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ESSAYS ON SHARE REPURCHASES

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ESSAYS ON SHARE REPURCHASES

DISSERTATION

A dissertation submitted in partial
fulfillment of the requirements for
the degree of Doctor of Philosophy
in the College of Business and
Economics at the University of
Kentucky

By
David Moore
Lexington, Kentucky

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ABSTRACT OF DISSERTATION

ESSAYS ON SHARE REPURCHASES

In my first chapter, we document and study the use of Rule 10b5 1 preset repurchase plans. We exploit this new and widespread form of payout to examine an issue at the core of payout decisionsthe tradeoff between commitment and financial flexibility. Relative to open market repurchases, preset plans provide an expanded repurchase window and increased legal cover, albeit at the cost of reducing repurchase flexibility and the option to time repurchases. These costs and benefits are significantly associated with Rule 10b5-1 adoption. Consistent with preset plans signaling commitment, Rule 10b5-1 repurchase announcements are associated with greater and faster completion rates, with more positive market reactions, and with more dividend substitution than open market repurchases. Lastly, we find that preset repurchase plans represent a unique payout tool whose introduction encouraged a different set of firms to buy back stock and significantly altered the payout landscape. My second chapter examines the strategic use and timing of share repurchases by insiders for personal gain. Using grant level compensation data and a hand-collected sample of monthly repurchases, I find a positive relation between CEO equity sales and share repurchases. I identify the relationship by instrumenting equity sales with equity grant vesting schedules. This relation is persistent across firm characteristics and does not appear to be destroying shareholder value. The results indicate managerial self-interest motivates a subset of share repurchases.

KEYWORDS: Share repurchase; Rule 10b5-1; preset trading plan; payout policy; financial flexibility; CEO incentives

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ESSAYS ON SHARE REPURCHASES

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1.1 Introduction

Beginning with the SEC safe harbor provisions of 1982, payout policy has evolved dramatically over the past three decades. Share repurchases now represent the largest form of payout (Grullon and Michaely (2002) and Skinner (2008)), with more firms repurchasing than paying dividends and with aggregate repurchase volume outpacing aggregate dividend payments (Floyd, Li, and Skinner, 2015). One potential explanation for the expansion of repurchase activity is that managers view repurchases as being more flexible than dividends (Brav, Graham, Harvey, and Michaely, 2005). The flexibility of repurchases allows firms to more easily respond to fluctuations in stock prices and investment opportunities. This flexibility comes with a price, however, as dividends send a stronger signal of commitment to investors (Farre-Mensa, Michaely, and Schmalz, 2014).

As the payout options available to managers have grown, so has their ability to trade-off flexibility with signaling commitment. As with any tradeoff, the optimal payout policy will differ across firms depending on the relative costs and benefits of each method. The relative benefits of financial flexibility are a function of the firm's ability to access capital: a firm with ample financial slack and correctly priced, liquid stock should place less value on financial flexibility in payout policy. Further, managers must consider the value of the option to "time the market," i.e., to increase repurchases if the firm's stock is underpriced and to reduce them if the price is at or above fair value. In an efficient market, the value of this option clearly relates to the manager's desire and ability to successfully exploit inside information. The primary benefit to signaling commitment is an increase in stock price when the firm announces payout decisions because payout announcement returns increase with expected payout levels (e.g., Comment and Jarrell, 1991). Managers have strong incentive to maximize stock prices: Higher stock prices imply greater compensation. Thus, while maintaining financial flexibility is important, signaling commitment adds firm value by increasing investors' expected level of payouts and thereby increasing stock price. The tradeoff between signaling commitment and maintaining the ability to abandon payouts or time the market is at the core of payout policy.

In this paper, we provide a fresh perspective on this tradeoff by studying how firms react to a change in the menu of payout options. In 2000 the SEC enacted Rule 10b5-1 to allow insiders to trade while in possession of material, non-public information by establishing a preset trading plan with a third party. Though the SEC originally intended the Rule to clarify enforcement of insider trading laws for individuals, the Rule also resulted in permitting firms to repurchase shares under the same conditions. Preset repurchases under Rule 10b5-1 are unique in that they allow firms to repurchase in a continuous fashion and provide additional legal coverage, at the cost of partially relinquishing the timing and abandonment options associated

with open market repurchase (OMR) programs. Further, when firms adopt a preset repurchase plan, they incur a real, costly commitment, which traditional open market repurchases lack. Prior to the introduction of preset repurchases, researchers examining the signaling-flexibility tradeoff were forced to compare across payout methods (e.g. self-tenders, OMRs, and dividends). Comparing preset and traditional OMRs allows us to hold constant factors that often confound payout decision, such as taxes, or compensation-driven incentives (Fenn and Liang (2001) and Cheng, Harford, and Zhang (2015)), providing a clean setting within which we can examine this tradeoff in payout policy. Studying preset repurchases also provides insight into how an addition to the menu of payout options affects firms' broader payout decisions.

We hand-collect 1,933 repurchase announcements between 2001 and 2014 that reference Rule 10b5-1. The use of the Rule to repurchase shares has been increasing rapidly since its enactment: We document only four such announcements in 2001, compared to at least 200 announcements per year during 2011-2014. In recent years Rule 10b5-1 plans are more than twice as popular as accelerated share repurchases, and approximately one quarter of all repurchase announcements include a Rule 10b5-1 component.

We first establish that preset repurchase plans indeed represent a greater commitment than OMRs, the most prevalent form of share repurchase. Relative to matched OMR programs, Rule 10b5-1 plans are associated with faster completion, greater completion rates (the dollar amount repurchased relative to the announced dollar amount) and are more likely to be completed. Thus, Rule 10b5-1 programs are a stronger commitment to repurchase shares, and a commitment to repurchase them more quickly, than are OMRs.

We next study the determinants of the decision to adopt a Rule 10b5-1 preset repurchase program relative to an OMR. Because firms delegate repurchase responsibilities to a third party and because Rule 10b5-1 prohibits adjustments to plans during blackout windows, a preset plan reduces a firm's ability to modify future repurchases. We find that the likelihood of adopting a preset plan is greater for firms with more stable cash flows, no dividend payments, better recent stock performance, or more liquid stocks. These results are consistent with managers trading-off other sources of financial flexibility against financial flexibility in their repurchase program. We also draw from a growing literature that characterizes the 2008-2009 financial crisis as an unanticipated shock to credit supply (e.g., Ivashina and Scharfstein, 2010; Cornett, McNutt, Strahan, and Tehranian, 2011; Bliss, Cheng, and Denis, 2015), which in turn increased the marginal benefits of financial flexibility. We find that 10b5-1 repurchase plan usage significantly stagnated during the crisis relative to estimated expected growth patterns, consistent with preset repurchase plan adoption likelihood decreasing as the marginal benefit of financial flexibility increases.

Firms enter into a trading plan during an "open window" when they are not in possession of material, nonpublic information, limiting a firm's ability to trade on information (i.e., "time their trades"). We find that firms with a record of worse repurchase timing are more likely to adopt a 10b5-1 plan, and smaller, younger, less financially sophisticated firms are among the first to adopt Rule 10b5-1 plans. These results are consistent with firms that are unable to or uninterested in making

information-based trades being more likely to adopt a preset plan.

By allowing a firm to continue repurchasing while in possession of material, non-public information, 10b5-1 plans expand a firm's available repurchase window and provide legal cover for these trades. We find that firms that should be more constrained by blackout windows, either due to longer reporting lags or more frequent releases of material information through 8-K reports, are more likely to adopt a 10b5-1 plan than an OMR. However, we find no evidence of firms at higher risk of litigation being more likely to adopt a preset repurchase plan.

We also show that firms without an active repurchase program when Rule 10b5-1 was enacted were more likely to choose 10b5-1 plans over OMRs. These results are consistent with preset repurchases facilitating buy backs within a different set of firms and occupying a unique space within the payout landscape.

Our data reveal that most firms that adopt a 10b5-1 plan continue to use a preset plan for future repurchases. Hence, adopting a 10b5-1 plan *for the first time* represents an important decision. We focus on first-time 10b5-1 plan adoption using a Cox proportional hazard model, which estimates how quickly firms adopt 10b5-1 plans. The hazard model generally corroborates our prior results and further shows that firms whose CEO's bonus is tied to earnings per share and firms with more dilution or executive options adopt a 10b5-1 plan more quickly.

We next turn our attention to stock returns around Rule 10b5-1 repurchase announcements. On the one hand, 10b5-1 plans, by construction, should not be information-driven, potentially reducing their announcement effect. On the other hand, establishing a preset trading plan lessens the firm's repurchasing flexibility and, on average, represents a stronger commitment to follow through on the announced repurchase plan. Empirically, we find that 10b5-1 announcements are met with positive and significant cumulative abnormal returns, which are generally increasing in the expected portion of the plan to be effected under the Rule. In fact, after matching on firm characteristics associated with 10b5-1 adoption, returns associated with repurchase announcements fully effected under Rule 10b5-1 are more than double returns to matched OMR announcements. The results are consistent with investors valuing the increased commitment of a preset repurchase plan, perhaps due to expected reductions in agency costs associated with free cash flow as in Jensen (1986).

In a final series of tests, we examine how preset repurchases fit into the broader set of payout policy choices. First, we test how 10b5-1 repurchases contribute to the substitution of repurchases for dividends and find that the substitution is concentrated in the subset of firm-year observations associated with Rule 10b5-1 announcements. These results are consistent with preset plans being distinct from traditional OMRs by emerging as the preferred substitute for dividend increases, likely because 10b5-1 plans represent a greater commitment and are thus more similar to dividends. Next, we document that the determinants of payout policy, particularly with respect to repurchase policy, changed significantly around the enactment of Rule 10b5-1. In sum, our results suggest the advent of Rule 10b5-1 significantly changed which types of firms engage in stock repurchases and how repurchases fit into a firm's broader payout policy.

Our findings contribute to the payout policy literature along multiple dimensions. The literature focusing on how firms choose to distribute cash to shareholders has primarily examined the choice between dividends and share repurchases (e.g., Brennan and Thakor, 1990; Allen, Bernardo, and Welch, 2000; Jagannathan, Stephens, and Weisbach, 2000; Guay and Harford, 2000; Grullon and Michaely, 2002; Grinstein and Michaely, 2005). Our results also contribute to the research examining the choice of payout vehicle. For example, Brickley (1983) and DeAngelo, DeAngelo, and Skinner (2000) examine the choice between regular and special dividends, Comment and Jarrell (1991) compare the signaling strength of Dutch auctions, tender offers, and OMRs, and Bargeron, Kulchania, and Thomas (2011) examine the choice to repurchase through accelerated share repurchases relative to OMRs. We contribute to this literature by documenting and examining the costs and benefits associated with a new form of payoutRule 10b5-1 preset repurchase plans. Further, we contribute to the literature examining market reactions to payout announcements, particularly their relation to completion rates (e.g., Stephens and Weisbach, 1998; Bonaimé, 2012). Finally, we contribute to the discussion regarding payout "smoothing" (e.g., Lambrecht and Myers, 2012; Michaely and Roberts, 2012; Leary and Michaely, 2011), as we have identified a means by which firms can commit to regular repurchase transactions, unencumbered by blackout windows.

Additionally, we contribute to a nascent literature examining SEC Rule 10b5-1, primarily with respect to its use for personal sales by insiders. Jagolinzer (2009) finds that executives trade strategically under the Rule: Insiders consistently sell before bad news and after good news, earning higher returns than non-Rule users. Henderson, Jagolinzer, and Muller (2012) find the decision to disclose insider use of Rule 10b5-1 is positively correlated with firm level litigation risk. We find no evidence that litigation risk is associated with the firm's use of the Rule to repurchase stock, indicating that the motives to adopt a preset plan to repurchase appear distinct from those associated with insider trading at the individual level. While trading by insiders using SEC Rule 10b5-1 plans has received much attention in the academic literature and popular press, we are the first paper, to our knowledge, documenting the prevalence, determinants, value, and payout policy impacts of the use of Rule 10b5-1 at the firm level to repurchase stock.

1.2   Hypothesis Development

Financing frictions result in the need to preserve financial flexibility in corporate finance decisions. Firms need to maintain sufficient financial slack to invest in positive net present value projects as they arise. One way to maintain financial flexibility is to build it into corporate payout policy. Managers state that flexibility is one of the most important reasons they choose share repurchases over dividends (Brav, Graham, Harvey, and Michaely, 2005). Empirical evidence corroborates managers' views and shows that financial flexibility is related to both the level and form of corporate payout (e.g., Guay and Harford, 2000; Jagannathan, Stephens, and Weisbach, 2000; Lie, 2005; DeAngelo and DeAngelo, 2007; Bonaimé, Hankins, and Harford, 2014).

Clearly, maintaining sufficient flexibility is important to managers when choosing an optimal payout structure.

However, payout vehicles that provide firms with more discretion come at the cost of sending weaker signals of commitment. A long line of research (see Farre-Mensa, Michaely, and Schmalz (2014) for a review) documents positive abnormal returns around payout initiations and increases, consistent with investors generally viewing the benefits of cash distributions as outweighing the potential negative signal about profitable investments. For example, abnormal returns to repurchase announcements are increasing in the implied level of commitment, with returns to fixed-price tender offers being greatest, followed by Dutch auctions, then OMRs (Comment and Jarrell, 1991). Moreover, prior literature documents that announcement returns are increasing in a program's size (e.g., Stephens and Weisbach, 1998) and prior completion rates (Bonaimé, 2012), consistent with investors' (positive) reaction to repurchase announcements increasing in their expected value of future repurchases. These findings all suggest that committing to distribute cash causes investors to positively reassess firm value, possibly because these distributions reduce agency costs associated with free cash flow as in Jensen (1986).

We reexamine the flexibility-signaling tradeoff within the context of an important recent change in the payout choice set. On October 23, 2000, the Securities and Exchange Commission (SEC) enacted Rule 10b5-1, which for the first time allows insiders or the firm itself to trade company stock while in possession of material, non-public information. Prior to Rule 10b5-1 courts disagreed on when insider trading liability arises. The Rule was intended to clarify that liability arises when insiders trade while in "knowing possession" of material, non-public information and to establish conditions under which insiders may legally trade in company stock. In an attempt to provide "appropriate flexibility" to insiders who wish to trade in company stock, the Rule specifies conditions that constitute an affirmative defense: that the insider establish a trading plan in advance with a third party, over whom they do not exert influence.[1] Thus, while the Rule specifically targeted insider trading for individuals, it also permitted firms to establish preset trading plans to repurchase shares.

Specifically, under Rule 10b5-1 firms enter into a trading plan during an "open window" when they are not in possession of material, nonpublic information, which provides an affirmative defense to any subsequent trading under the plan. The Rule states that a firm must either: (i) specify a written trading plan with either the amounts, dates, and prices to repurchase or a trading formula in a binding contract with a broker or dealer, or (ii) delegate the repurchase decisions to a broker or dealer (the company can have no further influence). The firm may modify the plan, but only during an open window. In addition, though early termination of a preset plan

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[1]According to the SEC: "Taken as a whole, the revised defense is designed to cover situations in which a person can demonstrate that the material nonpublic information was not a factor in the trading decision. We believe this provision will provide appropriate flexibility to those who would like to plan securities transactions in advance at a time when they are not aware of material nonpublic information, and then carry out those pre-planned transactions at a later time, even if they later become aware of material nonpublic information." https://www.sec.gov/rules/final/33-7881.htm

is legal, it jeopardizes the affirmative defense associated with 10b5-1 repurchases. Lastly, to maintain an affirmative defense at the motion to dismiss phase of litigation, the firm must publicly announce the plan and enter into it under good faith (Henderson, Jagolinzer, and Muller, 2012). In sum, relative to OMRs, preset Rule 10b5-1 repurchases restrict a firm's ability to ex post modify repurchase activity or to exploit inside information, but expand a firm's available repurchase window and provide additional legal coverage. These costs and benefits of preset repurchases relative to OMRs motivate our four hypotheses below.

1.2.1 Abandonment Options

Preset repurchase plans provide less flexibility since they reduce a firm's ability to modify repurchases. Essentially, firms adopting a preset plan partially relinquish the abandonment option associated with OMRs, which leads to our first hypothesis, the *Abandonment Option Hypothesis*: Firms with more internal capital or easier access to external capital markets will value the abandonment option inherent in OMRs less and thus be more likely to adopt alternative payout strategies without abandonment options, specifically, preset Rule 10b5 1 repurchase plans. The empirical predictions of the *Abandonment Option Hypothesis* are that firms with greater cash and cash flow and firms with predictable cash flows should be more willing to adopt 10b5-1 plans to execute share repurchases. We also predict that firms that can easily access the debt market, i.e., those with excess debt capacity, or the equity market, i.e., firms with liquid stocks that are not trading below fair value, should be more likely to adopt preset trading plans.[2]

We also note that, consistent with firms facing a direct trade-off between flexibility and commitment, firms with lower or unstable internal reserves and limited access to external capital markets are likely to value flexibility the most *and* are likely the firms for which the commitment signal is most costly because these firms risk financial distress to fund payouts.[3] Further, committing to payouts likely provides little benefit to these firms because agency costs should be low. Alternatively, firms with sufficient internal resources and easy access to external capital likely value flexibility the least and incur minimal costs to signaling commitment while also reducing agency costs surrounding the use of the capital.

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[2]We summarize variables used to test each hypothesis in Table 1.3 and provide detailed definitions in Appendix A.

[3]While it may seem counterintuitive for a firm to access external capital markets, particularly the equity market, to fund distributions to shareholders, recent empirical evidence by Farre-Mensa, Michaely, and Schmalz (2016) suggests that firms rely on external capital to finance as much as one third of payouts, contradicting the pecking order theory of Myers and Majluf (1984). Further, our argument does not hinge on firms accessing external capital to fund repurchases *per se*; we simply argue that firms that diminish cash holdings by committing to payouts may be obliged to raise capital externally to fund future projects.

1.2.2 Timing

Next, preset plans differ from OMRs in that the firm must delegate repurchase responsibility to a third party (without further influence) and thus the firm forfeits full control over the program, which reduces its ability to make information-based trades as in Dittmar and Field (2015). A firm may be willing to forfeit the option of exploiting inside information because it prefers to allocate resources to its core business. We also acknowledge the possibility that managers still time repurchases executed under Rule 10b5-1, either by creating complex price matrices that reflect the firm's private information regarding stock prices or by (illegally) exploiting alternative information channels to influence broker trades ex post. In either case, repurchasing under the Rule creates an additional barrier to timing repurchases because in the former situation firms must commit to a price matrix, however complex, in the latter situation they must risk accusations of insider trading.

Other firms may recognize that poor repurchase timing could lead to bad press. Many companies, including Viacom, Pfizer, C.R. Bard, Lowes, Exxon Mobil, Boeing, and EBay, have been accused of poor repurchase timing in the popular press.[4] Just as managers often cite preset 10b5-1 trading plans when asked about questionable personal transactions[5], companies can use Rule 10b5-1 as a buffer against accusations of poor timing. Companies less concerned about timing or with a reputation of poor timing would value this buffer more. We hypothesize that firms that value the timing option associated with OMRs the most will be less likely to adopt preset repurchase plans, which leads to our second hypothesis, the *Timing Option Hypothesis*: Firms that place more value on the timing option associated with OMR plans will be less likely to adopt preset Rule 10b5-1 repurchase plans.

The empirical implications of the *Timing Option Hypothesis* are that firms with a history of poor repurchase timing will be more willing and likely to outsource their repurchase program through a 10b5-1 plan either due to a lack of skill or an indifference to timing repurchases to correspond with low stock prices. We also expect that small firms, young firms, and those with less financially sophisticated treasury functions will be more likely to adopt preset plans.

1.2.3 Information Releases and Trading Blackouts

Rule 10b5-1 plans expand a firm's available repurchase window, and repurchasing firms often cite avoiding blackout windows as the motivation for repurchasing under Rule 10b5-1. While the Securities and Exchange Commission (SEC) generally does not mandate blackout periods, most companies impose explicit blackout windows to minimize the costs associated with illegal insider trading (Bettis, Coles, and Lemmon, 2000). Blackout windows generally last from quarter end until the release of earnings,

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[4]See "Hey, Big Spender!" (*Barron's* on January 27, 2014) and "Apple Buybacks Pay Most Ever as CEOs Spend $211 Billion" (*Bloomberg* on August 5, 2014).

