.4.4 Validation for the Identification: Pre-trend

The identification in this chapter takes a focal firm's financial restatement as an exogenous shock to the other firms in the same product market at the time of the restatement. It adopts a difference-in-differences approach that compares between peer firms and non-peer firms in the post-restatement period with the pre-restatement period. One natural question that follows is whether the treatment effect already exists before focal firms' financial restatements. There might be an unobservable underlying common factor that drives the peer effect of interest (Manski, 1993). To alleviate this concern on the reflection problem, I run tests to rule out the presence of pre-trends. However, as described in Section 2.3.1, the panel sample for this chapter constitutes an overlapping feature for the *Peer 2 Quarters* indicator variable. In turn, a given quarter can have multiple values of one for different time dummies relative to the treatment time. Hence, to circumvent this convolution, I create two indicator variables for the periods prior to a financial restatement and embed them in the baseline regression model.

I create an indicator variable *Previous One Quarter* that equals one if *Peer 2 Quarters* is zero in a given quarter but is one in the next quarter for a given firm, and zero otherwise. *Previous Two Quarters* equals one if *Peer 2 Quarters* is zero in the given quarter and the next quarter, but is one in the quarter after the next, and zero otherwise. These two variables restrict the definition of "pre-treatment" period to those firm-quarters prior to being affected by a financial restatement. I test the pre-trends as follows:

$$\begin{aligned} Repurchase_{i,t+1} = {} & \beta_1 Peer2Quarters_{i,t} + \beta_2 Previous\,One\,Quarter_{i,t} \\ & + \beta_3 Previous\,Two\,Quarters_{i,t} + \beta_4 Restate2Quarters_{i,t} \\ & + \gamma_i + \delta_t + \varepsilon_{i,t+1} \end{aligned} \tag{14}$$

The regression results are reported in Table 16, where column (1) retains the baseline model that is identical to column (1) of Table 14 as the reference for comparison. Column (2) only adds the one period pre-treatment indicator *Previous One Quarter* to the baseline model, whereas column (3) only adds the two period pre-treatment indicator *Previous Two Quarters*. Table 16 column (4) incorporates both pre-treatment indicators in the baseline model. The coefficients on the treatment effect, *Peer 2 Quarters*, are rather stable both in magnitude as well as in statistical significance. Further, the coefficients on *Previous One Quarter* and *Previous Two Quarters* are statistically insignificant in all models, suggesting that there exists no treatment effect in the periods prior to being affected by a financial restatement. In other words, there are no pre-trends for the identification strategy. This finding helps validate that there is no unobservable underlying factor that drives the peer (spillover) effect on stock repurchases. Instead, it is focal firms' financial restatements that drive the spillover effect.

2.4.5 Impact of Restatement Characteristics

Financial restatements can occur for various reasons. The common ones include aggressive accounting on the original financial reports, fraudulent financial reporting, or it could simply be clerical errors. Additionally, a restatement can also trigger investigations by the SEC, especially in fraudulent and aggressive accounting cases; and some financial restatements have the board of directors participated in the process. If the spillover effect of focal firms' restatements on peer firms' subsequent stock repurchases concentrates on the peer firms with higher accounting quality separating from the pooling equilibrium, it should then be driven by restatements that are directly related to aggressive accounting (**H2.2**). I adopt the following regression specification for the analysis:

$$\begin{aligned} FirmRepurchase_{i,t+1} = {} & \beta_1 Restatement\_Char\_forPeer2Quarters_{i,t} + \beta_2 Restate2Quarters_{i,t} \\ & + \beta_3 X_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t+1} \end{aligned} \tag{15}$$

where $Restatement\_Char\_forPeer2Quarters_{i,t}$ is an indicator variable that applies to the various characteristics of a financial restatement, namely *Aggressive Accounting*, *Fraud*, *Clerical Error*, *SEC Investigation*, and *Board Involvement* on a peer firm for two quarters. Thus, each of these five indicator variables are defined similarly to *Peer 2 Quarters* but with at least one focal firm's financial restatement bearing the given characteristic.[62] For instance, *Aggressive Accounting* equals one for a peer firm to a focal firm's financial restatement that is initiated due to aggressive accounting on the original financial report, and zero otherwise. *Aggressive Accounting* stays as one for two quarters. The other four characteristics-related indicator variables follow the same methodology.

[62] It is equivalent to a triple interaction term between the treatment dummy on peer firms, post dummy on post-restatement periods, and a dummy on the reason cited for the focal firm's restatement.

Table 17 presents the regression results. From column (1) to (5), each column corresponds to a particular characteristic of the focal firm's financial restatement, while column (6) embeds all the characteristics in the same regression. Conspicuously, financial restatements attributed to focal firms' aggressive accounting positively and significantly increase their peer firms' propensity to repurchase shares in the next quarter. In other words, financial restatements due to aggressive accounting drive peer firms' propensity for stock repurchases, consistent with hypothesis **H2.2**.

An interesting note is that restatements occurring due to fraudulent practices in the original reports negatively affect peer firms' propensity to repurchase shares subsequently.[63] One plausible explanation is that investors view aggressive accounting as more widely adopted by firms in the same product market, while fraudulent accounting is idiosyncratic to the restating firm. Hence, if the focal firms' financial restatements are due to aggressive accounting, investors in the equity market have an downward revision on the accounting quality of peer firms. This increases peer firms' average propensity to repurchase shares. But if the focal firms' restatements are ascribed to frauds, these investors view them as firm-specific, and do not infer peer firms' accounting quality based on that, reducing peer firms' average propensity to repurchase shares.

To further corroborate this explanation, I embed all the characteristics in one regression (i.e., column (6) of Table 17) and sum the coefficients on *Aggressive Accounting* and *Fraud*. By testing the joint coefficient, which has a value (F-stats and p-value) of 0.0093 (2.30 and 0.15), I confirm that these two characteristics have distinct effects on peer firms' propensity to repurchase shares subsequently.

The other characteristics alone do not largely affect peer firms' propensity for subsequent stock repurchases. Adding *Clerical Error*, *SEC Investigation*, and *Board Involvement* to the coefficient of *Aggressive Accounting* in column (6) produces coefficients (p-value) of 0.0111 (0.07), 0.0129

[63] Fraud can extend beyond accounting fraud. And the fraud category reported by Audit Analytics is back-filled and may not fully report all firms' frauds, as documented by Karpoff et al. (2017).

(0.01), and 0.0088 (0.02), respectively. The statistical significance implies that if restatements are issued due to a combination of aggressive accounting with clerical error, or aggressive accounting with SEC investigation, or aggressive accounting with board involvement, they will increase peer firms' propensity for share repurchases. Hence, it needs to be focal firms' financial restatements directly ascribed to their accounting standards that drive the spillover effect on peer firms' subsequent stock repurchases.

2.5 Peer Firms' Stock Repurchases for the Separating Equilibrium

2.5.1 Peer Firms' Accounting Quality in Accruals

Upon stock repurchases, peer firms of higher accounting quality separate themselves from the pooling equilibrium with those of lower accounting quality. Hence, their superior accounting quality should be reflected accordingly conditional on stock repurchases. Once some peer firms repurchase shares, the ones that do not repurchase shares will be deemed by the investors in the equity market as the lower accounting quality peers. Consequently, peer firms with stock repurchase should have higher accounting quality than the peer firms without stock repurchases (**H2.3**).

One common proxy for accounting quality is firm accruals quality (e.g., Dechow and Dichev (2002); Francis et al. (2005)). I adopt the exact measure for accruals quality developed by Francis et al. (2005). I regress current period's total accruals on previous, current, and next period's operating cash flow, change in revenue, and gross property, plant, and equipment (PPE). The residuals of the regression are the accruals that cannot be explained by the accounting variables. The standard deviation of the residuals in the past 5 periods (from $t-4$ to t) represent the level of accruals. Thus, the lower the accruals, the higher the accounting quality. I then compare a firm's accruals value in that quarter with the median accruals value of its product market in the same period. Specifically,

I define $High\_Accounting\_Quality_{i,t}$ as an indicator variable that equals one if firm i's accruals in quarter t is lower than its industry median accruals and zero otherwise. With this proxy for firm accounting quality, I run the following regression for the subsample of peer firms:

$$High\_Accounting\_Quality_{i,t+n} = \beta_1 Repurchase_{i,t} + \beta_2 X_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t+n} \tag{16}$$

where $n \in \{1,2,3,4\}$ in quarters. As the subsample only contains peer firms, and thus $Peer2Quarters_{i,j,t-1}$ equals one for all the observations in this test. $Repurchase_{i,t}$ equals one if firm i repurchases shares in quarter t in the open market, and zero otherwise. The remaining variables follow the definitions in Equation (13). Table 18 displays the results.

The coefficient on *Repurchase* are positive and statistically significant at the one percent level in all four columns. It suggests that within peer firms, those that repurchase shares have higher accruals quality than those that do not repurchase shares. This set of results is consistent with hypothesis **H2.3** for higher accounting quality peer firms use stock repurchases to reveal their true accounting quality. Peer firms that repurchase shares after being affected by focal firms' financial restatements are 2.9% more likely than the unconditional mean to have higher than industry median accruals quality in the next quarter, as compared to peer firms who do not repurchase shares.[64]

The literature has shown that peer firms experience negative announcement returns upon focal firms' financial restatements because investors worry about their accounting quality. However, such a link has not been documented for peer firms with positive announcement returns after exposure to focal firms' financial restatement. I show in Appendix Table A13 that conditional on peer firms with positive announcement returns after being affected by focal firms' financial restatements, the ones that repurchase shares have better accruals quality, and thus accounting quality,

[64]The unconditional mean of *High Accruals Quality* is 0.5040. Using the coefficient on *Repurchase* from column (1), the difference from the unconditional mean is $\frac{0.01438}{0.5040} = 0.029$, i.e., 2.9% higher probability of its accruals quality to be better than the product market median.

than their counterparts that do not repurchase shares. This robustness tests confirm that it is not undervaluation that drives the spillover effect. Instead, it is the peer firms with better accounting quality that repurchase shares to separate from the pooling equilibrium with the peer firms of lower accounting quality.

Further, I employ an alternative measure for a firm's accounting quality to test the robustness of the results. In the appendix, I proxy for a firm's accounting quality by its likelihood of managing earnings to narrowly beat the target value (Lang et al., 2006; Barth et al., 2008). I define this threshold above the target as 2 cents such that a firm actively adopts earnings management if its actual earnings is less than 2 cents higher than the target.[65] The $High\_Earnings\_Quality_{i,t+n}$ indicator here is one if firm i does *not* manage its earnings to be slightly above the target in quarter $t+n$ and zero otherwise. Following the same regression as Equation (16), Appendix Table A14 shows that peer firms who repurchase shares have higher accounting quality represented by the lower likelihood of earnings management than peer firms who do not repurchase shares.

Collectively with Table 18, I provide the first step in evidencing that the spillover effect originates from higher accounting quality peer firms repurchase shares to separate from the pooling equilibrium with the lower accounting quality peer firms.

2.5.2 Peer Firms' Subsequent Restatements

Financial restatements directly reflect firms' accounting quality. It means that peer firms who restate their own financial reports are the ones with lower accounting quality and vice versa. Peer firms with higher accounting quality can use stock repurchases to separate from the rest. Thus, peer firms who repurchase shares should have lower likelihood in restating their own financial reports subsequently than peer firms who do not repurchase shares (**H2.4**). By restricting to the subsample

[65] In unreported results, I test robustness by changing the threshold from 2 cents to 1 cent, 3 cents, and 5 cents slightly above the target. All results still hold.

of peer firms, I run the following regression model to test this hypothesis:

$$Subsequent\_Fin\_Res_{i,t+n} = \beta_1 Repurchase_{i,t} + \beta_2 X_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t+n} \tag{17}$$

where $n \in \{1,2,3,4\}$ in quarters. The subsample is identical to that in Section 2.5.1. *Subsequent_Fin_Res*$_{i,t+n}$ is an indicator variable that measures whether firm i issues any restatement in the next n quarters. The remaining variables follow the same definitions as in Equation (13). Table 19 exhibits the results.

The independent variable *Repurchase* has negative coefficients in all four columns, with statistical significance at the 10% level in columns (1) and (2). It implies that peer firms who repurchase shares have lower likelihood in restating their own financial reports in the next two quarters than their counterparts who do not repurchase shares. The effect correspond to 33% and 47.5% less likely to issue financial restatements from the unconditional mean among peer firms with stock repurchases. These magnitudes are relative to peer firms without stock repurchases in the first and second quarter after the focal firms' financial restatements.[66] The results are not statistically significant in columns (3) and (4) likely because it is rare for firms to restate their financial reports many periods after they occur. Nevertheless, Table 19 provide consistent results that peer firms with stock repurchases are less likely to restate their own financial statements subsequently than peer firms without stock repurchases.

2.5.3 Peer Firms' Subsequent Litigation Risk

Peer firms with better accounting quality want to reveal that information to the participants in the equity market. They do so to separate from the ones with lower accounting quality because

[66] Taking Column (1) and (2) for comparison. In column (1), the decrease from the unconditional mean is $\frac{0.00467}{0.0142} = 0.329$ or 33%. In column (2), the decrease from the unconditional mean is $\frac{0.00675}{0.0142} = 0.475$.

the latter often incur legal actions by investors, regulators, and watchdog groups. Hanley and Hoberg (2012) have also documented that firms apply numerous strategies to mitigate litigation risks during IPOs. Presumably, peer firms with higher accounting quality want to signal their accounting superiority to mitigate the litigation risk of class action lawsuits against their accounting practices. By the logic similar to that in Section 2.5.1 and 2.5.2, peer firms with stock repurchases are the ones with better accounting quality. Thus, ex post, they should have lower accounting-related litigation risk than peer firms without stock repurchases (**H2.5**). Within the subsample of peer firms, the following specification tests for this hypothesis:

$$Subsequent\_Litigation\_Risk_{i,t+n} = \beta_1 Repurchase_{i,t} + \beta_2 X_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t+n} \tag{18}$$

where $Subsequent\_Litigation\_Risk_{i,t+n}$ is an indicator variable that measures whether firm i faces any class action lawsuits against its accounting practices in the next six months, one, two, and three years after quarter t. The class action lawsuits against firms' accounting practices pertain to Rule 10b-5 of the Securities Exchange Act of 1934, Section 11, and Section 12(a) of the Securities Act of 1933, as described in Section 2.3.1. I measure litigation risk over a longer horizon because it takes time to file a class action lawsuit against a public firm in the U.S.. The subsample used in this analysis follows the one in Section 2.5.1 and 2.5.2.

Table 20 exhibits the empirical results. The coefficients on *Repurchase* are negative and statistically significant at the 1% level, suggesting that peer firms with stock repurchases have lower litigation risks against their accounting practices than peer firms without stock repurchases, consistent with **H2.5**. This finding supports the argument that peer firms of higher accounting quality avoid repercussions associated with low accounting quality by separating from the pooling equilibrium via stock repurchases. Without stock repurchases, peer firms attract attention from watchdog

groups, regulators, and other market participants to their accounting quality. In turn, they are more likely to incur accounting-related class action lawsuits filed by these entities. With stock repurchases, higher accounting quality peer firms separate themselves from the pooling equilibrium. They have revealed their accounting superiority to the relevant parties in the equity market and do not experience greater accounting litigation risk than their counterparts that do not repurchase shares.

The accounting-related litigation risk in the six months following peer firms' exposure to focal firms' financial restatements reduces by 89% from the unconditional mean for peer firms who repurchase shares relative to those who do not repurchase shares.[67] This represents a much larger economic magnitude than the previous results. It confirms the rationale for peer firms with greater accounting quality using stock repurchases to separate from the rest. Consequently, they manage to mitigate accounting-related litigation risks.

I test the same hypothesis using interactions and present the results in Appendix Table A15. I include the accounting quality measured by accruals quality of the peer firms in the regression model and interact that with peer firms' stock repurchase decisions. The interaction indicates the marginal effect of stock repurchases on peer firms' accounting-related litigation risks while holding the accounting quality constant. Columns (1) and (2) of Table A15 show negative and statistically significant coefficients on the interaction terms. Conditional on the accounting quality of a peer firm, repurchasing shares will reduce its accounting-related litigation risks, consistent with the hypothesis. This provides a robustness test where better peer firms repurchase shares to signal their superior accounting quality to separate from the pooling equilibrium with peer firms of lower accounting quality. In turn, the former avoid unwanted repercussions such as accounting-related

[67] For the six months period, it corresponds to column (1) of Table 20. *Repurchase* in column (1) has a coefficient of -0.00402, while the unconditional mean for an accounting-related litigation is 0.0045 as shown in Table 13. Thus, the economic magnitude is $\frac{-0.00402}{0.0045} = -0.893$ or -89%.

class action lawsuits.

This set of results completes the argument on peer firms using stock repurchases to separate themselves from a pooling equilibrium. Specifically, peer firms with better accounting quality repurchase shares to distinguish from the peer firms with lower accounting quality after exposure to focal firms' financial restatements. This spillover effect manifests itself in repurchasing firms showing greater accounting quality in higher quality of accruals and lower likelihood of subsequent self-restatement. In turn, the repurchasing peer firms, i.e., the peer firms with higher accounting quality, reduce accounting-related litigation risks.

2.6 Robustness

Accounting quality is a subset of general disclosure quality of a firm. In the context of this chapter, it would imply that peer firms that repurchase shares should be the ones with better general disclosure quality than the affected peer firms that do not repurchase shares. In unreported results, I broaden the definition of accounting quality to disclosure quality. The results in Section 2.5.1 and 2.5.2 still hold such that peer firms with stock repurchases have greater disclosure quality in general than the peer firms without stock repurchases.

The tests on peer firms' accounting quality in Section 2.5 rely on ex-post measures conditional on peer firms' stock repurchases after they are affected by focal firms' financial restatements. Alternatively, I can use ex-ante measures on accounting quality to predict the likelihood of a peer firm to repurchase shares upon exposure to the focal firm's financial restatements. This would provide additional robustness to the results presented earlier. In unreported results, I restrict the sample to only peer firms. I then regress their likelihood of stock repurchases in the two periods after being affected by focal firms' financial restatements on lagged accounting quality measures (accruals quality and earnings management). Both tests show consistent results that peer firms

with better prior accruals quality and lower likelihood in managing earnings are more likely to repurchase shares after the occurrence of focal firms' financial restatements than other peer firms with lower prior accruals quality and higher likelihood in managing earnings. Hence, my results are robust such that peer firms with better accounting quality use stock repurchases to separate from the pooling equilibrium from peer firms with lower accounting quality. Thus, the former mitigate accounting-related litigation risks associated with lower accounting quality.

Further, I compare the accounting quality between repurchasing and non-repurchasing firms when there are no financial restatements. This set of tests will provide a robustness check on whether all repurchasing firms have better accounting quality. Interestingly, I do not find such results, which suggest that during normal times without the shock of focal firms' financial restatements that trigger investors to question the accounting quality of a given industry, firms do not use stock repurchases to reveal their accounting quality.

There exists a rich literature on measuring accounting quality. Thus, it is impossible to conduct robustness tests using every accounting quality measure documented in the literature. However, to ensure the results hold at least generally well in terms of other measures of accounting quality, I follow Collins et al. (2017) for alternative proxies of accounting quality. The results where repurchasing peer firms have higher accounting quality remain unchanged.

3 Chapter 3

In the past few decades, the popularity of stock repurchases as a payout method has been increasing dramatically (Chetty and Saez, 2006). In the meanwhile, the fraction of corporate payouts made through cash dividends has been decreasing (e.g., Fama and French (2001)). Even after the Jobs and Growth Tax Relief Act of 2003 in the U.S., which reduced the tax rate on dividends to

15%, stock repurchases have been the dominant payout mechanism over cash dividends. In addition, the corporate tax cut in December 2017 further increased the amount of payout through stock repurchases. This phenomenon of disappearing dividends has been documented by Fama and French (2001); Grullon and Michaely (2002); Baker and Wurgler (2004); Brav et al. (2005) among others. This raises the question: What drives firms' choice of payout mechanism between cash dividends and stock repurchases, and the consequences of this choice for firms' stock prices? The objective of this chapter is to address this question in a setting where there is heterogeneity in investor beliefs about firms' future prospects between firm insiders and outsiders, and among outsiders, providing a new perspective that has not been studied in the literature.

A recent theoretical paper by Bayar et al. (2021) argues that the level of heterogeneity in investor beliefs is an important contributing factor for firms' choice of payout mechanism between cash dividends and stock repurchases. They argue that, when the degree of heterogeneity in investor beliefs about a firm's future prospects is high between its insiders and outsiders, and among the outside equity holders, there is a larger fraction of outsiders who are more pessimistic about the firm relative to its insiders. In turn, these pessimistic outsiders value the firm less than the insiders, i.e., they undervalue the firm relative to insider beliefs. This generates an incentive for the firm to repurchase undervalued shares from pessimistic outsiders, since, from the point of view of optimistic firm insiders, buying back shares from outside investors who are more pessimistic about their firm's future prospects is a positive NPV use of the cash available with the firm. Cash dividends, on the other hand, always have zero NPV. As the firm spends money on projects with the highest NPV first, it will pay out a larger fraction of its total cash distribution through stock repurchases compared to cash dividends when the level of heterogeneity in investor beliefs is high.

Using the normalized standard deviation of analysts' quarterly earnings forecast as the proxy for the heterogeneity in investor beliefs about firms' future prospects, which we term as the *Dis-*

persion of beliefs, our empirical tests support the hypothesis mentioned above. Higher level of heterogeneity in investor beliefs is associated with a larger fraction of firms' total payout amounts to be delivered through stock repurchases than cash dividends. One standard deviation increase in *Dispersion* corresponds to $1.9 million increase in the dollar amount of stock repurchases as a part of a firm's quarterly payout. Identification tests using the differential impact of COVID-19 on investor beliefs in different economic sectors find consistent results, corroborating that greater degree of heterogeneity in investor beliefs motivates firms to pay out a larger fraction of their total quarterly payout amounts using stock repurchases as compared to cash dividends.

Since the decision between cash dividends and stock repurchases hinges on the relative NPV of each choice under a given level of heterogeneity in investor beliefs, the firm will also compare the NPV of these payout choices with the NPV of real investments. When adding real investments to the mix, the firm continues to devote resources to the opportunity with the highest NPV first. A higher level of heterogeneity in investor beliefs produces greater dispersion in investor beliefs between insiders and outsiders, and among outsiders, generating greater differences in the valuation of the firm. A higher portion of outsiders are likely to be more pessimistic than insiders, boosting the NPV of repurchasing those more undervalued shares from the outside pessimists. Thus, it is more likely that the NPV of stock repurchases would surpass that of some other real investments. It means that the firm will choose to repurchase more shares first before investing in lower NPV real investment opportunities. We provide empirical evidence supporting this hypothesis that larger fraction of stock repurchases in a firm's total payout amounts is associated with lower real investments for the firm in the subsequent four quarters.

In the meantime, if a firm experiences a high level of heterogeneity in investor beliefs about its future prospects, there must be more room for the firm to repurchase shares from outside pessimists for the positive NPV of such actions. Hence, the firm would prepare to repurchase more shares and

allocate some cash that can otherwise be used for other lower NPV real investments to future stock repurchases. Our findings empirically document this anticipation effect where firms with greater *Dispersion*, i.e., a higher level of heterogeneity in investor beliefs, will anticipate for larger fraction of total payouts being done through stock repurchases in the near future and cut real investments for this anticipation effect.

Next, we analyze the impact of paying out a larger fraction of firms' total payout amounts via stock repurchases under heterogeneous beliefs on firms' post-repurchase stock returns. We will analyze both the immediate impact of a stock repurchase on a firm's stock returns (the price impact) and also the long-run post-repurchase stock returns. In terms of the price impact, we conjecture that when the level of heterogeneity in investor beliefs is high, the NPV of stock repurchases is positive. We hypothesize that firms will pay out a larger fraction of their total distribution via stock repurchases for the higher NPV, which benefits the firm both in the short-run in terms of the price impact, and in the long-run in terms of long-term abnormal stock returns. The intuition here is that, when firms repurchase shares from outside equity holders, they start from those with the most pessimistic beliefs (lowest valuation). The larger fraction of a firm's total payout being done through stock repurchases means more pessimists' holdings are bought back by the firm. The marginal investor remaining in the equity market, who determines the stock price of the firm, has more optimistic views as the firm repurchases more shares. Thus, the stock price of the firm also increases in the short term. Our results are consistent with the above hypothesis. We find that firms paying out a larger fraction of their total distribution with stock repurchases have a larger positive price impact on their equity.

We now turn to the empirical analysis of long-run stock returns after a repurchase. Bayar et al. (2021) argue theoretically that, as the firm pays out a larger fraction of its total payout using stock repurchases, the differences in beliefs between firm insiders and outsiders, as well as among out-

siders start to shrink. As pessimists sell their shares back to the firms, the beliefs of the remaining investors start to converge. Over this period, hard information about the firms' future prospects such as earnings announcements arrives, generating information that further reduces the heterogeneity in investor beliefs. These two factors jointly will result in persistently higher stock prices of the firms as compared to before their payout with stock repurchases. Hence, firms that pay out a larger fraction of the total cash disbursement with stock repurchases also experience greater long-run abnormal stock returns. The results of our empirical analysis support the above hypothesis. One standard deviation increase in the amount of stock repurchases as a fraction of firms' total quarterly payout is associated with 65 basis points greater abnormal stock returns within 3 months. The magnitude monotonically increases to 5.16% in three years. An important aspect of this finding is that, along with our price impact results, help to distinguish this chapter from the asymmetric information argument in the existing literature (e.g., Brennan and Thakor (1990)). Under asymmetric information alone, all information should be revealed when firms *announce* open market repurchase programs. Consequently, one will otherwise find neither a positive price impact nor long-run abnormal stock returns after firms execute stock repurchase payouts within the information asymmetry framework. The fact that we find such results enables us to show that heterogeneity in investor beliefs constitute an additional driver for firms' choice of payout using stock repurchases as compared to cash dividends.