[5]For example, in March of 2011 when Douglas Bergeron, CEO of VeriFone Systems Inc., was questioned about selling $14 million of VeriFone stock immediately prior to a stock price decline, Bergeron defended the sale of his stock by pointing to his preset Rule 10b5-1 trading plan. ("Executives' Good Luck in Trading Own Stock," *The Wall Street Journal*, November 28, 2012.)

as well as during other major corporate events that may result in insiders possessing material, nonpublic information. Firms with greater than \$75 million in public float must release earnings within 35 days of fiscal quarter end and 60 days of fiscal year end; smaller companies must release earnings within 45 and 90 days. Though firms may choose to some extent when to report earnings, reporting lags are most likely driven by factors other than the desire to repurchase sooner. For example, Sengupta (2004) finds that investor base, litigation risk, and accounting complexity are associated with reporting lags. Hence, blackout windows may substantially constrain firms by preventing them from repurchasing for months at a time throughout the year. In fact, some firms report blackout windows prohibiting repurchasing during two-thirds of all trading days.[6] Further, a firm with a large repurchase program may not be able to execute the entire program in the desired time frame due to blackout windows and volume conditions, which limit repurchases to a maximum of 25% of the average daily trading volume. To summarize, we hypothesize that blackout windows are a real constraint, but preset repurchases will circumvent this constraint. Thus, the *Blackout Window Hypothesis* states that firms that are more constrained by blackout windows are more likely to adopt a Rule 10b5-1 trading plan to circumvent blackout window restrictions. Empirically, this implies that firms with long reporting lags or frequent releases of material information will be more likely to adopt Rule 10b5-1 plans.

1.2.4   Litigation Risk

Finally, Rule 10b5-1 repurchases differ from OMRs in terms of legal cover. Firms may value additional legal cover as shareholders endure losses and managers suffer individual consequences when caught engaging in financial misrepresentation (Karpoff, Lee, and Martin, 2008). In 1982 the SEC enacted Rule 10b-18 to provide safe harbor to firms that repurchase under the manner, timing, price, and volume conditions. However, even if the firm meets all Rule 10b-18 conditions, it cannot legally engage in repurchases while in possession of material, nonpublic information. Though the new Rule 10b5-1 does not provide safe harbor, it does provide the firm with an affirmative defense. An affirmative defense differs from safe harbor in that a firm admits that its actions were a literal violation of the law against trading while in possession of material nonpublic information, but may introduce as evidence the existence of a preset Rule 10b5-1 trading plan establishing the trades when it was not in such possession, which, if found to be credible, will negate any criminal liability for insider trading.[7] Therefore, 10b5-1 plans provide companies with an additional shield from potential lawsuits related to repurchase activity. For example, during its July 25,

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[6]In their August 3rd, 2006 Q2 Earnings Conference Call Captaris stated that Rule 10b5-1 plans would allow them to repurchase during "blackout periods, which comprise about two-thirds of the trading days in each quarter." Further, a July 1st, 2011 article "Corporate Buybacks on the Rise" in *Traders Magazine* stated: "Corporations have about eight months out of the year when insider trading rules create blackout periods. However, under the SEC's 10b5-1 rule, companies can set up a system to perform automatic stock buybacks during those times."

[7]"Rule 10b-18 confers no immunity from possible Rule 10b-5 liability where the issuer engages in repurchases while in possession of favorable, material, nonpublic material, and nonpublic information concerning its securities." 1982 Adopting Release, *supra* note 4, at 47 FR 53333.

2014, conference call, Centene Corp. stated that "the only way to do it [repurchase] and be clean and above board is on a 10b5-1." The *Litigation Risk Hypothesis* states that firms that are more subject to litigation risk will be more likely to adopt a Rule 10b5-1 plan. The empirical predictions of the *Litigation Risk Hypothesis* are that firms with a high estimated probability of litigation are more likely to adopt a preset repurchase plan.

1.3 Sample formation and descriptive statistics

1.3.1 Sample construction

To construct our sample of preset repurchases, we search Factiva for announcements of Rule 10b5-1 repurchases and accelerated share repurchase (ASR), another type of preset repurchase, over the period 2001 to 2014. We verify all Factiva results to ensure that the use of Rule 10b5-1 corresponds to a repurchase and not an insider transaction. Our search identifies 1,933 announcements with a Rule 10b5-1 plan by 950 distinct firms and 832 announcements with an ASR by 430 firms. As most firms announce preset plans in conjunction with OMR announcements, we merge our hand-collected Rule 10b5-1 and ASR data with repurchase announcements from Thomson Financial's Securities Data Company (SDC) Mergers & Acquisitions and Repurchases databases.[8] We generally use non-preset OMRs (OMRs), i.e., OMRs without a Rule 10b5-1 or ASR component, as our control group. We further exclude block transactions, tender offers, and any repurchase program with missing data on the size of the announced program. We reconcile slight discrepancies in dates between the two SDC databases by searching Factiva for the repurchase announcement and recording the first available announcement date. This merge yields 14,198 repurchase announcements documented between 2001 and 2014.

We merge our repurchase announcement sample with several databases to construct other variables of interest and control variables. Specifically, accounting data and data on actual repurchases are from Compustat quarterly or annual filings, stock price data from CRSP, institutional ownership data from Thomson Financial 13F filings, options data from Execucomp, and 8-K filings from Edgar.

Our analyses center around two samples. The first sample conditions on a repurchase announcement and is used to compare preset repurchase plans to non-preset OMRs. We present repurchase plan details, completion rates, and announcement returns at the repurchase announcement level. When we use multivariate regressions to test our main hypotheses, we continue to use this conditional data but collapse it to the firm-year level. If a firm announces multiple types of repurchases within a year, we assign that firm-year observation the repurchase program with the highest commitment level. The second unconditional sample includes both repurchasing and *non-repurchasing* firm-years, over our sample period. We generate this sample from

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[8]To present the most complete sample possible, we use the union of flagged repurchases within the SDC M&A database with the SDC Repurchase database as our sample. During our sample period, approximately one-third of repurchase announcements appear in both databases, approximately one-half in the Repurchase database only, and the remaining one-sixth in the M&A database only.

the same intersection of databases as the conditional sample and use it to test how the introduction of preset repurchases fits into the broader payout landscape.

1.3.2 Rule 10b5-1 repurchase plan frequency

As shown in Figure 1.1 and Panel A of Table 1.1, the use of Rule 10b5-1 plans has grown rapidly. In 2001, the first year during which firms could adopt a Rule 10b5-1 plan, only four announcements contained such adoptions. These findings are consistent with a post-enactment learning period in which firms and investment banks confirmed the application of Rule 10b5-1 to repurchases over time.[9] Yet during the last four years in our sample period (2011-2014), at least 200 announcements contained a Rule 10b5-1 adoption each year. In fact, in recent years over one-quarter of repurchase announcements in our sample included a preset component. Therefore, the growth in Rule 10b5-1 plans cannot be explained by the growth in repurchase announcements during our time period because 10b5-1 plan use is growing even *as a percentage of* total repurchase announcements.[10]

We also compare Rule 10b5-1 plans to accelerated share repurchases (ASRs), another type of preset plan. In an ASR, an investment bank immediately delivers borrowed shares to the firm, resulting in an instantaneous reduction in shares outstanding by the amount of the repurchase. The investment bank then conducts the repurchase over time at prevailing market prices. The difference between what the firm paid the investment bank for the shares and what the investment bank actually had to pay to purchase them on the open market is settled at the end of the contract. (See Bargeron, Kulchania, and Thomas (2011) for an in-depth description of the mechanics of ASRs.) In sum, along the commitment/flexibility spectrum, ASRs provide the greatest level of commitment or the least flexibility. The immediacy of ASRs makes them ideal for managerial motives, such as takeover defense and manipulation of EPS numbers, while the hands-off nature of 10b5-1 plans are the least compatible with managerial motives. Further, the SEC has ruled that ASRs do not qualify for safe harbor or affirmative defense status.[11] Thus, ASRs and Rule 10b5-1 plans differ from a structural and legal perspective, as well as in their likely motives.

While ASRs have become more common, Rule 10b5-1 plans are the preferred preset repurchase method, particularly in recent years. We observe 2.4 times as many 10b5-1 plans as ASRs during our sample period (2001-2014). In 2014 only 13% of repurchase announcements included an ASR whereas 29% included a 10b5-1 plan. These results are consistent with more firms preferring to maintain some level of flexibility in their repurchase programs.

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[9]We observe a similar phenomenon following the introduction of the safe harbor provisions (Rule 10b-18) in 1982 (see, e.g., Grullon and Ikenberry (2000)). Many managers took several years to see enough precedence and implement a new method of payout (open market repurchases).

[10]Some firms mention preset repurchase plans in other corporate announcements, e.g., earnings reports and conference calls. While there is some overlap with our sample of preset repurchase announcements, we calculate that 377 of these mentions correspond to distinct firm-year observations, implying that our original estimates of the use of preset plans are likely conservative.

[11]https://www.sec.gov/divisions/marketreg/r10b18faq0504.htm

Preset repurchase announcements vary significantly by the expected portion of the repurchase to be effected under a preset plan. Table 1.1 Panel A also presents Rule 10b5-1 announcements by type. We refer to announcements as "boilerplate" if the firm "may" adopt a preset plan or conduct the repurchase through other means such as open market purchases, privately negotiated transactions, or block transactions. The boilerplate group represents approximately half of all Rule 10b5-1 announcements. "Expected" plans indicate that the company "expects to" or "intends to" adopt a preset component. Firms often include a general description of preset plans in these announcements. Expected plans make up the smallest group of announcements at 234 announcements or 12% of all 10b5-1 announcements. "Partial" plans include a preset componentwith certainty. Partial plans use definitive language or provide specific institutional details about the preset component of the plan. Approximately one quarter of Rule 10b5-1 announcements are partial. Finally, 269 or about 14% of plans are "pure," i.e., cover the full repurchase program.[12] We generally include all types of 10b5-1 plans in our analyses, though we often show results by type or without boilerplate plans. Firms announcing any type of 10b5-1 plans are important to study because they choose to include 10b5-1 plans as a potential repurchase mechanism.

1.3.3 Rule 10b5-1 repurchase plan details

We collect preset repurchase plan details regarding size, duration, motive and broker, if mentioned, and report summary statistics on Rule 10b5-1 plans in Panel B. We should note that these summary statistics apply to a small portion of the sample, exclude boilerplate plans by definition, and are skewed towards pure plans fully executed under the Rule. Therefore, these figures provide a glimpse inside these repurchase contracts, but do not represent the full sample. For the subset of firms that report the size of the preset repurchase, the average (median) Rule 10b5-1 program represents 5.2% (3.5%) of shares outstanding. While the size of Rule 10b5-1 programs appears smaller than that of other repurchase programs, we find that the total announced repurchase size is slightly larger for repurchases containing a preset component than for those that do not (8.08% versus 7.73%; p = 0.0625).

The dollar value of preset plans varies substantially from \$2 million at the 10th percentile to \$200 million at the 90th percentile for Rule 10b5-1 plans. The mean (median) dollar value is \$82 million (\$16 million). For firms that voluntarily disclose the size of their preset repurchase program, the mean (median) percentage of the total repurchase program under a Rule 10b5-1 plan is 94% (100%), and 87% will be conducted fully through a Rule 10b5-1 plan. We should note again, however, that these figures are biased upward because most firms that combine preset plans with other plans do not separately report the value of the preset component and are therefore not included in calculations for this table.

The mean time to commencement of a Rule 10b5-1 plan is 13 days, and 74 plans, or approximately one-third, begin within one day of the announcement. Rule 10b5-1

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[12]Examples of Rule 10b5-1 announcement types can be found in Section I of the Internet Appendix.

plans last 195 days on average, and the most frequently observed duration of one year is reported by approximately one in six (47 out of 299) firms. Other common time windows include one month (14 plans or 5%), two months (38 plans or 13%), three months (20 plans or 7%), and six months (22 plans or 7%). The figures are on par with the duration of OMR plans: 70% of OMR completion announcements occur within one year of the authorization, and the median duration for the subsample of firms that announce a completion is 223 days (Bargeron, Bonaimé, and Thomas, 2017). In sum, the duration of the majority of preset plans is long enough to represent a real and costly commitment.[13]

1.4 Rule 10b5-1 commitment

Given that accelerated share repurchases are executed immediately and in full, they represent a firm commitment to repurchasing the entire announced amount of stock. Rule 10b5-1 plans, on the other hand, allow firms some flexibility in terms of their execution. Anecdotally, we observe firms establishing a "price matrix," which implies repurchasing more (fewer) shares as the price decreases (increases).[14] However, firms can only put into place or modify a 10b5-1 plan during an open window, thus creating a greater commitment for the firm than a fully flexible OMR. If 10b5-1 plans represent a greater commitment to follow through with the announced repurchase, we expect greater completion rates and more plans completed relative to OMRs.

To test whether completion rates differ across Rule 10b5-1 and OMRs, we limit the sample to the period from 2004 to 2014 since fewer than 5% of repurchases contained a Rule 10b5-1 component prior to 2004 when firms and investment banks were learning how to apply the Rule. Further, after 2003 firms are required to report detailed quarterly information on actual shares repurchased. We calculate completion rate beginning the quarter the firm announces the repurchase program through the following eight quarters. Completion rate is the dollar value of shares repurchased, i.e., the number of shares repurchased times the average repurchase price per share as reported in Compustat, divided by the dollar value of the announced repurchase from SDC. Following Stephens and Weisbach (1998), we truncate completion rate at 100%. We report average cumulative completion rates for Rule 10b5-1 plans along varying levels of commitment as well as for OMR announcements without a preset component.

Panel A of Table 1.2 shows average completion rates and the percent of plans completed by quarter and by level of commitment to the Rule. Rule 10b5-1 plans

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[13]Internet Appendix Table IA1 shows plan details for pure 10b5-1 plans only. Pure plans represent on average 6.51% of shares outstanding or $56.33 million worth of stock. Internet Appendix Table IA13 shows plan details and the breakdown by type for accelerated share repurchases. Approximately one-third of ASRs announcements are "pure," one-third are "boilerplate," and the remaining are partial (26%) and expected (6%). ASR plans represent on average 6.22% of shares outstanding or $604 million worth of stock.

[14]Firms do not report the price matrix itself in public disclosure; rather, several firms mentioned that they set up a pricing matrix. We provide an example of a price matrix in Internet Appendix Figure IA1.

are associated with higher completion rates and a greater fraction of plans completed earlier in the program. Further, completion rates are generally increasing in the level of commitment to a Rule 10b5-1. For example, by quarter one, pure plans are on average 54% complete, compared to 40% complete for non-Rule programs. Similar patterns hold throughout the first year of the repurchase program and are especially strong when excluding boilerplate plans: When we exclude boilerplate plans, we find that completion rates are greater by 3 to 9 percentage points on average for Rule 10b5-1 repurchases than non-Rule repurchases during the first six quarters after the announcements. In addition, during the first year more preset repurchase plans are completed: By quarter four over half of partial and pure plans are complete, while only 38% of non-Rule 10b5-1 repurchases are complete. These results suggest a trend of completion rates increasing with the level of commitment to the Rule, specifically during the first year to year and a half of the repurchase program. By quarter seven completion rates stabilize across groups, indicating that executing a repurchase program through a Rule 10b5-1 plan may not increase the ultimate completion rate of the program but rather significantly increases the *speed* of completion. By quarter eight we identify average completion rates ranging from 71% to 78% across all groups, similar to OMR completion rates documented in previous studies (e.g., Stephens and Weisbach, 1998; Bonaimé, 2012; Babenko, Tserlukevich, and Vedrashko, 2012). It is interesting to note that even the adoption of a pure plan does not imply that the firm will repurchase 100% of authorized shares with certainty. These results point to the possibility that a non-trivial portion of firms establish a conservative price matrix or allow brokers some discretion over trades.

It is possible that firm characteristics correlated with adopting a preset repurchase program are driving completion rates. To address this issue, we identify control firms that strongly resemble Rule 10b5-1 announcers but do not repurchase under the Rule. We then examine differences in completion rates and percentage of plans completed between matched control firms and sample firms. To construct a control group of firms, we propensity score match to the five nearest neighbors using the logit model specifications presented in Panel A of Table IA3 in the Internet Appendix. We verify that none of the variables on which we match are statistically different between our sample and the matched sample, giving us confidence in our matching process.

Panel B of Table 1.2 reports the difference in completion rates or percentage of plans completed between Rule 10b5-1 repurchase programs and matched non-Rule 10b5-1 programs. To account for the fact that we estimate propensity scores, we use the correction proposed by Abadie and Imbens (2009), who find that ignoring the estimation error can bias results in either direction. Completion rates are significantly greater for Rule 10b5-1 plans than for non-Rule 10b5-1 plans during the first six quarters, and results are generally stronger as the level of commitment to repurchasing under the Rule increases. We find similar, if not stronger, results for the difference in percent of plans completed: By the second quarter after the announcement 24% more pure plans are completed than matched non-Rule plans. Furthermore, if we exclude boilerplate plans, the percent of plans completed is greater for Rule 10b5-1 plans than non-Rule plans in every quarter; by quarter eight significantly more (13% more) Rule 10b5-1 plans are complete than matched non-Rule plans.

Our results suggest preset plans are associated with greater completion rates, especially earlier in the life of the repurchase program. These results point to firms completing preset plans more quickly, which we test directly in Panel C using the subsample of completed repurchase programs. We examine time to completion, defined as the number of quarters to completion (conditional on completion). Consistent with expectations, we find that time to completion is monotonically decreasing with the level of commitment to a Rule 10b5-1 plan. In other words, firms complete preset plans faster, and the greater the commitment to repurchasing under the Rule, the faster the completion. Conditional on completion, firms complete non-Rule 10b5-1 plans in 3.2 quarters on average, whereas firms complete partial and pure Rule 10b5-1 plans within 2.7 and 1.5 quarters, respectively. After excluding boilerplate plans and using propensity score matching to control for firm characteristics, we show these differences are significant at the 1% level.

Overall, these results are consistent with preset plans being associated with stronger commitments to repurchase previously announced shares. Firms buy back larger portions of the announced repurchase under Rule 10b5-1 earlier in the program. Further, we find that preset plans are strongly associated with an increase in the speed of completion, and this speed of completion is increasing in the level of commitment to Rule 10b5-1. Significantly greater and faster preset plan completion rates are consistent with the Rule accomplishing one of the SEC's original goals: providing firms with the flexibility and legal protection to repurchase shares during times they otherwise could not have.

1.5 The determinants of Rule 10b5-1 adoption

Understanding which firms choose preset plans and what motivates them to do so provides unique insights into the signaling-flexibility tradeoff. In this section we study the determinants of the decision to adopt a Rule 10b5-1 plan, relative to a non-preset OMR, the most common repurchase vehicle, which leaves the firm with full flexibility.

1.5.1 Logit regressions of the decision to adopt a Rule 10b5-1 plan

Table 1.3 conditions on the sample of firms announcing a repurchase and presents logit regressions modeling the decision to adopt a Rule 10b5-1 plan relative to adopting a non-preset OMR.[15] We label firms that announce a Rule 10b5-1 plan during the fiscal year "Rule 10b5-1 firms" that year; firms that announce open market repurchases without a preset component are "OMR firms." The dependent variable is a binary variable equal to one if the repurchase announcement includes a Rule 10b5-1 component. If a firm announces more than one repurchase in a fiscal year, we categorize the firm as a Rule 10b5-1 firm if at least one of the repurchase announcements includes a Rule 10b5-1 plan. When we condition on the availability of control variables and collapse our sample to the firm-year level, our sample consists of 1,014 Rule 10b5-1 firm-year observations, 3,611 non-preset OMR observations, and 25,342

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[15]Summary statistics and difference in means tests are reported in Internet Appendix Table IA4.

non-repurchasing observations, unless otherwise noted. We match each repurchase announcement to prior fiscal year end accounting data from Compustat and stock price data from CRSP. Variable definitions are in Appendix A; continuous variables are winsorized at the 1st and 99th percentile to mitigate the effect of potential data errors and outliers. We report the coefficients on the independent variables along with their z-statistics calculated using robust standard errors clustered by firm. We include year dummies and Fama and French (1997) 12 industry dummies in all specifications.

The results in Table 1.3 support the *Abandonment Option Hypothesis'* predictions that firms with large internal capital reserves and predictable cash flows will be more likely to commit to a preset Rule 10b5-1 plan. Similar in spirit to Chay and Suh (2009), who find that cash flow uncertainty is negatively related to (inflexible) dividends, we find that the likelihood of adopting a Rule 10b5-1 plan as opposed to more flexible OMR decreases with cash flow volatility. The coefficient on the standard deviation of cash flow in Model (1) indicates that a one standard deviation increase in cash flow volatility decreases the likelihood of adopting a preset repurchase relative to an OMR by 16%. These results are also consistent with agency costs driving firms with more cash on hand and more predictable cash flows to commit to distribute more to shareholders. We find further support of the *Abandonment Option Hypothesis* as firms with better prior stock performance and more liquid stocks are generally more likely to adopt a Rule 10b5-1 plan. These results are consistent with firms that have better access to external capital being more likely to adopt a preset repurchase program. In other words, firms that can raise external capital more easily are more likely to commit to future payouts, which expend internal resources. Finally, we find that firms that have already committed to dividend payouts are less likely to commit to a preset repurchase plan—specifically, dividend payers are 17% less likely to adopt a Rule 10b5-1 plan than non-payers.

The *Timing Option Hypothesis* predicts that firms with a history of poor repurchase timing will be more likely to adopt a preset plan. Consistent with this prediction, we observe a significant and positive coefficient on our measure of repurchase timing. A one standard deviation increase in repurchase timing (implying worse timing over the prior fiscal year) is associated with an 11% increase in the likelihood of adopting a preset plan. The coefficients on financial sophistication, firm size, and firm age are all negative, as predicted by the *Timing Hypothesis*; however, the coefficients on financial sophistication and size fail to achieve statistical significance in most models.

Adopting a Rule 10b5-1 repurchase program allows firms to circumvent blackout windows. We find that the duration of prior blackout windows is positively and significantly related to the likelihood of adopting a preset plan across all specifications. The standardized odds ratio in Model (1) is 1.22, indicating a one standard deviation increase in blackout windows over the prior 12 quarters will increase the likelihood of adopting a 10b5-1 plan by 22% relative to a non-Rule 10b5-1 plan. We also find that 8-K filing frequency is positively correlated with adopting a preset plan. Thus, as predicted by the *Blackout Window Hypothesis*, we find that firms facing greater constraints to repurchasing due to long blackout windows or more frequent releases of material information are significantly more likely to use a preset Rule

10b5-1 repurchase plan.

Though Rule 10b5-1 provides additional legal protection unavailable in an OMR, we find no evidence that firms facing greater litigation risk are more likely to adopt a preset plan relative to an OMR. Our failure to achieve empirical support for the *Litigation Risk Hypothesis* is in line with the Rule's initial intent to clarify enforcement of insider trading laws for individuals and with anecdotal evidence: We observe very few cases in the popular press of firms being accused of using inside information while repurchasing.[16] However, this could simply reflect care taken not to run afoul of the law while executing these plans. Overall, our initial multivariate results are consistent with the *Abandonment Option, Timing Option, and Blackout Window Hypotheses*, but we fail to find support for the *Litigation Risk Hypothesis*.[17]

Lastly, we study if and how firms modify payout policy when the menu of payout options expands by examining how pre-Rule payout behavior relates to Rule 10b5-1 adoption likelihood. To examine which types of firms are most likely to exploit the addition of Rule 10b5-1 plans to the menu of payout options, in Model (6) we add indicators to capture pre-enactment payout policy. Specifically, we include three indicators, which equal one if a firm has: (i) no repurchase announcement, (ii) no dividend payment, or (iii) no payout (i.e., no repurchase announcement or dividend payment) in the three years leading up to enactment (1998-2000). The no payout indicator is econometrically equivalent to an interaction term of the other two indicators. We find that firms without an active repurchase program in place when Rule 10b5-1 was enacted are significantly more likely to adopt a preset repurchase plan instead of an OMR. The no dividend and no payout indicators are statistically insignificant. These results are consistent with preset repurchases occupying a unique space within the payout landscape. Specifically, preset plans allowed a different set of firms who had not been repurchasing to begin buying back their shares.

We include several other control variables that may affect a firm's choice of payout vehicle. Several models suggest that firms adopting 10b5-1 plans have more volatile prior repurchases, which may be correlated with blackout window constraints.[18] We

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[16]A notable exception is AOL, Inc., which received a securities class action complaint on behalf of selling shareholders between August 11, 2011 and April 9, 2012. The lead plaintiff alleged that AOL deliberated kept their plan to monetize their legacy patents a secret in order to keep AOL stock at an artificially depressed price, which enabled them to exploit the information imbalance through a stock repurchase program. The court dismissed allegations based on lack of factual support for the secret patent deal.

[17]In Internet Appendix Table IA6 we investigate whether firms with greater agency concerns, more employee stock options (ESOs), or higher turnover are more likely to adopt Rule 10b5-1 plans. The likelihood of adopting a Rule 10b5-1 plan is unrelated to the Bebchuk, Cohen, and Ferrell (2008) Entrenchment Index, to whether the CEO is also Chairman of the Board, or to whether an activist is present. However, firms with staggered boards, generally associated with worse corporate governance, are more likely to adopt preset repurchase plans. We do not identify a significant relation between the likelihood of adopting a Rule 10b5-1 plan and ESOs or turnover.

[18]We include repurchase frequency and standard deviation as controls to capture how regularly the firm is in the market for its own stock. Firms with more regular repurchases (high frequency, lower standard deviation) may not need preset plans to circumvent blackout windows because they appear to already be able to be in the market consistently. On the other hand, regular repurchasers may prefer preset plans to ensure that they can be in the market frequently without

find that repurchase frequency, institutional ownership, share dilution, and executive compensation are not significant predictors of Rule 10b5-1 adoption.[19]

1.5.2 Rule 10b5-1 plan adoption: Robustness to excluding boilerplate announcements

We next examine whether our above results regarding the decision to adopt a preset repurchase plan are sensitive to the exclusion of boilerplate announcements. Boilerplate Rule 10b5-1 plan announcements represent the lowest level of commitment to repurchasing under the Rule and are most susceptible to false signaling, i.e., firms including a Rule 10b5-1 component in their announcement but never actually establishing a preset plan. Table 1.4 reports the results of logit regressions modeling the decision to repurchase shares under Rule 10b5-1 excluding boilerplate announcements. In other words, Rule 10b5-1 firms are firms that announce a pure, partial, or expected Rule 10b5-1 plan. The base case is OMRs not containing any preset component. We report the coefficients along with their z-statistics. We include year and industry indicators in all specifications.

We gain several new insights into the decision to adopt a preset plan when we remove boilerplate plans. With a few caveats, our main results generally hold. We continue to find that flexibility is an important determinant of the decision to adopt a Rule 10b5-1 plan, consistent with the *Abandonment Option Hypothesis*. Firms with more stable cash flows, stronger prior stock performance, and more liquid stocks are generally more likely to adopt Rule 10b5-1 plans. Many of the cash and dividend payer coefficients lose statistical significance, although they maintain their expected sign in all cases. Given that our coefficients do not change drastically when we remove boilerplate plans, our loss of significance is likely due to reducing the power of our tests by cutting the sample size of Rule 10b5-1 plans by half. Poor repurchase timing is strongly related to adopting a non-boilerplate Rule 10b5-1 preset repurchase plan. Interestingly, when we exclude boilerplate plans, we discover that firm size is negatively related to Rule 10b5-1 adoption. Small firms and firms with a record of poor repurchase timing most likely lack the sophistication or desire to exercise the timing option associated with OMRs and thus are more likely to adopt a pure Rule 10b5-1 plan, supporting our *Timing Option Hypothesis*. We continue to find some support for the *Blackout Window Hypothesis* but no support of the *Litigation Risk Hypothesis*.[20] Further, we continue to show that firms without an active repurchase

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risk of regulatory scrutiny.

[19]We also model the decision to adopt a Rule 10b5-1 plan versus an ASR in Table IA13. Relative to firms adopting ASRs, Rule 10b5-1 firms have greater, less volatile cash flows, consistent with firms with higher and more predictable cash flows being more willing to adopt Rule 10b5-1 plans, which are executed over time. Yet, Rule 10b5-1 firms have more volatile, less liquid stocks than ASR firms. These finding are consistent with firms with less predictable stock returns being less willing to accept ASR contracts, whose ultimate cost is a function of the volume-weighted stock price during the contract period, and with the immediate execution of ASRs being more problematic for firms with illiquid stocks.

[20]Interestingly, we lose significance on Blackout window when we include Litigation risk in the model, likely because these variables are correlated ($\rho = -0.2563$; p-value = 0.000).

program when Rule 10b5-1 was enacted are significantly more likely to adopt preset repurchase plans. Taken together, we conclude that our main findings generally hold within Rule 10b5-1 plans that represent a stronger commitment to the Rule.[21]

1.5.3 What determines the speed to first preset repurchase plan adoption?

We observe that many firms adopting a preset repurchase plan continue to use a preset plan for future repurchases. In fact, only 199 firms that announce a preset repurchase plan subsequently announce an OMR without a Rule 10b5-1 component. Of these cases, 75% announced no further repurchase in the sample period, and the remaining 25% adopt another preset plan in their next repurchase announcement after the OMR. These findings suggest that a firm's decision to adopt its *first* Rule 10b5-1 plan is quite important. Thus, we examine the time to first Rule 10b5-1 plan or "adoption speed" in Table 1.5 employing a Cox proportional hazard model using the sample of firms that announce a Rule 10b5-1 plan during our sample period. We measure the duration to adoption as the number of calendar days from the end of 2003 to the first time a firm adopts a preset plan.

The hazard models generally corroborate the results from our logit models and are consistent with the *Abandonment Option, Timing Option, and Blackout Window Hypotheses*: Firms that have yet to adopt a preset plan are more likely to adopt a preset plan at time t if they have more cash on hand, have more stable cash flows, carry less debt, do not pay a dividend, have more liquid stocks, are smaller, are younger, are less financially sophisticated, have a record of poor repurchase timing, and disclose material information more frequently. In addition, we find that firms adopt Rule 10b5-1 plans more quickly if they did not have an active repurchase program but paid a dividend at Rule enactment, they repurchased inconsistently in the past, their CEO's bonus is tied to earnings per share, and they have more dilution or executive options.

1.5.4 Shock to cost of adopting a preset repurchase plan

Our results thus far suggest that firms for which financial flexibility is less valuable are more likely to adopt a Rule 10b5-1 plan over a traditional OMR plan. To claim a causal relation between financial flexibility and Rule 10b5-1 likelihood, we need to rule out endogeneity resulting from reverse causality or omitted variables. For reverse causality to be an issue, it must be the case that next year's decision to repurchase under Rule 10b5-1 affects this year's firm characteristics. We find this explanation improbable. A more reasonable concern is that we have failed to control for a variable that drives both financial flexibility and Rule 10b5-1 likelihood. While we take great care to control for an exhaustive list of observable variables, including

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[21]Internet Appendix Table IA7 examines varying plan types in a multinomial logit setting, with a base case of OMRs not containing a preset component. Overall, we observe that our results are not driven by one specific plan type.

firm-specific characteristics and industry and year fixed effects, our setting prevents us from completely ruling out omitted variables.

One potential solution is to identify an exogenous shock to the value of financial flexibility and examine changes in Rule 10b5-1 likelihood around this shock. Prior literature identifies the financial crisis of 2008 and 2009 as an unanticipated shock to the supply of credit available to firms (Ivashina and Scharfstein, 2010; Cornett, McNutt, Strahan, and Tehranian, 2011; Bliss, Cheng, and Denis, 2015), and a credit supply shock should increase the marginal benefit of financial flexibility. Therefore, adopting a preset repurchase plan became more costly around the financial crisis, and so we expect to see fewer firms adopting these types of plans during the crisis. In this section we examine whether a shock to the marginal benefit of financial flexibility affects the likelihood of adopting a preset plan.

Table 1.6 presents results on the effect of the shock to the benefits of financial flexibility on the likelihood of adopting a Rule 10b5-1 plan. Mirroring our logit analysis in Table 1.4, we condense our sample to the firm-year level and estimate the probability of adopting a preset plan, conditional on announcing a repurchase. We include the same list of control variables (though we only show our variables of interest to conserve space), but we replace our year dummies with two variables: (1) a trend variable capturing the increasing tendency for firms to adopt preset plans over time and (2) an indicator variable to demarcate the financial crisis. The financial crisis indicator variable captures any shift in the probability of announcing a preset plan during the crisis.

As expected, we observe a significant upward trend in the likelihood of adopting a Rule 10b5-1 plan relative to adopting an OMR. Holding other variables constant at the mean, the coefficient on our trend variable implies that the likelihood of adopting a Rule 10b5-1 plan, conditional on announcing a repurchase, increases by approximately 2.6% each year. However, the growth in preset repurchase plans significantly stagnates during the financial crisis. Repurchasing firms are 5.7% less likely to adopt a Rule 10b5-1 plan during the crisis.

In robustness tests, we run an "out-of-sample" logit model following Model (1) of Table 1.6 using the non-crisis period (2004-2007 and 2010-2013) and excluding the financial crisis indicator variable. We then predict the likelihood of announcing a preset plan during the financial crisis. The average predicted value during the financial crisis is 22.1%, significantly different at the 1% level from the actual value of 16.4%. This 5.7% difference is in line with our prior results. Overall, this evidence from an unanticipated positive shock to the marginal benefits of financial flexibility confirms our causal interpretation of the effect of flexibility concerns on the choice to adopt a 10b5-1 plan.

1.6 Repurchase announcement returns

We next examine abnormal returns surrounding announcements of Rule 10b5-1 re-purchases and OMRs. Preset repurchases are unique in that, relative to an OMR, private information should play a smaller role, if any. This would cause announcement returns to be lower for preset trading plans. On the other hand, preset plans

represent a greater commitment to repurchase shares, causing announcement returns to be greater in response to this signal. The net effect is an empirical question.

Panel A of Table 1.7 reports five-day cumulative abnormal returns (CARs) from trading days -2 to +2 around the announcement by type of repurchase (Rule 10b5-1 and non-preset OMR) and by level of commitment to repurchasing under the preset plan. We remove observations with earnings announcements during this five-day window. We estimate the parameters of the market model over 255 trading days, ending 46 days prior to the announcement. We use the Center for Research in Security and Prices (CRSP) value weighted index as the market portfolio and require a minimum of 100 trading days over the estimation window. We winsorize our returns measures at the 1st and 99th percentiles to mitigate the effect of outliers. Panel B presents difference in means tests, calculated using propensity score matching, which controls for observable firm characteristics likely to affect announcement returns. Control firms are the five nearest neighbors identified through our propensity score matching process based on logit regressions in Panel B of Table IA3 of the Internet Appendix.

We find positive and significant five-day cumulative abnormal returns (CARs) to preset repurchase announcements. In the aggregate, Rule 10b5-1 plans are met with CARs of 1.5%, or 0.4% greater than non-preset OMR plans.[22] This difference represents an increase of over 36% from the average non-preset CAR of 1.1%. Announcements with little commitment to a preset plan are associated with lower returns while announcements with a greater commitment are associated with higher returns. Boilerplate Rule 10b5-1 plans are associated with the lowest CARs of 1.1% while pure plans are associated with CARs of 2.4%; the returns to partial and expected plans fall in between. Thus, pure plans, which we know with certainty are executed fully under the Rule, are associated with CARs that are more than double the returns to non-preset OMR announcements. Further, when we control for firm characteristics likely to affect repurchase announcement returns, we find that announcement returns to pure Rule 10b5-1 announcements are 1.4% greater than and statistically different from abnormal returns to non-preset OMR announcements. These results are consistent with the benefit of the increased commitment and reduction in agency costs implied by preset plans outweighing the cost of being unable to exploit private information fully.[23,24] The current literature documents announcement returns of 1.3% and 3.4% for dividend increases and initiations, respectively (Farre-Mensa, Michaely,

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[22]Rule 10b5-1 announcement returns are on par with CARs around ASR announcements, which equal 1.8% for all ASR plans and 1.7% for pure ASR plans. We present these figures in Internet Appendix Table IA14.

[23]In Internet Appendix Table IA8, we also regress announcement returns on a Rule 10b5-1 repurchase plan indicator, the size of the repurchase program and our standard controls included in our base logit model (from Table 1.4, Panel A, Model (1)). These regressions corroborate our prior results.

[24]Given that previous studies document anomalous returns following repurchase announcements (e.g., Lakonishok and Vermaelen, 1990; Ikenberry, Lakonishok, and Vermaelen, 1995; Gong, Louis, and Sun, 2008; Peyer and Vermaelen, 2009), we estimate long-run (12-month) abnormal stock performance in Internet Appendix Table IA9. We document positive and significant long-run abnormal returns of 55 bps per month, but they are driven by the subsample of 10b5-1 plans that are concurrent with OMRs. Overall, our evidence on abnormal returns suggests that investors recognize and immediately respond to the increased commitment in preset repurchase plans.

and Schmalz, 2014; Grullon, Michaely, and Swaminathan, 2002; Michaely, Thaler, and Womack, 1995). Therefore, the commitment value (as proxied by announcement returns) of preset repurchases is comparable to that of dividend increases.

1.7 Rule 10b5-1 repurchase plans and overall payout policy

In a final series of tests, we further examine how Rule 10b5-1 plans fit into the broader set of payout choices. We first test whether preset repurchases substitute for dividend increases, and whether preset plans substitute more so than other repurchases. We then examine whether the determinants of payout policy changed around the introduction of the Rule.

1.7.1 Do preset repurchases substitute for dividend increases?

In Section 5 we documented that firms that have already committed to dividend payouts are less likely to commit to a preset repurchase plan. In this section, we conduct a more formal analysis of the dividend substitution effect of Rule 10b5-1 plans. The consensus in the literature is that repurchases are gradually replacing dividends, even among firms that continue to make distributions to shareholders through dividends (Skinner, 2008). However, because investors generally view dividend cuts unfavorably, most dividend-paying firms refuse to cut dividends outright, but rather choose not to increase them, using funds instead to repurchase. Indeed, Grullon and Michaely (2002) show that firms finance repurchases in part from cash that otherwise would have been used to increase dividends. In this section we examine whether Rule 10b5-1 repurchases offset dividend increases and whether preset repurchases have more of a substitution effect than other types of repurchases. Because dividend increases are expected to be maintained, we expect firms using Rule 10b5-1 plans, which have a higher level of commitment, to increase dividends less often and by less when they do.

Table 1.8 presents models of dividend increases using the conditional sample of repurchases at the firm-year level merged with non-repurchasing firm-years. Closely following Brown, Liang, and Weisbenner (2007), we define dividend changes as the change in total dividends on common stock, scaled by assets, from fiscal year t-1 to year t. Repurchases are total repurchases, scaled by assets, in year t. Rule 10b5-1 is an indicator variable that takes a value of one if a firm announces a Rule 10b5-1 as part of its repurchase program during fiscal year t. Our control variables mimic those in Brown, Liang, and Weisbenner (2007); that is, we control for cash, cash flow, leverage, book-to-market, lagged returns, the standard deviation of returns and firm size. All control variables are measured at the end of fiscal year t-1 and are defined in Appendix B. All continuous variables are winsorized at the 1st and 99th percentiles. We include year and industry fixed effects and cluster our standard errors by firm.