We now turn to the relationship between insider trading and firms' payout choice mechanism between stock repurchases and cash dividends. The intuition described above implies that firm insiders with more optimistic beliefs about a firm's future prospects value the firm higher than outsiders with more pessimistic beliefs. Thus, there are profits to be made if the former can buy shares from the latter. In our setting, firm insiders believe that there are profits when repurchasing shares from outside pessimists. If the firm buys those shares, the profits are shared among all remaining

investors including both insiders and the remaining outsiders left. However, if the insiders use their personal account to buy those shares from outside pessimists, they can retain all the profits to themselves. Such trading would leave fewer pessimists from whom the firm can repurchase shares. We conduct empirical tests to validate such a claim. We find that firms with more insider buying in the previous quarter pay out a smaller fraction of their total distributions using stock repurchases in the current quarter. In other words, we document an inverse relationship between insider buying of the firm's equity and firms' use of stock repurchases to pay out value. This describes a substitution effect between insider buying and firms' payout fraction in stock repurchases.

Second, we analyze the relationship between market downturns and the fraction of cash paid out using stock repurchases rather than dividends. During market downturns, the widespread pessimism among retail investors likely enlarges the dispersion of beliefs about firms' prospects between firm insiders and outsiders (many of whom are retail investors). We would therefore expect that market downturns are positively related to firms' fraction of payout using stock repurchases as compared to cash dividends. The results of our empirical tests confirm this hypothesis. We find that market downturns motivate firms to pay out a larger fraction of their total payout amounts using stock repurchases than cash dividends, consistent with our heterogeneous beliefs hypothesis. This provides another distinction from the information asymmetry hypothesis because it is unlikely that many firms suddenly incur a large degree of information asymmetry at the same time as stock market downturns. Conversely, it is more likely that beliefs about firms' future prospects start to change among different market participants during such times, leading to a larger degree of heterogeneity in investor beliefs between insiders and outsiders, and among outside investors.

Finally, we speak to the disappearing dividend puzzle by providing a new factor that may partially explain this phenomenon. In particular, as seen in the literature, the percentage of firms paying cash dividends has been decreasing in the past few decades, while that of firms repurchasing

shares has been increasing during the same period. Given that heterogeneity in investor beliefs may motivate firms to pay out more of their total distribution using stock repurchases rather than cash dividends, we conjecture that the level of heterogeneity in shareholder beliefs has been going up steadily over time. By grouping firms by time baskets, we find results consistent with our hypothesis. In particular, the level of heterogeneity in investor beliefs (as measured by *Dispersion*) is higher in more recent years than in the earlier years of our sample. And such trends extend to the fraction of firms' total payouts using stock repurchases. With two-stage least square regressions, we further confirm that increasing heterogeneity in shareholder beliefs over time is correlated with larger fraction of firms' total payouts using stock repurchases over time.

This chapter makes several important contributions to the literature. First, this is the first paper in the literature that empirically compares firms' payout choice between cash dividends and stock repurchases under heterogeneous beliefs. Few papers have compared between cash dividends and stock repurchases. Among the ones conducting such comparisons like Guay and Harford (2000); Grullon and Michaely (2002); Skinner (2002), none of them have looked at the issue when there exists heterogeneity in investor beliefs. Second, we add to but differ from the existing literature that analyzes the effect of information asymmetry between firm insiders and outsiders on firms' stock repurchases. We provide evidence in terms of price impact and long-run abnormal stock returns upon firms' actual repurchase executions to signify that asymmetric information alone cannot drive such findings. Hence, we provide new evidence supporting that the heterogeneity in investor beliefs is a new channel driving firms' choice of payout mechanism between stock repurchases and cash dividends, and document its associated impact on firms' stock returns. Third, our findings on the anticipation effect of firms' stock repurchases and real investments, as well as the substitution effect between insider buying and the corporate action of payout using stock repurchases are also new to the literature. Fourth, we deliver a new but rational explanation for the disappearing dividend

puzzle where increasing heterogeneity in investor beliefs over time is a contributing factor for the trend of decreasing ("disappearing") dividends but increasing stock repurchases.

3.1 Related Literature

This chapter is related to several strands in the existing literature that analyzes firms' payout choices between cash dividends and stock repurchases. The first is the theoretical literature that Brennan and Thakor (1990); Lucas and McDonald (1998) both present models to show that the size of cash distribution determines the methods of payout. In particular, larger payout amounts will be delivered via stock repurchases, whereas smaller amounts are done with cash dividends. Both of these papers and others in the current theoretical literature set their models in the asymmetric information framework. This chapter differs from the other papers in that we focus on the setting of heterogeneous beliefs where there are differential beliefs about firms' future prospects between firm insiders and outside equity holders, and such heterogeneity also exists among outside equity holders, to derive firms' choice of payout. We also provide empirical results that help us differentiate from the asymmetric information framework presented in the existing literature.

From the empirical perspective, this chapter is related to Guay and Harford (2000); Grullon and Michaely (2002); Skinner (2002). These papers empirically compare the conditions under which firms prefer one form of payout (i.e., cash dividends or stock repurchases) to the other. We add to this strand of literature by providing a new factor that drives firms' choice of payout methods between stock repurchases and cash dividends, namely, the degree of heterogeneity in investor beliefs about firms' future prospects, which have not been studied in the literature.

Naturally, this chapter also relates to the broader literature on stock repurchases (see e.g., Comment and Jarrell (1991); Jagannathan et al. (2000); Brav et al. (2005); Chetty and Saez (2006); Huang and Thakor (2013) etc.) and heterogeneous beliefs (see e.g., Miller (1977); Morris (1996);

Duffie and Pedersen (2002) etc.). However, this chapter stands out from theirs in that we not only studies stock repurchases, but effectively compares that with cash dividends when there is heterogeneity in investor beliefs about firms' future prospects.

3.2 Theoretical Framework and Testable Hypotheses

This section provides a theoretical framework for our empirical analysis and develops testable hypotheses. The theoretical setting we use to develop our testable hypotheses relies on the model of Bayar et al. (2021). Consider a setting of heterogeneous beliefs, where there are two types of agents, firm insiders and outside equity holders. The objective of the firm is to choose the optimal payout method between cash dividends and stock repurchases, while simultaneously making the firm's real investment decisions. Outsiders have heterogeneous beliefs about the firm's future prospects, both among themselves and with respect to firm insiders.

For simplicity, consider the framework depicted in Figure 1. A publicly traded firm has its future prospects reflected by the long term cash flow that can either be high (X^H) or low (X^L). Owning a fraction of the firm's equity, insiders believe that the firm will realize X^H with probability θ^f and realize X^L with probability $(1-\theta^f)$. Outsiders have heterogeneous beliefs on the long term cash flow of the firm, which also differ from the beliefs of insiders. In other words, there is heterogeneity in beliefs between insiders and outsiders, and among outside equity holders about the firm's future prospects. Outsiders believe that the probability of the firm achieving X^H is θ, while that for achieving a payoff X^L is $(1-\theta)$. Let the outsider beliefs be uniformly distributed over the interval $[\theta^m - \delta,\ \theta^m + \delta]$. We define θ^m, the average belief among outsiders, as the level of outsider optimism, and δ, the spread between the mean outsider belief and the extreme outsider belief (most optimistic or most pessimistic), as the dispersion in outsider beliefs. Further, we denote the marginal investor's (who determines the stock price of the firm) belief by $\bar{\theta}$.

Within such a theoretical framework, (Bayar et al., 2021) argue that firm insiders will compare the NPV (based on their own beliefs) among cash dividends, stock repurchases, and real investments at a given level of heterogeneity in investor beliefs between insiders and outsiders, and among outsiders, when making their payout decision. In particular, they postulate that when there is greater heterogeneity in outsider beliefs (higher δ), there are more outsiders less optimistic than insiders ($(1-\theta) > (1-\theta^f)$). In turn, the marginal investor will likely have less optimistic beliefs on the firm's prospect than insiders ($\bar{\theta} < \theta^f$). Thus, the marginal investor values the firm's stock less than insiders, creating a positive NPV for the firm to repurchase undervalued shares from the less optimistic outsiders.[68] On the other hand, cash dividends always have zero NPV because all equity holders receive the same payment (on a per share basis) regardless of their beliefs about the firm's future prospects. Conversely, if there is a lesser degree of heterogeneity in outsider beliefs (i.e., smaller dispersion and smaller δ), fewer outsiders are less optimistic than insiders. In this case, the amount devoted to buying back shares by the firm will be smaller: recall that, buying back "overvalued" shares (from the point of view of insider beliefs) is a negative NPV use of the firm's cash, so that in this case, the firm will payout a larger fraction of its cash available for distribution through dividends.

Thus, with heterogeneous beliefs, firms make the payout decision by comparing the net present value (NPV) of these two choices. Cash dividends always have zero NPV, while payout through stock repurchases may have a positive, zero, or a negative NPV depending on the degree of heterogeneity in investor beliefs between insiders and outsiders, and among outsiders (Bayar et al., 2021). When insiders' beliefs are more optimistic than a group of outside equity holders, there is positive NPV in buying back shares that are undervalued by the outside pessimists. If insiders' beliefs are similar to those of all the outsiders, payout with stock repurchases is then a zero NPV transaction

[68] Not that, since firm insiders are the decision makers, the expected net present value (NPV) of each action is computed with respect to the firm insiders' beliefs.

since all shareholders have the same valuation on the firm's share price. Further, if firm insiders value the firm's future prospects less than most of outside equity holders, buying back shares from outsiders will have negative NPV (conditional on insider beliefs) because the shares are overvalued by the outsiders. Thus, firms will compare the NPV of stock repurchases with that of cash dividends when making payout decisions and choose the fraction of the distribution amount to pay out through repurchases optimally (the remaining fraction will be paid out through dividends). In summary, depending on the configuration of insider and outsider beliefs, some firms may choose to pay out cash only through dividends; some may choose to pay out only through stock repurchases; and some may choose a combination of dividends and repurchases to pay out cash to outsiders.

3.2.1 Stock Repurchase versus Cash Dividends under Heterogeneous Beliefs

When heterogeneous beliefs about a firm's future prospects described above widen, the gap in beliefs about the firm's future prospects enlarges among outsiders (δ increases). Similarly, the gap also enlarges between firm insiders and the group of outsiders that are more pessimistic than the insiders. Thus, the differences in opinion about the firm's future prospects between its insiders and the pessimistic outsiders are greater, increasing the NPV in repurchasing shares from those pessimistic outsiders. The firm will take advantage of the higher NPV in stock repurchases to buy back more undervalued shares from the pessimists (Bayar et al., 2021). In turn, the firm pays out a larger fraction of its cash via stock repurchases as compared to cash dividends. This generates our first hypothesis that firms whose shareholders have greater heterogeneity in investor beliefs will pay a larger fraction of their total payout amounts using stock repurchases rather than cash dividends (**H3.1**).

3.2.2 Heterogeneous Beliefs, Stock Repurchases, and Real Investment Expenditures

When firms make the payout decisions under heterogeneous beliefs, they also choose the optimal real investment amount simultaneously (Bayar et al., 2021). When adding real investment decisions to the mix, firms will then compare the NPVs of the available investment opportunities with those of stock repurchases and cash dividend payments. When there is a greater heterogeneity in shareholder beliefs, the differences in opinion about the firm's future prospects are larger between insiders and the pessimistic outsiders, which increases the NPV of repurchasing shares from the pessimists. With greater heterogeneity in investor beliefs, the NPV of buying back shares from pessimists is also more likely to surpass the NPV of some available real investment opportunities, making stock repurchases more valuable than investing in those lower NPV projects.

The above logic implies that, as the heterogeneity in investor beliefs increases, subsequent investment expenditures are affected through two distinct channels. First, the fraction of cash paid through stock repurchases increases (since the NPV of stock repurchases increases), cutting down on the amount immediately available for real investment expenditures. Second, the opportunity for future stock repurchases by buying back a larger number of shares from pessimists increases, motivating the firm to cut back on investment expenditures in the future as well. This is the next hypothesis that we have here (**H3.2**).

3.2.3 Price Impact after Payout under Heterogeneous Beliefs

Firms buying back shares in the open market may have a price impact on their stock prices.[69] When a firm undertakes a stock repurchase program, it will start buying shares from the most

[69] Price impact is fundamentally different from the announcement effect. Price impact of a stock repurchase refers to the change in stock prices upon the firm actually executing the buy-back order in the open market, i.e., the actual repurchase action. The announcement effect refers to the change in stock prices or abnormal stock returns when a firm *announces* an open market stock repurchase program.

pessimistic outside equity holders. Thus, the marginal investor remaining values the firm more than the most pessimistic group ($\bar{\theta} > (\theta^m - \delta)$). In turn, this results in a positive price impact on the firm's stock price as it rises above the most pessimistic group's valuation after the stock repurchase. On the other hand, cash dividend payments induce zero price impact because no investors' beliefs about the firm's future prospects have changed and the group of pessimistic outsiders still exist. Hence, the larger fraction of cash that the firm pays out through a stock repurchase, the higher the marginal valuation of the firm by the remaining outside equity holders (higher $\bar{\theta}$), and the greater the price impact (**H3.3**).

3.2.4 Long-run Abnormal Stock Returns after Payout under Heterogeneous Beliefs

As a stock repurchase reduces the presence of pessimistic outside equity holders, not only would it induce positive price impact on the firm's stock but should also have a long-term effect. In particular, consider a setting with only two time periods: time t_1 where a firm buys back its shares in the open market and time t_2 where all cash flows are revealed (i.e., future prospects are realized in X^H or X^L). In between these two times, let us assume that some hard information about the firm's future prospects arrives (e.g., earnings announcements). With the shares repurchased from pessimistic outsiders, the remaining outside equity holders are more and more optimistic relative to the firm insiders. The marginal outside investor holding the firm's share is more optimistic about the firm's future prospects than those before the stock repurchase. After the arrival of the hard information on the firm's future prospects between time t_1 and t_2, the differences in beliefs on firm value also dissipates, resulting in convergence of the beliefs about firm value between insiders and outsiders as shown by Bayar et al. (2021). Hence, the firm experiences greater long-run stock returns after the reveal. In other words, the larger the fraction of value that the firm delivers through a repurchase as compared to cash dividend payments, the greater valuation of the

remaining marginal investor, the higher the post-payout long-run abnormal stock returns for the firm (**H3.4**).

3.2.5 Insider Trading and Substitution between Insider and Firm Stock Repurchases

A higher level of heterogeneity in outside investor beliefs about a firm's future prospects will motivate the firm to pay out more of its cash through stock repurchases than cash dividends. However, upon realizing such opportunities, insiders know that buying back shares from outside pessimists is profitable and may try to keep as much of those profits to themselves. On the contrary, if the firm repurchases shares from the outside pessimists, the profits are shared among all remaining equity holders, which include both the insiders and outsiders in the interval $[\bar{\theta}, \theta^m + \delta]$. As a result, the firm insiders may want to buy back shares from those pessimists first on their personal account. In other words, insiders of the firm will buy more shares on their personal account before the firm repurchases shares from pessimistic outside equity holders. The more that insiders buy on their personal account before the firm starts its own stock repurchases, the fewer pessimists are left for the firm to repurchase shares from. Hence, the greater the insider buying of shares on their personal account, the smaller the subsequent stock repurchases by the firm. Thus, our next hypothesis is that a firm's insider buying is inversely related to the firm's subsequent fraction of payout using stock repurchases as compared to cash dividends (**H3.5**).

3.2.6 The Relationship between Stock Market Conditions and Firm Choice between Stock Repurchases and Cash Dividends

Economic conditions may largely affect investors' beliefs, which alters the degree of heterogeneity in investor beliefs about a firm's future prospects. In turn, this will impact the firm's payout decision using stock repurchases versus cash dividends. In particular, the existing literature has es-

tablished that market conditions often change investor sentiment and their beliefs where market downturns induce more pessimism among retail investors (e.g., Mitchell and Netter (1989); Baker and Wurgler (2006)). Under such conditions, however, firm insiders' opinions about their firms' future prospects may remain relatively stable. Thus, the degree of heterogeneity in investor beliefs (and the difference between insider and outsider beliefs) may become larger after market downturns, motivating the firm to payout a larger fraction using stock repurchases than cash dividends (to take advantage of the larger positive NPV in repurchasing shares from the more pessimistic outsiders induced by the market downturns). Accordingly, we hypothesize that macro-conditions in the financial market are inversely related to firms' payout choice using stock repurchases as compared to cash dividends (**H3.6**).

3.2.7 Stock Repurchases versus Cash Dividends through Time

The existing literature has documented that the proportion of firms paying cash dividends has been decreasing in the past decades (e.g., Fama and French (2001)), a phenomenon commonly known as the "disappearing dividend puzzle". On the other hand, stock repurchases have been rising steadily (see e.g., Jagannathan et al. (2000); Peyer and Vermaelen (2009)). In turn, the fraction of payout using stock repurchases as compared to cash dividends has also been gradually going up. As we have argued above, greater heterogeneity in investor beliefs about a firm's future prospects encourages firms to pay out a larger fraction of cash using stock repurchases rather than through cash dividends. Thus, it is possible that the increasing heterogeneity in investor beliefs plays a part in the disappearing dividend and rising stock repurchase puzzle. We hypothesize that one possible contributor of such a trend may be that the level of heterogeneity in investor beliefs has been going up over time, leading to a substitution of cash dividends with stock repurchases for firm payouts (**H3.7**).

3.3 Data and Summary Statistics

We collect quarterly actual repurchases ($ million) and dividend payments ($ million) from COMPUSTAT, which also provides data on other firm level accounting variables as controls. We obtain daily stock prices for each firm and the market from the Center for Research in Securities Prices (CRSP) database. We use analysts' earnings forecast from I/B/E/S to calculate the proxy for heterogeneous beliefs. Thomson Reuters Insiders is where we acquire all the insider trading related information. The sample period ranges from 2005 to 2020. Control variables measured at the quarterly level are matched to quarterly payout data contemporaneously, whereas those measured at the annual frequency are matched to quarterly payout data by the previous fiscal year-end.

Our main proxy for the heterogeneous beliefs on firm future prospects is the *Dispersion* of analysts' earnings forecasts on a given firm's quarterly earnings per share (EPS). It is calculated as the standard deviation of a firm's earnings forecasts across all the analysts covering that firm in that quarter. We then scale the standard deviation by the mean of the earnings forecasts to create a standardized measure for dispersion. To test for robustness of our results later on, we construct two additional proxies for heterogeneous beliefs - *Abnormal Turnover* and earnings *Forecast Error*. *Abnormal Turnover* is defined as the turnover of a firm in a given quarter minus the median value of the firm's turnover in the past 12 quarters (3 years). *Forecast Error* is the difference between actual earnings and each analyst's earnings forecast, divided by the mean of analyst earnings forecast for a firm in a given quarter, and averaged across all analysts. As the forecast error measure is averaged across all analysts covering a firm in a given quarter, we refer to it as *Mean Forecast Error*.

The key dependent variable pertains to a firm's choice of payout between stock repurchases and cash dividends. We measure this variable - *Fraction of Repurchase*, as the dollar amount of stock repurchases that a firm actually buys back in the open market in a given quarter divided by the total amount of cash payout, which is the sum of dollar amount of stock repurchases in that quarter and

the dollar amount of cash dividends paid in that quarter. This allows us to compare firms' payout decisions between cash dividend payments and stock repurchases under heterogeneous beliefs.

We measure *Last 6 Months' Returns* as the total cumulative returns on the firms in the past six months prior to the first day of a given quarter. All the buy-and-hold abnormal stock returns (BHAR) refer to firms' abnormal stock returns after the end of the quarter when the payout occurs. They are computed as the buy-and-hold stock returns of a given firm net the buy-and-hold returns on the market, which is the value-weighted CRSP market index.

Table 21 presents the summary statistics of the final sample, which contains a total of 119,041 firm-year-quarter observations. Panel A presents the summary statistics on variables measured at the quarterly frequency and Panel B presents those measured at the annual frequency. There are a total of 5,573 unique firms in the sample covering 69 industries classified by two-digit SIC codes. An average firm in our sample spends about $64 million paying dividends in a given quarter, whereas it distributes $53 million in terms of stock repurchases to shareholders. In turn, a firm delivers an average of 38 percent of its quarterly payout via stock repurchases. Our sample firms also cover a wide range of sizes, with their total assets spanning from $55 million to $300 billion. The main proxy for heterogeneous beliefs, *Dispersion* of analysts' earnings forecasts, has a mean of 1.56, which is the same as its median value. Thus, the distribution of *Dispersion* is normalized for clearer interpretation.

3.4 Relationship between Heterogeneous Beliefs and Stock Repurchases

3.4.1 Baseline Results

We first test that firms with a greater degree of heterogeneity in investor beliefs between insiders and outsiders, and among outside investors, will pay a larger fraction of their total payout via stock

repurchases than via cash dividends (**H3.1**). The intuition is that with greater heterogeneity in investor beliefs, the dispersion of beliefs among outsiders is wider. It allows for a larger portion of outsiders to be more pessimistic than the insiders. Insiders have a higher valuation of the firm than the outside pessimistic investors. Thus, it benefits the firm to repurchase shares from the outside pessimists for the positive NPV embedded in such stock repurchases. To test **H3.1**, we regress a firm's *Fraction of Repurchase* on its *Dispersion* measure, which serves as the proxy for the level of heterogeneity in investor beliefs about the firm's future prospects. Specifically, we focus on the following regression specification and present the regression results in Table 22.

$$Repurchase\,Fraction_{i,j,t} = \beta Dispersion_{i,j,t} + \alpha X_{i,j,t} + \gamma_j + \delta_t + \varepsilon_{i,j,t} \tag{19}$$

where $Repurchase\,Fraction_{i,j,t}$ is the *Fraction of Repurchase* for firm i in industry j at time (year-quarter) t. $Dispersion_{i,j,t}$ is the proxy that measures the level of heterogeneity in investor beliefs of firm i's future prospects between insiders and outsiders, and among outsiders, as defined in Section 3.3. $X_{i,j,t}$ is the set of control variables that are matched contemporaneously for quarterly measures and matched to the previous fiscal year-end for annual measures. γ_j represents industry fixed effect, classified by two-digit SIC codes. δ_t is the time fixed effect. We cluster standard errors at the firm level.

Column (1) of Table 22 only includes *Dispersion* as the independent variable, while column (2) includes the full set of control variables. The coefficients on *Dispersion* are positive and statistically significant at the 1% level in both columns. It suggests that the greater dispersion in investor beliefs about a firm's future prospects, the larger fraction of the payout will be delivered by the firm via stock repurchases, consistent with **H3.1**. In terms of economic significance, one standard deviation increase in *Dispersion* or the level of heterogeneity in investor beliefs corresponds to

a $1.9 million more payout using stock repurchases.[70] Hence, the regression results support our hypothesis where firms with a greater level of heterogeneity in investor beliefs about its future prospects will deliver a larger fraction of its total payout amounts via stock repurchases. With a greater level of heterogeneity in investor beliefs about the firm's future prospects, more outside equity holders have less optimistic beliefs than the insiders. This creates a higher NPV in buying back undervalued shares from these outside pessimists. Since cash dividends always have zero NPV, the NPV of stock repurchases outweigh that of cash dividends under such circumstances, motivating the firm to pay more of their distribution by stock repurchases.

Further, the loadings on the control variables are consistent with the existing literature. The positive and significant coefficients on *Cash*, *Net Income*, and *EPS* suggest that firms with higher earnings and cash are likely to payout a larger fraction using stock repurchases. This is likely due to the fact that larger cash holdings and greater current quarter's earnings are transient. Thus, firms prefer to distribute transient cash increase through stock repurchases (Jagannathan et al., 2000; Brav et al., 2005). The negative and significant coefficient on *Size* implies that larger firms will likely payout a larger fraction using cash dividends. This also makes sense because larger firms have more stable income, enabling them to afford a larger fraction of cash dividends in their total payouts. The positive and significant coefficient on *MTB*, i.e., market-to-book ratio, is consistent with Ben-Rephael et al. (2013) such that growth firms are more likely to capture the benefits in stock repurchases. Finally, *Last 6 Months' Return* bears negative and significant coefficient, suggesting that the lower prior returns are associated with firms paying a larger fraction of their total payout amounts with stock repurchases. This fits with the intuition mentioned above such that with a greater heterogeneity in investor beliefs, there are more outsiders who are more pessimistic

[70]The standard deviation of *Dispersion* is 0.84. The coefficient in Table 22 column (2) is 0.01807. Thus, the magnitude is: $0.84 \times 0.01807 = 0.0151788$. The mean quarterly total payout is $124.71 million. The increase in the dollar amount of stock repurchases is thus: $0.0151788 \times \$124.71 = \$1.9$ million.

than the insiders. This undervalues the stock price of the firm, lowering the prior returns and making stock repurchases from the pessimists a positive NPV project.

To test the robustness of the results, we also run the same regressions using the two alternative proxies for the level of heterogeneity in investor beliefs. First, we replace the *Dispersion* measure with *Abnormal Turnover*, where higher abnormal turnover corresponds to a higher level of heterogeneity in investor beliefs. The results are presented in Appendix A16. *Abnormal Turnover* have positive and significant coefficients, consistent with the main results in Table 22 and hypothesis **H3.1**. Second, we change the independent variable in Equation (1) to *Mean Forecast Error*, where greater value of *Mean Forecast Error* represents a higher level of heterogeneity in investor beliefs about a firm's future prospects.[71] Their results reside in Appendix A22. Similarly, *Mean Forecast Error* yields positive and significant coefficients, supporting the results in Table 22 and hypothesis **H3.1**. Specifically, both robustness tests confirm that when a firm has a greater level of heterogeneity in shareholder beliefs about its future prospects, it is likely to pay out a larger fraction of its total cash distribution via stock repurchases as compared to cash dividends.

3.4.2 Identification

Upon establishing the baseline results on the positive association between heterogeneous beliefs and firm's fraction of payout using stock repurchases as compared to cash dividends, we provide an identification to more clearly isolate this finding. We use the COVID-19 global pandemic (the pandemic from here on) as an exogenous shock to firms and the beliefs of their shareholders. The idea is that the pandemic has a differential impact on different industries in the U.S. economy. In particular, the mandatory stay-at-home orders issued by the U.S. government due to the pandemic negatively impacted industries such as transportation, hotel services, retail, and tourism.

[71] For the definition of *Abnormal Turnover* and *Mean Forecast Error*, please refer to Section 3.3.