Models (1) and (2) are Tobit regressions of dividend increases on repurchase activity. The dependent variable in Model (1) is the maximum of zero and the change in dividends scaled by assets. In Model (2) we impose an additional restriction requiring actual (i.e., unscaled) dividends to increase. We find that the substitution effect of

repurchases with dividends is concentrated in the subset of repurchases associated with Rule 10b5-1 plans. The coefficient on the interaction between repurchases and the Rule 10b5-1 indicator is negative and highly significant, consistent with preset repurchases serving as more of a substitution mechanism than other repurchases. In fact, F-tests of the significance of the sum of the coefficients associated with repurchases and the interaction term reveals that increases in Rule 10b5-1 repurchases result in firms increasing dividends to a lesser extent, if at all. Using the more conservative figures from Model (1), if a firm announced a Rule 10b5-1 plan, then a one standard deviation increase in repurchases is associated with a 0.162% decline in dividend increases, or 17.85% of the mean change in dividend, conditional on an increase.

Models (3) and (4) are logit regressions modeling the likelihood of a dividend increase. In Model (3) dividend increases are defined as any increase in dividends; in Model (4) we additionally require unscaled dividends to increase. Our results corroborate those from our Tobit models. Specifically, we observe that dividend increases are more likely for firms with greater repurchase activity, except if the repurchases are conducted under a Rule 10b5-1 plan. The coefficient on the interaction of repurchases and the Rule 10b5-1 indicator is negative and significant, consistent with Rule 10b5-1 repurchases having more of a substitution effect than other types of repurchases. Further, F-tests reveal that the net effect of repurchases on the likelihood of dividend increases is negative if the firm announced a Rule 10b5-1 plan during the fiscal year. Holding other variables constant at the mean, a one standard deviation increase in repurchases if a firm announced a Rule 10b5-1 plan during the fiscal year corresponds to a 1.8 percentage point decrease in the likelihood of increasing its dividend. The effect is economically meaningful given that the unconditional probability of increasing a dividend is 26.35%. Whereas earlier, we found that dividend payers were not more likely to adopt a 10b-5 plan, here we find that conditional on repurchasing through a 10b-5 plan, repurchasing firms are using the plan to substitute for dividends increases.

1.7.2 Determinants of payout decision before and after Rule 10b5-1 enactment

To further explore how payout policy decisions changed around the advent of preset repurchase plans, in Table 1.9 we compare the drivers of payout before and after the Rule enactment using the full, unconditional sample of firms with available payout and control variables. We estimate payout choice separately for the pre-Rule 10b5-1 period (1990-2000) and the post-Rule 10b5-1 period (2004-2014) using multinomial logits and then compare coefficients across the two periods. We exclude the 2001-2003 early adoption and learning period because our data suggest that very few firms use preset repurchase plansperhaps because firms and investment banks were unaware of these plans or uncertain about applying the Rule to repurchases. While we are unable to completely rule out the effect of general time trends, we expand our list of control variables to include two macroeconomic controls that may influence payout

decisions.[25] First, we define dividend premium, following Baker and Wurgler (2004), as the difference in the logs of average market-to-book ratios of dividend-paying and non-dividend-paying stocks. Second, we add market returns, defined as the 12-month buy-and-hold returns on the value-weighted CRSP index. Our base group is firms with no payout, and the three groups of interest are dividend increasers, repurchasers, and firms that are both repurchasers and dividend increasers. Repurchasers are firms that actually repurchased shares in a given year. Because firms do not report prior to 2004 the actual number of shares repurchased, we define repurchasers as firms with positive values of repurchases calculated from cash flow statement values following Banyi, Dyl, and Kahle (2008).

Most changes in coefficients are concentrated in the decision to repurchase and the decision to both increase a dividend and repurchase. This finding is consistent with there being a shock to the repurchase landscape but with the factors determining dividends remaining largely constant. With 10b-5 plans changing the composition of repurchasing firms, cash and cash flow have become less important to the repurchase decision, as has leverage, prior abnormal returns, and repurchase regularity. On the other hand, return volatility, blackout window length, prior repurchase behavior, and the dividend premium have become more important to the repurchase decision, and option compensation is positively related to the repurchase decision in recent years. While we are unable to fully eliminate general time trends in payout policy driving changes in payout policy decision, coupling these findings with our logits in Table 1.3 modeling the OMR/Rule 10b5-1 decision, the multinomial logit results are consistent with the enactment of Rule 10b5-1 enticing a new group of firmsthose without poor prior abnormal returns, with longer blackout windows, and with more option compensationto repurchase stock.[26] Overall, our findings suggest that the determinants of payout policy, specifically with respect to share repurchases, significantly changed around the enactment of Rule 10b5-1.

1.8 Conclusion

This paper exploits a new addition to the menu of payouts, SEC Rule 10b5-1 preset repurchase plans, to reexamine a choice at the core of corporate payout decisions: whether to send a stronger signal of commitment or maintain options to abandon and time payouts. Though the Rule's original intent was to clarify the necessary conditions for enforcing insider trading laws, generally thought to apply to individuals classified as firm insiders, we find strong use of the Rule *at the firm level* to repurchase company stock. We are the first to our knowledge to document and study the widespread use of Rule 10b5 1 to repurchase company stock. Our evidence suggests that preset repurchase plans represent a unique payout tool whose introduction significantly altered the payout landscape.

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[25]A common macroeconomic variable in payout policy models is the difference in the tax rates for dividends versus long-term capital gains. We are unable to use tax differential because there is no variation in the post-Rule period.

[26]Internet Appendix Table IA11 show results are similar if dividend increasers are replaced with dividend payers.

Table 1.1: Preset repurchase frequency and plan details

Panel A presents the annual frequency of preset repurchase plan announcements. "Pure" ("Partial") preset plans represent repurchase programs executed fully (in part) under Rule 10b5-1. "Expected" preset plans denote that the firm intends to adopt a Rule 10b5-1 plan. "Boilerplate" refers to announcements that shares may be repurchased through a Rule 10b5-1 or through other means. "ASR" refers to accelerated share repurchases, and "Total Repurchases" includes all Rule 10b5-1 plans, ASRs, and all other open market repurchase (OMR) plans. Appendix A provides further details and examples of each type of plan. Panel B presents summary statistics on Rule 10b5-1 plan details, which are only available for the subset of non-boilerplate announcements that include such details. We report the size of the preset repurchase as a percentage of shares outstanding, in millions of dollars, or as a percentage of the total repurchase plan. Time to commencement is the number of days between the repurchase announcement and the start of the preset plan. Plan duration is the number of days during which the Rule 10b5-1 plan is effective.

Panel A: Annual preset repurchase announcement frequencies

Year	Rule 10b5-1	ASR	Total Repurchases	Rule 10b5-1/ Total	ASR/Total	Rule 10b5-1 plans by commitment level			
						Boilerplate	Expected	Partial	Pure
2001	4	10	1,131	0.35%	0.88%	0	2	2	0
2002	9	9	887	1.01%	1.01%	3	0	5	1
2003	22	15	734	3.00%	2.04%	4	1	8	9
2004	47	27	889	5.29%	3.04%	17	9	13	8
2005	86	52	1,099	7.83%	4.73%	22	16	25	23
2006	156	79	1,144	13.64%	6.91%	58	20	47	31
2007	180	131	1,540	11.69%	8.51%	52	28	54	46
2008	213	63	1,618	13.16%	3.89%	97	35	49	32
2009	81	20	580	13.97%	3.45%	31	11	21	18
2010	172	72	842	20.43%	8.55%	76	24	51	21
2011	247	69	1,152	21.44%	5.99%	138	30	54	25
2012	245	64	880	27.84%	7.27%	135	24	61	25
2013	200	97	766	26.11%	12.66%	126	19	41	14
2014	271	124	936	28.95%	13.25%	192	15	48	16
Total	1,933	832	14,198	13.61%	5.86%	951	234	479	269

Table 1.1: Preset repurchase frequency and plan details,continued

Panel B: Preset repurchase plan details (excluding boilerplate)

	N	Mean	10th percentile	Median	90th percentile	Std. Dev.
% shares outstanding	307	5.20	0.84	3.46	10.63	8.01
$ millions	393	81.51	1.96	16.00	200.00	283.11
% total repurchase	383	93.81	85.58	100.00	100.00	19.58
Time to commencement (in days)	213	13.08	0	4	35	18.97
Plan duration (in days)	299	195.39	37	146	366	164.84

Table 1.2: Do Rule 10b5-1 plans represent a greater commitment?

This table examines completion rates around Rule 10b5-1 repurchase announcements (by level of commitment) and around open market repurchase (OMR) announcements without a Rule 10b5-1 component. Panel A presents average cumulative quarterly completion rates the cumulative quarterly percentage of repurchase plans completed, where Quarter 0 corresponds to the quarter of the announcement. We truncate completion rates at 100%. Panel B presents difference in means tests controlling for firm characteristics using the five nearest neighbors from a propensity score matching process based on logit regressions presented in Table IA3 of the Internet Appendix. Panel C presents the average time to completion, i.e., the number of quarters until the plan is complete, and difference in means tests also using propensity score matching. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Average completion rates and percent of plans completed

	Average completion rate					Percent of plans completed				
Quarter	Non-Rule 10b5-1	Boilerplate	Expected	Partial	Pure	Non-Rule 10b5-1	Boilerplate	Expected	Partial	Pure
0	0.245	0.240	0.250	0.304	0.317	0.060	0.054	0.062	0.092	0.136
1	0.399	0.412	0.450	0.495	0.541	0.140	0.146	0.169	0.208	0.333
2	0.503	0.521	0.564	0.624	0.607	0.221	0.240	0.302	0.317	0.443
3	0.576	0.595	0.634	0.690	0.660	0.302	0.315	0.375	0.435	0.493
4	0.629	0.639	0.682	0.728	0.674	0.376	0.385	0.451	0.513	0.523
5	0.668	0.676	0.707	0.761	0.681	0.433	0.444	0.487	0.564	0.532
6	0.696	0.702	0.731	0.784	0.682	0.478	0.495	0.513	0.623	0.529
7	0.718	0.724	0.746	0.779	0.697	0.516	0.541	0.556	0.616	0.552
8	0.737	0.738	0.764	0.783	0.705	0.545	0.567	0.562	0.663	0.554

Panel B: Differences in means controlling for firm characteristics using propensity score matching

	Difference in completion rate				Difference in percent of plans completed			
Quarter	All Rule 10b5-1 - OMR	Expected, Partial, - & Pure - OMR	Partial & Pure -OMR	Pure - OMR	All Rule 10b5-1 - OMR	Expected, Partial, & Pure - & Pure - OMR	Partial & Pure -OMR	Pure - OMR
0	0.005	0.039**	0.052**	0.079***	0.003	0.033**	0.023	0.067***
1	0.067***	0.101***	0.150***	0.151***	0.036**	0.098***	0.116***	0.191***
2	0.048***	0.109***	0.145***	0.121***	0.054***	0.147***	0.145***	0.240***
3	0.033**	0.078***	0.125***	0.101***	0.042**	0.130***	0.161***	0.180***
4	0.030**	0.081***	0.109***	0.081***	0.032	0.127***	0.172***	0.124***
5	0.028**	0.039*	0.106***	0.097***	0.054**	0.089***	0.146***	0.168***
6	0.025*	0.042**	0.087***	0.042	0.043**	0.095***	0.129***	0.043
7	0.021	0.038*	0.078***	0.049**	0.039*	0.075**	0.117***	0.082***
8	0.022	0.042**	0.081***	0.041***	0.040*	0.083***	0.129***	0.055**

Table 1.2: Do Rule 10b5-1 plans represent a greater commitment?, continued

Panel C: Time to completion

Mean time to completion				
Non-Rule 10b5-1	Boilerplate	Expected	Partial	Pure
3.218	3.103	2.747	2.720	1.453

Differences in means controlling for firm characteristics using propensity score matching			
All Rule 10b5-1 - OMR	Expected, Partial, & Pure - OMR	Partial & Pure - OMR	Pure - OMR
-0.163	-0.640***	-1.016***	-1.470***

Table 1.3: What firm characteristics are related to preset repurchase adoption?

Using our sample of firms that announce a repurchase, this table reports logit regressions modeling the decision to adopt a Rule 10b5-1 plan relative to an open market repurchase without a Rule 10b5-1 component. The dependent variable equals one if the firm announced at least one Rule 10b5-1 repurchase program during the year and zero otherwise. All variables are defined in Appendix A; continuous variables are winsorized at the 1st and 99th percentiles. All specifications include fixed effects for year and Fama and French (1997) 12 industry classifications. Z-statistics (in parentheses) and based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 1.3: What firm characteristics are related to preset repurchase adoption?, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Abandonment option hypothesis								
Cash	0.933**	0.806	0.579	0.789**	0.559	0.517	0.966*	0.541
	(2.377)	(1.622)	(1.182)	(1.987)	(1.348)	(1.151)	(1.826)	(0.982)
Cash flow	2.205	4.242*	3.284	2.109	1.978	0.710	1.934	1.182
	(1.088)	(1.654)	(1.306)	(1.049)	(0.929)	(0.313)	(0.739)	(0.402)
Standard deviation of cash flow	-13.384***	-16.886***	-17.241**	-13.443***	-13.839**	-12.516**	-6.103	-15.955*
	(-2.589)	(-2.721)	(-2.285)	(-2.632)	(-2.461)	(-2.028)	(-0.955)	(-1.835)
Leverage	-0.549	-0.693	-0.822*	-0.668*	-0.625	-0.789*	-0.716	-0.931*
	(-1.543)	(-1.551)	(-1.834)	(-1.839)	(-1.580)	(-1.939)	(-1.486)	(-1.774)
Dividend payer	-0.359***	-0.200	-0.455***	-0.351***	-0.352***	-0.311*	-0.364*	-0.449***
	(-2.897)	(-1.238)	(-3.005)	(-2.782)	(-2.673)	(-1.914)	(-1.958)	(-2.776)
Book-to-market	0.399**	0.310	0.344	0.287	0.164	0.269	0.647***	0.229
	(2.208)	(1.270)	(1.494)	(1.569)	(0.841)	(1.353)	(2.771)	(0.823)
Prior stock performance	0.599**	0.099	0.553	0.589*	0.653**	0.840**	0.401	1.312***
	(1.966)	(0.256)	(1.456)	(1.906)	(2.056)	(2.506)	(0.973)	(2.963)
Standard deviation of returns	0.366	0.750	7.950	0.308	-5.523	4.451	-3.172	-5.953
	(0.056)	(0.090)	(1.007)	(0.046)	(-0.776)	(0.619)	(-0.310)	(-0.612)
Ln(illiquidity)	-0.162**	-0.157**	-0.170*	-0.177***	-0.149*	-0.157**	-0.075	-0.168
	(-2.379)	(-1.978)	(-1.789)	(-2.702)	(-1.897)	(-2.057)	(-0.747)	(-1.294)
Timing option hypothesis								
Financial sophistication	-0.094	-0.291*	0.030	-0.087	-0.156	-0.069	-0.262	-0.075
	(-0.766)	(-1.735)	(0.206)	(-0.691)	(-1.163)	(-0.509)	(-1.281)	(-0.463)
Ln(Market Cap)	-0.153	-0.113	-0.178	-0.230**	-0.240*	-0.138	0.033	-0.279
	(-1.389)	(-0.901)	(-1.210)	(-2.293)	(-1.941)	(-1.134)	(0.227)	(-1.641)
Ln(Age)		-0.294**						
		(-2.100)						
Repurchase timing			1.111**					
			(2.152)					
Blackout window hypothesis								
Blackout window (days)	0.002***	0.002***	0.002***	0.002***	0.001*	0.002***	0.001**	0.001*
	(3.438)	(3.753)	(2.852)	(2.931)	(1.802)	(2.825)	(2.174)	(1.820)
8-K reporting frequency				0.046***				
				(2.822)				
Litigation risk hypothesis								
Litigation risk					2.832			
					(0.759)			
Payout at 10b5-1 enactment								
No active repurchase program						0.483**		
						(2.247)		
No dividend						0.301		
						(1.208)		
No payout						-0.331		
						(-1.203)		
Controls								
Standard deviation of	0.081	0.068	0.116*	0.075	0.059	0.087	0.113	0.137**
repurchases	(1.498)	(1.042)	(1.898)	(1.380)	(1.035)	(1.462)	(1.523)	(1.980)
Repurchase frequency	-0.004	0.169	-0.109	0.052	0.027	0.089	-0.106	0.082
	(-0.020)	(0.803)	(-0.487)	(0.303)	(0.139)	(0.465)	(-0.427)	(0.381)
Institutional ownership	0.047	-0.042	-0.125	0.144	0.055	0.061	0.276	0.076
	(0.175)	(-0.118)	(-0.355)	(0.515)	(0.185)	(0.200)	(0.733)	(0.164)
Dilution	0.232	-1.098	0.896	0.106	0.405	0.661	1.463	
	(0.188)	(-0.599)	(0.568)	(0.084)	(0.298)	(0.478)	(0.871)	
EPS bonus dummy							0.241	
							(1.191)	
Options								-2.301
								(-0.656)
Observations	4,625	2,435	2,949	4,502	3,678	4,129	2,497	2,692
Pseudo R-squared	0.0791	0.0834	0.0738	0.0788	0.0724	0.0752	0.0540	0.0658

Table 1.4: Robustness to excluding boilerplate Rule 10b5-1 plans

Using our sample of firms that announce a repurchase, this table report logit regressions modeling the decision to adopt a Rule 10b5-1 plan relative to an open market repurchase without a Rule 10b5-1 component, using the subsample of Rule 10b5-1 plans excluding boilerplate plans. The dependent variable takes a value of one if a firm announced at least one non-boilerplate (i.e., pure, partial, or expected) Rule 10b5-1 repurchase program during the year and zero otherwise. All variable are defined in Appendix A; continuous variables are winsorized at the 1st and 99th percentiles All specifications include fixed effects for year and Fama and French (1997) 12 industry classifications. Z-statistics (in parentheses) and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 1.4: Robustness to excluding boilerplate Rule 10b5-1 plans, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Abandonment option hypothesis								
Cash	0.861*	1.136*	0.195	0.600	0.560	0.448	1.009	0.190
	(1.691)	(1.763)	(0.317)	(1.200)	(1.023)	(0.777)	(1.493)	(0.262)
Cash flow	1.155	3.618	2.208	0.825	0.665	-0.882	0.490	-0.545
	(0.467)	(1.143)	(0.708)	(0.343)	(0.251)	(-0.313)	(0.152)	(-0.142)
Standard deviation of cash flow	-11.885*	-15.617**	-17.117*	-11.599*	-12.790*	-10.509	-5.491	-21.380*
	(-1.858)	(-2.125)	(-1.779)	(-1.846)	(-1.827)	(-1.457)	(-0.733)	(-1.854)
Leverage	-0.812*	-0.903	-1.033*	-1.015**	-0.654	-0.982*	-0.858	-0.911
	(-1.715)	(-1.463)	(-1.835)	(-2.105)	(-1.272)	(-1.857)	(-1.515)	(-1.391)
Dividend payer	-0.219	-0.041	-0.282	-0.224	-0.206	-0.156	-0.332	-0.396**
	(-1.464)	(-0.211)	(-1.607)	(-1.463)	(-1.330)	(-0.841)	(-1.480)	(-2.000)
Book-to-market	0.094	0.189	-0.018	-0.046	0.060	0.010	0.583**	0.012
	(0.441)	(0.617)	(-0.066)	(-0.212)	(0.259)	(0.043)	(2.266)	(0.037)
Prior stock performance	0.970***	0.668	0.934**	0.997***	0.979**	1.156***	0.618	1.904***
	(2.619)	(1.427)	(2.068)	(2.667)	(2.567)	(2.933)	(1.261)	(3.624)
Standard deviation of returns	-1.959	1.226	4.381	-1.546	-3.122	0.387	-7.283	-7.245
	(-0.255)	(0.120)	(0.482)	(-0.195)	(-0.367)	(0.046)	(-0.605)	(-0.627)
Ln(illiquidity)	-0.183**	-0.157	-0.213**	-0.182**	-0.210**	-0.171**	-0.012	-0.217
	(-2.384)	(-1.606)	(-2.046)	(-2.315)	(-2.466)	(-2.016)	(-0.116)	(-1.292)
Timing option hypothesis								
Financial sophistication	-0.223	-0.299	-0.168	-0.220	-0.166	-0.231	-0.271	-0.296
	(-1.433)	(-1.461)	(-0.923)	(-1.382)	(-0.998)	(-1.337)	(-1.142)	(-1.424)
Ln(Market Cap)	-0.312***	-0.206	-0.382**	-0.369***	-0.394***	-0.301**	0.004	-0.501**
	(-2.722)	(-1.321)	(-2.547)	(-3.196)	(-3.140)	(-2.386)	(0.029)	(-2.443)
Ln(Age)		-0.082						
		(-0.445)						
Repurchase timing			1.221**					
			(2.018)					
Blackout window hypothesis								
Blackout window (days)	0.001**	0.002***	0.002**	0.001*	0.001	0.001**	0.001**	0.001*
	(2.425)	(2.940)	(2.215)	(1.855)	(1.312)	(1.998)	(2.110)	(1.887)
8-K reporting frequency				0.042**				
				(2.302)				
Litigation risk hypothesis								
Litigation risk					0.007			
					(0.001)			
Payout at 10b5-1 enactment								
No active repurchase program						0.521**		
						(2.011)		
No dividend						0.367		
						(1.220)		
No payout						-0.362		
						(-1.097)		
Controls								
Standard deviation of repurchases	0.143**	0.092	0.185***	0.140**	0.124**	0.147**	0.163**	0.227***
	(2.458)	(1.280)	(2.816)	(2.361)	(2.039)	(2.299)	(2.147)	(2.973)
Repurchase frequency	0.208	0.469*	0.052	0.266	0.311	0.312	-0.119	0.435
	(0.955)	(1.813)	(0.198)	(1.227)	(1.283)	(1.321)	(-0.415)	(1.571)
Institutional ownership	-0.027	-0.095	-0.029	0.069	-0.143	-0.017	0.559	-0.291
	(-0.079)	(-0.219)	(-0.066)	(0.193)	(-0.378)	(-0.044)	(1.207)	(-0.495)
Dilution	-0.285	-1.351	-0.345	-0.497	-0.334	-0.073	0.778	
	(-0.186)	(-0.581)	(-0.168)	(-0.315)	(-0.197)	(-0.042)	(0.397)	
EPS bonus dummy							0.479**	
							(2.103)	
Options								-3.461
								(-0.829)
Observations	4,202	2,189	2,686	4,099	3,327	3,806	2,375	2,451
Pseudo R-squared	0.0663	0.0672	0.0700	0.0662	0.0663	0.0687	0.0534	0.0781