On the other hand, the pandemic benefited industries such as healthcare, online merchandise, and financial services. The negatively affected industries likely incurred greater heterogeneity in investor beliefs on firms' future prospects because there was much uncertainty on the outlook of those industries. The benefited industries were less likely to incur such a large increase in the heterogeneity in investor beliefs because the pandemic boosted their general business trends upward. By exploiting this differential impact on the level of heterogeneity in investor beliefs among different industries, we adopt a difference-in-differences approach to identify the effect of heterogeneous beliefs on firms' choice of payout between stock repurchases and cash dividends.

We take the second quarter of 2020 as the treatment period because almost all states in the U.S. have issued stay-at-home order by April 2020. As the stock market crash due to the uncertainty of COVID-19 occurred on March 20, 2020, it marks the clear impact of the pandemic throughout the U.S., making the second quarter of 2020 the natural choice for the treatment starting period. We include three periods before the treatment starting period as the pre-treatment period, and three periods since the treatment starting period as the post-treatment period.[72] Firms in the industries negative affected by the pandemic compose the treated group, whereas those in the industries not damaged by the pandemic constitute the control group. We then run the following regression specification to test for the impact of heterogeneous beliefs on firm's choice of payout between stock repurchases and cash dividends:

$$\begin{aligned} RepurchaseFraction_{i,j,t} = \beta_1 Treated_{i,j} + \beta_2 Post_t + \beta_3 Treated_{i,j} \times Post_t \\ + \alpha X_{i,j,t} + \gamma_j + \delta_t + \varepsilon_{i,j,t} \end{aligned} \tag{20}$$

where $Treated_{i,j,t}$ is an indicator equal to one if firm i is in industry j, where j is negatively

[72]The pre-treatment period is 2019 Q3, Q4, and 2020 Q1. The post-treatment period is 2020 Q2, Q3, and Q4, which is our sample end.

affected by the pandemic, and zero otherwise. $Post_t$ equals one if time t is in the second, third, or fourth quarter of 2020, and zero otherwise. The sample period for this difference-in-differences approach ranges from the second quarter of 2019 to the fourth quarter of 2020. The coefficient on the interaction term, β_3, estimates the treatment effect of the level of heterogeneity in investor beliefs on firms' choice of payout between stock repurchases and cash dividends. The remaining coefficients are as defined in Equation (20). We continue to include industry and time fixed effect, while clustering standard error at the firm level.[73] Table 23 displays the regression results.

The coefficients of β_3 of the interaction term are positive and significant in both columns, implying that firms in industries subject to greater heterogeneity in investor beliefs in the post-pandemic period will payout a larger fraction of their total distribution via stock repurchases. The unconditional mean for *Fraction of Repurchase* is 0.38, as reported in Table 21. Thus, the economic significance for the treatment effect is 16.5 percent higher from the unconditional mean.[74] In other words, firms with greater level of heterogeneity in shareholder beliefs in the post-pandemic period deliver 16.5 % more of their total payout amounts using stock repurchases from the unconditional mean as compared to cash dividends.

This set of results further confirms hypothesis **H3.1**. Firms in industries negatively affected by the pandemic were prone to a higher level of heterogeneity in investor beliefs about their firms' future prospects because most investors had no idea how the industries would perform. Thus, the treated firms incur a greater level of heterogeneity in shareholder beliefs about their future prospects. Firms in the control group were less likely to experience such uncertainty, and thus experience a relatively lower level of heterogeneity in investor beliefs. By comparing between the post-pandemic with the pre-pandemic period, firms with a greater level of heterogeneity in

[73] Because we include industry and time fixed effect, $Treat_{i,j}$ and $Post_t$ cannot be estimated. Only the interaction term can be estimated.

[74] The economic significance with respect to the unconditional mean is calculated as: $\frac{0.0627}{0.38} = 0.165$ or 16.5%

investor beliefs pay out a larger fraction using stock repurchases than firms with a lesser level of heterogeneity in investor beliefs. Further, the control variables show similar sign and statistical significance as the baseline results, supporting the consistency of the results.

In sum, Section 3.4.1 and 3.4.2 together, provide evidence consistent with hypothesis **H3.1**. In particular, we show that firms with a greater level of heterogeneity in investor beliefs about their future prospects pay out a larger fraction of their total cash distributions via stock repurchases as compared to cash dividends.

3.5 Real Investments, Price Impact, and Long-run Stock Returns

3.5.1 Heterogeneous Beliefs and Corporate Investments

When firms choose between stock repurchases and cash dividends for the payout decisions, they simultaneous choose the optimal real investment amount (Bayar et al., 2021). They do so by comparing the NPVs among stock repurchases, cash dividend payments, and real investment opportunities, and start with the one with the highest NPV.

For a firm with a greater level of heterogeneity in investor beliefs, the differences in beliefs between its insiders and the portion of outsiders who are more pessimistic than the insiders are larger. In turn, it increases the NPV of repurchasing undervalued shares from the outside pessimists, making it more likely to be higher than the NPV of some real investments. The firms will take priority in the stock repurchase before allocating monetary resources for the lower NPV real investment projects, as described in hypothesis **H3.2**.

Further, a higher level of heterogeneity in shareholder beliefs about a firm's future prospects also represents more opportunities for future stock repurchases. Hence, it is possible that the firm will plan to repurchase more undervalued shares from outside pessimists and reserve some cash

that can otherwise be used for lower NPV real investments on future stock repurchases, i.e., the anticipation effect explained in hypothesis **H3.2**. We test these two hypotheses jointly by running the following regression specification:

$$\begin{aligned} Investment_{i,j,t+n} = \beta_1 Repurchase\,Fraction_{i,j,t} + \beta_2 Dispersion_{i,j,t} \\ + \alpha X_{i,j,t} + \gamma_j + \delta_t + \varepsilon_{i,j,t+n} \end{aligned} \tag{21}$$

where $n \in \{-1,0,1,2,3,4\}$ in quarters. Thus, $Investment_{i,j,t+n}$ measures the sum of *R&D Expense* and *Capital Expenditure* by firm i in industry j one quarter before, the current quarter, and one, two, three, and four quarters after time (year-quarter) t scaled by firm i's book value in the previous fiscal year-end. $Repurchase\,Fraction_{i,j,t}$ is the *Fraction of Repurchase* for firm i in industry j at time t. β_1 captures the substitution effect between stock repurchases and real investments, corresponding to hypothesis **H3.2**. β_2 pertains to the anticipation effect, and thus refer to the second part of hypothesis **H3.2**. The rest of the specification follows Equation (1). We present the results in Table 24.

Column (1) and (2) of Table 24 has the dependent variable set as firm investment in the quarter prior and the current quarter. Column (3), (4), (5), and (6) of Table 24 uses firm investment in one, two, three, and four quarters from the current quarter as the dependent variable, respectively. The negative and significant coefficients on *Fraction of Repurchase* (β_1) across all columns indicate that firms that deliver a larger fraction of their total payout amounts via stock repurchases have lower real investment amount in the next four quarters. This is consistent with **H3.2** where firms that pay out a larger fraction using stock repurchases for the higher NPV, and thus reduce the cash available for the lower NPV real investment projects. Taking the next quarter's investment as an example for economic magnitude, one standard deviation increase in the *Fraction of Repurchase* is associated with -0.127 decrease in the next quarter's investment, which is 105.4% decrease from

the unconditional mean.[75]

The coefficients on *Dispersion*, i.e., β_2, are also negative and statistically significant in all columns. Greater dispersion means a higher level of heterogeneity in shareholder beliefs about a firm's future prospects. Thus, it is associated with smaller real investment amounts in the next four quarters. This is consistent with the second part of **H3.2** for the interpretation that when firms have a greater level of heterogeneity in investor beliefs about their future prospects, there are more stock repurchase opportunities such that firms will reserve some cash that otherwise can be used for lower NPV real investments for future stock repurchases. In turn, this set of results describes the anticipation effect between the level of heterogeneity in investor beliefs about firms' future prospects and firms' future fraction of payout using stock repurchases and their associated real investment amounts. In terms of economic significance, one standard deviation increase in *Dispersion* leads to -0.057 decrease in the next quarter's real investment, which is -102.4% decrease from the unconditional mean.[76]

The coefficients on β_1 and β_2 attest to hypothesis **H3.2**. Hence, this subsection provides supporting evidence such that firms compare the NPVs of stock repurchases, with those of cash dividends, and real investments simultaneously when making investment and payout decisions. The higher the dispersion of investor beliefs about a firm's future prospects, the larger the positive NPV of stock repurchases, the larger the fraction the firm will pay out via stock repurchases, the smaller the amount of real investments. Further, we document an anticipation effect that with a greater level of heterogeneity in investor beliefs, the firm will plan to take advantage of the higher NPV bearing stock repurchases in the near future. In turn, they allocate more cash that can otherwise

[75]One standard deviation of *Fraction of Repurchase* is 0.43. Its impact on the next quarter's investment is: $0.43 \times (-0.29530) = -0.127$. The unconditional mean of quarterly investment is 2.36, and the difference from the unconditional mean is: $\frac{-0.127-2.36}{2.36} = -1.0538$ or -105.4%.

[76]The standard deviation of *Dispersion* is 0.84, multiplying with the coefficient yields: $0.84 \times (-0.06784) = -0.057$. The unconditional mean for quarterly investment is 2.36, and thus the difference from the unconditional mean is: $\frac{-0.057-2.36}{2.36} = -1.024$ or -102.4%.

be used for future real investments to repurchase shares in the open market as a part of their total payout.

3.5.2 Heterogeneous Beliefs and Price Impact of Stock Repurchases

This section analyzes the price impact of firms' fraction of payout using stock repurchases. When firms repurchase shares, the transaction starts with the most pessimistic outside equity holders. As the firm pays out a larger fraction of its total payout via stock repurchases, more and more pessimists' shares have been bought back by the firm. As a result, the marginal outside investor left has a relatively more optimistic belief about the firm's future prospects than before the stock repurchases. By climbing up the belief ladder of the marginal investor, the valuation on the firm's stock price also increases. In turn, it generates a positive price impact on the firm's stock, as described in hypothesis **H3.3**. We run the following regression to test the hypothesis:

$$Price\,Impact_{i,j,t+1+n} = \beta_1 Repurchase\,Fraction_{i,j,t} + \alpha X_{i,j,t} + \delta_t + \varepsilon_{i,j,t+1+n} \tag{22}$$

where $Price\,Impact_{i,j,t+1+n}$ is the buy-and-hold abnormal stock returns on firm i 5 days, 7 days, and 30 days starting from the first day of quarter $t+1$. Buy-and-hold abnormal stock returns is the buy-and-hold returns on firm i minus the buy-and-hold returns on CRSP market index for a given horizon. We include only time fixed effect because industry fixed effect is forward looking within an industry. We cluster standard errors at the firm level. The remaining variables are as defined in Equation (20). Table 25 tabulates the results.

The positive and significant coefficients on *Fraction of Repurchase* in all three columns suggest that the larger fraction that a firm pays out via stock repurchases, the greater the price impact on its stock, consistent with **H3.3**. The intuition is that the larger fraction of stock repurchases a firm

uses in its total payout, the more shares it is buying back from pessimistic outside equity holders. In turn, the higher the valuation on its stock price from the remaining marginal investor as they climb up the belief ladder about the firm's future prospects. With the higher valuation on the stock price by the marginal investor, the larger the price impact. In terms of economic significance, one standard deviation increase in the *Fraction of Repurchase* leads to 8 basis points, 7 basis points, and 36 basis points increase in firms' abnormal stock returns 5 days, 7 days, and 30 days after a quarter-end, respectively.[77]

3.5.3 Long-run Abnormal Stock Returns Following Stock Repurchases

As firms pay out a larger fraction of their total distributions with stock repurchases, the fewer outside pessimists are left and the marginal investor has increasingly optimistic belief about the firms' future prospects. As a result, the differences in belief between insiders and outside equity holders start to narrow. Meanwhile, hard information such as earnings announcements about the firms' future prospects arrive, which would converge the beliefs between insiders and outsiders. These two forces together result in a persistently higher stock prices on the firms, and thus greater long-run abnormal stock returns on the firms with more stock repurchases a part of their payouts (**H3.4**). We run similar regressions as in Equation (22), but elongate the windows for buy-and-hold abnormal stock returns to 3 months, 6 months, 1 year, 2 years, and 3 years. Their results reside in Table 26.

Consistent with **H3.4**, we find that firms delivering a larger fraction of their total payout amounts via stock repurchases experience greater long-run abnormal stock returns in the post-payout period. This is shown by the positive and statistically significant coefficients on *Fraction of Repurchase* in all columns of Table 26. The effect is monotonically increasing as the time goes

[77] One standard deviation of *Fraction of Repurchase* is 0.43. Thus, the economic significance is: $0.43 \times 0.00196 = 0.0008$, $0.43 \times 0.00166 = 0.0007$, $0.43 \times 0.00843 = 0.0036$.

on. Specifically, one standard deviation increase in *Fraction of Repurchase* corresponds to 65 basis points greater abnormal stock returns in the next 3 months. It enlarges to 1.28% in 6 months, and continues to increase to 2.27%, 3.89%, and 5.16% in one, two, and three years, respectively.

The positive and monotonically increasing long-run abnormal stock returns for firms paying out a larger fraction of their total payout using stock repurchases is consistent with our intuition. When firms pay out more using stock repurchases as compared to cash dividends, they reduce the portion of outside equity holders who are more pessimistic than the insiders. The marginal investor left values the firm higher than the previous marginal investor does before the stock repurchases, resulting in a higher stock price of the firm. In the meantime, hard information about the firm's future prospects arrives, leading to a convergence of beliefs between insiders and remaining outsiders. In turn, it generates higher stock prices in the long-run.

Together with the results in Section 3.5.2 where a larger fraction of total payout using stock repurchases is associated with more positive price impact, we distinguish our framework of heterogeneous beliefs from the asymmetric information story commonly argued by the existing literature. Under asymmetric information alone, all information should be reflected by firms' *announcements* of open market repurchase programs. Thus, the *announcement returns* should adjust for the information asymmetry. We would not have found the positive price impact and long-run abnormal stock returns solely based on the asymmetric information setting. Hence, the presence of positive price impact and long-run abnormal stock returns following firms' usage of stock repurchases for a larger fraction of their total payouts corroborates our hypothesis that it is the level of heterogeneity in investor beliefs about firms' future prospects that partly contributes to firms' payout choice between cash dividends and stock repurchases.

3.6 Additional Tests

3.6.1 Insider Trading and Stock Repurchases

Given the aforementioned argument, firms pay out a larger fraction of their total cash distributions via stock repurchases when the stock repurchases have higher NPV than cash dividends, which always have zero NPV. And this occurs when the level of heterogeneity in investor beliefs about firms' future prospects is high between insiders and outsiders, as well as among outside equity holders. Under such circumstances, however, firm insiders know that the NPV of stock repurchases is higher than cash dividends and some other real investment opportunities. Thus, buying shares from the outside pessimists generates positive profits. Naturally, insiders want to keep those benefits to themselves. Insiders would prefer to buy back shares from the outside pessimists on their own personal accounts first to solely enjoy the profits. On the other hand, when firms repurchase those shares, the profits are shared among all remaining equity holders, including both the insiders and remaining outsiders. The more shares that the insiders buy back on their personal accounts leave fewer shares held by the pessimists in the market from whom their firms can repurchase. In turn, there is a substitution effect between insiders' buying and firms' subsequent payout fraction using stock repurchases, as described in hypothesis **H3.5**. We adopt the following regression to test this hypothesis:

$$RepurchaseFraction_{i,j,t} = \beta_1 InsiderTrading_{i,j,t-1} + \alpha X_{i,j,t} + \gamma_j + \delta_t + \varepsilon_{i,j,t} \tag{23}$$

where the independent variable $InsiderTrading_{i,j,t-1}$ is lagged by one quarter. $InsiderTrading_{i,j,t-1}$ takes three forms. When $InsiderTrading_{i,j,t-1}$ is *Net Shares Transacted*, it measures the net number of shares transacted by all the insiders of firm i at time $t-1$. The net number of shares is calculated as the total number of shares purchased minus the total number of shares sold by all

the insiders of firm i at time $t-1$. The second form is *Net Percentage (%) of Shares Transacted*, which is the *Net Shares Transacted* as a percentage of firm i's total number of shares outstanding in quarter $t-1$. Finally, $InsiderTrading_{i,j,t-1}$ is represented by *Percentage (%) of Buy Orders*, which is the number of purchase *orders* (not shares) from firm i's insiders in quarter $t-1$, divided by its total number of insider trading *orders* (i.e., the sum of purchase orders and sell orders) in the same period.

Table 27 exhibits the regression results. Column (1) has *Net Shares Transacted* as the main independent variable of interest, column (2) pertains to *Net Percentage (%) of Shares Transacted*, and column (3) is for *Percentage (%) of Buy Orders*. The negative and significant coefficients of these proxies of insider trading in all three columns suggest that the greater amount that insiders buy prior to firms' stock repurchase actions, the smaller fraction firms pay out using stock repurchases as compared to cash dividends. This is consistent with hypothesis **H3.5** where greater insider buying is inversely related to firms' payout fraction with stock repurchases. The results are consistent with the intuition that insiders want to keep the profits from buying undervalued shares from outside pessimists. They do so by buying the shares on their personal accounts first before the firms' payout actions. In turn, fewer pessimists are left from whom the firms can repurchase shares, resulting in smaller fraction of firms' payout via stock repurchases.

In the three regressions of Table 27, we control for the level of heterogeneity in investor beliefs about firms' future prospects by including *Dispersion* in the model. The positive and significant coefficients on *Dispersion* further attests to **H3.1** such that greater dispersion, i.e., greater heterogeneity in investor beliefs, leads to a larger fraction of firms' total payout being delivered through stock repurchases. Importantly, the coefficients on the insider buying measures staying statistically significant with the presence of this control variable adds credibility to the results. To further ensure the robustness of our results, we run similar regressions using the two alternative measures

of heterogeneity in investor beliefs, namely *Abnormal Turnover* and *Mean Forecast Error*, whose results are presented in Appendix A20 and A26, respectively. Our results persist when using these two alternative proxies of heterogeneity in investor beliefs.

3.6.2 Stock Market Conditions and Stock Repurchases

General stock market conditions can largely affect investor beliefs. When the market experiences a downturn, there is more uncertainty in the market, making it more challenging for all investors to reach consensus on firms' future prospects. That can lead to a higher degree of heterogeneity in investor beliefs on firm values. However, given that insiders have the same set of information regardless of the market conditions, the discrepancy between insider and outsider valuations enlarges when the market is down. As the behavioral finance literature has documented that market downturns usually induce negative sentiment among retail investors (e.g., Baker and Wurgler (2006)), outsider equity holders, who are mostly retail investors, are likely to be more pessimistic as compared to firm insiders regarding firms' prospects during these times. Given that our hypothesis **H3.1** and its associated empirical results have shown the positive association between greater heterogeneity in investor beliefs about firms' future prospects and a larger fraction of total payout via stock repurchases as compared to cash dividends, we posit that during market downturns, firms are likely to pay out a larger fraction of their total distribution with stock repurchases, as explicated in hypothesis **H3.6**. We adopt the following regression model to test the hypothesis:

$$Repurchase\,Fraction_{i,j,t} = \beta_1 Market\,Condition_t + \alpha X_{i,j,t} + \gamma_j + \delta_t + \varepsilon_{i,j,t} \tag{24}$$

where *Market Condition* takes two forms to estimate the relationship between the stock market and firms' choice of payout using stock repurchases. In column (1) and (2) of Table 28, *Market*

Condition takes the form as the *Quarterly Market Return*, which is the quarterly buy-and-hold returns of the CRSP value-weighted market index. In column (3) and (4), *Market Condition* takes the second form as an indicator variable called *Market Downturn Indicator*, which equals one if a given quarter's market buy-and-hold return is lower than the median value of quarterly market returns in the previous twelve quarters (three years) and zero otherwise. We also include *Dispersion* to control for the level of heterogeneity in shareholder beliefs in the regressions. We continue including industry and time fixed effects, while clustering standard errors at the firm level.

The negative and significant coefficients in columns (1) and (2) suggest the inverse relationship between the stock market returns and firms' payout fraction using stock repurchases. Specifically, it implies that the lower the market returns are in a given quarter, the larger the fraction of firms' total payout amounts will be delivered through stock repurchases. Further, the positive and significant coefficients in columns (3) and (4) state that when the stock market experiences a downturn in a given quarter (as compared to the past three years of the market returns), firms are likely to pay a larger fraction of their total distributions with stock repurchases in that quarter. Jointly, Table 28 provides empirical evidence supporting hypothesis **H3.6** that market downturns create general pessimism among outside equity holders, enlarging the level of heterogeneity in investor beliefs about firms' future prospects between insiders and outsiders, and among outsiders. In turn, firms pay out a larger fraction of their quarterly distributions using stock repurchases as compared to cash dividends.

In addition, this test also helps us differentiate our framework from the asymmetric information story. When the stock market busts, it is unlikely that many firms develop a large degree of information asymmetry all of a sudden simultaneously. It is more plausible, however, that many firms experience a higher level of heterogeneity in investor beliefs about firms' prospects, which drives the larger fraction of firms' payout using stock repurchases. Together with the results in Sec-

tion 3.5.2 and 3.5.3, we provide evidence to distinguish our setting of heterogeneous beliefs about firms' future prospects from the information asymmetry explanation for firms' stock repurchases documented in the extant literature.

3.6.3 Stock Repurchases versus Cash Dividends over Time

The disappearing dividend puzzle states that the percentage of public companies paying cash dividends has been decreasing for the past few decades (e.g., Fama and French (2001)). Meanwhile, more and more firms have started buying back their shares in the open market. Since we have shown that a higher level of heterogeneity in investor beliefs about firms' future prospects drives firms to pay out a larger fraction of their total payout amounts using stock repurchases as compared to cash dividends. We hypothesize as in **H3.7** where one potential contributing factor for the disappearing dividend puzzle is that cash dividends have been slowly replaced by stock repurchases because the level of heterogeneity in investor beliefs has been going up steadily over time. This would provide a novel and important explanation for the disappearing dividend puzzle.

We run two sets of tests to verify this hypothesis. First, we run an OLS regression using time baskets. In particular, we group the sample period from 2005 to 2020 (16 years) into three time baskets, each of which has a corresponding monotonically increasing time index. Years from 2005 to 2010 have the time index of 1. Those from 2011 to 2015 have the time index of 2, while years from 2016 to 2020 have the time index of 3. Within each time index of a given firm, we calculate the average values of its *Fraction of Repurchase* and *Dispersion*, as well as other control variables. Thus, for each firm, it has three observations with respect to each variable. We define three indicator variables, one for each time index. *Early Years* equals one if time index is 1 and zero otherwise. *Middle Years* equals one if time index is 2 and zero otherwise. *Later Years* equals one if time index is 3 and zero otherwise.

In column (1) and (2) of Table 29, we regress firms' within time basket average *Fraction of Repurchase* and *Dispersion* respectively, on the time index and control variables. The positive and significant coefficients of *Time Index* suggest that increasing value in time index, which monotonically corresponds to the passage of time, is associated with greater dispersion and larger fraction of firms' payout using stock repurchases. To provide a clearer specification, we use *Early Years, Middle Years, and Later Years* to replace the categorical variable *Time Index* in the OLS regression in column (3) and (4). We omit *Early Years* in the regressions such that they will be the reference category. The positive and significant coefficients on *Later Years* in column (3) and (4) indicate that the level of dispersion and the fraction of payout via stock repurchases are higher in recent years than in earlier years of our sample. Hence, Table 29 presents the first set of results consistent with hypothesis **H3.7** where the level of heterogeneity has been increasing steadily through time, which potentially contribute to the gradual replace of cash dividends with stock repurchases.

Second, we use the *Time Index* as an instrument to conduct two-stage least squares (2SLS) tests. Our objective is not to show causal inference, but to document that the level of heterogeneity in investor beliefs has been going up steadily over the sample period, which is correlated with the rising fraction of firms' payout with stock repurchases over the same window. For this reason, we do not emphasize on the exclusion restriction here. To show that rising heterogeneity in shareholder beliefs contribute to the larger fraction of stock repurchases in quarterly payout, we run the first stage by regressing the *Dispersion* measure on *Time Index*. We then use the predicted value of *Dispersion* as the independent variable in the second stage, and regress *Fraction of Repurchase* on *Predicted Dispersion*. Table 30 displays the results with column (1) pertaining to the first stage, and column (2) for the second stage.

The positive and significant coefficient on *Time Index* and the F-stats of 85.77 show the validity of using the time baskets as an instrument to predict the level of dispersion, and thus the level

of heterogeneity in shareholder beliefs about firms' future prospects over time. Importantly, the positive coefficient on *Predicted Dispersion* in column (2) is statistically significant at the 1% level, indicating that a higher level of heterogeneity in investor beliefs about firms' future prospects is associated with firms' choice of paying out a larger fraction of their quarterly total payout amounts using stock repurchases. Hence, the evidence in both Table 29 and Table 30 support hypothesis **H3.7**. Collectively, they suggest that, indeed, growing heterogeneity in investor beliefs over time within our sample period may be a contributing factor for the greater portion of firms' total payout relying on stock repurchases. Thus, we provide a new potential resolution to the disappearing dividend puzzle.

4 Conclusion

The three essays in this document comprises my dissertation for the degree of Doctor of Philosophy, submitted to the Faculty of the department of finance at Boston College Carroll School of Management. I present novel empirical evidence using textual analysis techniques and thus new data sets to answer unexplored research questions. Consequently, I show that firms under greater external pressure, reflected in the form of more intense discussions of share repurchases by equity analysts, will more extensively follow through on their recently announced share repurchase programs.

In addition, firms may also execute their recently announced share repurchase programs to suggest greater accounting quality and thus fend off potential accounting-related litigation when they are in a pooling equilibrium with lower accounting quality firms after a focal firm's financial restatement.

Finally, I provide analysis, together with my co-authors, to compare the circumstances under

which firms prefer cash dividends to share repurchases as the payout method, and vice versa. Firms with greater heterogeneity in beliefs between insiders and outsiders, and among outside equity investors lean towards share repurchases as the preferred payout method. Importantly, we partially explain the disappearing dividend puzzle. The rising trend of heterogeneity in beliefs between firm insiders and outsiders, and among firm outside equity investors regarding the firm's prospects in the general economy consists one of the reasons for more firms substituting cash dividends with share repurchases.