Table 1.5: Hazard models of preset plan adoption

Using our sample of repurchasing firms between 2004 and 2014, this table presents Cox proportional hazard model of the duration to Rule 10b5-1 plan adoption. The duration to adoption is the number of calendar days from the end of 2003 to the first time the firm adopts a Rule 10b5-1 plan. If the firm enters the sample after 2003 we calculate duration as the number of days from the end of the first calendar year in Compustat. All variables are defined in Appendix A; continuous variables are winsorized at the 1st and 99th percentiles. We also include industry fixed effects based on Fama and French (1997) 12 industry classifications. Z-statistics (in parentheses) are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 1.5: Hazard models of preset plan adoption, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Abandonment option hypothesis								
Cash	0.736**	0.285	0.160	0.582	0.630	0.338	0.614	0.319
	(2.037)	(0.740)	(0.355)	(1.558)	(1.596)	(0.963)	(1.206)	(0.665)
Cash flow	1.020	1.143	0.028	1.051	1.578	0.314	-1.104	-2.010
	(0.527)	(0.563)	(0.012)	(0.543)	(0.747)	(0.165)	(-0.415)	(-0.736)
Standard deviation of cash flow	-10.251**	-10.935**	-11.695*	-11.464**	-10.171*	-5.927	4.903	-5.596
	(-2.085)	(-2.253)	(-1.665)	(-2.260)	(-1.927)	(-1.314)	(0.834)	(-0.779)
Leverage	-0.503	-0.764**	-0.649	-0.686**	-0.501	-0.654**	-0.911*	-0.415
	(-1.584)	(-2.131)	(-1.554)	(-2.095)	(-1.426)	(-2.061)	(-1.655)	(-1.005)
Dividend payer	-0.253**	-0.145	-0.361**	-0.259**	-0.191	-0.316**	-0.422*	-0.272*
	(-2.007)	(-1.034)	(-2.210)	(-1.992)	(-1.402)	(-2.323)	(-1.957)	(-1.729)
Book-to-market	0.314*	0.269	0.176	0.219	0.264	0.128	0.293	0.075
	(1.888)	(1.445)	(0.800)	(1.260)	(1.424)	(0.819)	(1.152)	(0.314)
Prior stock performance	0.321	-0.560	0.206	0.302	0.440	0.371	0.482	1.183**
	(0.840)	(-1.467)	(0.396)	(0.766)	(1.092)	(1.003)	(1.039)	(2.163)
Standard deviation of returns	4.361	-0.315	4.126	4.768	2.287	2.550	-53.901***	-10.950
	(0.700)	(-0.046)	(0.557)	(0.740)	(0.320)	(0.434)	(-4.515)	(-1.194)
Ln(illiquidity)	-0.155**	-0.072	-0.159*	-0.135**	-0.167**	-0.100*	-0.036	0.039
	(-2.566)	(-1.104)	(-1.816)	(-2.241)	(-2.286)	(-1.685)	(-0.393)	(0.369)
Timing option hypothesis								
Financial sophistication	-0.272**	-0.326**	-0.176	-0.283**	-0.353**	-0.267**	-0.408*	-0.355**
	(-2.136)	(-2.109)	(-1.115)	(-2.200)	(-2.448)	(-2.122)	(-1.712)	(-2.257)
Ln(Market Cap)	-0.203**	-0.082	-0.213*	-0.221**	-0.260**	-0.149	0.022	-0.011
	(-2.241)	(-0.787)	(-1.672)	(-2.424)	(-2.575)	(-1.631)	(0.175)	(-0.080)
Ln(Age)		-0.598***						
		(-5.736)						
Repurchase timing			1.070*					
			(1.909)					
Blackout window hypothesis								
Blackout window (days)	0.000	0.002***	0.001	0.000	0.000	0.001*	-0.001	0.000
	(0.902)	(2.745)	(1.467)	(0.517)	(0.151)	(1.844)	(-1.237)	(0.483)
8-K reporting frequency				0.058***				
				(3.880)				
Litigation risk hypothesis								
Litigation risk					-3.817			
					(-0.818)			
Payout at 10b5-1 enactment								
No active repurchase program						0.398**		
						(2.308)		
No dividend						0.206		
						(1.000)		
No payout						-0.419*		
						(-1.821)		
Controls								
Standard deviation of	0.131**	0.055	0.149**	0.125**	0.116**	0.079	0.024	0.136*
repurchases	(2.520)	(0.864)	(2.544)	(2.321)	(2.058)	(1.395)	(0.304)	(1.936)
Repurchase frequency	-0.180	-0.318	-0.495**	-0.166	-0.191	-0.334*	-0.542**	-0.371*
	(-1.048)	(-1.579)	(-2.191)	(-0.960)	(-1.020)	(-1.933)	(-2.080)	(-1.734)
Institutional ownership	0.385	0.318	-0.104	0.477	0.323	0.392	0.204	0.685
	(1.309)	(0.990)	(-0.257)	(1.589)	(0.991)	(1.327)	(0.475)	(1.499)
Dilution	0.950	2.192	1.642	0.683	1.090	2.586**	3.377**	
	(0.866)	(1.638)	(1.031)	(0.609)	(0.891)	(2.298)	(2.512)	
EPS bonus dummy							0.392**	
							(1.975)	
Options								4.863*
								(1.705)
Observations	4,006	2,102	2,514	3,911	3,144	3,729	2,395	2,414
Pseudo R-squared	0.736**	0.285	0.160	0.582	0.630	0.017	0.614	0.319

Table 1.6: Shock to cost of adopting a preset repurchase plan

Using our sample of firms that announce a repurchase, this table report logit regressions modeling the decision to adopt a Rule 10b5-1 plan relative to an open market repurchase without a Rule 10b5-1 component during the financial crisis. The dependent variable equals one if the firm announced at least one Rule 10b5-1 repurchase program during the year and zero otherwise. Trend is a count variable equal to 1 for observations in 2004, 2 for observations in 2005, etc. Financial crisis is an indicator variable equal to 1 for announcements made during 2008 or 2009. All variables are defined in Appendix A; continuous variables are winsorized at the 1st and 99th percentiles. All specifications include fixed effects for Fama and French (1997) 12 industry classifications. Z-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trend	0.163***	0.175***	0.151***	0.167***	0.176***	0.146***	0.258***	0.118***
	(9.236)	(7.305)	(6.437)	(9.269)	(9.211)	(7.559)	(3.289)	(4.635)
Financial crisis	-0.363***	-0.368***	-0.276**	-0.342***	-0.408***	-0.408***	-0.527***	-0.461***
	(-3.334)	(-2.705)	(-2.142)	(-3.093)	(-3.431)	(-3.471)	(-2.923)	(-3.236)
Ln(Age)		-0.292**						
		(-2.088)						
Repurchase timing			1.102**					
			(2.146)					
8-K reporting frequency				0.045***				
				(2.782)				
Litigation risk					2.307			
					(0.617)			
No active repurchase program						0.472**		
						(2.203)		
No dividend						0.287		
						(1.157)		
No payout						-0.312		
						(-1.139)		
EPS bonus dummy							0.257	
							(1.274)	
Options								-2.524
								(-0.724)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,625	2,435	2,952	4,502	3,678	4,129	2,497	2,692
Pseudo R-squared	0.0765	0.0813	0.0711	0.0763	0.0696	0.0718	0.0515	0.0630

Table 1.7: Univariate analysis - Abnormal returns around preset repurchase announcements

This table reports five-day cumulative abnormal returns around repurchase announcements. We remove observations with earnings announcements during this five-day window. Panel A shows mean abnormal returns by type of repurchase announcement. Table 1 explains our categorization of announcements. Panel B examines the difference in abnormal returns between groups of preset repurchase plans and open market repurchase plans that do not include a preset component. Significance of mean abnormal returns is assessed using a t-test or propensity score matching, as indicated. We use the five nearest neighbors identified from the logit regressions in Table IA3 as matched control firms then calculate the difference in means. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Panel A: Abnormal returns at announcement by type of repurchase					
	Rule 10b5-1					
	All	Boilerplate	Expected	Partial	Pure	OMR
Mean	1.531	1.147	2.044	1.932	2.385	1.129
t-stat	7.276	4.256	4.237	2.891	3.879	13.046
N	842	512	124	94	112	4,274

Panel B: Differences in means controlling for firm characteristics
using propensity score matching

	Rule 10b5-1		
	Expected		
	Partial, &Pure	Partial & Pure	
All - OMR	- OMR	-OMR	Pure - OMR
0.222	0.88**	1.047**	1.436***

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Table 1.8: Do Rule 10b5-1 repurchases substitute for dividend increases?

Using the full, unconditional sample of firm-years created by merging our repurchase announcement sample with non-repurchasing firm-years, this table presents models of dividend increases as a function of repurchase activity, with a focus on the differential substitution effect of Rule 10b5-1 repurchases. Models (1) and (2) report results from Tobit regressions modeling dividend increases. In Model (1) dividend increases are defined as the maximum of zero and the change in dividends, scaled by assets, from fiscal year t-1 to year t; in Model (2) we also require unscaled dividends to increase. Models (3) and (4) are logit regressions modeling the likelihood of a dividend increase. In Model (3) dividend increases are defined as any increase in dividends, scaled by assets, from year t-1 to year t; to be classified as a dividend increase; in Model (4), we additionally require unscaled dividends to increase. Repurchases are total repurchases, scaled by assets, in fiscal year t. Rule 10b5-1 is an indicator variable that takes a value of one if a firm announced a Rule 10b5-1 as part of its repurchase program during fiscal year t. Prior stock performance equals the return on the company's stock during fiscal year t-1, net the return on the value-weighted CRSP index over the same period. All other variables are measured at the end of fiscal year t-1 and defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. We include year and Fama and French (1997) 12 industry fixed effects in all specifications. T-statistics or Z-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Tobit models		Logit models	
		ΔDiv/Assets >0 &		ΔDiv/Assets >0
	ΔDiv/Assets >0	ΔDiv >0	ΔDiv/Assets >0	ΔDiv >0
	(1)	(2)	(3)	(4)
Repurchases/Assets	0.017**	0.017**	2.321***	1.968***
	(2.216)	(2.169)	(4.123)	(3.530)
Repurchase/Assets x Rule 10b5-1	-0.063***	-0.066***	-5.641***	-5.630***
	(-3.103)	(-3.088)	(-3.481)	(-3.324)
Rule 10b5-1	-0.000	0.000	0.011	0.035
	(-0.151)	(0.099)	(0.096)	(0.304)
p-values from F-tests				
Repurchases/Assets +	-0.046**	-0.049**	-3.320**	-3.662**
Repurchase/Assets x Rule 10b5-1	[0.020]	[0.018]	[0.035]	[0.026]
Controls	Yes	Yes	Yes	Yes
Observations	36,619	36,723	36,619	36,723
Log likelihood	13,413	12,035	-17,603	-17,190

Table 1.9: How have preset repurchases changed payout decisions?

Use the full, unconditional sample of firm-years created by merging our repurchase announcement sample with non-repurchasing firm-years, this table presents multinomial logit models of dividend increases and repurchases in the pre-Rule 10b5-1 period (1990-2000) and the post-Rule 10b5-1 period (2004-2014), as well as the difference in coefficients across the two periods. The base group is firm-years with zero repurchases and no increase in dividends. The other groups include: (i) firm-years with dividend increases but zero repurchases, (ii) firm-years with dividend increases and positive repurchases, and (iii) firm-years with no dividend increase but positive repurchases. Dividend increases are cases in which the change in dividends, scaled by assets, from fiscal year t-1 to year t is positive. Positive repurchases imply a positive repurchase value inferred from the cash flow statement following Banyi, Dyl, and Kahle (2008). Independent variables are measured at the end of fiscal year t-1 and defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. We include industry fixed effects based on Fama and French (1997) 12 industry classifications. Z-statistics (in parentheses) are based on robust standard errors clustered by firm; p-values associated with differences are in brackets. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 1.9: How have preset repurchases changed payout decisions?, continued

	Pre-Rule 10b5-1 period (1990-2000)			Post-Rule 10b5-1 period (2004-2014)			Difference		
	Dividend increase	Dividend increase & Repurchase	Repurchase	Dividend increase	Dividend increase & Repurchase	Repurchase	Dividend increase	Dividend increase & Repurchase	Repurchase
Cash	0.447	0.735**	0.981***	0.088	0.661***	0.337***	-0.359	-0.074	-0.644***
	(1.449)	(2.534)	(6.234)	(0.526)	(4.043)	(3.138)	[0.337]	[0.842]	[0.003]
Cash flow	3.408***	6.910***	6.907***	3.640***	5.219***	3.329***	0.231	-1.693	-3.575***
	(2.895)	(5.537)	(11.569)	(5.543)	(7.092)	(7.466)	[0.893]	[0.28]	[0.000]
Standard deviation of cash flow	0.667	-5.189*	-4.546***	-0.081	-5.339***	-2.950***	-0.747	-0.159	1.600
	(0.654)	(-1.955)	(-3.795)	(-0.125)	(-3.558)	(-3.601)	[0.618]	[0.968]	[0.404]
Leverage	0.210	-0.801***	-0.983***	-0.066	-0.680***	-0.353***	-0.276	0.121	0.629***
	(1.053)	(-3.743)	(-7.705)	(-0.557)	(-5.449)	(-3.949)	[0.267]	[0.679]	[0.001]
Dividend payer	3.200***	2.981***	-0.143**	2.756***	2.537***	-0.188***	-0.444***	-0.444***	-0.045
	(25.656)	(21.922)	(-2.311)	(42.149)	(39.957)	(-4.327)	[0.004]	[0.006]	[0.603]
Book-to-market	0.256***	0.025	-0.019	0.031	0.060	-0.048	-0.226**	0.036	-0.029
	(3.324)	(0.267)	(-0.504)	(0.673)	(1.062)	(-1.583)	[0.012]	[0.773]	[0.574]
Prior stock performance	0.466***	0.217**	-0.319***	0.300***	0.345***	-0.044	-0.166**	0.128	0.275***
	(5.985)	(2.569)	(-7.250)	(6.011)	(6.204)	(-1.204)	[0.058]	[0.195]	[0.000]
Standard deviation of returns	-21.446***	-21.273***	-10.433***	-17.602***	-36.796***	-17.561***	3.873	-15.534***	-7.131***
	(-5.993)	(-5.363)	(-5.926)	(-8.577)	(-15.630)	(-12.023)	[0.409]	[0.003]	[0.008]
Ln(illiquidity)	0.086**	0.040	-0.030	0.083***	0.080***	-0.016	-0.003	0.04	0.014
	(2.395)	(1.024)	(-1.357)	(5.012)	(4.456)	(-1.081)	[0.942]	[0.403]	[0.637]
Ln(Market Cap)	0.169***	0.128**	-0.036	0.194***	0.273***	0.034	0.025	0.145**	0.070
	(3.138)	(2.246)	(-1.027)	(7.392)	(9.966)	(1.458)	[0.702]	[0.046]	[0.142]
Blackout window (days)	-0.001	0.003	-0.001	-0.000	0.007***	0.007***	0.001	0.004	0.008***
	(-0.381)	(0.802)	(-0.328)	(-0.491)	(34.581)	(37.860)	[0.755]	[0.434]	[0.004]
Standard deviation of Repurchases	-0.015	-0.007	0.063***	0.029	0.034	-0.003	0.045	0.042	-0.065**
	(-0.387)	(-0.221)	(3.015)	(1.218)	(1.623)	(-0.174)	[0.372]	[0.346]	[0.022]
Repurchase frequency	-0.445**	3.748***	3.774***	-0.280***	4.205***	4.440***	0.166	0.457**	0.666***
	(-2.357)	(27.831)	(35.456)	(-2.691)	(53.376)	(64.876)	[0.501]	[0.013]	[0.000]
Institutional ownership	0.011	0.171	0.709***	0.037	0.533***	0.449***	0.026	0.361	-0.261
	(0.052)	(0.830)	(5.481)	(0.361)	(5.066)	(5.558)	[0.915]	[0.166]	[0.131]
Dilution	2.035***	0.702	-0.653*	1.652***	2.330***	0.778*	-0.385	1.626**	1.432**
	(3.972)	(1.168)	(-1.839)	(2.992)	(4.247)	(1.910)	[0.621]	[0.071]	[0.019]
Dividend premium	-0.218	0.284	-0.300	0.707*	-0.599	0.712**	0.908**	-0.880	1.015***
	(-0.601)	(0.854)	(-1.500)	(1.749)	(-1.493)	(2.313)	[0.091]	[0.109]	[0.008]
Market returns	0.150	0.504	-0.220	0.257*	-0.486***	-0.265**	0.104	-0.989***	-0.045
	(0.459)	(1.634)	(-1.133)	(1.712)	(-3.423)	(-2.393)	[0.777]	[0.004]	[0.845]
Observations		13,288			33,005				
Pseudo R-squared		0.282			0.347				