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List of Tables

Table 1: Descriptive Statistics

Open market repurchase announcements span from January 2001 to September 2020. Transcripts and actual repurchases start from January 2003 to September 2020. The sample is at the firm-year-month level. Panel A conditions on transcripts in which the questions and answers sections mention share repurchases (and key words alike) at least once. Panel B describes the announced open market repurchase programs and their completion rates.

Panel A: Conference Call Transcripts Mentioning Repurchase						
	Mean	St. Dev	Median	Min	Max	N
Frequency_of_Mention	0.051	0.025	0.051	0.002	0.082	9124
Frequency_Analyst	0.041	0.022	0.041	0.000	0.067	9124
Frequency_Company	0.007	0.008	0.000	0.000	0.017	9124
Mention_byAnalyst	0.973	0.162	1.000	0.000	1.000	9124
Mention_byCompany	0.473	0.499	0.000	0.000	1.000	9124
FirstMention_byAnalyst	0.356	0.479	0.000	0.000	1.000	9124
FirstMention_byCompany	0.612	0.487	1.000	0.000	1.000	9124

Panel B: Announcement and Completion						
	Mean	St. Dev	Median	Min	Max	N
Announced_Amount	786.763	4452.158	75.000	0.015	225000.000	10247
Complete 100%	0.086	0.280	0.000	0.000	1.000	10247
Complete 50%	0.193	0.395	0.000	0.000	1.000	10247
Complete 10%	0.350	0.477	0.000	0.000	1.000	10247
Complete 0%	0.543	0.498	1.000	0.000	1.000	10247
Months for Completion	14.787	8.986	13.000	2.000	36.000	879

Table 2: Full Sample Summary Statistics

Open market repurchase announcements span from January 2001 to September 2020. Transcripts, actual repurchases, and other firm level variables start from January 2003 to September 2020. The sample is at the firm-year-month level. *Repurchase* is an indicator that equals one if a firm repurchases shares in the open market in a given month and zero otherwise. Industry is defined by 2-digit SIC code. All firm level control variables are measured at the year-quarter level and matched to the previous quarter-end of a given month for the same firm. All continuous variables are winsorized at the 1% and 99% level.

	Mean	St. Dev	Median	Min	Max	N
Repurchase	0.148	0.355	0.000	0.000	1.000	236654
Repurchase_Dollar	3.848	20.084	0.000	0.000	161.990	236654
Scaled_Repurchase_Dollar	0.060	0.234	0.000	0.000	1.604	236654
Frequency_of_Mention	0.002	0.011	0.000	0.000	0.082	236654
Mention_Repurchase	0.039	0.193	0.000	0.000	1.000	236654
Log_attention_10KQ	2.813	2.380	3.555	0.000	13.432	236654
Log_attention_other	3.032	2.410	3.784	0.000	12.425	236654
Percent_common_coverage	0.006	0.074	0.000	0.000	1.000	236654
Lagged_cumulative	0.164	0.409	0.000	0.000	2.672	236654
Frequency_Analyst	0.002	0.009	0.000	0.000	0.067	236654
Frequency_Company	0.000	0.002	0.000	0.000	0.017	236654
Mention_byAnalyst	0.038	0.190	0.000	0.000	1.000	236654
Mention_byCompany	0.018	0.134	0.000	0.000	1.000	236654
FirstMention_byAnalyst	0.014	0.116	0.000	0.000	1.000	236654
FirstMention_byCompany	0.024	0.152	0.000	0.000	1.000	236654
Analyst_firstdistance	0.035	0.178	0.000	0.000	0.984	236654
Company_firstdistance	0.035	0.177	0.000	0.000	1.000	236654
Analyst_questionlength (thousand words)	0.002	0.017	0.000	0.000	0.154	236654
Percentage_othertopics	0.995	0.064	1.000	0.000	1.000	236654
Mentioning Analysts' Holding (%)	0.000	0.019	0.000	0.000	6.469	236654
Mentioning Analysts' Holding (million shares)	0.001	0.122	0.000	0.000	30.825	236654
Prior EPS Upward Revision	0.000	0.008	0.000	0.000	1.000	236654
Analysts Asked Other Firms' Repurchases (%)	0.002	0.042	0.000	0.000	7.692	236654
Blunt Question	0.000	0.021	0.000	0.000	1.000	236654
Tone_Analyst	-0.012	0.111	0.000	-1.087	0.000	236654
Tone_Company	0.074	0.408	0.000	0.000	2.844	236654
Institutional_Holding	68.314	29.508	77.122	1.182	100.000	236654
Total_Assets	11485.197	38067.997	1331.369	0.000	284587.000	236654
Size	7.167	2.248	7.195	0.000	14.993	236654
Leverage	0.172	0.226	0.068	0.000	0.893	236654
Market_Cap	5986.180	18126.980	450.908	0.000	131404.047	236654
Market_to_Book	2.160	3.102	1.326	0.000	20.378	232400
Profitability	0.025	0.029	0.023	-0.069	0.118	236654
Cash	0.150	0.172	0.077	0.000	0.747	236654
Retained_Earnings	5.599	2.403	5.715	-6.908	12.880	183685
Prev_6month_return	0.052	0.297	0.040	-0.669	1.224	227374
Firm					4080	236654
2-Digit SIC Industry					69	236654

Table 3: Share Repurchases Following Conference Calls

This table presents the regression results on how mentioning share repurchases in the questions and answers section of a given conference call affects the firm's subsequent actual share repurchases. The dependent variable $Repurchase_{t+1}$ is an indicator set to one if a firm repurchases shares in the open market in month $t+1$ and zero otherwise (Panel A). The dependent variable *Scaled Dollar* $Repurchase_{t+1}$ is the dollar amount that a firm spends on repurchasing shares in the open market in a given month divided by its total market value in the previous quarter-end (Panel B). *Mention_Repurchase* is an indicator equal to one if analysts or the company mentions share repurchases (and keywords alike) at least once in the questions and answers section of a given conference call and zero otherwise. *Frequency_of_Mention* is the number of times that share repurchases are mentioned in the questions and answers section of a conference call divided the total number of words spoken in the same section of the same call. Industry is defined by 2-digit SIC code. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Next Month's Likelihood of Actual Repurchases						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	$Repurchase_{t+1}$					
Mention_Repurchase	0.026***	0.026***	0.027***			
	(4.99)	(5.13)	(4.82)			
Frequency_of_Mention				0.575***	0.568***	0.589***
				(7.12)	(7.38)	(6.77)
Lagged_cumulative	0.150***	0.153***		0.150***	0.153***	
	(14.34)	(14.37)		(14.33)	(14.37)	
Institutional_Holding	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-1.06)	(-1.00)	(-1.09)	(-1.06)	(-1.00)	(-1.10)
Size	0.023***	0.028***	0.025***	0.023***	0.028***	0.025***
	(4.42)	(5.36)	(4.05)	(4.43)	(5.38)	(4.06)
Leverage	-0.097***	-0.102***	-0.109***	-0.096***	-0.102***	-0.109***
	(-3.95)	(-3.95)	(-4.05)	(-3.95)	(-3.94)	(-4.04)
Market_to_Book	0.001	0.001	0.001	0.001	0.001	0.001
	(1.20)	(1.13)	(1.21)	(1.21)	(1.14)	(1.22)
Profitability	0.270***	0.227***	0.224**	0.269***	0.226***	0.223**
	(3.03)	(2.68)	(2.59)	(3.02)	(2.67)	(2.58)
Dividend	0.008	0.003	0.006	0.008	0.003	0.006
	(0.33)	(0.11)	(0.22)	(0.33)	(0.11)	(0.22)
Cash	0.101***	0.104***	0.090***	0.101***	0.104***	0.090***
	(3.64)	(3.60)	(3.22)	(3.63)	(3.58)	(3.20)
Prev_6month_return	-0.022***	-0.021***	-0.024***	-0.021***	-0.021***	-0.024***
	(-4.71)	(-4.41)	(-5.24)	(-4.70)	(-4.41)	(-5.24)
Observations	223,195	221,664	221,664	223,195	221,664	221,664
Adjusted R-squared	0.330	0.335	0.318	0.330	0.335	0.318
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	No	Yes	No	No
Industry × Time FE	No	Yes	Yes	No	Yes	Yes

Table 3: Share Repurchases Following Conference Calls (Continued)

Panel B: Next Month's Scaled Dollar Amount of Actual Repurchases						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Scaled Dollar Repurchase$_{t+1}$					
Mention_Repurchase	0.025***	0.025***	0.026***			
	(6.65)	(7.43)	(6.80)			
Frequency_of_Mention				0.585***	0.582***	0.599***
				(7.75)	(8.50)	(7.86)
Lagged_cumulative	0.126***	0.127***		0.126***	0.127***	
	(15.55)	(15.96)		(15.53)	(15.94)	
Institutional_Holding	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.66)	(-0.29)	(-0.48)	(-0.66)	(-0.29)	(-0.48)
Size	0.005	0.008*	0.006	0.005	0.008**	0.006
	(1.28)	(1.99)	(1.44)	(1.30)	(2.02)	(1.46)
Leverage	-0.065***	-0.057***	-0.063***	-0.065***	-0.057***	-0.063***
	(-4.37)	(-3.59)	(-3.81)	(-4.37)	(-3.58)	(-3.80)
Market_to_Book	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(-1.44)	(-1.66)	(-1.43)	(-1.42)	(-1.65)	(-1.42)
Profitability	0.142***	0.125**	0.122**	0.140***	0.123**	0.121**
	(3.53)	(2.58)	(2.47)	(3.50)	(2.55)	(2.44)
Dividend	-0.002	-0.006	-0.003	-0.002	-0.006	-0.003
	(-0.11)	(-0.40)	(-0.21)	(-0.11)	(-0.41)	(-0.21)
Cash	0.074***	0.078***	0.066***	0.074***	0.077***	0.066***
	(6.25)	(7.01)	(6.68)	(6.26)	(7.01)	(6.67)
Prev_6month_return	-0.018***	-0.016***	-0.019***	-0.018***	-0.016***	-0.019***
	(-5.48)	(-4.70)	(-6.05)	(-5.46)	(-4.70)	(-6.04)
Observations	223,195	221,664	221,664	223,195	221,664	221,664
Adjusted R-squared	0.181	0.184	0.158	0.181	0.185	0.158
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	No	Yes	No	No
Industry × Time FE	No	Yes	Yes	No	Yes	Yes

Table 4: What Drives Analysts' Mentioning of Share Repurchases

This table presents the regression results on factors that drive analysts' discussion of share repurchases in conference calls. Panel A shows regressions at the individual analyst level, while Panel B shoes regressions aggregated at the firm-month level. *Prior EPS Upward Revision* is set to one if at least one of the participating analysts in a firm's conference call in month revised the firm's EPS upward in the previous month, and zero otherwise. *EPS Forecast Above Consensus* equals one if a particular analyst's EPS forecast for a given firm in a given quarter is above the consensus forecast and zero otherwise. *Mentioning Analysts' Holding (million shares)* measures the total number of millions of shares that the employer companies at which analysts who ask about the firm's stock repurchases work in a month. Industry is defined by 2-digit SIC code. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Analyst Level Regression			
	(1)	(2)	(3)
VARIABLES	Analyst_Mention_Repurchases	Analyst_Mention_Repurchases	Analyst_Mention_Repurchases
Prior EPS Upward Revision	0.007***		0.003***
	(6.79)		(4.74)
EPS Forecast Above Consensus		0.007***	0.006***
		(7.78)	(7.63)
Observations	1,487,617	1,487,617	1,487,617
Adjusted R-squared	0.044	0.044	0.044
Other Controls	Absorbed	Absorbed	Absorbed
Firm × Time FE	Yes	Yes	Yes
Panel B: Firm Level Regression			
	(1)	(2)	(3)
VARIABLES	Frequency_of_Mention	Frequency_of_Mention	Frequency_of_Mention
Mentioning Analysts' Holding (million shares)	0.002***		0.002***
	(15.50)		(14.35)
Prior EPS Upward Revision		0.018**	0.018**
		(2.39)	(2.39)
Lagged_cumulative	0.000	0.000	0.000
	(0.91)	(0.95)	(0.91)
Institutional_Holding	0.000	0.000	0.000
	(0.49)	(0.50)	(0.49)
Size	0.000	0.000	0.000
	(0.37)	(0.39)	(0.37)
Leverage	-0.001**	-0.001**	-0.001**
	(-2.59)	(-2.60)	(-2.58)
Market_to_Book	-0.000	-0.000	-0.000
	(-0.91)	(-0.89)	(-0.89)
Profitability	0.008***	0.008***	0.008***
	(3.34)	(3.34)	(3.34)
Dividend	0.000	-0.000	0.000
	(0.06)	(-0.01)	(0.02)
Cash	0.002***	0.002***	0.002***
	(3.62)	(3.62)	(3.62)
Prev_6month_return	-0.000**	-0.000**	-0.000**
	(-2.09)	(-2.09)	(-2.07)
Observations	221,664	221,664	221,664
Adjusted R-squared	0.103	0.102	0.103
Firm FE	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes

Table 5: Mention of Share Repurchases by Different Entities

This table presents regressions after decomposing who mention share repurchases in the questions and answers section of conference calls. *Mention_byAnalyst* is an indicator variable equal to one if an analysts talks about share repurchases (and keywords alike) in the questions and answers section of a conference call, and zero otherwise. *Mention_byCompany* is an indicator variable equal to one if someone from the company talks about share repurchases (and keywords alike) in the questions and answers section of a conference call, and zero otherwise. *Frequency_Analyst* is the number of times that analysts mention share repurchase (and keywords alike) in the questions and answers section of a conference call divided by the total number of words spoken in the questions and answers section of that conference call. *Frequency_Company* is the number of times that the company mentions share repurchase (and keywords alike) in the questions and answers section of a conference call divided by the total number of words spoken in the questions and answers section of that conference call. Other controls include *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Repurchase$_{t+1}$			Scaled Dollar Repurchase$_{t+1}$		
Mention_byAnalyst	0.028***			0.022***		
	(4.93)			(6.35)		
Mention_byCompany	-0.002			0.009		
	(-0.21)			(1.44)		
Frequency_Analyst		0.756***	0.761***		0.692***	0.692***
		(9.44)	(9.70)		(7.78)	(7.76)
Frequency_Company		-0.239	-0.241		0.301	0.300
		(-0.66)	(-0.67)		(0.61)	(0.61)
Log_attention_10KQ			0.003**			0.000
			(2.43)			(0.03)
Log_attention_other			-0.003**			0.000
			(-2.25)			(0.06)
Lagged_cumulative	0.153***	0.153***	0.153***	0.127***	0.127***	0.127***
	(14.37)	(14.36)	(14.36)	(15.95)	(15.94)	(15.94)
Observations	221,664	221,664	221,664	221,664	221,664	221,664
Adjusted R-squared	0.335	0.335	0.335	0.184	0.185	0.185
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry $\times$ Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Effect of Who Mentions First, Position, and Tone

This table presents regressions regarding who mention share repurchases first in a conference call, how early they first mention share repurchases, and their general tone when talking about share repurchases in the same conference call. *FirstMention_byAnalyst* is an indicator set to one if an analyst mentions share repurchases (and keywords alike) first in the questions and answers section of a conference call and zero otherwise. *FirstMention_byCompany* is an indicator set to one if someone from the company mentions share repurchases (and keywords alike) first in the questions and answers section of a conference call and zero otherwise. *Analyst_firstdistance* refers to the distance between the first time an analyst mentions repurchases within the questions and answers section of that conference call and the end of their last speech divided by the total length of their speech in that section of the call. *Company_firstdistance* refers to the distance between the first time the company mentions repurchase in the questions and answers section of that conference call and the end of their last speech divided by the total length of the company's speech in that section of the call. *F*-stat for (*FirstMention_byAnalyst - FirstMention_byCompany*) in column (1) is 13.09 with *p*-value=0.0006. *F*-stat for (*FirstMention_byAnalyst - FirstMention_byCompany*) in column (4) is 16.02 with *p*-value =0.0002. *Tone_Analyst* is the number of positive words minus the number of negative positive words that analysts speak in speeches containing share repurchases in a conference call, divided by the total number of words they speak in those speeches in the same conference call. *Tone_Company* follow the same definition but is with respect to the company's speech. Other controls include *Lagged_Cumulative* (progress of actual repurchases under the announced program), *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Repurchase$_{t+1}$			Scaled Dollar Repurchase$_{t+1}$		
FirstMention_byAnalyst	0.027**	0.021	0.022*	0.017	0.004	0.011
	(2.34)	(1.51)	(1.82)	(1.19)	(0.25)	(0.76)
FirstMention_byCompany	-0.024*	-0.016	-0.019	-0.025	-0.028	-0.019
	(-1.70)	(-0.96)	(-1.36)	(-1.64)	(-1.51)	(-1.26)
Analyst_firstdistance		0.052**			0.046***	
		(2.33)			(2.75)	
Company_firstdistance		-0.063*			-0.032	
		(-1.96)			(-1.14)	
Tone_Analyst			-0.003**			-0.004***
			(-2.37)			(-2.79)
Tone_Company			0.004			0.005**
			(1.55)			(2.26)
Mention_byAnalyst	0.052***	0.059***	0.037**	0.046***	0.039**	0.029
	(3.83)	(3.11)	(2.38)	(2.79)	(2.34)	(1.63)
Mention_byCompany	-0.040***	-0.040***	-0.036***	-0.022**	-0.022**	-0.017*
	(-3.61)	(-3.63)	(-3.21)	(-2.26)	(-2.25)	(-1.84)
Observations	221,664	221,664	221,664	221,664	221,664	221,664
Adjusted R-squared	0.335	0.335	0.335	0.184	0.184	0.184
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: Effect of Question Length, Focus, and Bluntness

This table presents regressions regarding the length of analysts mentioning share repurchases, the number of non-share repurchases related topics when analysts mention share repurchases, and whether analysts sharply ask why the firm is lagging behind repurchase schedule during the questions and answers section of conference calls. *Analyst_questionlength* refers to the average number of words for questions in which analysts ask about share repurchases in a given conference call. *Percentage_othertopics* measures the proportion of topics in analysts' questions about share repurchases that are related to topics other than share repurchases. *Blunt Question* is an indicator that equals to one if at least one analyst directly asks why the firm is behind its share repurchase schedule and zero otherwise. Other controls include *Lagged_Cumulative* (progress of actual repurchases under the announced program), *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Repurchase$_{t+1}$				Scaled Dollar Repurchase$_{t+1}$			
Analyst_questionlength	-0.035***			-0.026**	-0.037***			-0.036**
	(-2.97)			(-2.22)	(-2.79)			(-2.53)
Percentage_othertopics		-0.031***		-0.025**		-0.018*		-0.010
		(-2.87)		(-2.26)		(-1.88)		(-0.92)
Blunt Question			0.072**	0.080**			0.101***	0.108***
			(2.28)	(2.46)			(3.24)	(3.45)
Mention_byAnalyst	0.029***	0.028***	0.028***	0.028***	0.023***	0.022***	0.022***	0.023***
	(5.08)	(4.83)	(4.92)	(4.97)	(6.50)	(6.15)	(6.32)	(5.93)
Mention_byCompany	0.007	-0.009	-0.003	-0.003	0.018**	0.004	0.006	0.013
	(0.82)	(-1.31)	(-0.46)	(-0.35)	(2.27)	(0.71)	(1.03)	(1.40)
Observations	221,664	221,664	221,664	221,664	221,664	221,664	221,664	221,664
Adjusted R-squared	0.335	0.335	0.335	0.335	0.184	0.184	0.184	0.184
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8: Firms with Completed Repurchase Programs

This table restricts to the sub-sample with only completed open market share repurchase programs. All variables follow the definitions in Table 3 and 5. Other controls include *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Summary Statistics for Completed Repurchase Programs

	Mean	St. Dev	Median	Min	Max	N
Mention_Repurchase	0.053	0.225	0.000	0.000	1.000	8528
Mention_byAnalyst	0.052	0.222	0.000	0.000	1.000	8528
Mention_byCompany	0.026	0.158	0.000	0.000	1.000	8528
Frequency_of_Mention	0.003	0.014	0.000	0.000	0.082	8528
Frequency_Analyst	0.002	0.011	0.000	0.000	0.067	8528
Frequency_Company	0.000	0.002	0.000	0.000	0.017	8528
Log_attention_10KQ	3.132	2.299	3.850	0.000	8.794	8528
Log_attention_other	3.323	2.321	4.060	0.000	9.036	8528

Panel B: Baseline Regressions for Completed Repurchase Programs

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES			Repurchase$_{t+1}$			
Mention_Repurchase	0.031					
	(0.77)					
Mention_byAnalyst		0.063				
		(1.28)				
Mention_byCompany		-0.053				
		(-0.87)				
Frequency_of_Mention			0.722		0.747	
			(0.92)		(0.91)	
Frequency_Analyst				1.606		1.643
				(1.36)		(1.36)
Frequency_Company				-4.168		-4.216
				(-1.12)		(-1.14)
Log_attention_10KQ					-0.011	-0.011
					(-1.38)	(-1.39)
Log_attention_other					-0.000	-0.000
					(-0.04)	(-0.04)
Lagged_cumulative	0.127***	0.127***	0.127***	0.127***	0.127***	0.127***
	(5.20)	(5.19)	(5.11)	(5.08)	(5.13)	(5.10)
Observations	5,605	5,605	5,605	5,605	5,605	5,605
Adjusted R-squared	0.378	0.378	0.378	0.378	0.378	0.379
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 9: Analyst Pressure through Stock Ratings

This table presents the regression results at firm-time-analyst level. Each observation corresponds to a particular analyst that has participated in at least one conference call with the firm in that month. Panel A shows the summary statistics. Panel B shows the regression results. Other controls include *Lagged_Cumulative* (progress of actual repurchases under the announced program), *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Analyst Level Summary Statistics

	Mean	St. Dev	Median	Min	Max	N
Analyst_dwngrd_1mth	0.000	0.009	0.000	0.000	1.000	1,493,959
Analyst_dwngrd_3mth	0.003	0.051	0.000	0.000	1.000	1,493,959
Analyst_dwngrd_6mth	0.005	0.071	0.000	0.000	1.000	1,493,959
Analyst_dwngrd_9mth	0.005	0.072	0.000	0.000	1.000	1,493,959
Analyst_dwngrd_12mth	0.006	0.079	0.000	0.000	1.000	1,493,959
Analyst_mention	0.008	0.091	0.000	0.000	1.000	1,493,959

Panel B: Analyst Level Regression on Stock Ratings

	(1)	(2)	(3)	(4)	(5)
	Analyst Stock Downgrade				
VARIABLES	t+1	t+3	t+6	t+9	t+12
Analyst Mentioning$_{t-1}$	0.0000	0.0009	0.0022**	0.0020*	0.0026***
	(0.28)	(1.19)	(2.35)	(1.74)	(2.68)
Repurchase$_t$	-0.0000	0.0001	0.0001	0.0000	-0.0000
	(-0.23)	(0.55)	(0.41)	(0.14)	(-0.05)
Analyst Mentioning$_{t-1}\times$ Repurchase$_t$	-0.0003*	-0.0028**	-0.0046**	-0.0044**	-0.0068***
	(-1.85)	(-2.12)	(-2.59)	(-2.47)	(-4.21)
Observations	1,469,668	1,469,668	1,469,668	1,469,668	1,469,668
R-squared	0.024	0.049	0.081	0.085	0.102
Other Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry $\times$ Time FE	Yes	Yes	Yes	Yes	Yes
Analyst FE	Yes	Yes	Yes	Yes	Yes

Table 10: Instrumental Variable: Two Stage Least Squares Regressions

This table presents the results of two stage least squares (2SLS) regression analyses uisng an instrumental variable. *Analysts Asked Other Firms' Repurchases* measures the percentage of analysts that ask about a firm's share repurchases in a given conference call that have asked similar questions to *other* firms within the previous year. It is the instrumental variable for the *Frequency_of_Mention* on share repurchases in a given conference call. Column (1) shows the first stage regression results. Columns (2) and (3) show the second stage regression results using predicted values of $\widehat{Frequency\_of\_Mention}$ from the first stage as the independent variable of interest. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. Industry is defined by 2-digit SIC code. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
	First Stage	Second Stage	
	Frequency_of_Mention	Repurchase	Scaled_Repurchase_Dollar
Analysts Asked Other Firms' Repurchases (%)	0.061***		
	(121.10)		
$\widehat{Frequency\_of\_Mention}$		0.695**	0.666***
		(2.96)	(3.87)
Lagged_cumulative	0.000	0.153***	0.127***
	(1.79)	(74.78)	(84.95)
Institutional_Holding	0.000	-0.000	-0.000
	(0.96)	(-1.93)	(-0.64)
Size	0.000	0.028***	0.008***
	(1.17)	(11.69)	(4.64)
Leverage	-0.001***	-0.101***	-0.057***
	(-5.51)	(-14.68)	(-11.24)
Market_to_Book	-0.000	0.001***	-0.001***
	(-0.90)	(3.52)	(-3.55)
Profitability	0.007***	0.225***	0.123***
	(5.16)	(5.69)	(4.24)
Dividend	0.000	0.003	-0.006
	(0.06)	(0.40)	(-1.10)
Cash	0.002***	0.103***	0.077***
	(4.89)	(10.47)	(10.65)
Prev_6month_return	-0.000	-0.021***	-0.017***
	(-1.87)	(-7.87)	(-8.49)
Observations	221,664	221,664	221,664
F-stat	16.38	-	-
Firm FE	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes
Hausman Test χ^2	-	0.30	0.24

Table 11: Total Analyst Pressure on Firms' Subsequent Actual Repurchases

This table presents the total effect of analyst pressure on a firm's subsequent actual share repurchases. *Common_Coverage* is an indicator equal to one if a firm shares an analyst with another firm who just announced an open market repurchase program in the previous month and zero otherwise. *Percent_Common_Coverage* is the percentage of such common analysts that the firm has in a given month. $Repurchase_{t+1}$ is an indicator set to one if a firm repurchases shares in the open market in month $t+1$ and zero otherwise. The dependent variable $Scaled\ Dollar\ Repurchase_{t+1}$ is the dollar amount that a firm spends on repurchasing shares in the open market in a given month divided by its total market value in the previous quarter-end. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES		$Repurchase_{t+1}$			$Scaled\ Dollar\ Repurchase_{t+1}$	
Common_Coverage	0.069***			0.049***		
	(7.98)			(7.13)		
Percent_Common_Coverage		0.081***	0.058***		0.051***	0.032***
		(9.13)	(6.36)		(6.16)	(3.98)
Lagged_cumulative	0.154***	0.154***		0.128***	0.128***	
	(14.48)	(14.48)		(16.01)	(15.99)	
Institutional_Holding	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.97)	(-0.97)	(-1.07)	(-0.26)	(-0.26)	(-0.45)
Size	0.028***	0.028***	0.025***	0.008*	0.008*	0.006
	(5.30)	(5.31)	(4.02)	(1.97)	(1.98)	(1.43)
Leverage	-0.102***	-0.102***	-0.109***	-0.058***	-0.058***	-0.064***
	(-3.97)	(-3.97)	(-4.06)	(-3.61)	(-3.61)	(-3.83)
Market_to_Book	0.001	0.001	0.001	-0.001	-0.001	-0.001
	(1.13)	(1.14)	(1.22)	(-1.65)	(-1.64)	(-1.42)
Profitability	0.230***	0.230***	0.227**	0.128**	0.128**	0.125**
	(2.71)	(2.72)	(2.62)	(2.64)	(2.64)	(2.52)
Dividend	0.003	0.003	0.006	-0.005	-0.005	-0.003
	(0.13)	(0.12)	(0.23)	(-0.39)	(-0.39)	(-0.20)
Cash	0.104***	0.104***	0.091***	0.078***	0.078***	0.067***
	(3.60)	(3.60)	(3.23)	(6.99)	(6.99)	(6.67)
Prev_6month_return	-0.021***	-0.021***	-0.024***	-0.016***	-0.016***	-0.019***
	(-4.37)	(-4.37)	(-5.21)	(-4.66)	(-4.67)	(-6.03)
Observations	221,664	221,664	221,664	221,664	221,664	221,664
Adjusted R-squared	0.335	0.335	0.318	0.184	0.184	0.157
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 12: Restatement Summary Statistics

This table presents the summary statistics on the financial restatements used to generate the sample. The sample period spans from 2003 to 2020 and includes all the financial restatements occurred in this period that can be matched to the CRSP/Compustat Merged Database. There are a total of 7,038 financial restatements. Panel A describes the characteristics of the restatements. Panel B presents the statistics on the number of peer firms matched to each restatement.

Panel A: Characteristics of Restatements

Restatement Types	Number	Percentage of Total
Accounting	6,714	95.40
Fraud	126	1.79
Clerical Error	299	4.25
Negative Revision	5,663	80.46
SEC Investigation	411	5.84
Board Involvement	2,410	34.24
Total Restatement	7,038	100.00

Panel B: Number of Peer Firms to Restatements

	Mean	St. Dev.	Min	25%	Median	75%	Max	Observation
Number of Peer Firms	167	153	1	42	118	259	773	612,259

Table 13: Firm Level Summary Statistics

This table presents the summary statistics on the full sample. The sample period spans from 2003 to 2020 and includes all firms in the CRSP/Compustat Merged Database. Variables presented are at the firm-quarter level. All variables related to share repurchase are matched to the next calendar quarter, while all annual variables are controls matched to the previous fiscal year-end. *Scaled Shares Repurchased* is calculated as the raw number of shares repurchased by a firm in a given quarter divided by the firm's number of shares outstanding in the previous fiscal year-end. Similarly, *Scaled Dollar Repurchased* is computed as the dollar amount spent by a firm on repurchasing shares in the open market in a given quarter divided by its market capitalization in the previous fiscal year-end. *Previous 6 Months' Return* refers to the six months (calendar month) return prior to the first day of a given quarter for a given firm in the sample, presented in decimals. Cumulative abnormal returns (CAR) refer to the abnormal returns for both peer and non-peer firms around the day that a focal firm releases its financial restatement.They are calculated as the mean CARs to all the financial restatements in a given quarter for each peer and non-peer firm. Each CAR is estimated using the market model. Panel A refers to all variables measured at the quarterly frequency, while Panel B refers to variables at the annual frequency.

	Mean	St. Dev.	Median	Min	Max	Observation
Panel A: Quarterly Measures						
Repurchase	0.0976	0.2968	0.0000	0.0000	1.0000	412,582
Repurchase Dollar ($)	2,474,962.7599	14,852,240.1128	0.0000	0.0000	125,050,000.0000	412,582
Repurchase Shares	69,418.3426	383,738.9608	0.0000	0.0000	3,137,473.0000	412,582
Scaled Shares Repurchased	0.0008	0.0037	0.0000	0.0000	0.0272	397,465
Scaled Dollar Repurchased	0.0007	0.0033	0.0000	0.0000	0.0242	397,316
Previous 6 Months' Return	0.0722	0.4210	0.0407	-0.7767	1.9034	356,063
CAR[-1, 3]	0.00831	1.27392	-0.00026	-0.55054	667.99902	396,220
CAR[-1, 5]	0.00771	0.76219	-0.00051	-0.66550	257.80344	396,220
CAR[-1, 7]	0.00852	1.30423	-0.00106	-0.77598	699.00470	396,214
ROA	0.0071	0.0652	0.0190	-0.3239	0.1292	337,700
Quarterly Asset ($ billion)	8.0232	29.1000	0.7204	0.0061	232.1030	368,151
High Accrual (> industry median)	0.5040	0.5000	1.0000	0.0000	1.0000	279,310
Restatement	0.0142	0.1183	0.0000	0.0000	1.0000	412,582
Litigation	0.0045	0.0671	0.0000	0.0000	1.0000	412,582
Panel B: Annual Controls						
Total Assets ($ million)	8,504.1337	31,329.9970	716.9360	6.2520	249,758.9910	358,777
Cash ($ billion)	0.4039	1.3442	0.0418	0.0001	10.2198	352,822
Shares Outstanding (millions)	130.9069	332.6756	35.2740	1.7620	2,434.0000	397,465
EPS (diluted)	0.7681	2.3376	0.5400	-7.4700	10.0000	357,952
Retained Earnings ($ billion)	1.0354	4.4046	0.0221	-3.9229	32.3140	350,660
Market Cap. ($ million)	4,179.2077	12,607.8068	442.6497	5.9661	90,390.5234	397,316
Size	6.6075	2.2373	6.5764	1.9813	12.4283	358,777
Market-to-Book	1.3600	1.6476	0.8337	0.0321	9.7486	358,332
Price-Earnings Ratio	12.4957	50.8987	13.2374	-219.0000	268.6667	356,514
Quarter Panel Sample Firms					12,385	412,582

Table 14: Baseline Results on Peer Firms' Share Repurchases

This table presents the difference-in-differences regression results on peer firms' share repurchases. The dependent variables in the first two columns are *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. The dependent variables in the middle two columns are *Scaled Shares*, which is the number of shares repurchased by a firm in a given quarter scaled by its shares outstanding in the previous fiscal year-end. The dependent variables in columns (5) and (6) are *Scaled Dollar*, which is the dollar amount of shares repurchased by a firm in a given quarter scaled by its market capitalization in the previous fiscal year-end. *Peer 2 Quarters* equals one if a given firm is in the same product market as the restating firm for 2 quarters starting from the quarter in which the restatement occurs. *Restate 2 Quarters* equals one if a given firm issues a restatement in a given quarter and stays as one from the restating quarter for 2 quarters, and zero otherwise. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Repurchase$_{t+1}$	Repurchase$_{t+1}$	Scaled Shares$_{t+1}$	Scaled Shares$_{t+1}$	Scaled Dollar$_{t+1}$	Scaled Dollar$_{t+1}$
Peer 2 Quarters	0.01474***	0.01256***	0.00016***	0.00014***	0.00014***	0.00012***
	(3.08)	(3.94)	(3.95)	(4.94)	(3.79)	(4.76)
Restate 2 Quarters	-0.00660	-0.00880*	-0.00006	-0.00005	-0.00005	-0.00004
	(-1.46)	(-2.04)	(-1.06)	(-0.89)	(-0.97)	(-0.78)
Size		0.02180***		0.00016***		0.00011***
		(5.77)		(5.15)		(4.15)
Previous 6 Months' Return		0.00278		-0.00000		0.00009***
		(0.94)		(-0.09)		(3.97)
Cash		0.00324		0.00002		0.00003
		(1.20)		(0.85)		(0.97)
EPS		0.00654***		0.00010***		0.00008***
		(5.09)		(5.96)		(5.63)
Retained Earnings		-0.00222		-0.00002		-0.00002
		(-1.36)		(-1.11)		(-1.26)
PE Ratio		0.00003		0.00000		0.00000
		(1.63)		(0.98)		(0.94)
MTB		0.00138		-0.00001		-0.00003*
		(0.75)		(-0.35)		(-1.92)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	412,298	307,772	397,284	307,772	397,136	307,772
Adjusted R-squared	0.328	0.329	0.179	0.179	0.193	0.192

Table 15: Different Windows for Peer Firms' Repurchase Propensity

This table presents the difference-in-differences results with different windows. The dependent variables are all *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. *Peer First Quarter* equals one if a given firm is in the same product market as the restating firm for the quarter in which the restatement occurs and zero otherwise. *Peer Second Quarter* equals one if a given firm is in the same product market as the restating firm for the second quarter after the restatement and zero otherwise. Similar definitions extends to the other windows. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Repurchase$_{t+1}$	Repurchase$_{t+1}$	Repurchase$_{t+1}$	Repurchase$_{t+1}$	Repurchase$_{t+1}$
Peer First Quarter	0.00719***				0.01549***
	(3.11)				(3.48)
Peer Second Quarter		0.00593**			0.01583***
		(2.21)			(3.09)
Peer Third Quarter			-0.00232		0.00747
			(-0.72)		(1.57)
Peer Fourth Quarter				-0.00437*	0.00446
				(-1.86)	(1.20)
Restate First Quarter	-0.00638				-0.00749
	(-1.42)				(-1.53)
Restate Second Quarter		-0.00949**			-0.01077**
		(-2.27)			(-2.36)
Restate Third Quarter			-0.00184		-0.00347
			(-0.46)		(-0.81)
Restate Fourth Quarter				0.00100	-0.00050
				(0.36)	(-0.16)
Size	0.02186***	0.02197***	0.02195***	0.02195***	0.02176***
	(5.79)	(5.76)	(5.77)	(5.77)	(5.74)
Previous 6 Months' Return	0.00286	0.00283	0.00288	0.00289	0.00273
	(0.96)	(0.95)	(0.96)	(0.97)	(0.93)
Cash	0.00326	0.00330	0.00330	0.00329	0.00322
	(1.21)	(1.22)	(1.22)	(1.22)	(1.19)
EPS	0.00654***	0.00652***	0.00653***	0.00653***	0.00653***
	(5.07)	(5.04)	(5.04)	(5.05)	(5.10)
Retained Earnings	-0.00222	-0.00221	-0.00221	-0.00221	-0.00221
	(-1.36)	(-1.36)	(-1.36)	(-1.36)	(-1.36)
PE Ratio	0.00003	0.00003	0.00003	0.00003	0.00003
	(1.62)	(1.63)	(1.63)	(1.63)	(1.63)
MTB	0.00142	0.00150	0.00149	0.00149	0.00138
	(0.77)	(0.81)	(0.81)	(0.81)	(0.75)
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	307,772	307,772	307,772	307,772	307,772
Adjusted R-squared	0.328	0.328	0.328	0.328	0.329

Table 16: Pre-trend Test on the Baseline Results

This table tests on the pre-trend of the baseline regressions. *Previous One Quarter* equals one if *Peer 2 Quarters* is zero in a given quarter but is one in the immediate next quarter, and zero otherwise. *Previous Two Quarters* equals one if *Peer 2 Quarters* is zero in a given quarter and the next quarter but is one two quarters from now, and zero otherwise. The dependent variables are *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. *Peer 2 Quarters* equals one if a given firm is in the same product market as the restating firm for 2 quarters starting from the quarter in which the restatement occurs. *Restate 2 Quarters* equals one if a given firm issues a restatement in a given quarter and stays as one from the restating quarter for 2 quarters, and zero otherwise. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

VARIABLES	(1) Repurchase$_{t+1}$	(2) Repurchase$_{t+1}$	(3) Repurchase$_{t+1}$	(4) Repurchase$_{t+1}$
Peer 2 Quarters	0.01474***	0.01474***	0.01539***	0.01539***
	(3.08)	(3.08)	(3.03)	(3.03)
Previous One Quarter		0.01275		0.01360
		(0.17)		(0.18)
Previous Two Quarters			0.00798	0.00798
			(1.52)	(1.52)
Restate 2 Quarters	-0.00660	-0.00660	-0.00662	-0.00662
	(-1.46)	(-1.46)	(-1.46)	(-1.46)
Other Controls	No	No	No	No
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	412,298	412,298	412,298	412,298
Adjusted R-squared	0.328	0.328	0.328	0.328

Table 17: Restatement Characteristics for the Spillover Effect

This table presents the difference-in-differences regression results regarding the different characteristics of focal firms' financial restatements. The dependent variables in all columns are *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. The independent variables are *Aggressive Accounting, Fraud, Clerical Error, SEC Investigation, and Board Involvement*, each of which equals one for a peer firm exposed to at least one focal firm's financial restatement that has the corresponding characteristics (e.g., the restatement was due to aggressive accounting) starting in the quarter that the restatement occurs for 2 quarters. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Repurchase	Repurchase	Repurchase	Repurchase	Repurchase	Repurchase
Aggressive Accounting	0.01284***					0.01603***
	(4.07)					(4.49)
Fraud		-0.00990**				-0.00671
		(-2.47)				(-1.63)
Clerical Error			-0.00585			-0.00491
			(-1.21)			(-1.07)
SEC Investigation				-0.00447*		-0.00312
				(-1.79)		(-1.35)
Board Involvement					-0.00273	-0.00721*
					(-0.87)	(-1.87)
Restate 2 Quarters	-0.00877*	-0.00816*	-0.00812*	-0.00813*	-0.00810*	-0.00861*
	(-2.03)	(-1.88)	(-1.87)	(-1.87)	(-1.88)	(-2.01)
Size	0.02179***	0.02203***	0.02201***	0.02202***	0.02206***	0.02188***
	(5.77)	(5.77)	(5.77)	(5.77)	(5.79)	(5.80)
Previous 6 Months' Return	0.00280	0.00292	0.00282	0.00278	0.00285	0.00275
	(0.94)	(0.98)	(0.94)	(0.93)	(0.95)	(0.92)
Cash	3.22713	3.31043	3.34573	3.31663	3.32318	3.27045
	(1.20)	(1.23)	(1.24)	(1.23)	(1.23)	(1.22)
EPS	0.00654***	0.00652***	0.00650***	0.00651***	0.00650***	0.00649***
	(5.08)	(5.04)	(5.02)	(5.04)	(5.01)	(5.01)
Retained Earnings	-2.21493	-2.21065	-2.21081	-2.20452	-2.20773	-2.21174
	(-1.36)	(-1.36)	(-1.36)	(-1.36)	(-1.36)	(-1.36)
PE Ratio	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003
	(1.62)	(1.64)	(1.63)	(1.63)	(1.64)	(1.64)
MTB	0.00138	0.00151	0.00151	0.00152	0.00152	0.00148
	(0.75)	(0.82)	(0.82)	(0.82)	(0.82)	(0.80)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	307,772	307,772	307,772	307,772	307,772	307,772
Adjusted R-squared	0.329	0.328	0.328	0.328	0.328	0.329

Table 18: Post-Repurchase Accounting Quality in Accruals

This table presents the subsample analysis on the accruals quality within peer firms. The dependent variables for accruals quality are the *High Accruals Quality* of a firm, defined as one if the firm's *accounting accruals* are lower than the median accounting accruals of the product market in a given quarter, and zero otherwise. Accounting accruals are calculated as Francis, LaFond, Olsson, and Schipper (2005). The higher the accounting accruals, the lower the accounting quality. Independent variable of interest is *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. The regressions compare the accruals quality between peer firms with share repurchases and peer firms without share repurchases. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)
	High Accruals Quality for Peer 2 Quarters = 1			
VARIABLES	t+1	t+2	t+3	t+4
Repurchase	0.01438***	0.01485***	0.01678***	0.01902***
	(3.00)	(3.32)	(3.48)	(3.74)
Size	-0.07960***	-0.06433***	-0.04862***	-0.03861***
	(-9.70)	(-6.14)	(-4.12)	(-3.48)
Previous 6 Months' Return	0.00738**	0.01206***	0.01146***	0.01150***
	(2.54)	(4.79)	(3.75)	(3.33)
Cash	0.00848	0.01112**	0.00967*	0.01131*
	(1.69)	(2.18)	(1.78)	(2.07)
EPS	0.00234	0.00244	0.00227	0.00202
	(1.65)	(1.55)	(1.51)	(1.45)
Retained Earnings	0.00391***	0.00467***	0.00568***	0.00620***
	(3.13)	(3.45)	(3.89)	(4.23)
PE Ratio	-0.00001	-0.00002	-0.00001	0.00001
	(-0.52)	(-0.80)	(-0.24)	(0.30)
MTB	0.00308	0.00378	0.00402	0.00504*
	(1.43)	(1.55)	(1.58)	(1.94)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	163,242	163,242	163,242	163,242
Adjusted R-squared	0.445	0.435	0.432	0.429

Table 19: Post-Repurchase Likelihood of Restatement

This table presents the subsample analysis on the subsequent likelihood in issuing financial restatements within peer firms. The dependent variables are the *Likelihood of Restatement* of a firm, defined as one if the firm issues a financial restatement in the corresponding quarter, and zero otherwise. Independent variable of interest is *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. The regressions compare the subsequent likelihood of issuing financial restatements between peer firms with share repurchases and peer firms without share repurchases. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)
	Likelihood of Restatement for Peer 2 Quarters = 1			
VARIABLES	t+1	t+2	t+3	t+4
Repurchase	-0.00467*	-0.00675*	-0.00703	-0.00790
	(-2.04)	(-1.97)	(-1.67)	(-1.69)
Size	0.01082***	0.01528***	0.01779***	0.02084***
	(6.14)	(5.95)	(5.47)	(5.69)
Previous 6 Months' Return	-0.00258	-0.00373*	-0.00432	-0.00447
	(-1.71)	(-1.79)	(-1.70)	(-1.55)
Cash	0.00209	0.00284	0.00468*	0.00478*
	(1.38)	(1.56)	(2.07)	(1.76)
EPS	-0.00248***	-0.00338***	-0.00401***	-0.00409***
	(-4.49)	(-4.45)	(-4.22)	(-3.86)
Retained Earnings	0.00065	0.00103	0.00140	0.00167
	(1.18)	(1.33)	(1.41)	(1.39)
PE Ratio	0.00000	0.00001	0.00002	0.00002
	(0.00)	(0.45)	(0.76)	(0.64)
MTB	-0.00062	-0.00051	-0.00072	-0.00043
	(-0.86)	(-0.49)	(-0.59)	(-0.29)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	163,242	163,242	163,242	163,242
Adjusted R-squared	0.081	0.119	0.154	0.186

Table 20: Post-Repurchase Likelihood of Litigation

This table presents the subsample analysis on the subsequent accounting-related litigation risk within peer firms. The dependent variables are the *Litigation Risk* of a firm, defined as one if the firm receives a class action lawsuit against its accounting practices in the corresponding quarter, and zero otherwise. Independent variable of interest is *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. The regressions compare the subsequent accounting-related litigation risk between peer firms with share repurchases and peer firms without share repurchases. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)
	Litigation Risk for Peer 2 Quarters = 1			
VARIABLES	6 Months	1 Year	2 Years	3 Years
Repurchase	-0.00402***	-0.00654***	-0.01122***	-0.01289***
	(-3.02)	(-3.65)	(-3.60)	(-3.57)
Size	0.01204***	0.01563***	0.01946***	0.01995***
	(8.64)	(6.56)	(4.75)	(4.50)
Previous 6 Months' Return	-0.00857***	-0.00736***	-0.00212	-0.00043
	(-5.22)	(-3.79)	(-1.05)	(-0.19)
Cash	-0.00002	0.00099	0.00328	0.00150
	(-0.01)	(0.39)	(0.80)	(0.28)
EPS	-0.00024	-0.00048	-0.00065	-0.00043
	(-0.72)	(-1.03)	(-0.84)	(-0.44)
Retained Earnings	0.00090*	0.00097	0.00096	0.00056
	(1.77)	(1.08)	(0.65)	(0.26)
PE Ratio	0.00000	-0.00000	-0.00000	-0.00000
	(0.31)	(-0.18)	(-0.10)	(-0.08)
MTB	0.00319***	0.00369**	0.00465***	0.00548***
	(3.59)	(2.85)	(3.00)	(3.08)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	163,242	163,242	163,242	163,242
Adjusted R-squared	0.079	0.138	0.232	0.303

Table 21: Summary Statistics

This table presents the summary statistics of the sample. The sample period ranges from 2005 to 2020. Panel A presents variables measured at the quarterly frequency, and all quarterly measures are matched contemporaneously. Panel B presents variables measured at the annual frequency, and are matched to the previous fiscal year-end as control variables. Any given firm in the sample has issued at least one payout either through dividend or repurchase in the sample period. Among these firms, quarterly observations with zero dividends and zero repurchases are treated as missing observations to strictly compare between dividends and repurchases. The sample consists a total of 119,041 firm-year-quarter observations with 5,573 firms covering 69 industries classified by two-digit SIC codes. Buy-and-hold abnormal stock returns (BHAR) are calculated as the buy-and-hold stock return adjusted for dividends and stock splits net buy-and-hold return on value-weighted CRSP market index for a given horizon. All continuous variables are winsorized at the 1 percent and 99 percent level.

	Mean	St. Dev.	Median	Min	Max	Observations
Panel A: Quarterly Measures						
Fraction of Repurchase (decimal)	0.38	0.43	0.08	0.00	1.00	119,041
Dollar Repurchase ($ million)	52.78	177.86	0.20	0.00	1,264.17	119,041
Dollar Dividend ($ million)	64.36	209.94	5.79	0.00	1,555.00	119,041
Total Payout ($ million)	124.71	367.74	14.43	0.01	2,598.00	119,041
Repurchase Additional to Dividends (decimal)	0.12	2.71	-0.91	-1.00	18.77	119,033
Scaled Dollar Repurchase	0.01	0.02	0.00	0.00	0.10	119,032
Dispersion	1.56	0.84	1.56	-0.89	4.23	119,041
Abnormal Turnover	0.20	0.41	0.10	-0.29	1.95	102,731
Forecast Error (decimal)	0.01	0.25	0.01	-1.05	1.31	117,859
Insider Net Shares Transacted (millions of shares)	-0.20	0.83	-0.02	-7.00	0.61	74,208
Insider Net Shares Transacted (% of shares outstanding)	0.00	0.01	0.00	-0.08	0.01	74,197
Insider Buy-order (% of total insider orders)	25.69	40.35	0.00	0.00	100.00	74,208
EPS (Diluted)	0.45	0.81	0.36	-2.72	3.77	118,974
Debt Raised ($ billion)	0.20	0.69	0.00	0.00	5.19	111,317
Investment (% book value)	2.36	2.85	1.61	0.77	22.59	117,133
Last 6 Months' Returns (decimal)	0.06	0.30	0.06	-0.66	1.06	115,322
BHAR 5 Days	0.00	0.06	0.00	-0.17	0.19	117,129
BHAR 7 Days	0.00	0.07	0.00	-0.20	0.28	116,883
BHAR 30 Days	0.00	0.15	0.00	-0.40	0.50	116,883
BHAR 3 Months	0.02	0.25	0.00	-0.59	0.90	114,970
BHAR 6 Months	0.03	0.35	0.00	-0.77	1.32	113,042
BHAR 1 Year	0.04	0.44	0.00	-0.90	1.68	106,660
BHAR 2 Years	0.09	0.65	0.03	-1.17	2.62	94,222
BHAR 3 Years	0.18	0.85	0.07	-1.38	3.60	82,057
Market Return (decimal)	0.02	0.09	0.03	-0.24	0.28	119,041
Panel B: Annual Measures						
Total Asset ($ million)	14,210.22	40,899.20	2,448.16	55.54	300,193.00	117,499
Size	7.91	1.76	7.80	4.03	12.61	117,499
Cash ($ million)	1,261.94	4,283.25	149.90	0.52	33,630.00	117,499
Net Income ($ million)	504.39	1,467.09	75.00	-752.90	10,508.00	117,441
Market-to-Book (MTB)	3.48	5.35	2.04	0.46	42.73	117,186
Annual Dividend Paid ($ million)	218.58	678.62	21.66	0.00	5,062.00	116,913
Retained Earnings ($ million)	2,386.53	7,698.51	248.84	-4,233.94	55,309.00	113,705
Shares Outstanding (millions of shares)	210.73	491.02	59.58	4.30	3,486.69	117,496
Industry (2-digit SIC)					69	119,041
Firm					5,573	119,041

Table 22: Heterogeneity in Investor Beliefs and Fraction Paid out through Stock Repurchases - Baseline Results

This table presents the results for the baseline regressions. The dependent variable is *Fraction of Repurchase* conducted by a firm in a given quarter divided by its total payout, which is the dollar sum of stock repurchases spending and dividend payments in that quarter. Independent variables of interest are *Dispersion*, which is measured as the standard deviation of earnings forecasts by all analysts covering the same firm for the same given quarter scaled by its mean. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)
VARIABLES	Fraction of Repurchase	Fraction of Repurchase
Dispersion	0.01510***	0.01807***
	(6.02)	(6.78)
Debt Raised		0.00508
		(1.07)
Size		-0.01360***
		(-3.48)
Cash		0.00001***
		(3.98)
Net Income		0.00006***
		(11.12)
MTB		0.00416***
		(5.09)
Previous Total Dividend		-0.00018***
		(-13.97)
Retained Earnings		-0.00000
		(-0.70)
Last 6 Months' Return		-0.03906***
		(-5.75)
EPS		0.01275***
		(3.30)
Observations	119,038	103,975
Adjusted R-squared	0.214	0.232
Industry FE	Yes	Yes
Time FE	Yes	Yes

Table 23: Heterogeneity in Investor Beliefs and Stock Repurchases - Identification