Figure 1.1: Preset Repurchase Announcements

This figure shows the number of repurchase announcements containing a preset repurchase plan (left axis) and the percentage of repurchase announcements that include a preset repurchase component (right axis) from 2001 to 2014.
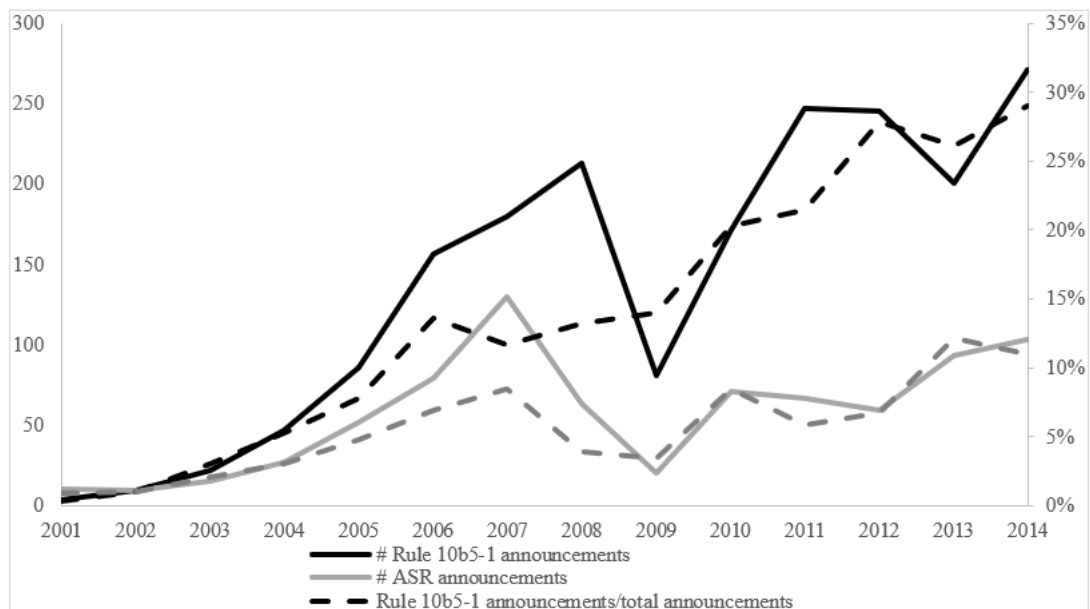
Figure 1.2: Preset repurchase plans in payout initiations

This figure presents initiations that include a preset repurchase component as a percentage of repurchase initiations and all payout initiations. We define repurchase (payout) initiations as the first repurchase (payout) since 1990.
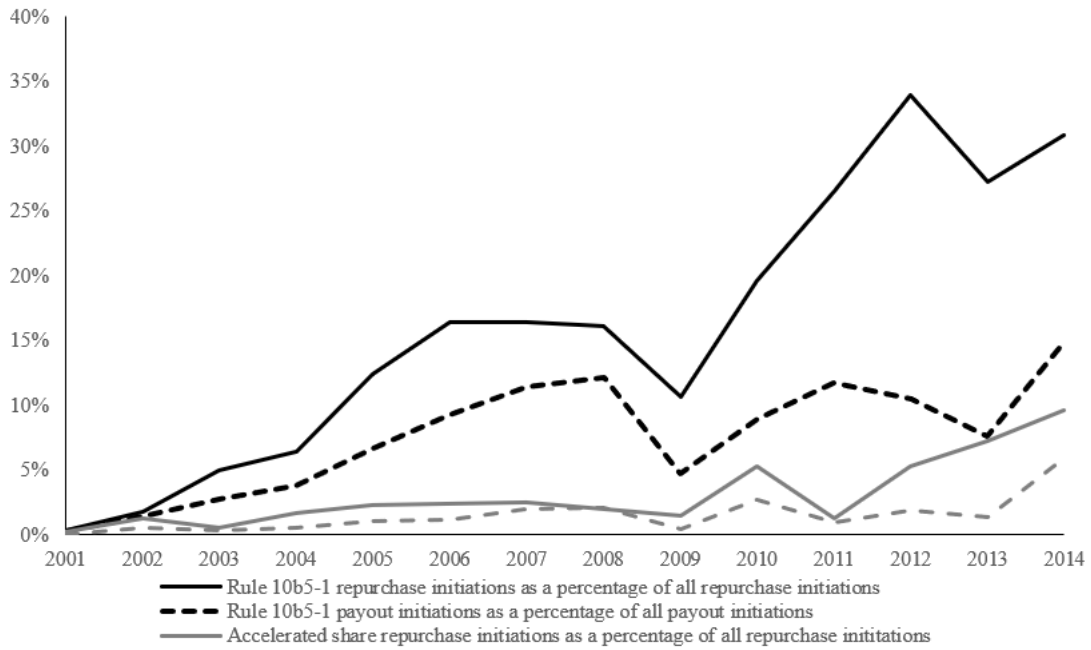
Chapter 2 Managerial Self-Interest and Strategic Repurchases: Evidence from Equity Vesting Schedules

2.1 Introduction

Share repurchases are an important corporate decision as they are the most prevalent form of payout in the US in recent years. In 2014, S&P 500 firms spent over half-a-trillion dollars on share repurchases, a year-over-year increase of over 16%. The existing literature focuses primarily on firm-level motivations to announce and execute a repurchase program.[1] An often overlooked element is the manager's desire to personally benefit from the repurchase program. This paper studies the strategic use and timing of share repurchases by insiders for personal gain. Specifically, I study the relation between monthly CEO equity sales and simultaneous share repurchase likelihood and magnitude.

Several articles in the business press question whether managerial motivations for repurchasing are actually in the best interest of the firm, or rather are for manager's own personal benefit.[2] For example, a 2014 *Economist* article[3] states:

> ...buy-backs have a flaw: they can create perverse incentives to pay out too much cash, damaging firms' balance-sheets and their ability to invest. For a start, both investors and managers can become addicted to the temporary 'pop' that a buy-back can give to a share price.

If managers use share repurchases as a tool to benefit personally from a temporary boost in share price, then I expect share repurchases to increase when managers personally benefit from stock prices the most.

Repurchases are often executed in conjunction with insider equity sales. For instance, in June of 2012 General Electric repurchased 217,227 shares at an average price of $38.29 the same month that the CEO Kendall Powell sold 58,684 shares at $38.44. Prior literature studies insider trading as it relates to the credibility of the undervaluation signal of repurchases (Bonaimé and Ryngaert (2013), Babenko, Tserlukevich, and Vedrashko (2012) and Chan, Ikenberry, Lee, and Wang (2012)), but

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[1] The evidence suggests firms repurchase due to a combination of signaling (Vermaelen (1981) and Comment and Jarrell (1991)), undervaluation (D'mello and Shroff, 2000), agency costs (Jensen (1986) and Stephens and Weisbach (1998)), dilution (Fenn and Liang (2001) and Kahle (2002)), capital structure adjustments (Hovakimian, Opler, and Titman, 2001), manipulating earnings-per-share (EPS) (Hribar, Jenkins, and Johnson, 2006), liquidity (Hillert, Maug, and Obernberger, 2016), and financial flexibility (Brav, Graham, Harvey, and Michaely (2005) and Bonaimé, Hankins, and Harford (2014)).

[2] See "Profits Without Prosperity" (Harvard Business Review, September 2014 issue),"Beware the Stock-Buyback Craze"(The Wall Street Journal, June 19, 2015), "Is the Surge in Stock Buybacks Good or Evil?" (The Wall Street Journal, November 22, 2015), and "Buybacks enrich the bosses when business sags" (Reuters, December 10, 2015).

[3] "The Repurchase Revolution" (The Economist on September 13, 2014).

does not draw a causal relationship between insider equity sales and actual share re-purchases. Causal inferences are difficult to establish because share repurchases and equity sales are endogenously determined. Market characteristics, such as liquidity and returns, and firm characteristics, such as free cash flow and investment opportunities, determine both share repurchases and equity sales. A manager can frequently choose when to sell equity and when to repurchase shares,[4] implying that the decision to repurchase shares in a particular month is potentially correlated with the decision to sell equity. Moreover, both the choice to sell equity and to repurchase shares are potentially correlated with unobservable omitted variables. For example, a CEO may be less likely to sell equity due to unobservable positive information about future cash flows while at the same time the firm would be more likely to repurchase due to the same information. This opposite correlation with potential omitted variables results in a downward bias of the estimated effect of equity sales on repurchases.

To overcome the endogeneity of CEO equity sales, I use an instrumental variable approach. As first shown in Edmans, Goncalves-Pinto, Wang, and Xu (2016), vesting of stock and option grants increases the likelihood of equity sales in a given month.[5] A CEO is significantly more likely to sell equity in a month when equity grants vest, satisfying the relevance criterion for a valid instrument. Vesting schedules also satisfy the exclusion restriction, as firms establish vesting schedules years in advance at the grant date. Vesting typically begins at least 12 months after the grant date and can extend 3-7 years. Therefore, vesting in a particular month is unlikely correlated with current market and firm characteristics as well as any omitted variables that may drive equity sales and repurchases. Lastly, the CEO is aware of the schedule in advance, allowing sufficient time to adjust repurchases. From the previous example, the CEO of General Mills Kendall Powell was awarded two restricted stock grants totaling 58,684 shares in June of 2008 with vesting occurring 4 years after the grant date. Mr. Powell sold the exact same amount of shares in June 2012, the same month that the stock grants vested.

I identify vesting schedules using data on equity grants from ISS Incentive Lab. I focus on time-based equity grants because performance-based vesting grants can influences share repurchases through alternative channels other than vesting. Performance-based grants are often tied to current firm performance metrics and some metrics can be directly manipulated using repurchases.[6] Theory suggests that it is optimal for an undiversified executive facing trading and hedging restrictions to exercise options and/or sell equity upon vesting of grants (Hall and Murphy (2002) and Kahl, Liu, and Longstaff (2003)). I show that vesting indeed increases the likelihood of an equity sale by management. Focusing on time-based grants I document an increase of 3-5%

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[4]Repurchases are constrained by SEC Rule 10b-18 whereas equity sales are constrained by SEC Rule 144 and other imposed insider trading restrictions.

[5]Edmans, Fang, and Lewellen (2016) show a similar relationship between equity vesting and sales using quarterly data.

[6]Cheng, Harford, and Zhang (2015) find that CEOs repurchase in larger quantities when their bonus is tied to EPS. Hribar, Jenkins, and Johnson (2006) find that a large number of firms repurchase shares to meet analysts' forecasts. Almeida, Fos, and Kronlund (2016) document a similar relationship and show that investment and employment decrease after EPS-motivated repurchases.

in the likelihood of equity sale by CEO in months when equity grants vest, which is consistent with the empirical results of Edmans, Goncalves-Pinto, Wang, and Xu (2016). I exploit this setting to test whether the firm alters its share repurchase program during months when the CEO faces a greater incentive to manipulate the current stock price.

Using a sample of hand-collected monthly repurchases, I find that a share repurchase is 2% more likely in a month when the CEO's equity grant vests relative to non-vesting months. This corresponds to a 7.5% increase over the unconditional probability of repurchasing in a month. I also find that the number of shares repurchased is significantly increasing in the value of the equity grants vesting. A one standard deviation increase from the mean value of vesting equity implies an increase in shares repurchased that corresponds to approximately 8% of the mean monthly shares repurchased. These results are consistent with managers strategically using share repurchases to personally benefit from the positive effects of repurchasing on the stock price.[7]

Do CEOs increase repurchases when selling equity to potentially benefit from selling a higher stock price? I implement a two-stage least square (2SLS) analysis to test if vesting driven equity sales are associated with increased repurchases. I find that after using vesting as an instrument for equity sales, a firm is 47% more likely to repurchase in months where the CEO also sells equity due to vesting. The results hold if I use the value of vesting equity and equity sold rather than binary variables. A firm increases repurchases by 0.05% of shares outstanding, an increase equivalent to 30% of the mean, when the value of equity sold by the CEO in the same month doubles. When managers sell equity due to vesting, I find the firm is more likely to repurchase stock simultaneously and the number of shares repurchased is increasing in the value of equity sold. The magnitude of the effect of equity sales on repurchases is also much larger than that of vesting, consistent with managerial self-interest as the equity sale is driving the repurchase and not dilution. This result is consistent with managers using repurchases to personally benefit from the stock price support and suggests a causal relation between CEO sales and share repurchases.

I next ask if firms strategically shift repurchases in the months surrounding equity vesting. Since vesting schedules are known to the CEO well in advance of actual vesting, it is possible that the CEO would reduce repurchase activity leading up to or following a vesting month. Consistent with this hypothesis, I find a significant decrease in repurchase activity one-month prior to vesting. These results suggest a shifting of repurchases from the month before vesting to months where CEOs are concerned with the current stock price.

Upon vesting of grants (or exercising of options) shares outstanding increase, diluting the equity positions of existing shareholders. Previous literature shows evidence that firms use repurchases to offset the dilutive effects of equity grants (e.g., Kahle, 2002; Dittmar, 2000; Cuny, Martin, and Puthenpurackal, 2009). To address the potential alternative explanation that vesting induces dilution, which then causes

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[7]McNally, Smith, and Barnes (2006) and Zhang (2005) have found evidence that repurchases affect stock prices.

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repurchases, I control for firm-wide dilution in all regression specifications. I further test this alternative hypothesis by limiting the sample to vesting months where only option grants vest and there are also no simultaneous exercising of options held by the CEO. A CEO in this sample experiences a change in their equity holdings, an increase in unexercised exercisable options, while the firm experiences no direct dilution caused by the CEO's compensation, i.e., shares outstanding did not increase. The vesting causes no immediate dilution while still increasing the incentive to maximize the current stock price. I continue to find a significant and positive relationship between equity sales and repurchases under this specification. Alternatively, it is not a necessary condition that vesting does not cause a dilution motivated repurchase. The fact that the manager increased repurchases due to an equity sale suggests personal benefit from the repurchase is an additional motive to repurchase.

In the next series of tests I test the robustness of the effect of vesting and equity sales on repurchasing. First, there exists a tradeoff between using internal funds to repurchase for personal gain and using those same funds for investments or precautionary cash reserves. Equity sales increase the CEO's personal incentive to maximize the current stock price. It is also true that CEO's typically hold a large equity stake in the firm and thus their personal wealth is directly linked to the *long-term* value of the firm. The manager must therefore balance the repurchase's effect on long-term value against its benefits to the current stock price. Do CEOs continue to repurchase shares around equity sales when the costs of repurchasing are higher? Repeating the 2SLS analysis using subsample splits based on cash holdings, cash flow, cash flow volatility, and investment opportunities to proxy for repurchasing costs, I find minimal evidence that CEO's adjust their behavior around vesting induced equity sales. The costs to repurchasing have no significant incremental impact and my main result holds.

Second, the potential price impact of the share repurchase varies by firm and through time, which may change the incentive of the CEO to repurchase for personal gain. I use illiquidity to proxy for potential price impact and find no evidence that the CEO is more likely to repurchase around equity sales when the firm's stock price is more liquid. Third, increased monitoring may reduce the incentives of the CEO to repurchase for personal gain; however, I find that increased monitoring through institutional ownership does not have a differential effect on the relationship between equity sales and share repurchases. I do find a significantly stronger effect if the CEO is also the chairman. Lastly, I examine CEO characteristics. I find no significant effect on the result based on age or tenure of the CEO. Overall the result continues to hold even among CEOs with increased monitoring or greater career concerns.

Lastly, I look at abnormal returns following the simultaneous sale of equity and share repurchase. If this behavior by the CEO is detrimental for the firm than I would expect to see worse returns in the future. On the other hand, the CEO may be increasing repurchases only to a point where it does not hurt the long-term value of the firm, while still benefiting personally. I find that firms repurchasing in the same month as vesting-induced equity sales have 78 bps lower abnormal returns in the following month than firms that also had a vesting-induced equity sale but did not repurchase. Looking at buy-and-hold abnormal returns over the quarter following

the equity sale I find no significant difference between firms that repurchased shares and those that did not. I also find no difference among repurchasing firms for those that had equity sales and those that did not. There is also no significant difference in abnormal returns when adjusting using DGTW portfolio returns. Overall, it does not seem that using share repurchases for the personal benefit of the CEO is detrimental to long-term firm value.

My results are consistent with the CEO repurchasing for personal benefit by making minor deviations from the optimal share repurchase. It appears as though the CEO is using repurchases to pump up the stock price around equity sales while refraining from significantly affecting the long-run value of the firm. I find CEO contracts have a real effect on repurchases and, that effect does not significantly impact shareholder welfare.

2.2   Literature Review and Contribution

My findings contribute to two strands of literature. First, there is broad literature on the motivation behind share repurchase programs. Specifically, this paper contributes to the literature that relates repurchases to insider trading, timing, price effects, and options. The second literature concerns CEO contracts, particularly the literature on real outcomes of compensation contracts on the firm. Below I review each strand of literature as it pertains to my results and discuss the paper's contribution to the literature.

My primary contribution is to the study of repurchase motivations. The literature has documented several motivations to repurchase stock, most of which appear to have the intent of increasing shareholder value. Survey evidence suggests managers prefer to repurchase if the stock is a good investment relative to its true value (Brav, Graham, Harvey, and Michaely, 2005) and managers are often quoted in repurchase announcements suggesting undervaluation as the reason behind the repurchase initiation (Bonaimé, 2012). Empirical evidence supports the claim that undervaluation is a primary driver of the repurchase decision (e.g., Vermaelen, 1981; Grullon and Michaely, 2004; Louis and White, 2007).

Managers have superior information about the firm's prospects, and theory suggests they can use repurchases to signal this information to the market (Ofer and Thakor, 1987; McNally, 1999). Studies on the market reaction of repurchases announcements as well as the long-run returns in the years following the announcement find positive and significant returns suggesting signaling as a motivation to repurchase (e.g., Vermaelen, 1981; Comment and Jarrell, 1991; Stephens and Weisbach, 1998; Jagannathan and Stephens, 2003; Chan, Ikenberry, and Lee, 2004; Ikenberry et al., 1995; Bargeron et al., 2017; Manconi, Peyer, and Vermaelen, 2014).

Signaling and undervaluation are not the only motivations to repurchase. Other important motivators are agency costs (Jensen, 1986), dilution (Kahle, 2002), capital structure (Bonaimé, Öztekin, and Warr, 2014), takeover defense (Billett and Xue, 2007), and financial flexibility (Bonaimé, Hankins, and Harford, 2014). These motivations are not mutually exclusive as several factors can influence the decision to repurchase.

My study differs in that I focus on the manager's personal incentives to benefit from the share repurchase program in the short-term by examining insider equity sales around repurchases. On the one hand, managers tend to hold significant positions in the firm and thus benefit from any value increasing activity. It follows then that managers would benefit personally from a value increasing repurchase program. On the other hand, the manager faces a motivation to support or boost the stock price when selling equity. Bonaimé and Ryngaert (2013) find that repurchases are most likely in quarters with net insider selling. Other studies that examine the relationship between insider trading patterns and share repurchases focus on the direction of insider trading and its ability to mitigate or validate the information signal of repurchases (Babenko, Tserlukevich, and Vedrashko, 2012; Bonaimé and Ryngaert, 2013) or the undervaluation of the stock (Chan, Ikenberry, Lee, and Wang, 2012). Using an improved sample of monthly repurchases and exploiting vesting schedules to control for the endogeneity of equity sales, I show a strong causal link between equity sales and repurchases. This result makes a significant contribution to the literature on share repurchase motivations. Though prior literature generally finds evidence that repurchases are done in "good faith" to improve shareholder value, I find evidence that repurchases can be motivated by managerial self-interest to personally benefit the CEO. This result is consistent with more recent studies suggesting more perverse motivations to repurchases (Cheng, Harford, and Zhang (2015) and Almeida, Fos, and Kronlund (2016)).

Recent studies have examined the timing of share repurchases. Bonaimé, Hankins, and Jordan (2016) find that on average the return on investment from share repurchase programs would be greater if the firm smoothed repurchases through time, suggesting insiders are suboptimal timers when it comes to executing share repurchases. On the other hand, Dittmar and Field (2015) show that frequent repurchasers are able to execute repurchases at below-average prices, suggesting a subset of firms are better able or willing to time repurchases. I add to the literature on timing ability by showing a scenario in which managers are less concerned about repurchasing at below average prices and more concerned about supporting or boosting the stock price. This implies that insiders aren't necessarily bad at timing share repurchases but rather face motivations that decrease their desire to time the market. Furthermore, I find evidence that managers strategically time share repurchases to coincide with equity sales in vesting months as the number of shares repurchased is increasing in the value of equity sold in a given month.

An important assumption is that share repurchases affect stock prices. McNally, Smith, and Barnes (2006) find prices fall less after repurchases than matched within-firm non-repurchase trades using data from the Toronto stock exchange. Zhang (2005) finds a 3-day abnormal return to actual daily repurchases of 0.43% using data from Hong Kong. A recent paper by Busch and Obernberger (2016) finds minimal evidence that managers use share repurchases to manipulate stock prices but rather use repurchases to ensure stock prices accurately reflect fundamental value. This paper is not directly testing if share repurchases manipulate stock prices but rather whether managers strategically use share repurchases when they face a greater incentive to manipulate stock prices. Given the findings of Busch and Obernberger (2016), it is

plausible that CEO's use repurchases around equity vesting to help increase prices and sell equity closer to its fundamental value, which would also imply that undervaluation can still be a motive when managers are repurchasing for their own personal benefit. Moreover, it is not necessary that repurchases have an impact on stock prices on average but rather that the manager believes the share repurchase will affect their stock price. My results are consistent with managers believing repurchases either support or boost the stock price as they tend to increase repurchases around equity sales.

This paper is also related to the study of options and share repurchases. There are several papers that link options to repurchases (e.g., Kahle, 2002; Dittmar, 2000; Cuny, Martin, and Puthenpurackal, 2009). This relationship could be explained by the dilutive effects of options or the lack of dividend protections inherent in an option grant. My paper is related to this literature in that I show the vesting schedule of executive options is positively related to repurchasing. A contemporaneous paper by Ferri and Li (2016) uses the expensing of options due to FAS 123R as an exogenous shock to option compensation and contrary to previous findings shows no causal relationship between options and repurchases. Though options granted may not have a causal effect on the aggregate level of repurchases, my results show a causal effect of the vesting schedule of options on repurchase timing.

Lastly, I add to a new strand of literature studying the real effects of CEO contracting. The board of directors may neutralize the agency conflict between shareholders and management by issuing equity grants. Equity grants generally have long-term vesting schedules to encourage management to focus on long-term firm value, thus aligning their incentives with long-term shareholders. However, equity grants may be associated with some unintended consequences. For example, equity grants can increase concerns over the current stock price which could lead to an increase in focus on current cash flows rather than long-run value. Edmans, Fang, and Lewellen (2016) show that CEO contracting can cause short-term real effects on the firm through a reduction in investment and Edmans, Goncalves-Pinto, Wang, and Xu (2016) find a shift in positive discretionary news releases towards vesting months. Both results suggest CEO contracts may cause myopic behavior and an increased concern over the current stock price. Ladika and Sautner (2016) show that the accelerated vesting of options due to the expensing of options under FAS 123R induces myopic behavior through a reduction in investment and an increase in both equity sales and departures. I add to this literature by showing that CEO contracts also have a real effect on the cash policy of the firm through share repurchases.

2.3   Sample Selection

Beginning in 2004, the SEC required firms to report monthly share repurchase activity under the newly created items 2(e) of Form 10-Q and 5(c) of Form 10-K. Firms report the total number of shares purchased, the average price paid per share, the number of shares purchased under a publicly announced program, and the maximum number of shares that may still be repurchased under the programs. I use the total number of shares repurchased under a publicly announced program as the measure of monthly

repurchases. This measure differs from the total number of shares purchased, which typically includes shares tendered by employees as payment of taxes withheld on the exercise of stock options and the vesting of restricted stock granted under the company's equity compensation plans.

To collect the sample of monthly repurchases, I begin with all non-missing, non-zero measures of quarterly shares repurchased as reported by Compustat. I download the 10-Qs and 10-Ks from 2004-2014 for this sample of firms and manually collect the table on repurchase activity as well as any accompanying footnotes. Not all firms report repurchases by calendar month of the quarter as some repurchases span two calendar months. I assume calendar month repurchases for these firms based on quarter-end date.

Data on equity grants is obtained from ISS Incentive Lab, which collects detailed information on executive compensation from annual proxy statements during the period 1998-2013. They examine the largest 750 firms per year and ensure a complete history for every company in the sample. The data is obtained from the Summary Compensation, Outstanding Equity Awards, Grants of Plan-based awards, Options Exercises and Stock Vested tables of the proxy statement and also from analysis of the accompanying text and footnotes. I focus on time based grants as performance based grants are tied to current firm outcomes such as earnings per share (EPS), which could also influence repurchases. Cheng, Harford, and Zhang (2015) find a significant relationship between executives with bonuses tied to EPS and repurchases. Moreover, Hribar, Jenkins, and Johnson (2006) and Almeida, Fos, and Kronlund (2016) find that firms are significantly more likely to repurchase if they would otherwise miss analyst forecasts for EPS. Time based grants present the most exogeneous identification strategy as they have no relation to the current performance of the firm.

Time based grants can follow either a ratable or cliff vesting schedule. I will refer to vesting as the award of stock grants or the transition of options from unexercisable to exercisable throughout the paper. Ratable awards vest monthly, quarterly, semi-annually, or yearly and are assumed to vest equally over the vesting period. Vesting usually begins 12-months after the grant date of the award and typically continues over a 3-5 year period at the specified frequency, with some grants extending as long as 7 years. Grants with a cliff vesting schedule are awards that do not vest until the end of the term, which is typically after 2 years but can also last up to 7 years at which point the entire award vests. For example, a ratable stock grant of 1,000 shares awarded today with a 4-year vesting period would vest 250 shares per year starting one-year from today, whereas a similar grant with a cliff vesting schedule would award all 1,000 shares at the end of 4 years. I exclude grants where the vesting schedule is unclear.

Insider sales data is from Thomson Reuters Insider data, which reports not only open market purchases and sales but also the exercise of in- or at- the money options. All data sets are separately constructed on a monthly basis. Due to the improvements in incentive contract reporting in 2006 and the use of end-of-year values to construct certain control variables, the final sample is from 2007-2013. I exclude firms with industrial classifications of financial or utility to be consistent with prior literature on payout policy, leaving a final sample of 40,641 firm-months and 749 distinct firms.

2.4 Variable Construction and Descriptive Statistics

I use the data on equity grants to create my variables of interest: vesting month and vesting value. Vesting month is an indicator variable equal to one in a given month if the CEO has stock grants or options that vest. To calculate the effective value of the vesting equity, I first calculate the number of shares vesting in a given month. Since we focus on time-based grants that are either ratable or cliff, it is straightforward to determine the number of vesting securities: Ratable grants vest equally over the vesting period based on the reported frequency, and cliff schedules vest entirely at the end of the term. To get a more accurate measure of the value of the securities vesting, I calculate the delta, which reflects the equivalent number of shares. I use the Black-Scholes formula to calculate the delta of an option. The exercise price and expiration date are given in the data, while the risk-free rate is the one-month Treasury bill rate. Additional inputs are the prior fiscal year dividend yield and the prior 12-month average stock return volatility calculated from CRSP. With the delta of the options calculated and the delta of a share being equal to one, I sum across the vesting stock and options to get an effective number of shares vesting for each CEO-month. Lastly, I multiply the total effective number of shares vesting by the prior month-end stock price. I refer to this measure as vesting value, which represents the dollar sensitivity of vesting grants to a 100% change in the stock price. From summary statistics reported in Table 2.1, the median month does not see any vesting while 21% of months in our sample experience vesting with an average effective value of $383,366 across the sample. When conditioning on months where vesting occurs, the average vesting value is $1,803,674.

I also control for vested equity, which is the current value of exercisable options plus the current value of shares held, and unvested equity, which is the sum of all unexercisable options and unvested equity. These measures account for the current wealth of the CEO that is trade-able (vested equity) and the current value of equity awarded that is not yet trade-able (unvested equity). The Outstanding Equity Awards table reports option and stock awards that are outstanding as of year-end, i.e., unexercised exercisable options, unexercised unexercisable options, and stock grants that have not yet vested. To construct my measure of vested equity I begin by calculating the delta of all unexercised exercisable options at year-end and take the summation to get the effective number of shares of vested options. Each month I use insider transaction data and data on vesting schedules to adjust for the exercise of options and the vesting of option grants to get a monthly effective number of shares exercisable. To calculate the value of vested stock, I use the Beneficial ownership table reported in proxy statements which reports the number of shares held by executives, board members, and those owning more than 5% of shares outstanding. I adjust the number of shares held to account for the fact that it contains all exercisable options in the next 60 days. Again, I use Insider data to account for acquiring and disposing of shares each month to get a monthly total of shares held. Vested value is then calculated monthly as the sum of vested options and vested stock multiplied by prior month-end stock price.

I calculate unvested equity in a similar fashion beginning with prior year-end

values from the proxy statement. I start with the sum of all unexercised unexercisable options and unvested stock from the Outstanding Options Awards table. I adjust these figures monthly by adding new options and stock grants and subtracting any option or stock grants that vest. I again calculate the delta of the options and stocks to get an effective number of shares and multiply the sum of unvested stock and unvested options by prior month-end stock price to get the monthly value of unvested equity. Unvested equity and vested equity are log transformed in the regression analysis by taking the log of one plus the variable to account for significant skewness. Table 2.1 reports that the average CEO in the sample has approximately $115 million in vested equity and $29.7 million in unvested equity. These values are larger than those found in Edmans, Goncalves-Pinto, Wang, and Xu (2016); however, this is expected as my dataset contains only the largest firms, whereas their sample consists of Russell 3000 firms.

I employ two measures of share repurchases. The first is binary, taking a value of one if the firm repurchased any shares under a publicly announced program in a given month and zero otherwise. The second variable is equal to the percent of shares outstanding repurchased under a publicly announced program in a given month. Firms in my sample repurchase in 27.8% of months and repurchase 0.17% of shares outstanding. Conditioning on repurchasing in a month the average repurchasing firm buys back 0.61% of shares outstanding.

The final variable of interest is a measure of CEO equity sales. Using the Thomson Reuters Insider Transaction data on Form 4 fillings, I create an indicator variable equal to one if in a given month the CEO sold any equity and zero otherwise. I also calculate the total value of shares sold as the number of shares sold multiplied by the prior month-end stock price. CEOs sell equity in 9.6% of months and sell $492,635 worth of shares on average in a month. If I condition on equity sales being greater than zero, the average value sold is $5,093,145. I also take the log of one plus equity sold to account for skewness.

I construct control variables for stock and firm characteristics that may influence repurchase behavior. Specifically, lagged stock returns may influence repurchase behavior. Firms may increase repurchasing following poor returns as they perceive the stock as undervalued. Liquidity could influence whether a firm repurchases. Hillert, Maug, and Obernberger (2016) show repurchases tend to increase liquidity therefore one could argue firms repurchase when shares are less liquid to improve liquidity. I use the natural log of market capitalization to control for firm size. I also control for ability and flexibility to repurchase using cash, cash flow, and standard deviation of cash flows. I control for leverage as Farre-Mensa, Michaely, and Schmalz (2016) show 30% of aggregate payouts are financed by debt. I expect firms with more cash, greater cash flows, more stable cash flows and lower leverage to be more likely to repurchase. I control for book-to-market as a proxy for growth opportunities. Theory suggests firms with lower book-to-market, more growth opportunities, should be less likely to repurchase (Jensen, 1986). Lastly, I control for firm-wide dilution by calculating the percent of shares outstanding that could be converted to stock and cause dilution. This measure is constructed using the difference in number of shares used to calculate shares outstanding for basic EPS and Diluted EPS, the latter includes

any instrument that can be converted to stock, i.e., options, warrants, convertible debt. If firms are concerned with dilution then greater levels of dilution should be associated with an increase in repurchases. The literature finds evidence of a positive relationship between dilution caused by option grants and repurchases (Kahle (2002) and Fenn and Liang (2001)) but a recent paper by Ferri and Li (2016) suggests the relation between option based pay and repurchases may not be causal suggesting the prior documented relation suffers from an endogeneity bias. Summary statistics on control variables are reported in Table 2.1 and fully defined in Appendix B.

2.5   Results

This section studies the relation between equity sales and share repurchases. I begin by showing the endogenous relation between CEO equity sales and repurchases. I next demonstrate that vesting is a valid instrument for equity sales. I then examine the relation between vesting and repurchases before showing the effect of instrumented equity sales on repurchases. Next, I examine the repurchase behavior in the months surrounding an equity sale. I then do a sub-sample analysis to rule out dilution as an alternative explanation. I perform robustness tests on the main result and conclude by looking at abnormal returns in the following months.

2.5.1   Main results

I run the following equation to establish the baseline relation between CEO equity sales and repurchases:

$$Repurchases_{m,i} = \alpha_1 + \beta Sales_{m,i} + \gamma Controls_{m-1,i} + FixedEffects + \epsilon_{m,i}, \quad (1)$$

Equity sales and repurchase are determined simultaneously by the CEO of the firm and likely suffer from endogeneity bias. If I am omitting a variable that is positively correlated with repurchases and negatively correlated with sales, or vice-versa, then my estimate of β will suffer from a downward bias. It is likely that any omitted variable that would increase the probability of a repurchase would also decrease the probability of a CEO equity sale since they are opposite trades.

Table 2.2 shows the results of this regression. I find a positive and significant relation between equity sales and repurchases when the dependent variable is a binary measure of repurchases. However, the coefficient on β is insignificant when I include a continuous measure of repurchases. As stated above, the β coefficient is biased downward by omitted variables. Therefore, I apply a plausible instrument for equity sales to test the relation between equity sales and repurchases.

Here I establish the relation between vesting and sales. Table 2.3 shows the results of the following regression:

$$Sales_{m,i} = \alpha_1 + \beta Vesting_{m,i} + \gamma Controls_{m-1,i} + FixedEffects + \epsilon_{m,i}, \quad (2)$$

where Sales is either a binary or continuous measure of CEO monthly equity sales. Vesting is the variable of interest in this specification and is either vesting month or vesting value as described in Section 2.4. Vesting and sales are defined for month m and firm i. The control variables are defined in Appendix 2.6 and discussed previously in Section 2.4. All control variables are lagged by one-month. I also control for any time invariant firm characteristics with firm fixed effects. I use year fixed effects for any macro level unobservables in a given year. Lastly, I include calendar month fixed effects to control for any seasonality in vesting or sales that may be due to a particular calendar month. Standard errors are clustered at the firm level to account for possible correlation across residuals. I expect $\beta > 0$, i.e., vesting to be positively associated with the likelihood and magnitude of equity sales.

Table 2.3 shows the results from these regressions. As expected, vesting equity is positively associated with equity sales. The results are positive and statistically significant for both samples of stock grants and option grants as well as the combined sample. The results show that CEOs are 2.8-5.6% more likely to sell equity in a month when stock or option grants vest, where the unconditional probability of an equity sale in a given month is 9.6%. Similarly, a 100% change in the value of equity vesting is associated with approximately 5% change in equity sales. We also see a positive correlation between equity sales and lagged returns, size, and vested equity, whereas the coefficient on book-to-market is negative. Overall, there is a strong statistically significant relationship between vesting equity and equity sales by the CEO, which suggests that managers sell equity shortly after experiencing vesting of equity grants. This relation provides personal incentive for the CEO to maximize the current stock price in vesting months.

I next show the relationship between vesting and repurchases. Table 2.4 shows the results of the following regression:

$$Repurchases_{m,i} = \alpha_1 + \beta Vesting_{m,i} + \gamma Controls_{m-1,i} + FixedEffects + \epsilon_{m,i}, \quad (3)$$

where repurchases is either a dummy variable or measured as repurchases as a percentage of shares outstanding. As in Table 2.3, all specifications contain year, month, and firm fixed effects. I also control for firm and stock characteristics that may influence repurchases. The results show that firms are 1.4-2.3% more likely to repurchase shares in months where grants vest; the unconditional probability of a repurchase in a given month is 27%. I also find that the value of shares vesting is significantly and positively associated with the percent of shares outstanding repurchased. A one standard deviation increase in vesting value is associated with a 0.01 percentage point increase in shares repurchased, which is equivalent to 8% of the mean percentage of shares repurchased. In unreported results, I regress vesting month on share repurchases and find that vesting months are associated with 0.03 percentage point increase in shares repurchased, which is 18% of the mean. Control variables have the expected sign; firms with lower returns, more cash, lower leverage, and more liquid stocks are more likely to repurchase shares.

The results indicate a positive relationship between repurchasing and vesting, consistent with managers attempting to maximize the current stock price through

repurchases. However, a more direct question is whether repurchases are higher in months where the CEO sells equity. Equity sales represent a realization of an increase in CEO personal wealth for which the value of the increase is directly related to the current stock price. An issue with examining equity sales is that the CEO sells equity based on similar factors that the firm repurchases shares. In other words, equity sales are endogenous. Vesting months serves as a plausible instrument. Similar to Edmans, Goncalves-Pinto, Wang, and Xu (2016), vesting is highly correlated with equity sales as shown in Table 2.3 and by construction an equity grant's vesting schedule is set up years in advance and should be unrelated to current unobservables that are correlated with equity sales and repurchases, thus satisfying the relevance criterion and the exclusion restriction for a valid instrument.

In Table 2.5, I instrument equity sales using vesting and find positive and statistically significant coefficients in all specifications. In months when CEOs are predicted to sell equity due to the vesting of equity grants they are more likely to repurchase shares and repurchase more shares, indicating a plausibly causal relation between equity sales and share repurchases. The economic significance is impactful. Vesting induced equity sales increase the likelihood of repurchasing in a month by 4.0-5.5%, an increase representing around 20% of the unconditional probability to repurchase. The number of shares repurchased is increasing in the value of equity sold, suggesting the CEO uses more firm resources as the personal benefit from repurchases increases. A 100% change in the value of equity sold results in an increase of share repurchases by 0.05% of shares outstanding, an increase equivalent to 30% of the average monthly share repurchase volume.

In order to repurchase shares the CEO requires an approved share repurchase program from the board of directors. The prior test assumes that the CEO can unilaterally approve a share repurchase program if needed. In Table 2.6, I restrict the sample to firms that announced a share repurchase program in the prior 36 months, thus allowing the CEO to operate independently from the board. As expected, the economic magnitude increases across all specifications. When the CEO is able to act more independently from the board of directors, the degree of managerial self interest increases.

I find strong evidence that CEOs are more likely to repurchase shares when they are also selling equity. This evidence is consistent with the hypothesis that the CEO uses a portion of share repurchases to personally benefit. I find further evidence of this relationship in that the number of shares repurchased is increasing in the value of equity sold. The larger the potential benefit, the more firm funds are devoted towards repurchasing shares. The results strengthen when I force the CEO to have an approved repurchase program available. Overall, I find strong evidence that equity sales and vesting schedules play a significant role in the timing and magnitude of repurchases.

2.5.2 Dynamic analysis

In this section I test if managers strategically shift repurchases from surrounding months to the vesting or equity sale month. In Table 2.7, I run the models from

Table 2.4 and Table 2.5 and replace vesting with lagged values of one to two months prior to the repurchasing month. In Panel B, I replace vesting with forward looking values of vesting up to two months after the repurchase month. I find no change in repurchase behavior following a vesting. Interestingly, I find a negative and statistically significant coefficient for vesting in month *m+1* on repurchases in month *m*. This result suggests firms are less likely to repurchase and repurchase fewer shares in the month before vesting and potentially shift those repurchases to the vesting month. This result holds if I use vesting as an instrument for equity sales. Overall, firms do not appear to shift repurchases from months following vesting; however, I find evidence that firms reduce repurchases in the month preceding vesting and equity sales.