This table presents results on the difference-in-differences regressions. The identification uses the differential impact of COVID-19 on different economic sectors to compare firms in negatively affected industries with firms in positively (or non-affected) industries between the pre-treatment and post-treatment periods. *Treatment* equals one if a firm belongs to an industry that is negatively affected by the COVID-19 pandemic, and thus is subject to a higher level of heterogeneity in investor beliefs, and zero otherwise. *Post* equals one for three quarters starting in the second quarter of 2020, where the United States government formally recognized the COVID-19 pandemic and issued quarantine guidelines, and zero otherwise. The interaction term *Treatment* $\times$ *Post* estimates the treatment effect that compares firms with higher level of heterogeneity in investor beliefs with those of unchanged or lower level of heterogeneity in investor beliefs in the after COVID-19 quarantine periods relative to the before COVID-19 periods. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)
VARIABLES	Fraction of Repurchase	Fraction of Repurchase
Treatment	-	-
Post	-	-
Treatment × Post	0.06045***	0.06270***
	(4.08)	(3.70)
Debt Raised		0.01508**
		(2.17)
Size		-0.02620***
		(-4.52)
Cash		0.00001***
		(4.23)
Net Income		0.00005***
		(5.59)
MTB		0.00422***
		(3.98)
Previous Total Dividend		-0.00017***
		(-10.05)
Retained Earnings		-0.00000
		(-1.41)
Last 6 Months' Return		-0.04457**
		(-2.02)
EPS		-0.00066
		(-0.12)
	145	
Observations	11,858	9,294
Adjusted R-squared	0.195	0.244
Industry FE	Yes	Yes
Time FE	Yes	Yes

Table 24: Heterogeneity in Investor Beliefs and Investment Expenditures

This table presents regression results with respect to firms' real investments in periods surrounding the payout decision. The dependent variables are *Investment* by a given firm in the previous one quarter, the current quarter, and one, two, three, and four quarters after a given quarter for columns (1) through (6) respectively. *Investment* is the sum of R&D expenses, capital expenditure, and other capital investment of a firm in a quarter scaled by the book value of the firm in the prior fiscal year-end. *Debt Raised* is measured as the amount of debt raised by a firm in a given quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

VARIABLES	(1) Investment$_{t-1}$	(2) Investment$_{t}$	(3) Investment$_{t+1}$	(4) Investment$_{t+2}$	(5) Investment$_{t+3}$	(6) Investment$_{t+4}$
Fraction of Repurchase	-0.27955***	-0.30586***	-0.29530***	-0.24801***	-0.20171***	-0.15371**
	(-4.68)	(-5.24)	(-4.68)	(-3.83)	(-3.03)	(-2.26)
Dispersion	-0.06077***	-0.06310***	-0.06784***	-0.06729***	-0.05876***	-0.05220***
	(-3.49)	(-3.78)	(-3.79)	(-3.64)	(-3.03)	(-2.62)
Debt Raised	0.34426***	0.46625***	0.46788***	0.45531***	0.44915***	0.43328***
	(6.73)	(9.07)	(8.21)	(7.73)	(7.38)	(6.98)
Size	0.28403***	0.26342***	0.28510***	0.28629***	0.28359***	0.27866***
	(11.22)	(10.76)	(10.86)	(10.97)	(10.79)	(10.51)
Cash	0.00003**	0.00003**	0.00003**	0.00003**	0.00003*	0.00002
	(2.11)	(2.29)	(2.10)	(2.00)	(1.80)	(1.48)
Net Income	-0.00026***	-0.00032***	-0.00031***	-0.00030***	-0.00028***	-0.00026***
	(-7.00)	(-8.26)	(-7.90)	(-7.50)	(-7.14)	(-6.66)
MTB	0.31308***	0.34375***	0.35726***	0.33537***	0.31238***	0.28878***
	(24.08)	(25.85)	(23.97)	(22.80)	(21.18)	(19.23)
Previous Total Dividend	-0.00018**	-0.00013*	-0.00015*	-0.00009	-0.00005	-0.00002
	(-2.30)	(-1.74)	(-1.92)	(-1.16)	(-0.65)	(-0.18)
Retained Earnings	-0.00002***	-0.00002**	-0.00002**	-0.00002***	-0.00003***	-0.00003***
	(-2.78)	(-2.54)	(-2.40)	(-2.90)	(-3.11)	(-3.13)
Last 6 Months' Return	-0.04218	-0.00648	0.09229*	0.09944*	0.08036	0.04038
	(-0.90)	(-0.15)	(1.75)	(1.80)	(1.39)	(0.69)
EPS	-0.28775***	-0.26050***	-0.34036***	-0.34706***	-0.35826***	-0.35162***
	(-10.30)	(-9.58)	(-11.26)	(-11.30)	(-11.29)	(-10.58)
Observations	99,659	103,940	102,830	99,945	96,894	93,710
Adjusted R-squared	0.391	0.450	0.405	0.362	0.324	0.287
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 25: Price Impact of Stock Repurchases

This table presents regression results on price impact. The dependent variables are buy-and-hold abnormal stock returns (BHAR) 5, 7, and 30 days after a quarter-end for column (1), (2), and (3) respectively. BHARs are calculated as the buy-and-hold returns of a firm's stock adjusted for dividends and stock splits net of buy-and-hold returns on the CRSP value-weighted market index for the same window. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions only include time fixed effect because industry fixed effect is forward looking within an industry. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)
VARIABLES	Price Impact 5 Days	Price Impact 7 Days	Price Impact 30 Days
Fraction of Repurchase	0.00196***	0.00166***	0.00843***
	(6.22)	(4.59)	(8.89)
Dispersion	0.00005	0.00016	0.00047
	(0.27)	(0.79)	(0.92)
Debt Raised	-0.00025	-0.00025	-0.00142**
	(-1.19)	(-1.03)	(-2.14)
Size	0.00038***	0.00029**	0.00041
	(3.70)	(2.44)	(1.42)
Cash	0.00000	0.00000**	0.00000**
	(0.90)	(2.11)	(2.16)
Net Income	-0.00000	-0.00000	-0.00000***
	(-1.27)	(-1.15)	(-3.58)
MTB	0.00011***	0.00007**	0.00013
	(4.32)	(2.56)	(1.61)
Previous Total Dividend	0.00000	-0.00000	0.00000
	(0.53)	(-0.12)	(0.86)
Retained Earnings	0.00000	-0.00000	-0.00000*
	(0.19)	(-0.02)	(-1.87)
EPS	0.00053**	0.00043*	0.01102***
	(2.45)	(1.78)	(16.92)
Constant	-0.00360***	-0.00275***	-0.00765***
	(-4.49)	(-2.99)	(-3.38)
Observations	104,490	104,484	104,484
Adjusted R-squared	0.559	0.638	0.455
Industry FE	No	No	No
Time FE	Yes	Yes	Yes

Table 26: Long-Run Abnormal Stock Returns following Stock Repurchases

This table presents regression results with respect to long-term abnormal stock returns. The dependent variables are buy-and-hold abnormal stock returns (BHAR) 3 and 6 months after a quarter-end in column (1) and (2), and 1, 2, and 3 years after a quarter-end in column (3), (4), and (5) respectively. BHARs are calculated as the buy-and-hold returns of a firm's stock adjusted for dividends and stock splits net of buy-and-hold returns on the CRSP value-weighted market index for the same window. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions only include time fixed effect because industry fixed effect is forward looking within an industry. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	3 Months	6 Months	1 Year	2 Years	3 Years
Fraction of Repurchase	0.01523***	0.02979***	0.05274***	0.09055***	0.11993***
	(7.81)	(8.80)	(8.10)	(6.86)	(5.68)
Dispersion	-0.00025	0.00174	0.00218	0.00556	0.00716
	(-0.26)	(1.22)	(0.91)	(1.35)	(1.17)
Debt Raised	-0.00206*	-0.00711***	-0.01423***	-0.03055***	-0.05133***
	(-1.80)	(-3.79)	(-4.42)	(-4.87)	(-4.83)
Size	-0.00195***	-0.00364***	-0.00534**	-0.00640	0.00167
	(-3.20)	(-3.38)	(-2.51)	(-1.43)	(0.23)
Cash	0.00000***	0.00000***	0.00000*	0.00000	0.00000
	(3.32)	(2.85)	(1.66)	(0.46)	(0.28)
Net Income	-0.00000***	-0.00000*	0.00000	0.00001	-0.00000
	(-3.02)	(-1.75)	(0.57)	(1.30)	(-0.20)
MTB	0.00069***	0.00140***	0.00251***	0.00398***	0.00372*
	(3.72)	(4.22)	(3.98)	(3.00)	(1.82)
Previous Total Dividend	0.00001**	0.00001**	0.00001	0.00001	0.00002
	(2.47)	(2.02)	(1.20)	(0.59)	(0.74)
Retained Earnings	-0.00000**	-0.00000*	-0.00000***	-0.00000**	-0.00000
	(-2.00)	(-1.82)	(-2.59)	(-2.39)	(-1.48)
EPS	0.01768***	0.01786***	0.02560***	0.03698***	0.04419***
	(14.32)	(9.36)	(7.86)	(6.00)	(4.35)
Constant	0.01740***	0.03163***	0.04597***	0.07918**	0.09835*
	(3.64)	(3.70)	(2.74)	(2.25)	(1.72)
Observations	102,757	100,979	95,171	83,888	72,939
Adjusted R-squared	0.414	0.369	0.210	0.145	0.105
Industry FE	No	No	No	No	No
Time FE	Yes	Yes	Yes	Yes	Yes

Table 27: Insider Trading and Stock Repurchases

This table presents regression results on insider trading. The independent variables of interest are *Net Shares Transacted*, *Net % Shares Transacted*, and *% Buy Orders*. *Net Shares Transacted* is the net number of shares transacted (shares bought minus shares sold) by all the insiders of a given firm in the previous quarter. *Net % Shares Transacted* is the net number of shares transacted by insiders as a percentage of number of shares outstanding, which is *Net Shares Transacted* scaled by the firm's quarterly total shares outstanding. *% Buy Orders* measures the number of buy orders (not shares) as a percentage of all the orders submitted (the sum of buy and sell orders, not shares) by all insiders of a given firm in the previous quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)
VARIABLES	Fraction of Repurchase	Fraction of Repurchase	Fraction of Repurchase
Net Shares Transacted	-0.00758***		
	(-2.60)		
Net % Shares Transacted		-0.35879*	
		(-1.89)	
% Buy Orders			-0.00078***
			(-9.62)
Dispersion	0.01232***	0.01224***	0.01160***
	(4.00)	(3.98)	(3.80)
Debt Raised	0.00591	0.00560	0.00645
	(1.08)	(1.02)	(1.19)
Size	-0.00927**	-0.00884**	-0.01209***
	(-2.15)	(-2.04)	(-2.76)
Cash	0.00001***	0.00001***	0.00001***
	(3.77)	(3.88)	(3.89)
Net Income	0.00006***	0.00006***	0.00006***
	(9.02)	(9.16)	(9.28)
MTB	0.00430***	0.00431***	0.00396***
	(4.83)	(4.83)	(4.50)
Previous Total Dividend	-0.00019***	-0.00019***	-0.00019***
	(-13.79)	(-13.84)	(-13.70)
Retained Earnings	0.00000	0.00000	0.00000
	(0.34)	(0.20)	(0.14)
Last 6 Months' Return	-0.04721***	-0.04655***	-0.06026***
	(-5.88)	(-5.80)	(-7.43)
EPS	0.01169***	0.01137***	0.00770*
	(2.67)	(2.60)	(1.78)
Observations	66,874	66,863	66,874
Adjusted R-squared	0.254	0.254	0.258
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Table 28: Stock Repurchases following Market Downturns

This table presents results on market macro-conditions. The dependent variable is *Fraction of Repurchase* conducted by a firm in a given quarter divided by its total payout, which is the dollar sum of stock repurchases spending and dividend payments in that quarter. Independent variables of interest are *Quarterly Market Returns*, which is the buy-and-hold returns on value-weighted CRSP market index in a given quarter, and *Market Downturn Indicator*, which equals to one if a quarter's market return is less than the median market returns in the previous twelve quarters and zero otherwise. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and year fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

VARIABLES	(1) Fraction of Repurchase	(2) Fraction of Repurchase	(3) Fraction of Repurchase	(4) Fraction of Repurchase
Quarterly Market Return (in decimal)	-0.19895***	-0.17946***		
	(-20.19)	(-16.30)		
Market Downturn Indicator			0.02915***	0.02320***
			(16.51)	(12.28)
Dispersion	0.01438***	0.01731***	0.01448***	0.01731***
	(5.77)	(6.53)	(5.81)	(6.53)
Debt Raised		-0.00058		-0.00098
		(-0.13)		(-0.21)
Size		-0.01296***		-0.01293***
		(-3.32)		(-3.31)
Cash		0.00001***		0.00001***
		(4.06)		(4.06)
Net income		0.00006***		0.00006***
		(11.16)		(11.17)
MTB		0.00415***		0.00417***
		(5.09)		(5.11)
Previous Total Dividend		-0.00018***		-0.00018***
		(-13.94)		(-13.95)
Retained Earnings		-0.00000		-0.00000
		(-0.69)		(-0.69)
Last 6 Months' Return		-0.03950***		-0.04347***
		(-6.37)		(-7.07)
EPS		0.01232***		0.01190***
		(3.21)		(3.11)
Observations	119,038	103,975	119,038	103,975
Adjusted R-squared	0.211	0.230	0.210	0.229
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 29: Heterogeneous Beliefs and Stock Repurchases over Time

This table presents the results testing the time trend of fraction of repurchase and firms' level of heterogeneous beliefs. Sample period from 2005 to 2020 is grouped into three baskets - *Early Years* (2005 to 2009), *Middle Years* (2010 to 2015), and *Later Years* (2016 to 2020). The time index for these three groups are 1, 2, and 3 respectively. Columns (1) and (2) use the time index as the independent variable of interest. Columns (3) and (4) use indicator variables for *Middle Years* (time index 2) and *Later Years* (time index 3) as the main independent variables of interest. The omitted variable is the indicator for *Early Years* in columns (3) and (4). Thus, interpretation for the latter two columns should be made relative to the *Early Years*. All regressions include industry fixed effect. Time fixed effects are absorbed by the *Time Index* variables as the indicator variables for each time index. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)	(4)
VARIABLES	Fraction of Repurchase	Dispersion	Fraction of Repurchase	Dispersion
Time Index	0.00802**	0.07166***		
	(1.97)	(8.78)		
Middle Years			0.01001	-0.01934
			(1.40)	(-1.32)
Later Years			0.01606**	0.14302***
			(1.97)	(8.78)
Debt Raised	0.00191	-0.04511*	0.00196	-0.04746*
	(0.14)	(-1.80)	(0.14)	(-1.91)
Size	-0.02026***	0.18245***	-0.02024***	0.18158***
	(-5.11)	(28.06)	(-5.10)	(27.97)
Cash	0.00000***	-0.00001**	0.00000***	-0.00001**
	(2.72)	(-2.51)	(2.71)	(-2.37)
Net Income	0.00010***	-0.00005**	0.00010***	-0.00005***
	(10.30)	(-2.55)	(10.29)	(-2.60)
MTB	0.00312***	0.00159	0.00313***	0.00094
	(2.98)	(0.88)	(2.98)	(0.52)
Previous Total Dividend	-0.00025***	-0.00010***	-0.00025***	-0.00010***
	(-14.27)	(-3.06)	(-14.27)	(-3.10)
Retained Earnings	-0.00000***	-0.00000	-0.00000***	-0.00000
	(-3.06)	(-1.02)	(-3.06)	(-0.98)
Last 6 Months' Return	-0.14972***	-0.04942	-0.15058***	-0.01025
	(-7.27)	(-1.07)	(-7.09)	(-0.21)
EPS	-0.01505	-0.01164	-0.01506	-0.01089
	(-1.64)	(-0.61)	(-1.64)	(-0.57)
Observations	9,251	9,251	9,251	9,251
Adjusted R-squared	0.285	0.218	0.285	0.222
Industry FE	Yes	Yes	Yes	Yes

Table 30: Heterogeneous Beliefs and Stock Repurchases over Time - 2SLS Analysis
This table presents the two stage least squares regressions using the time index. Sample period from 2005 to 2020 is grouped into three baskets - *Early Years* (2005 to 2009), *Middle Years* (2010 to 2015), and *Later Years* (2016 to 2020). In column (1), the first stage regresses each firm's *Dispersion* averaged across all the periods in each time index basket on the time index (1, 2, and 3). The second stage regresses the *Fraction of Repurchase* on the *Predicted Dispersion* from the first stage, whose results are in column (2). All regressions include industry fixed effect. Time fixed effect is absorbed by the time value used in the first stage. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1) Dispersion (First Stage)	(2) Fraction of Repurchase (Second Stage)
Time Index	0.07720***	
	(9.26)	
Predicted Dispersion		0.16545***
		(2.87)
Debt Raised	-0.07714**	-0.00424
	(-3.16)	(-0.28)
Size	0.16111***	-0.08298***
	(26.36)	(-7.75)
Cash	-0.00001*	0.00001***
	(-2.53)	(6.10)
Net Income	-0.00003	0.00015***
	(-1.51)	(12.46)
MTB	0.00464**	0.00868***
	(2.62)	(7.23)
Previous Total Dividend	-0.00017***	-0.00032***
	(-5.19)	(-13.73)
Retained Earnings	0.00001*	0.00000
	(2.01)	(0.03)
Last 6 Months' Return	-0.06231	-0.14449***
	(-1.31)	(-6.19)
EPS	0.01107	-0.00643
	(0.58)	(-0.62)
F-statistics	85.77***	
Observations	9,252	9,252
Centered R-squared	0.151	0.129
Industry FE	Yes	Yes

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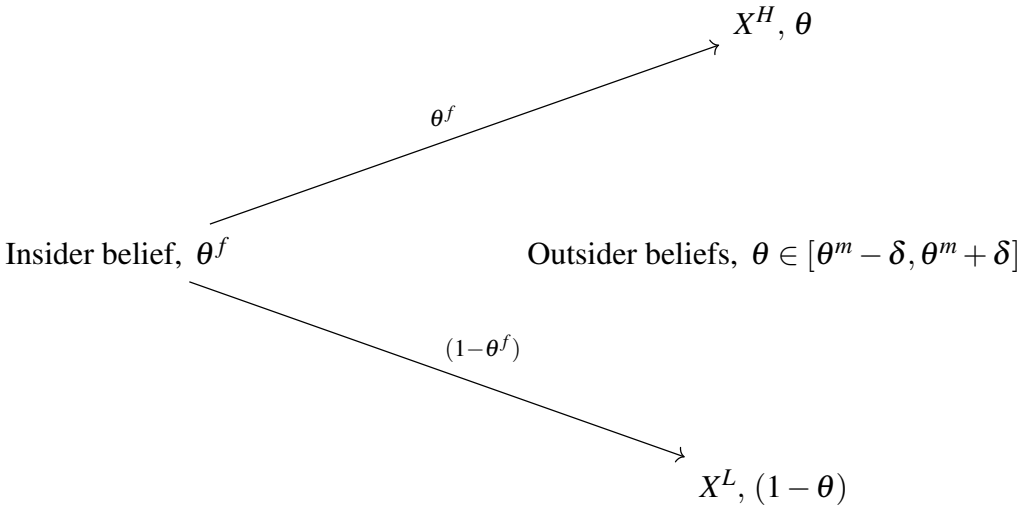

Figure 1: Insider and Outsider Beliefs about the Firm's Future Prospects

A Appendix

Table A1: Robustness When Controlling for Incentives

This table presents the regression results on how mentioning share repurchases in the questions and answers section of a given conference call affects the firm's subsequent actual share repurchases. $Repurchase_{t+1}$ is an indicator set to one if a firm repurchases shares in the open market in month $t+1$ and zero otherwise. $Scaled\ Dollar\ Repurchase_{t+1}$ is the dollar amount that a firm spends on repurchasing shares in the open market in a given month divided by its total market value in the previous quarter-end. $Frequency\_of\_Mention$ is the number of times that share repurchases are mentioned in the questions and answers section of a conference call divided the total number of words spoken in the same section of the same call. *Mentioning Analysts' Holding (million shares)* measures the total number of millions of shares that the employer companies at which analysts who ask about the firm's stock repurchases work in a month. *Prior EPS Upward Revision* equals one if one of the participating analysts in a firm's conference call in month revised the firm's EPS upward in the previous month, and zero otherwise. Industry is defined by 2-digit SIC code. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Repurchase$_{t+1}$			Scaled Dollar Repurchase$_{t+1}$		
Frequency_of_Mention	0.565***	0.568***	0.565***	0.582***	0.582***	0.582***
	(7.32)	(7.34)	(7.28)	(8.44)	(8.52)	(8.45)
Mentioning Analysts' Holding (million shares)	0.086***		0.086***	0.006		0.006
	(2.68)		(2.68)	(0.47)		(0.47)
Prior EPS Upward Revision		-0.003	-0.003		-0.004	-0.004
		(-0.03)	(-0.03)		(-0.06)	(-0.06)
Lagged_cumulative	0.153***	0.153***	0.153***	0.127***	0.127***	0.127***
	(14.36)	(14.37)	(14.36)	(15.94)	(15.94)	(15.94)
Institutional_Holding	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-1.00)	(-1.00)	(-1.00)	(-0.29)	(-0.29)	(-0.29)
Size	0.028***	0.028***	0.028***	0.008**	0.008**	0.008**
	(5.37)	(5.38)	(5.37)	(2.02)	(2.02)	(2.02)
Leverage	-0.102***	-0.102***	-0.102***	-0.057***	-0.057***	-0.057***
	(-3.94)	(-3.94)	(-3.94)	(-3.58)	(-3.58)	(-3.58)
Market_to_Book	0.001	0.001	0.001	-0.001	-0.001	-0.001
	(1.14)	(1.14)	(1.14)	(-1.65)	(-1.65)	(-1.65)
Profitability	0.226***	0.226***	0.226***	0.123**	0.123**	0.123**
	(2.67)	(2.67)	(2.67)	(2.55)	(2.55)	(2.55)
Dividend	0.003	0.003	0.003	-0.006	-0.006	-0.006
	(0.11)	(0.11)	(0.11)	(-0.41)	(-0.41)	(-0.41)
Cash	0.104***	0.104***	0.104***	0.077***	0.077***	0.077***
	(3.58)	(3.58)	(3.58)	(7.01)	(7.01)	(7.01)
Prev_6month_return	-0.021***	-0.021***	-0.021***	-0.016***	-0.016***	-0.016***
	(-4.41)	(-4.41)	(-4.41)	(-4.70)	(-4.70)	(-4.70)
Observations	221,664	221,664	221,664	221,664	221,664	221,664
Adjusted R-squared	0.335	0.335	0.335	0.185	0.185	0.185
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Table A2: Robustness using Net Repurchase Measures

This table checks robustness by using net repurchase measure by McLean et al. (2009) as the dependent variables. *Log_Net_Shares_Repurchased* has a mean of 0.00013 and a standard deviation of 0.0388. *Net_Shares_Repurchased* has a mean of 0.00086 and a standard deviation of 0.0107. Other controls include *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) Log_Net_ Shares_Repurchased$_{t+1}$	(2) Net_Shares_ Repurchased$_{t+1}$	(3) Log_Net_ Shares_Repurchased$_{t+1}$	(4) Net_Shares_ Repurchased$_{t+1}$
Frequency_of_Mention	0.020***	0.011***		
	(4.03)	(3.82)		
Frequency_Analyst			0.016**	0.011***
			(2.41)	(3.02)
Frequency_Company			0.054	0.021
			(1.41)	(1.36)
Log_attention_10KQ	0.000	0.000	0.000	0.000
	(1.61)	(0.27)	(1.61)	(0.27)
Log_attention_other	-0.001***	-0.000***	-0.001***	-0.000***
	(-3.35)	(-6.92)	(-3.35)	(-6.92)
Lagged_cumulative	0.001***	0.001***	0.001***	0.001***
	(5.58)	(9.03)	(5.58)	(9.02)
Observations	181,125	181,037	181,125	181,037
Adjusted R-squared	0.039	0.063	0.039	0.063
Other Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes

Table A3: Baseline Regressions with Analysts' Employer Indicator Variables

This table presents the regression analysis similar to Table 3 and 5 but with each participating analyst's employer fixed effect. For each firm that an analyst in a given call belongs to, it appears as a dummy variable in the regression. There are a total of 232 firms that participating analysts in my sample belong to. The remaining variables are as defined in Table 3 and 5. Other controls include *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm, industry by time, and analysts' employer fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Repurchase$_{t+1}$				Scaled Dollar Repurchase$_{t+1}$			
Mention_Repurchase	0.026***				0.025***			
	(4.84)				(7.11)			
Mention_byAnalyst		0.028***				0.022***		
		(4.72)				(6.13)		
Mention_byCompany		-0.001				0.009		
		(-0.20)				(1.38)		
Frequency_of_Mention			0.562***				0.581***	
			(6.86)				(8.29)	
Frequency_Analyst				0.746***				0.691***
				(8.49)				(7.50)
Frequency_Company				-0.230				0.297
				(-0.56)				(0.58)
Lagged_cumulative	0.153***	0.153***	0.153***	0.153***	0.127***	0.127***	0.127***	0.127***
	(14.42)	(14.41)	(14.41)	(14.41)	(15.95)	(15.95)	(15.93)	(15.93)
Observations	221,664	221,664	221,664	221,664	221,664	221,664	221,664	221,664
Adjusted R-squared	0.335	0.335	0.335	0.335	0.184	0.184	0.185	0.185
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analysts' Employer Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A4: Hazard Model on Extensive Margin

This table presents the regression results for programs that have not started since the announcement of the open market repurchase program till the month the buy starts repurchasing shares. Other controls include *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Repurchase$_{t+1}$				Scaled Dollar Repurchase$_{t+1}$			
Mention_Repurchase	0.021***				0.024***			
	(5.29)				(5.64)			
Mention_byAnalyst		0.025***				0.021***		
		(4.59)				(4.53)		
Mention_byCompany		-0.005				0.011*		
		(-0.55)				(1.91)		
Frequency_of_Mention			0.400***				0.559***	
			(7.00)				(6.34)	
Frequency_Analyst				0.512***				0.608***
				(7.05)				(4.75)
Frequency_Company				-0.094				0.594
				(-0.23)				(1.27)
Lagged_cumulative	0.425***	0.425***	0.425***	0.425***	0.316***	0.316***	0.316***	0.316***
	(25.01)	(25.00)	(24.99)	(24.99)	(20.72)	(20.71)	(20.70)	(20.70)
Observations	168,757	168,757	168,757	168,757	168,757	168,757	168,757	168,757
Adjusted R-squared	0.665	0.665	0.665	0.665	0.397	0.397	0.397	0.397
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry $\times$ Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A5: How Analysts Ask About Share Repurchases and Stock Rating

This table presents the correlation between the different dimensions of analysts talking about share repurchases and their individual stock rating change afterward. The unit of observation is at the firm-month-analyst level. *Analyst_First* equals one for a particular analyst if she asks about a firm's share repurchases in its conference call before the firm does and zero otherwise. *Analyst_Blunt* equals one for a particular analyst if at least one of her questions on the firm's share purchases is blunt. *Analyst_Freq*, *Analyst_Length*, *Analyst_Distance*, *Analyst_Tone*, and *Analyst_Othertopics* are all continuous variables for each particular analyst regarding her questions on the firm's share repurchases. They are similar to the measurement in Table 6 and 7 but at the analyst level. Other controls include *Lagged_Cumulative* (progress of actual repurchases under the announced program), *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm, industry by time, and analyst fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Analyst Downgrade$_{t+1}$	Analyst Downgrade$_{t+3}$	Analyst Downgrade$_{t+6}$	Analyst Downgrade$_{t+9}$	Analyst Downgrade$_{t+12}$
Analyst_First	-0.000	-0.001	-0.001	-0.004*	-0.005***
	(-1.66)	(-0.46)	(-0.49)	(-1.96)	(-2.86)
Analyst_Blunt	0.000	-0.002*	-0.002*	-0.001	-0.002
	(0.88)	(-1.69)	(-1.73)	(-0.97)	(-1.28)
Analyst_Freq	-0.120**	-0.016	1.199	0.927	1.095
	(-2.11)	(-0.02)	(0.82)	(0.63)	(0.78)
Analyst_Length	-0.000*	-0.000	-0.000	-0.000	-0.000
	(-1.69)	(-0.14)	(-0.64)	(-0.30)	(-0.62)
Analyst_Distance	-0.002	0.025	0.022	0.014	0.011
	(-1.38)	(1.48)	(1.02)	(0.73)	(0.53)
Analyst_Tone	-0.001	0.004	-0.013	-0.012	-0.012
	(-0.54)	(0.26)	(-0.63)	(-0.52)	(-0.51)
Analyst_Othertopics	0.001	0.007	0.011	0.008	0.015
	(1.33)	(0.64)	(0.76)	(0.55)	(0.97)
Observations	1,469,668	1,469,668	1,469,668	1,469,668	1,469,668
Adjusted R-squared	-0.029	-0.003	0.031	0.035	0.053
Other Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes
Analyst FE	Yes	Yes	Yes	Yes	Yes

Table A6: How Analysts Ask About Share Repurchases and Stock Rating Conditional on Firm Response

This table presents the results on whether an analyst downgrades a firm's stock three months after the firm's (lack of) response following the different dimensions how this analyst asked about the firm's share repurchases. The unit of observation is at the firm-month-analyst level. *Analyst_First* equals one for a particular analyst if she asks about a firm's share repurchases in its conference call before the firm does and zero otherwise. *Analyst_Blunt* equals one for a particular analyst if at least one of her questions on the firm's share purchases is blunt. *Analyst_Freq*, *Analyst_Length*, *Analyst_Distance*, *Analyst_Tone*, and *Analyst_Othertopics* are all continuous variables for each particular analyst regarding her questions on the firm's share repurchases. They are similar to the measurement in Table 6 and 7 but at the analyst level. Other controls include *Lagged_Cumulative* (progress of actual repurchases under the announced program), *Institutional_Holding*, *Size*, *Leverage*, *Market_to_Book*, *Profitability*, *Dividend*, *Cash*, and *Previous_6month_return*. Industry is defined by 2-digit SIC code. All regressions include firm, industry by time, and analyst fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Analyst Downgrade$_{t+3}$						
Repurchase	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.31)	(0.34)	(0.42)	(0.31)	(0.37)	(0.31)	(0.38)
Analyst_First	-0.000						
	(-0.00)						
Repurchase × Analyst_First	-0.003						
	(-0.90)						
Analyst_Blunt		-0.000					
		(-0.12)					
Repurchase × Analyst_Blunt		-0.001					
		(-0.74)					
Analyst_Freq			1.435				
			(1.53)				
Repurchase × Analyst_Freq			-2.561				
			(-1.55)				
Analyst_Length				0.000			
				(1.64)			
Repurchase × Analyst_Length				-0.000			
				(-0.65)			
Analyst_Distance					0.035		
					(1.62)		
Repurchase × Analyst_Distance					-0.043		
					(-1.39)		
Analyst_Tone						-0.015	
						(-1.07)	
Repurchase × Analyst_Tone						0.032	
						(1.04)	
Analyst_Othertopics							0.010*
							(1.73)
Repurchase × Analyst_Othertopics							-0.013
							(-1.42)
Observations	1,469,668	1,469,668	1,469,668	1,469,668	1,469,668	1,469,668	1,469,668
Adjusted R-squared	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analyst FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A7: Firms without Active Open Market Repurchase Announcements

This table pertains to the alternative sample where none of the firms have announced any open market repurchase programs. Within this alternative sample, the mean *Frequency_Analyst* is 0.00097 with standard deviation 0.000946. *Frequency_Company* is 0 for all the observations. *Repurchase* has mean of 0.0457 and standard deviation of 0.209. *Scaled Repurchase Dollar* has a mean of 0.007598 and standard deviation of 0.052. *AnnouncementIndicator* has a mean of 0.005 and standard deviation of 0.067. *Scaled Announced Dollar* has a mean of 0.0004 and standard deviation of 0.028. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. *t*-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Repurchase$_{t+1}$		Scaled Dollar Repurchase$_{t+1}$		Announcement$_{t+1}$		Scaled Announced Dollar$_{t+1}$	
Frequency_of_Mention	2.953***		1.117***		0.122		0.006	
	(9.70)		(9.18)		(1.35)		(0.42)	
Frequency_Analyst		3.975***		1.538***		-0.217		-0.015
		(6.56)		(7.16)		(-0.89)		(-0.49)
Frequency_Company		0.854		0.252		0.820		0.048
		(0.89)		(1.27)		(1.43)		(0.90)
Log_attention_10KQ	0.001	0.001	0.000	0.000	0.000**	0.000**	0.000***	0.000***
	(1.06)	(1.07)	(1.19)	(1.20)	(2.09)	(2.09)	(2.69)	(2.68)
Log_attention_other	-0.000	-0.000	-0.000	-0.000	-0.000***	-0.000***	0.000	0.000
	(-0.18)	(-0.18)	(-0.95)	(-0.95)	(-2.95)	(-2.95)	(1.27)	(1.27)
Institutional_Holding	0.000**	0.000**	0.000*	0.000*	0.000	0.000	-0.000	-0.000
	(2.39)	(2.39)	(1.81)	(1.81)	(0.33)	(0.32)	(-0.90)	(-0.90)
Size	0.009***	0.009***	0.001**	0.001**	0.002***	0.002***	0.000***	0.000***
	(4.45)	(4.45)	(2.62)	(2.62)	(7.15)	(7.14)	(2.94)	(2.94)
Leverage	-0.009	-0.009	-0.005**	-0.005**	-0.005***	-0.005***	0.000	0.000
	(-1.33)	(-1.33)	(-2.53)	(-2.53)	(-7.19)	(-7.19)	(0.09)	(0.09)
Market_to_Book	0.000**	0.000**	0.000	0.000	-0.000**	-0.000**	-0.000**	-0.000**
	(2.20)	(2.20)	(0.81)	(0.81)	(-2.50)	(-2.51)	(-2.24)	(-2.25)
Profitability	0.024	0.024	0.010**	0.010**	0.007*	0.007*	0.001*	0.001*
	(1.44)	(1.44)	(2.20)	(2.20)	(1.90)	(1.90)	(1.97)	(1.97)
Dividend	0.023***	0.023***	0.005**	0.005**	-0.003***	-0.003***	-0.001***	-0.001***
	(3.52)	(3.51)	(2.49)	(2.49)	(-6.34)	(-6.29)	(-4.00)	(-4.00)
Cash	0.005	0.005	0.003***	0.003***	0.005***	0.005***	0.000	0.000
	(0.72)	(0.72)	(2.72)	(2.72)	(3.48)	(3.48)	(1.49)	(1.49)
Prev_6month_return	-0.170	-0.170	-0.075***	-0.075***	-0.183***	-0.183***	-0.017**	-0.017**
	(-1.51)	(-1.52)	(-2.86)	(-2.86)	(-5.78)	(-5.78)	(-2.47)	(-2.46)
Observations	796,894	796,894	796,894	796,894	796,894	796,894	796,894	796,894
Adjusted R-squared	0.299	0.299	0.196	0.196	0.022	0.022	-0.004	-0.004
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A8: Placebo Test on the Measure for Total Analyst Pressure

This tables shows the regressions using a placebo instrumental variable *Common_Coverage_M&A*. It is an indicator equal to one if firm i in month t shares an analyst with with firm z who just announced an M&A program in month $t-1$. It is analogous to *Common_Coverage* in Table 11 but the shared analyst hinges on M&A announcements instead of open market repurchase programs. $Repurchase_{t+1}$ is an indicator set to one if a firm repurchases shares in the open market in month $t+1$ and zero otherwise. The dependent variable $Scaled\ Dollar\ Repurchase_{t+1}$ is the dollar amount that a firm spends on repurchasing shares in the open market in a given month divided by its total market value in the previous quarter-end. Untabulated two-way t-tests show no statistically differences in firm characteristics between firms with *Common_Coverage* and those with *Common_Coverage_M&A*. Other controls include $Institutional\_Holding$, *Size*, *Leverage*, $Market\_to\_Book$, $Profitability$, *Dividend*, *Cash*, and $Previous\_6month\_return$. Industry is defined by 2-digit SIC code. All regressions include firm and industry by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. t-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	$Repurchase_{t+1}$		$Scaled\ Dollar\ Repurchase_{t+1}$	
Common_Coverage_M&A	-0.000	0.000	-0.013*	-0.013*
	(-0.01)	(0.02)	(-1.85)	(-1.83)
Common_Coverage		0.069***		0.049***
		(7.99)		(7.12)
Lagged_cumulative	0.153***	0.154***	0.127***	0.128***
	(14.39)	(14.48)	(15.97)	(16.02)
Observations	221,664	221,664	221,664	221,664
Adjusted R-squared	0.335	0.335	0.184	0.184
Other Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry $\times$ Time FE	Yes	Yes	Yes	Yes

Table A9: Individual Analyst Incentive and Benefit

This table show ex-post analyst forecast error after they exert pressure on a firm and firm responds accordingly. The dependent variable is *Forecast_Err_%*, which measures the percentage deviation from an analyst's EPS forecast from the actual EPS. Column (1) focuses on the subsample where analysts do not have incentives to pressure for repurchases, i.e, analysts whose EPS forecasts are *not* above consensus forecast. Column (2) focuses on the subsample where analysts have incentives to pressure for repurhcases, i.e., analysts whose EPS forecasts *are* above consensus forecast. Independent variable, $Analyst\_Mention\_Share\_Repurchase_t$ is an indicator equal to one if a given analyst asks about share repurchases in a firm's conference call in month t, and zero otherwise. $Firm\_Repurchase_{t+1}$ is an indicator equal to one if the same firm repurchases shares in month $t+1$. The coefficient of interest is the interaction term. Industry is defined by 2-digit SIC code. All regressions include firm by time fixed effects. Robust standard errors are double clustered by industry and year-quarter. t-statistics are presented in parentheses. ***, **, * represents statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
	Analyst Without Incentives	Analyst With Incentives
VARIABLES	Forecast_Err_%	
Analyst_Mention_Share_Repurchases$_t$	-0.011	0.018**
	(-0.50)	(2.41)
Firm_Repurchase$_{t+1}$	-	-
Analyst_Mention_Share_Repurchases$_t$ × Firm_Repurchase$_{t+1}$	0.034	-0.018**
	(0.99)	(-2.13)
Observations	1,274,632	160,617
Adjusted R-squared	0.108	0.867
Firm × Time FE	Yes	Yes

Table A10: Market Timing

This table presents the marginal effect of announcement returns on peer firms' subsequent stock repurchase. The dependent variables in the first three columns are *Repurchase* indicators. The dependent variables in the middle three columns are *Scaled Shares*, while those in columns (7) through (9) are *Scaled Dollar* amount. All dependent variables lead the independent variables by one quarter. *Peer 2 Quarters* equals one if a given firm is in the same product market as the restating firm for 2 quarters starting from the quarter in which the restatement occurs. CAR for a given firm at the quarterly level is the mean value of its CARs to all the financial restatements in that quarter. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	$Repurchase_{t+1}$			$Scaled\ Shares_{t+1}$			$Scaled\ Dollar_{t+1}$		
Peer 2 Quarters	0.01210***	0.01210***	0.01210***	0.00014***	0.00014***	0.00014***	0.00012***	0.00012***	0.00012***
	(3.55)	(3.55)	(3.54)	(4.72)	(4.72)	(4.70)	(4.50)	(4.50)	(4.50)
CAR[-1, 3]	-0.00244			-0.00000			0.00001		
	(-0.63)			(-0.11)			(1.15)		
Peer 2 Quarters × CAR[-1, 3]	-0.00346			-0.00013			-0.00002		
	(-0.45)			(-1.46)			(-0.50)		
CAR[-1, 5]		-0.00201			-0.00000			0.00002	
		(-0.57)			(-0.18)			(1.39)	
Peer 2 Quarters × CAR[-1, 5]		-0.00239			-0.00011*			-0.00002	
		(-0.49)			(-1.93)			(-0.47)	
CAR[-1, 7]			-0.00715***			-0.00003*			-0.00001
			(-3.10)			(-1.91)			(-1.41)
Peer 2 Quarters × CAR[-1, 7]			-0.00356			-0.00008			-0.00005
			(-0.45)			(-1.18)			(-1.19)
Restate 2 Quarters	-0.00820*	-0.00820*	-0.00821*	-0.00005	-0.00005	-0.00005	-0.00005	-0.00005	-0.00005
	(-1.93)	(-1.93)	(-1.93)	(-0.94)	(-0.94)	(-0.94)	(-0.87)	(-0.87)	(-0.87)
Size	0.02189***	0.02188***	0.02186***	0.00016***	0.00016***	0.00016***	0.00011***	0.00011***	0.00011***
	(6.75)	(6.75)	(6.72)	(5.47)	(5.47)	(5.45)	(4.17)	(4.18)	(4.16)
Cash	0.00213	0.00213	0.00213	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
	(0.87)	(0.87)	(0.87)	(0.33)	(0.33)	(0.33)	(0.53)	(0.53)	(0.53)
EPS	0.00701***	0.00701***	0.00701***	0.00010***	0.00010***	0.00010***	0.00009***	0.00009***	0.00009***
	(8.86)	(8.85)	(8.82)	(8.64)	(8.63)	(8.62)	(8.90)	(8.90)	(8.89)
Retained Earnings	-0.00107	-0.00107	-0.00107	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001
	(-0.86)	(-0.86)	(-0.86)	(-0.59)	(-0.59)	(-0.59)	(-0.79)	(-0.79)	(-0.80)
PE Ratio	0.00002	0.00002	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	(1.52)	(1.52)	(1.52)	(1.15)	(1.15)	(1.15)	(1.10)	(1.10)	(1.10)
MTB	0.00269**	0.00269**	0.00268**	0.00000	0.00000	0.00000	-0.00002	-0.00002	-0.00002
	(2.17)	(2.17)	(2.15)	(0.04)	(0.04)	(0.04)	(-1.51)	(-1.51)	(-1.52)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	329,304	329,304	329,304	329,304	329,304	329,304	329,304	329,304	329,304
Adjusted R-squared	0.338	0.338	0.338	0.184	0.184	0.184	0.198	0.198	0.198

Table A11: Negative revisions and returns

This table restricts the regression in Equation (1) to the subsamples of peer firms affected by negative restatements and those with negative CARs after the focal firms' financial restatements. Columns (1), (2), and (3) pertain to the subsample where the focal firms' financial restatements lead to negative revisions on the restated items. Columns (4), (5), and (6) pertain to the subsample where all the peer firms experience negative announcement returns after the focal firms release their financial restatements. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Restatements of Negative Revisions			Restatements of Negative CAR		
VARIABLES	Repurchase$_{t+1}$	Scaled Shares$_{t+1}$	Scaled Dollar$_{t+1}$	Repurchase$_{t+1}$	Scaled Shares$_{t+1}$	Scaled Dollar$_{t+1}$
Peer 2 Quarters	0.01189***	0.00013***	0.00012***	0.01257***	0.00016***	0.00014***
	(3.74)	(4.45)	(4.26)	(3.48)	(4.62)	(4.74)
Restate 2 Quarters	-0.00848	-0.00006	-0.00006	-0.01203**	-0.00009	-0.00012*
	(-1.51)	(-0.97)	(-0.88)	(-2.17)	(-1.32)	(-1.85)
Size	0.02149***	0.00017***	0.00012***	0.02162***	0.00017***	0.00012***
	(5.25)	(5.01)	(4.13)	(4.81)	(4.67)	(3.97)
Previous 6 Months' Return	0.00224	-0.00001	0.00009***	0.00368	0.00001	0.00011***
	(0.83)	(-0.21)	(3.77)	(1.36)	(0.34)	(3.86)
Cash	0.00225	0.00003	0.00003	0.00098	0.00001	0.00002
	(0.84)	(0.87)	(0.90)	(0.39)	(0.45)	(0.53)
EPS	0.00610***	0.00009***	0.00008***	0.00612***	0.00009***	0.00008***
	(4.33)	(5.24)	(4.78)	(4.22)	(5.05)	(4.69)
Retained Earnings	-0.00271	-0.00002	-0.00002	-0.00316**	-0.00002	-0.00002
	(-1.66)	(-1.30)	(-1.29)	(-2.19)	(-1.39)	(-1.41)
PE Ratio	0.00003*	0.00000	0.00000	0.00004**	0.00000	0.00000
	(1.88)	(0.81)	(0.59)	(2.21)	(1.08)	(0.83)
MTB	0.00265	-0.00000	-0.00003	0.00324	0.00001	-0.00002
	(1.22)	(-0.17)	(-1.43)	(1.40)	(0.23)	(-0.92)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	246,260	246,260	246,260	218,344	218,344	218,344
Adjusted R-squared	0.328	0.174	0.187	0.329	0.173	0.184

Table A12: Positive revisions and returns

This table restricts the regression in Equation (1) to the subsamples of peer firms affected by positive restatements and those with positive CARs after the focal firms' financial restatements. Columns (1), (2), and (3) pertain to the subsample where the focal firms' financial restatements lead to positive revisions on the restated items. Columns (4), (5), and (6) pertain to the subsample where all the peer firms experience positive announcement returns after the focal firms release their financial restatements. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Restatements of Positive Revisions			Restatements of Positive CAR		
VARIABLES	Repurchase$_{t+1}$	Scaled Shares$_{t+1}$	Scaled Dollar$_{t+1}$	Repurchase$_{t+1}$	Scaled Shares$_{t+1}$	Scaled Dollar$_{t+1}$
Peer 2 Quarters	0.01359***	0.00016***	0.00011**	0.01196***	0.00008**	0.00007*
	(3.51)	(2.92)	(2.47)	(3.85)	(2.41)	(2.06)
Restate 2 Quarters	-0.00337	0.00011	0.00005	-0.00976	-0.00005	-0.00001
	(-0.35)	(0.71)	(0.48)	(-1.10)	(-0.47)	(-0.11)
Size	0.02014***	0.00016***	0.00011***	0.01959***	0.00016***	0.00011***
	(4.42)	(4.01)	(3.12)	(4.35)	(4.11)	(3.30)
Previous 6 Months' Return	0.00336	0.00002	0.00011***	0.00366	0.00002	0.00011***
	(1.18)	(0.69)	(3.95)	(1.33)	(0.93)	(4.36)
Cash	-0.00035	-0.00001	-0.00000	0.00024	0.00000	0.00001
	(-0.12)	(-0.21)	(-0.11)	(0.08)	(0.09)	(0.25)
EPS	0.00591***	0.00009***	0.00007***	0.00576***	0.00009***	0.00007***
	(3.93)	(4.65)	(4.26)	(3.62)	(4.63)	(4.14)
Retained Earnings	-0.00334**	-0.00002	-0.00002	-0.00336**	-0.00002	-0.00002
	(-2.51)	(-1.20)	(-1.21)	(-2.46)	(-1.40)	(-1.41)
PE Ratio	0.00005**	0.00000	0.00000	0.00004**	0.00000	0.00000
	(2.30)	(1.38)	(1.51)	(2.48)	(1.15)	(1.22)
MTB	0.00319	0.00000	-0.00002	0.00317	0.00001	-0.00002
	(1.24)	(0.19)	(-0.93)	(1.25)	(0.22)	(-0.89)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	185,196	185,196	185,196	193,530	193,530	193,530
Adjusted R-squared	0.331	0.168	0.180	0.333	0.170	0.183

Table A13: Accounting Quality in Accruals for the Positive Return Sample

This table presents the accounting quality measured by accruals quality for peer firms who experience positive announcement returns after the focal firms release their financial restatements. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)
	High Accruals Quality for Peer Firms with Positive Returns			
VARIABLES	t+1	t+2	t+3	t+4
Repurchase	0.01750**	0.01188*	0.01710**	0.01944**
	(2.47)	(1.99)	(2.28)	(2.57)
Size	-0.06666***	-0.04480***	-0.02656**	-0.01411
	(-6.11)	(-3.75)	(-2.22)	(-1.27)
Previous 6 Months' Return	0.00198	0.00958**	0.00992**	0.01238**
	(0.40)	(2.22)	(2.32)	(2.33)
Cash	0.00573	0.00472	0.00600	0.00532
	(0.84)	(0.62)	(0.81)	(0.76)
EPS	-0.00028	0.00015	0.00062	0.00070
	(-0.14)	(0.07)	(0.29)	(0.33)
Retained Earnings	0.00525***	0.00720***	0.00852***	0.00980***
	(3.03)	(4.57)	(4.75)	(4.98)
PE Ratio	-0.00007**	-0.00006*	-0.00004	-0.00004
	(-2.50)	(-1.99)	(-1.26)	(-1.35)
MTB	0.00183	0.00366	0.00608	0.00767**
	(0.65)	(1.13)	(1.67)	(2.23)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	87,279	87,279	87,279	87,279
Adjusted R-squared	0.454	0.441	0.432	0.423

Table A14: Accounting Quality in Likelihood of Earnings Management

This table presents the subsample analysis on the earnings quality within peer firms. The dependent variables for earnings quality are the *High Earnings Quality* of a firm, defined as one if the firm's actual EPS is *not* within 2 cents above the EPS target in a given quarter, and zero otherwise. Independent variable of interest is *Repurchase*, which equals one if a firm spends a non-zero amount repurchasing its shares in the open market in a given quarter, and zero otherwise. The regressions compare the earnings quality between peer firms with share repurchases and peer firms without share repurchases. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	(1)	(2)	(3)	(4)
	High Earnings Quality for Peer 2 Quarters = 1			
VARIABLES	t+1	t+2	t+3	t+4
Repurchase	0.01847***	0.01659***	0.01661***	0.01882***
	(3.48)	(3.11)	(3.13)	(2.97)
Size	0.06452***	0.07074***	0.06666***	0.06184***
	(10.16)	(11.89)	(9.83)	(9.97)
Previous 6 Months' Return	0.01240***	0.01685***	0.01739***	0.01632***
	(3.70)	(4.37)	(3.88)	(3.74)
Cash	0.00342	0.00552	0.00520	0.00627
	(0.84)	(1.31)	(1.12)	(1.32)
EPS	0.00263**	0.00353**	0.00349**	0.00373**
	(2.22)	(2.64)	(2.33)	(2.65)
Retained Earnings	-0.00246	0.00067	0.00228	0.00247
	(-1.38)	(0.36)	(1.22)	(1.28)
PE Ratio	0.00005*	0.00004	0.00004	0.00004
	(1.82)	(1.41)	(1.10)	(1.02)
MTB	0.00828***	0.01061***	0.01144***	0.01166***
	(3.36)	(5.22)	(5.33)	(5.41)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	163,242	163,242	163,242	163,242
Adjusted R-squared	0.507	0.427	0.393	0.377

Table A15: Litigation Risk Conditional on Accounting Quality

This table presents the subsample analysis for accounting-related litigation risks within peer firms. The dependent variables are the *Litigation Risk* of a firm, defined as one if the firm receives a class action lawsuit against its accounting practices in the corresponding period, and zero otherwise. *High Accruals Quality* equals one if a firm has lower accruals than its industry median in the corresponding period and zero otherwise. Independent variable of interest is the interaction term between *Repurchase* and *High Accruals Quality* in the relevant periods. Thus, the coefficient on the interaction states the marginal effect of stock repurchases while holding peer firms' accounting quality constant. All regressions include firm and time fixed effects and robust standard errors are clustered by firm and year. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance at the 10%, 5%, and 1% level.