2.5.3 Alternative hypothesis

This section addresses the potential concerns over the dilutive effect of options and its impact on repurchasing. I've shown that the firm repurchases more shares in months where the CEO sells equity due to vesting. My hypothesis is that this relation is due to a personal incentive to maximize the current stock price through the use of share repurchases in order to increase the return from equity sales. I conclude that personal managerial incentives motivate share repurchases. An alternative hypothesis is that the CEO is repurchasing to undo the dilution caused by the exercising of options or the vesting of stock grants. In Table 2.8, I address the concern that repurchases in vesting months are to offset dilution rather than for CEO personal gain. I look at a sub-sample of months when CEO options vest and the CEO does not exercise any existing or vesting options in the same month. I also condition on no exercising occurring in the prior month. This subsample causes no dilution to current shares outstanding by the CEO. I continue to find positive and significant coefficients across all specifications. These results provide further evidence that vesting induced repurchases are unlikely driven by the motivation to undo dilution but rather related to manager's personal incentive to maximize the current stock price. Taken together with the result that equity sales cause an increase in repurchases, it is likely that the CEO's personal incentives motivate a subset of share repurchases beyond the desire to offset the dilutive effect of options.

2.5.4 Robustness

In the next series of tests I examine if the effect of equity sales on repurchase behavior varies based on potential costs to repurchase, CEO career concerns, and governance. First, I look at potential costs to increasing repurchases. A common motive to repurchase is to distribute excess cash when the opportunity cost of that cash is low. A share repurchase program becomes costly as cash reserves are depleted or alternative uses of the cash are bountiful and profitable. Do CEOs continue to repurchase shares around equity sales when the costs to repurchasing are higher? In Table 2.9, I run the model from Table 2.5 on subsample splits. In the first four columns I proxy for repurchasing costs using cash holdings, market-to-book, cash flow, and cash flow

volatility. Repurchases are potentially less costly to the firm if cash holdings are high and the CEO of cash rich firms may be more likely to use repurchases for personal gain. I find a stronger effect of equity sales on repurchases likelihood for high cash periods however there is no significant difference in the effect when examining magnitude of share repurchases. An alternative cost to repurchasing is foregoing other more profitable uses of cash. I proxy for investment opportunities using market-to-book, the CEO of a firm with lower investment opportunities faces less of constraint to use cash to repurchase for personal gain as there are fewer alternative uses for cash. I find no significant difference in the coefficients on fitted equity sales.

Cash flow and cash flow volatility may be better indicators of funds available to repurchase. I do find evidence that firms with higher cash flow volatility have a greater effect of equity sales on repurchases. Again, this result does not hold when testng the magnitude of repurchases. The effect on repurchases is not significantly different across subsamples of cash flow. The CEO may increase repurchases at a greater intensity around equity sales when the potential price impact is greater. On the other hand, if the potential price impact of a share repurchase is low, a CEO may increase repurchases more in order to cause any price impact. I proxy for potential price impact using stock liquidity, the price of a more liquid stock may be less affected by an increase in share repurchases relative to a more illiquid stock. I find no evidence that the effect varies based on illiquidity of the firm's stock. A key takeaway is that the main result that fitted equity sales significantly increase the likelihood and magnitude of repurchases holds in all but two subsamples, suggesting that the result is robust across potential benefits and costs of repurchasing.

In a second set of subsample splits I look at proxies for governance and CEO career concerns. If the CEO increasing repurchases around equity sales is undesirable to shareholders, it may be less likely when monitoring of the CEO is greater. I proxy for monitoring with institutional ownership but find no significant difference in the effect of equity sales on repurchases across different levels of monitoring. Alternatively, it may be easier for the CEO to act independent of the board if the CEO is also the chairman. I find a significantly stronger effect when the CEO is also the chairman. This result suggests the CEO repurchases more shares around equity sales when monitoring by the board is lower.

In the last set of cross sectional tests I look at CEO characteristics. If using repurchases for personal gain is viewed negatively then I expect CEOs with greater career concerns are less likely to use repurchases in this manner. I use age of the CEO and tenure as CEO at the current firm as proxies for career concerns. I find no evidence that younger or less tenured CEOs use repurchases any differently around equity sales. Lastly, I split the sample based on how much of the CEO's wealth is tied to firm value. If repurchases around equity sales hurt firm value then I would expect the result to be weaker among CEOs with more wealth tied to firm value. I find no significantly different effect suggesting that these repurchases may not harm firm value. I continue to find a strong positive relation between equity sales and repurchases across all but two subsamples.

Overall, these results show that the positive effect of equity sales on repurchases is strong across all firms and does not seem to vary much based on costs and benefits

to repurchasing, monitoring or CEO career concerns. Taken together this set of tests is not clear on whether this behavior negatively impacts the firm. In the next series of test I address this question directly.

2.5.5 Do these repurchases destroy shareholder value?

In this section I examine the 1-month and 3-month abnormal returns following a month of simultaneous repurchasing and CEO equity sales. Table 2.10 shows buy-and-hold abnormal returns for different subsets of firm-months. Monthly and quarterly returns are adjusted using either the Fama-French 25 size and book-to-market portfolios or the Daniel, Grinblatt, Titman, and Wermers (1997) (referred to as DGTW) 125 size, book-to-market, and momentum portfolios.[8] Within the sample of repurchasing months, I find positive and significant abnormal returns across all subgroups that did not simultaneously sell equity(with our without simultaneous vesting), the returns range from 20 to 54 bps (72 to 143 bps quarterly). However, in the month or quarter following a simultaneous share repurchase and an equity sale I find no significant abnormal returns except for quarterly DGTW adjusted returns. Interestingly, when vesting and equity sales occur but the firm does not engage in a share repurchase, I find positive and significant abnormal returns, 76-87 bps monthly. Next, I look at differences in abnormal returns to test if repurchasing around equity sales is harmful to firm value. I run several different comparisons based equity sales, vesting, and repurchases. Though abnormal returns are consistently lower when the CEO simultaneously repurchases and sells equity, the differences only reach marginal significance when comparing abnormal returns following simultaneous repurchasing and equity sales to abnormal returns following an equity sale with no repurchase. The result increases in magnitude if I force equity sales to occur with vesting. Moreover, the difference is not significant for quarterly abnormal returns.

The evidence suggests that the CEO is not destroying shareholder wealth. I do not find a significant difference in abnormal returns and the effect is similar across subsamples. Overall, this suggests that in the region around the optimal repurchase amount, small deviations in repurchases do not have a significant effect on firm value and CEOs are able to benefit without affecting shareholder wealth.

2.6 Conclusion

This paper exploits vesting schedules of equity grants to show a causal relationship between CEO private equity sales and share repurchases. An increase in the personal managerial incentive to maximize the current stock price, measured as vesting induced equity sales, increases the likelihood and magnitude of share repurchases. This finding indicates a personal managerial motivation to repurchase shares. Though equity grants with vesting schedules are intended to focus the interest of managers on long-term firm value, I find evidence consistent with a short-term outcome of CEO

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[8]Returns and breakpoints are obtained from Ken French's and Russ Wermer's websites respectively. Book-to-market is industry adjusted for DGTW portfolios as per Wermers (2004).

contracts in that managers use repurchases to personally benefit. However, I find little evidence that firm value is destroyed.

I contribute to the literature on repurchase motivations and timing by drawing a causal link between CEO equity sales and repurchases. A previously undocumented motivation to repurchase shares is for the personal benefit of the CEO. I also contribute to the growing literature on real outcome of CEO contracts by showing that vesting schedules of equity grants have a real effect on share repurchases.

Table 2.1: Summary Statistics

This table presents summary statistics on the main variables used in this study. The sample period is from 2007 and 2013. Monthly repurchase data is hand collected from 10-Qs and 10-Ks. The grant level data on vesting equity is from ISS Incentive Lab which is collected from firm Proxy statements. Insider sales are taken from Thomson Reuters Insider Trading filings, which pulls from SEC Form 4. Firm and stock characteristics are taken from Compustat and CRSP respectively. All variable are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Our sample consists of 41,692 firm-year observations and 763 distinct firms over the sample period.

	5th Percentile	Mean	Median	95th Percentile	Standard Deviation	Skewness	Kurtosis
Repurchases:							
Repurchase Dummy	0	0.278	0	1.000	0.448	0.989	1.979
Repurchases	0	0.167	0	1.034	0.420	3.369	15.055
CEO Incentives (Binary):							
Vest Month Dummy	0	0.211	0	1	0.408	1.414	3.000
Vest Month Dummy Stock	0	0.089	0	1	0.284	2.896	9.390
Vest Month Dummy Option	0	0.148	0	1	0.355	1.983	4.934
Sales Dummy	0	0.096	0	1	0.294	2.747	8.545
CEO Incentives ($Millions):							
Vesting Value	0	0.383	0.000	1.820	2.135	15	399
Vesting Value Stock	0	0.124	0.000	0.451	1.116	44	3186
Vesting Value Option	0	0.260	0.000	0.905	1.711	15	363
Sales	0	0.493	0.000	1.894	4.274	60	6855
Controls:							
Unvested ($Millions)	0.4	29.7	13.4	101.0	73.7	16	453
Vested ($Millions)	2.7	115.0	33.9	335.0	517.0	17	378
Return	-0.176	0.011	0.012	0.193	0.111	0.081	4.315
Log(Illiquidity)	-24.36	-21.90	-21.97	-19.12	1.59	0.559	3.975
Market Capitilization	6	8	8	11	1	0.17	3.32
Cash	0.008	0.144	0.096	0.449	0.144	2	6
Cash Flow	0.002	0.037	0.036	0.082	0.027	-0.128	7.190
Cash Flow Volatility	0.003	0.013	0.008	0.037	0.014	3.385	17.602
Leverage	0.000	0.256	0.233	0.609	0.191	1.033	4.619
Book-to-Market	0.017	0.434	0.388	1.072	0.376	-0.168	7.455
Dilution	0.000	0.020	0.011	0.071	0.033	3.996	20.999

Table 2.2: Repurchases and Equity Sales

This table models the decision to repurchase. I report results from linear probability regressions in Columns (1)-(2) where the dependent variable takes a value of one if the repurchased in that given month and zero otherwise. In Columns (3)-(4), I report results from an OLS regression where the dependent variable is the number of shares repurchased scaled by shares outstanding. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Quarterly variables are held constant across the three months of the quarter. Firm, year, and calendar month fixed effects are included in all specifications. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Dependent variable:	Repurchase Dummy		Repurchases$_m$	
	(1)	(2)	(3)	(4)
Sales Dummy$_m$	0.020***	0.030***		
	(2.674)	(3.550)		
Ln(1 + Sales)$_m$			-0.000	0.001
			(-0.301)	(1.144)
Unvested$_{m-1}$		0.003		0.000
		(1.450)		(0.015)
Vested$_{m-1}$		0.010*		0.006
		(1.711)		(1.016)
Return $_{m-1}$		-0.090***		-0.203***
		(-5.446)		(-10.066)
Log(Illiquidity)$_{m-1}$		0.132**		0.112*
		(2.017)		(1.896)
Log(Market Capitilization)$_{q-1}$		0.455**		0.292
		(2.427)		(1.581)
Cash$_{q-1}$		-1.003**		-0.660
		(-1.967)		(-1.434)
Cash Flow$_{q-1}$		-0.278***		-0.278***
		(-4.450)		(-5.046)
Cash Flow Volatility$_{q-1}$		-0.036**		-0.012
		(-2.468)		(-0.764)
Leverage$_{q-1}$		0.000		-0.049***
		(0.026)		(-3.582)
Book-to-Market$_{q-1}$		-0.022***		-0.050***
		(-2.944)		(-6.555)
Dilution$_{q-1}$		-0.325***		-0.079
		(-2.587)		(-0.709)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes
Observations	69,846	41,692	69,846	41,692
R-squared	0.032	0.052	0.023	0.036

Table 2.3: Does Vesting Predict Equity Sales?

This table models the decision to sell equity. I report results from linear probability regressions in Columns (1)-(4) where the dependent variable takes a value of one if the CEO sold equity in that given month and zero otherwise. In Columns (5)-(8) I report results from an OLS regression where the dependent variable is the natural log of the value of equity sold in a given month. Columns (2) and (6) shows the results for only vesting stock, Columns (3) and (7) shows option vesting only and Columns (1), (4), (5), and (6) is for all vesting, stock and options. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Quarterly variables are held constant across the three months of the quarter. Firm, year, and calendar month fixed effects are included in all specifications. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Dependent variable:	Sales Dummy				Ln(1 + Sales)			
Vesting instrument:	Stock & Options	Stock	Options	Stock & Options	Stock & Options	Stock	Options	Stock & Options
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Vest month dummy$_m$	0.028***	0.056***	0.032***	0.038***				
	(5.297)	(6.988)	(4.552)	(6.424)				
Vesting value$_m$					0.046***	0.056***	0.042***	0.046***
					(8.185)	(6.837)	(5.312)	(7.367)
Unvested$_{m-1}$		0.001	0.001	0.001		0.011	0.009	0.009
		(0.806)	(0.799)	(0.740)		(0.798)	(0.698)	(0.691)
Vested$_{m-1}$		0.013***	0.013***	0.013***		0.205***	0.196***	0.203***
		(4.117)	(3.937)	(4.036)		(4.370)	(4.187)	(4.298)
Return $_{m-1}$		0.163***	0.163***	0.164***		2.478***	2.440***	2.447***
		(12.334)	(12.292)	(12.340)		(12.893)	(12.677)	(12.751)
Log(Illiquidity)$_{m-1}$		0.002	0.002	0.002		0.045	0.057	0.054
		(0.491)	(0.529)	(0.488)		(0.739)	(0.934)	(0.894)
Log(Market Capitilization)$_{q-1}$		0.046***	0.047***	0.047***		0.705***	0.706***	0.704***
		(4.946)	(5.009)	(4.968)		(5.375)	(5.385)	(5.356)
Cash$_{q-1}$		0.091*	0.095*	0.094*		1.184*	1.212*	1.177*
		(1.717)	(1.782)	(1.757)		(1.677)	(1.709)	(1.665)
Cash Flow$_{q-1}$		0.261**	0.249*	0.252*		3.857**	3.721**	3.750**
		(1.997)	(1.897)	(1.921)		(2.060)	(1.992)	(2.011)
Cash Flow Volatility$_{q-1}$		-0.153	-0.170	-0.162		-1.179	-1.162	-1.086
		(-0.516)	(-0.566)	(-0.538)		(-0.283)	(-0.279)	(-0.261)
Leverage$_{q-1}$		-0.005	-0.003	-0.003		-0.059	-0.007	-0.025
		(-0.154)	(-0.097)	(-0.100)		(-0.122)	(-0.014)	(-0.051)
Book-to-Market$_{q-1}$		-0.024***	-0.023***	-0.023***		-0.335***	-0.323***	-0.329***
		(-2.805)	(-2.713)	(-2.700)		(-2.837)	(-2.724)	(-2.785)
Dilution$_{q-1}$		0.008	0.010	0.006		0.556	0.526	0.517
		(0.089)	(0.108)	(0.070)		(0.430)	(0.404)	(0.397)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	69,846	41,692	41,692	41,692	69,846	41,692	41,692	41,692
R-squared	0.010	0.025	0.023	0.024	0.011	0.025	0.024	0.025

Table 2.4: Does Vesting Predict Repurchases?

This table models the decision to repurchase shares. I report results from linear probability regressions in Columns (1)-(4) where the dependent variable takes a value of one if the firm repurchased shares in that given month and zero otherwise. In Columns (5)-(8) I report results from an OLS regression where the dependent variable is the number of shares repurchased scaled by shares outstanding. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Quarterly variables are held constant across the three months of the quarter. Firm, year, and calendar month fixed effects are included in all specifications. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Dependent variable:	Repurchase Dummy				$Repurchases_m$			
Vesting instrument:	Stock & Options	Stock	Options	Stock & Options	Stock & Options	Stock	Options	Stock & Options
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Vest month dummy$_m$	0.016***	0.023***	0.014**	0.018***				
	(3.033)	(3.419)	(2.009)	(2.932)				
Vesting value$_m$					0.002***	0.002***	0.002***	0.002***
					(3.807)	(3.048)	(3.366)	(4.011)
Unvested$_{m-1}$		0.003	0.003	0.003		0.000	0.000	0.000
		(1.467)	(1.466)	(1.455)		(0.030)	(0.001)	(0.002)
Vested$_{m-1}$		0.011*	0.011*	0.011*		0.007	0.006	0.007
		(1.817)	(1.787)	(1.815)		(1.083)	(1.039)	(1.087)
Return$_{m-1}$		-0.086***	-0.086***	-0.086***		-0.201***	-0.204***	-0.203***
		(-5.151)	(-5.149)	(-5.137)		(-10.005)	(-10.097)	(-10.063)
Log(Illiquidity)$_{m-1}$		-0.022***	-0.022***	-0.022***		-0.050***	-0.049***	-0.049***
		(-2.944)	(-2.936)	(-2.946)		(-6.554)	(-6.481)	(-6.508)
Log(Market Capitilization)$_{q-1}$		0.002	0.002	0.002		-0.049***	-0.049***	-0.049***
		(0.103)	(0.121)	(0.113)		(-3.562)	(-3.576)	(-3.576)
Cash$_{q-1}$		0.132**	0.134**	0.133**		0.111*	0.111*	0.110*
		(2.034)	(2.052)	(2.042)		(1.878)	(1.870)	(1.852)
Cash Flow$_{q-1}$		0.465**	0.460**	0.461**		0.297	0.292	0.293
		(2.486)	(2.456)	(2.464)		(1.610)	(1.577)	(1.586)
Cash Flow Volatility$_{q-1}$		-1.009**	-1.016**	-1.013**		-0.661	-0.660	-0.656
		(-1.974)	(-1.989)	(-1.983)		(-1.434)	(-1.431)	(-1.422)
Leverage$_{q-1}$		-0.279***	-0.278***	-0.278***		-0.278***	-0.276***	-0.277***
		(-4.468)	(-4.442)	(-4.444)		(-5.056)	(-4.972)	(-5.000)
Book-to-Market$_{q-1}$		-0.037**	-0.037**	-0.037**		-0.013	-0.012	-0.012
		(-2.537)	(-2.521)	(-2.520)		(-0.795)	(-0.766)	(-0.785)
Dilution$_{q-1}$		-0.326***	-0.325***	-0.327***		-0.080	-0.082	-0.082
		(-2.592)	(-2.588)	(-2.601)		(-0.712)	(-0.730)	(-0.730)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	69,846	41,692	41,692	41,692	69,846	41,692	41,692	41,692
R-squared	0.032	0.052	0.052	0.052	0.023	0.036	0.036	0.036

Table 2.5: Equity Sales and Share Repurchases: Instrumental Variable Analysis

This table models the decision to repurchase shares. I report results from two-stage least squared regression where the dependent variable takes a value of one if the firm repurchased shares in that given month and zero otherwise in Columns (1)-(4) and the number of shares repurchased scaled by shares outstanding in Columns (5)-(8). Fitted equity sold dummy is from a first stage of Sales Dummy on Vesting month (instrument) dummy and controls. Fitted equity is the fitted value from a first stage regression of Ln(1 + Sales) on Vesting value (instrument) and controls. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Quarterly variables are held constant across the three months of the quarter. Firm, year, and calendar month fixed effects are included in all specifications. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Dependent variable:	Repurchase Dummy				Repurchases_m			
Vesting instrument:	Stock & Options (1)	Stock (2)	Options (3)	Stock & Options (4)	Stock & Options (5)	Stock (6)	Options (7)	Stock & Options (8)
Fitted Equity Sold Dummy$_m$	0.553***	0.401***	0.456*	0.470***				
	(2.664)	(3.060)	(1.818)	(2.625)				
Fitted Equity$_m$					0.034***	0.031***	0.054***	0.045***
					(3.354)	(2.834)	(2.769)	(3.434)
Unvested$_{m-1}$		0.003	0.003	0.003		-0.000	-0.001	-0.000
		(1.343)	(1.326)	(1.321)		(-0.141)	(-0.248)	(-0.208)
Vested$_{m-1}$		0.006	0.005	0.005		0.000	-0.004	-0.003
		(0.907)	(0.739)	(0.731)		(0.032)	(-0.566)	(-0.369)
Return$_{m-1}$		-0.151***	-0.160***	-0.162***		-0.278***	-0.336***	-0.313***
		(-5.474)	(-3.640)	(-