	Litigation Risk for Peer 2 Quarters = 1			
VARIABLES	6 Months	1 Year	2 Years	3 Years
Repurchase	-0.00100	-0.00060	-0.00867**	-0.00849*
	(-0.70)	(-0.27)	(-2.38)	(-1.93)
High Accruals Quality_6months	0.00200**			
	(2.39)			
Repurchase × High Accruals Quality_6months	-0.00494**			
	(-2.53)			
High Accruals Quality_1Year		0.00321*		
		(1.88)		
Repurchase × High Accruals Quality_1Year		-0.00932***		
		(-3.22)		
High Accruals Quality_2Years			0.00238	
			(1.20)	
Repurchase × High Accruals Quality_2Years			-0.00370	
			(-0.76)	
High Accruals Quality_3Years				0.00490
				(1.72)
Repurchase × High Accruals Quality_3Years				-0.00601
				(-1.03)
Size	0.01198***	0.01561***	0.01948***	0.02009***
	(8.58)	(6.61)	(4.76)	(4.55)
Previous 6 Months' Return	-0.00854***	-0.00731***	-0.00208	-0.00038
	(-5.20)	(-3.78)	(-1.04)	(-0.17)
Cash	0.00002	0.00106	0.00333	0.00159
	(0.01)	(0.42)	(0.81)	(0.30)
EPS	-0.00023	-0.00047	-0.00065	-0.00042
	(-0.71)	(-1.02)	(-0.83)	(-0.42)
Retained Earnings	0.00091*	0.00098	0.00098	0.00061
	(1.78)	(1.10)	(0.66)	(0.28)
PE Ratio	0.00000	-0.00000	-0.00000	-0.00000
	(0.30)	(-0.20)	(-0.11)	(-0.07)
MTB	0.00320***	0.00371**	0.00466***	0.00550***
	(3.60)	(2.86)	(3.01)	(3.10)
Observations	163,242	163,242	163,242	163,242
Adjusted R-squared	0.079	0.138	0.232	0.303

Table A16: Baseline Results with Abnormal Turnover

This table presents the results for the baseline regressions using *Abnormal Turnover* as the proxy for heterogeneous beliefs. The dependent variable is *Fraction of Repurchase* conducted by a firm in a given quarter divided by its total payout, which is the dollar sum of stock repurchases spending and dividend payments in that quarter. Independent variable of interest is *Abnormal Turnover*, which is measured as the turnover of a firm in a given quarter minus its median turnover in the past three years. *Turnover* is the trading volume divided by shares outstanding of a firm in a given quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)
VARIABLES	Fraction of Repurchase	Fraction of Repurchase
Abnormal Turnover	0.15380***	0.14345***
	(13.71)	(12.14)
Debt Raised		0.00207
		(0.42)
Size		-0.02022***
		(-5.05)
Cash		0.00000***
		(2.86)
Net Income		0.00007***
		(11.06)
MTB		0.00326***
		(3.64)
Previous Total Dividend		-0.00017***
		(-12.09)
Retained Earnings		0.00000
		(0.59)
Last 6 Months' Return		-0.03438***
		(-4.96)
EPS		0.02019***
		(4.71)
Observations	102,730	90,730
Adjusted R-squared	0.237	0.248
Industry FE	Yes	Yes
Time FE	Yes	Yes

Table A17: Subsequent Investment with Abnormal Turnover

This table presents regression results with respect to firms' subsequent investments using *Abnormal Turnover* as the proxy for heterogeneous beliefs. The dependent variables are *Investment* by a given firm in one, two, three, and four quarters after a given quarter for columns (1), (2), (3), and (4) respectively. *Investment* is the sum of R&D expenses, capital expenditure, and other capital investment of a firm in a quarter scaled by the book value of the firm in the previous fiscal year-end. *Debt Raised* is measured as the amount of debt raised by a firm in a given quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)	(4)
VARIABLES	Investment$_{t+1}$	Investment$_{t+2}$	Investment$_{t+3}$	Investment$_{t+4}$
Fraction of Repurchase	-0.31953***	-0.26563***	-0.21899***	-0.17450**
	(-4.90)	(-4.00)	(-3.24)	(-2.53)
Abnormal Turnover	0.12027	0.14647*	0.15422*	0.16598*
	(1.57)	(1.81)	(1.85)	(1.91)
Debt Raised	0.48292***	0.46924***	0.45721***	0.42970***
	(7.94)	(7.54)	(7.22)	(6.76)
Size	0.26858***	0.26706***	0.26499***	0.26071***
	(9.77)	(9.89)	(9.88)	(9.73)
Cash	0.00003*	0.00003*	0.00002	0.00002
	(1.86)	(1.77)	(1.58)	(1.31)
Net Income	-0.00030***	-0.00029***	-0.00027***	-0.00025***
	(-7.38)	(-7.07)	(-6.73)	(-6.24)
MTB	0.35440***	0.32923***	0.30611***	0.28384***
	(21.46)	(20.69)	(19.50)	(17.99)
Previous Total Dividend	-0.00009	-0.00002	0.00003	0.00007
	(-1.07)	(-0.20)	(0.29)	(0.70)
Retained Earnings	-0.00002***	-0.00003***	-0.00003***	-0.00003***
	(-2.58)	(-2.98)	(-3.17)	(-3.18)
Last 6 Months' Return	0.17859***	0.18378***	0.15511***	0.09895*
	(3.35)	(3.29)	(2.69)	(1.70)
EPS	-0.33674***	-0.34594***	-0.35377***	-0.34197***
	(-10.43)	(-10.55)	(-10.66)	(-10.08)
Observations	89,891	88,825	87,632	86,463
Adjusted R-squared	0.401	0.356	0.321	0.287
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table A18: Price Impact with Abnormal Turnover

This table presents regression results on price impact using *Abnormal Turnover* as the proxy for heterogeneous beliefs. The dependent variables are buy-and-hold abnormal stock returns (BHAR) 5, 7, and 30 days after a quarter-end for column (1), (2), and (3) respectively. BHARs are calculated as the buy-and-hold returns of a firm's stock adjusted for dividends and stock splits net of buy-and-hold returns on the CRSP value-weighted market index for the same duration. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions only include time fixed effect because industry fixed effect is forward looking within an industry. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)
VARIABLES	Price Impact 5 Days	Price Impact 7 Days	Price Impact 30 Days
Fraction of Repurchase	0.00130***	0.00126***	0.00723***
	(3.92)	(3.36)	(7.43)
Abnormal Turnover	0.00187***	0.00092*	0.00426***
	(4.17)	(1.81)	(3.35)
Debt Raised	-0.00026	-0.00034	-0.00238***
	(-1.12)	(-1.29)	(-3.20)
Size	0.00005	-0.00006	0.00025
	(0.50)	(-0.50)	(0.83)
Cash	0.00000	0.00000**	0.00000*
	(0.35)	(1.97)	(1.73)
Net Income	-0.00000	-0.00000	-0.00000***
	(-1.21)	(-1.21)	(-2.90)
MTB	0.00004	0.00004	0.00003
	(1.44)	(1.33)	(0.35)
Previous Total Dividend	0.00000**	0.00000*	0.00000**
	(2.49)	(1.90)	(2.57)
Retained Earnings	0.00000	0.00000	-0.00000**
	(0.20)	(0.18)	(-2.51)
EPS	0.00107***	0.00137***	0.01264***
	(4.36)	(5.09)	(17.27)
Constant	-0.00132	-0.00175*	-0.00868***
	(-1.61)	(-1.87)	(-3.75)
Observations	91,203	91,198	91,198
Adjusted R-squared	0.550	0.638	0.487
Industry FE	No	No	No
Time FE	Yes	Yes	Yes

Table A19: Long-Term Abnormal Stock Returns with Abnormal Turnover

This table presents regression results with respect to long-term abnormal stock returns using *Abnormal Turnover* as the proxy for heterogeneous beliefs. The dependent variables are buy-and-hold abnormal stock returns (BHAR) 3 and 6 months after a quarter-end in column (1) and (2), and 1, 2, and 3 years after a quarter-end in column (3), (4), and (5) respectively. BHARs are calculated as the buy-and-hold returns of a firm's stock adjusted for dividends and stock splits net of buy-and-hold returns on the CRSP value-weighted market index for the same duration. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions only include time fixed effect because industry fixed effect is forward looking within an industry. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	3 Months	6 Months	1 Year	2 Years	3 Years
Fraction of Repurchase	0.01331***	0.02936***	0.05599***	0.10376***	0.14009***
	(6.71)	(8.34)	(8.45)	(7.82)	(6.64)
Abnormal Turnover	0.00065	-0.00107	-0.02040**	-0.06287***	-0.09994***
	(0.24)	(-0.22)	(-2.32)	(-3.98)	(-4.13)
Debt Raised	-0.00313**	-0.00758***	-0.01368***	-0.02951***	-0.04928***
	(-2.55)	(-3.93)	(-4.24)	(-4.75)	(-4.67)
Size	-0.00163***	-0.00252**	-0.00289	-0.00160	0.00940
	(-2.73)	(-2.32)	(-1.38)	(-0.36)	(1.31)
Cash	0.00000***	0.00000***	0.00000	0.00000	0.00000
	(3.32)	(2.80)	(1.53)	(0.50)	(0.36)
Net Income	-0.00000***	-0.00001***	-0.00000	0.00001	-0.00001
	(-3.54)	(-2.78)	(-0.11)	(0.90)	(-0.64)
MTB	0.00026	0.00084**	0.00212***	0.00457***	0.00477**
	(1.42)	(2.54)	(3.39)	(3.42)	(2.32)
Previous Total Dividend	0.00001***	0.00001***	0.00001	0.00000	0.00001
	(3.77)	(3.00)	(1.46)	(0.30)	(0.50)
Retained Earnings	-0.00000***	-0.00000**	-0.00000***	-0.00000**	-0.00000
	(-2.73)	(-2.45)	(-2.91)	(-2.56)	(-1.60)
EPS	0.01769***	0.01930***	0.02318***	0.03460***	0.04042***
	(13.52)	(9.70)	(7.08)	(5.66)	(4.00)
Constant	0.01449***	0.03039***	0.03995**	0.06031*	0.06626
	(3.06)	(3.50)	(2.38)	(1.71)	(1.16)
Observations	91,197	91,197	91,197	83,742	72,797
Adjusted R-squared	0.421	0.334	0.215	0.147	0.107
Industry FE	No	No	No	No	No
Time FE	Yes	Yes	Yes	Yes	Yes

Table A20: Insider Trading with Abnormal Turnover

This table presents regression results on insider trading using *Abnormal Turnover* as the proxy for heterogeneous beliefs. The independent variables of interest are *Net Shares Transacted*, *Net % Shares Transacted*, and *% Buy Orders*. *Net Shares Transacted* is the net number of shares transacted (shares bought minus shares sold) by all the insiders of a given firm in the previous quarter. *Net % Shares Transacted* is the net number of shares transacted by insiders as a percentage of number of shares outstanding, which is *Net Shares Transacted* scaled by shares outstanding. *% Buy Orders* measures the number of buy orders (not shares) as a percentage of all the orders submitted (the sum of buy and sell orders, not shares) by all insiders of a given firm in the previous quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)
VARIABLES	Fraction of Repurchase	Fraction of Repurchase	Fraction of Repurchase
Net Shares Transacted	-0.00724**		
	(-2.34)		
Net % Shares Transacted		-0.24920	
		(-1.25)	
% Buy Orders			-0.00081***
			(-9.64)
Abnormal Turnover	0.12840***	0.12827***	0.12753***
	(10.57)	(10.55)	(10.61)
Debt Raised	0.00356	0.00325	0.00412
	(0.62)	(0.57)	(0.74)
Size	-0.01591***	-0.01546***	-0.01893***
	(-3.58)	(-3.47)	(-4.20)
Cash	0.00000**	0.00000**	0.00000**
	(2.37)	(2.47)	(2.45)
Net Income	0.00006***	0.00006***	0.00006***
	(9.21)	(9.37)	(9.50)
MTB	0.00358***	0.00361***	0.00326***
	(3.66)	(3.68)	(3.37)
Previous Total Dividend	-0.00018***	-0.00018***	-0.00017***
	(-12.02)	(-12.04)	(-11.89)
Retained Earnings	0.00000	0.00000	0.00000
	(1.51)	(1.36)	(1.31)
Last 6 Months' Return	-0.04230***	-0.04161***	-0.05479***
	(-5.20)	(-5.11)	(-6.67)
EPS	0.01736***	0.01704***	0.01329***
	(3.50)	(3.43)	(2.70)
Observations	59,611	59,611	59,611
Adjusted R-squared	0.268	0.268	0.273
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Table A21: Stock Market Downturn with Abnormal Turnover

This table presents results on market macro-conditions using *Abnormal Turnover* as the proxy for heterogeneous beliefs. The dependent variable is *Fraction of Repurchase* conducted by a firm in a given quarter divided by its total payout, which is the dollar sum of stock repurchases spending and dividend payments in that quarter. Independent variables of interest are *Quarterly Market Returns*, which is the buy-and-hold returns on the value-weighted CRSP market index in a given quarter, and *Market Downturn Indicator*, which equals to one if a quarter's market return is less than the median market returns in the previous twelve quarters and zero otherwise. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and year fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

VARIABLES	(1) Fraction of Repurchase	(2) Fraction of Repurchase	(3) Fraction of Repurchase	(4) Fraction of Repurchase
Quarterly Market Return (in decimal)	-0.06142***	-0.04624***		
	(-5.02)	(-3.45)		
Market Downturn Indicator			0.01543***	0.01104***
			(8.23)	(5.49)
Abnormal Turnover	0.15484***	0.14402***	0.15477***	0.14401***
	(13.86)	(12.25)	(13.88)	(12.26)
Debt Raised		-0.00237		-0.00218
		(-0.50)		(-0.46)
Size		-0.01990***		-0.01991***
		(-4.98)		(-4.98)
Cash		0.00000***		0.00000***
		(2.94)		(2.94)
Net income		0.00007***		0.00007***
		(11.09)		(11.09)
MTB		0.00323***		0.00324***
		(3.62)		(3.62)
Previous Total Dividend		-0.00017***		-0.00017***
		(-12.07)		(-12.07)
Retained Earnings		0.00000		0.00000
		(0.61)		(0.61)
Last 6 Months' Return		-0.03307***		-0.03303***
		(-5.23)		(-5.27)
EPS		0.02043***		0.02031***
		(4.79)		(4.76)
Observations	102,730	90,730	102,730	90,730
Adjusted R-squared	0.235	0.246	0.235	0.246
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table A22: Baseline Results with Mean Forecast Error

This table presents the results for the baseline regressions using *Mean Forecast Error* as the proxy for heterogeneous beliefs. The dependent variable is *Fraction of Repurchase* conducted by a firm in a given quarter divided by its total payout, which is the dollar sum of stock repurchases spending and dividend payments in that quarter. Independent variable of interest is *Mean Forecast Error*, which measures the forecast error of each analyst's forecast against the actual earnings of the firm in a given quarter scaled by the mean of the earnings forecasts and averaged across all the analysts covering the firm in that quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)
VARIABLES	Fraction of Repurchase	Fraction of Repurchase
Mean Forecast Error	0.00770*	0.00915*
	(1.70)	(1.84)
Debt Raised		0.00519
		(1.09)
Size		-0.01213***
		(-3.13)
Cash		0.00001***
		(3.95)
Net Income		0.00006***
		(10.97)
MTB		0.00403***
		(4.94)
Previous Total Dividend		-0.00018***
		(-13.91)
Retained Earnings		-0.00000
		(-0.68)
Last 6 MOnths' Return		-0.04105***
		(-6.02)
EPS		0.01255***
		(3.24)
Observations	117,856	102,931
Adjusted R-squared	0.215	0.233
Industry FE	Yes	Yes
Time FE	Yes	Yes

Table A23: Subsequent Investment with Mean Forecast Error

This table presents regression results with respect to firms' subsequent investments using *Mean Forecast Error* as the proxy for heterogeneous beliefs. The dependent variables are *Investment* by a given firm in one, two, three, and four quarters after a given quarter for columns (1), (2), (3), and (4) respectively. *Investment* is the sum of R&D expenses, capital expenditure, and other capital investment of a firm in a quarter scaled by the book value of the firm in the previous fiscal year-end. *Debt Raised* is measured as the amount of debt raised by a firm in a given quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

VARIABLES	(1) Investment$_{t+1}$	(2) Investment$_{t+2}$	(3) Investment$_{t+3}$	(4) Investment$_{t+4}$
Fraction of Repurchase	-0.30363***	-0.25565***	-0.20829***	-0.15953**
	(-4.78)	(-3.92)	(-3.11)	(-2.33)
Mean Forecast Error	0.05064	0.03146	0.07919*	0.09181**
	(1.39)	(0.81)	(1.92)	(2.18)
Debt Raised	0.46956***	0.45710***	0.45031***	0.43395***
	(8.25)	(7.77)	(7.41)	(7.00)
Size	0.27184***	0.27316***	0.27209***	0.26819***
	(10.60)	(10.72)	(10.64)	(10.41)
Cash	0.00003**	0.00003**	0.00003*	0.00002
	(2.16)	(2.06)	(1.85)	(1.52)
Net Income	-0.00031***	-0.00029***	-0.00027***	-0.00026***
	(-7.88)	(-7.49)	(-7.13)	(-6.66)
MTB	0.35800***	0.33595***	0.31276***	0.28888***
	(23.93)	(22.76)	(21.14)	(19.16)
Previous Total Dividend	-0.00015*	-0.00009	-0.00005	-0.00001
	(-1.86)	(-1.09)	(-0.59)	(-0.12)
Retained Earnings	-0.00002**	-0.00002***	-0.00003***	-0.00003***
	(-2.34)	(-2.85)	(-3.06)	(-3.10)
Last 6 Months' Return	0.09168*	0.10053*	0.07851	0.03294
	(1.73)	(1.81)	(1.36)	(0.56)
EPS	-0.33516***	-0.34141***	-0.35408***	-0.34658***
	(-11.03)	(-11.06)	(-11.13)	(-10.43)
Observations	101,811	98,949	95,917	92,752
Adjusted R-squared	0.406	0.363	0.325	0.288
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table A24: Price Impact with Mean Forecast Error

This table presents regression results on price impact using *Mean Forecast Error* as the proxy for heterogeneous beliefs. The dependent variables are buy-and-hold abnormal stock returns (BHAR) 5, 7, 20, and 30 days after a quarter-end for column (1), (2), (3), and (4) respectively. BHARs are calculated as the buy-and-hold returns of a firm's stock adjusted for dividends and stock splits net of buy-and-hold returns on the CRSP value-weighted market index for the same duration. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions only include time fixed effect because industry fixed effect is forward looking within an industry. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)
VARIABLES	Price Impact 5 Days	Price Impact 7 Days	Price Impact 30 Days
Fraction of Repurchase	0.00199***	0.00172***	0.00845***
	(6.40)	(4.79)	(9.00)
Mean Forecast Error	0.00218***	0.00255***	0.02966***
	(3.66)	(3.80)	(15.57)
Debt Raised	-0.00026	-0.00026	-0.00166**
	(-1.23)	(-1.11)	(-2.53)
Size	0.00039***	0.00033***	0.00045
	(3.89)	(2.86)	(1.59)
Cash	0.00000	0.00000**	0.00000*
	(0.89)	(2.23)	(1.95)
Net Income	-0.00000	-0.00000	-0.00000***
	(-1.40)	(-1.36)	(-3.45)
MTB	0.00011***	0.00008***	0.00013*
	(4.37)	(2.66)	(1.69)
Previous Total Dividend	0.00000	0.00000	0.00000
	(0.77)	(0.04)	(0.70)
Retained Earnings	0.00000	-0.00000	-0.00000
	(0.07)	(-0.07)	(-1.64)
EPS	0.00042*	0.00031	0.01000***
	(1.93)	(1.28)	(15.51)
Constant	-0.00361***	-0.00280***	-0.00712***
	(-4.43)	(-3.00)	(-3.14)
Observations	103,455	103,449	103,449
Adjusted R-squared	0.561	0.640	0.459
Industry FE	No	No	No
Time FE	Yes	Yes	Yes

Table A25: Long-Term Abnormal Stock Returns with Mean Forecast Error

This table presents regression results with respect to long-term abnormal stock returns using *Mean Forecast Error* as the proxy for heterogeneous beliefs. The dependent variables are buy-and-hold abnormal stock returns (BHAR) 3 and 6 months after a quarter-end in column (1) and (2), and 1, 2, and 3 years after a quarter-end in column (3), (4), and (5) respectively. BHARs are calculated as the buy-and-hold returns of a firm's stock adjusted for dividends and stock splits net of buy-and-hold returns on the CRSP value-weighted market index for the same duration. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions only include time fixed effect because industry fixed effect is forward looking within an industry. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	3 Months	6 Months	1 Year	2 Years	3 Years
Fraction of Repurchase	0.01515***	0.02981***	0.05281***	0.09065***	0.11895***
	(7.84)	(8.82)	(8.10)	(6.84)	(5.61)
Mean Forecast Error	0.04058***	0.04410***	0.04821***	0.06777***	0.08664***
	(12.50)	(9.65)	(7.47)	(6.92)	(6.23)
Debt Raised	-0.00231**	-0.00749***	-0.01457***	-0.03113***	-0.05180***
	(-2.05)	(-4.03)	(-4.54)	(-4.96)	(-4.87)
Size	-0.00212***	-0.00353***	-0.00546**	-0.00625	0.00186
	(-3.53)	(-3.29)	(-2.58)	(-1.41)	(0.25)
Cash	0.00000***	0.00000***	0.00000*	0.00000	0.00000
	(3.34)	(2.84)	(1.67)	(0.44)	(0.27)
Net Income	-0.00000***	-0.00000*	0.00000	0.00001	-0.00000
	(-2.90)	(-1.67)	(0.65)	(1.35)	(-0.14)
MTB	0.00069***	0.00141***	0.00252***	0.00393***	0.00361*
	(3.75)	(4.25)	(4.00)	(2.95)	(1.76)
Previous Total Dividend	0.00001**	0.00001*	0.00001	0.00001	0.00002
	(2.47)	(1.93)	(1.12)	(0.54)	(0.69)
Retained Earnings	-0.00000*	-0.00000*	-0.00000**	-0.00000**	-0.00000
	(-1.83)	(-1.68)	(-2.47)	(-2.31)	(-1.43)
EPS	0.01632***	0.01638***	0.02389***	0.03464***	0.04064***
	(13.27)	(8.52)	(7.25)	(5.53)	(3.94)
Constant	0.01856***	0.03385***	0.05027***	0.08716**	0.11007*
	(3.88)	(3.92)	(2.95)	(2.43)	(1.88)
Observations	101,725	99,954	94,160	82,896	71,986
Adjusted R-squared	0.417	0.371	0.212	0.147	0.106
Industry FE	No	No	No	No	No
Time FE	Yes	Yes	Yes	Yes	Yes

Table A26: Insider Trading with Mean Forecast Error

This table presents regression results on insider trading using *Mean Forecast Error* as the proxy for heterogeneous beliefs. The independent variables of interest are *Net Shares Transacted*, *Net % Shares Transacted*, and *% Buy Orders*. *Net Shares Transacted* is the net number of shares transacted (shares bought minus shares sold) by all the insiders of a given firm in the previous quarter. *Net % Shares Transacted* is the net number of shares transacted by insiders as a percentage of number of shares outstanding, which is *Net Shares Transacted* scaled by shares outstanding. *% Buy Orders* measures the number of buy orders (not shares) as a percentage of all the orders submitted (the sum of buy and sell orders, not shares) by all insiders of a given firm in the previous quarter. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and time fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

VARIABLES	(1) Fraction of Repurchase	(2) Fraction of Repurchase	(3) Fraction of Repurchase
Net Shares Transacted	-0.00733**		
	(-2.51)		
Net % Shares Transacted		-0.35745*	
		(-1.88)	
% Buy Orders			-0.00079***
			(-9.66)
Mean Forecast Error	0.01571**	0.01580**	0.01624***
	(2.49)	(2.51)	(2.58)
Debt Raised	0.00574	0.00543	0.00629
	(1.04)	(0.99)	(1.16)
Size	-0.00839**	-0.00798*	-0.01135***
	(-1.98)	(-1.88)	(-2.63)
Cash	0.00001***	0.00001***	0.00001***
	(3.74)	(3.85)	(3.86)
Net Income	0.00005***	0.00006***	0.00006***
	(8.94)	(9.08)	(9.20)
MTB	0.00419***	0.00419***	0.00385***
	(4.71)	(4.71)	(4.38)
Previous Total Dividend	-0.00019***	-0.00019***	-0.00019***
	(-13.74)	(-13.79)	(-13.64)
Retained Earnings	0.00000	0.00000	0.00000
	(0.34)	(0.20)	(0.14)
Last 6 Months' Return	-0.04913***	-0.04852***	-0.06239***
	(-6.10)	(-6.03)	(-7.67)
EPS	0.01127**	0.01096**	0.00727*
	(2.57)	(2.50)	(1.68)
Observations	66,360	66,349	66,360
Adjusted R-squared	0.255	0.255	0.259
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Table A27: Stock Market Downturn with Mean Forecast Error

This table presents results on market macro-conditions using *Mean Forecast Error* as the proxy for heterogeneous beliefs. The dependent variable is *Fraction of Repurchase* conducted by a firm in a given quarter divided by its total payout, which is the dollar sum of stock repurchases spending and dividend payments in that quarter. Independent variables of interest are *Quarterly Market Returns*, which is the buy-and-hold returns on value-weighted CRSP market index in a given quarter, and *Market Downturn Indicator*, which equals to one if a quarter's market return is less than the median market returns in the previous twelve quarters and zero otherwise. Control variables are matched to the same quarter for quarterly measures, and matched to previous fiscal year-end for annual measures. All regressions include industry and year fixed effect. Robust standard errors are clustered at the firm level. *t*-statistics are presented in parentheses. *, **, *** represents statistical significance the 10%, 5%, and 1% level respectively.

VARIABLES	(1) Fraction of Repurchase	(2) Fraction of Repurchase	(3) Fraction of Repurchase	(4) Fraction of Repurchase
Quarterly Market Return (in decimal)	-0.19905***	-0.17758***		
	(-20.23)	(-16.14)		
Market Downturn Indicatorn			0.02920***	0.02294***
			(16.66)	(12.26)
Mean Forecast Error	0.00778*	0.00956*	0.00682	0.00902*
	(1.72)	(1.92)	(1.51)	(1.81)
Debt Raised		-0.00034		-0.00073
		(-0.07)		(-0.16)
Size		-0.01164***		-0.01162***
		(-3.01)		(-3.00)
Cash		0.00001***		0.00001***
		(4.02)		(4.02)
Net income		0.00006***		0.00006***
		(11.01)		(11.02)
MTB		0.00403***		0.00405***
		(4.94)		(4.96)
Previous Total Dividend		-0.00018***		-0.00018***
		(-13.88)		(-13.88)
Retained Earnings		-0.00000		-0.00000
		(-0.67)		(-0.67)
Last 6 Months' Return		-0.04161***		-0.04554***
		(-6.68)		(-7.37)
EPS		0.01210***		0.01170***
		(3.14)		(3.04)
Observations	117,856	102,931	117,856	102,931
Adjusted R-squared	0.212	0.231	0.211	0.230
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes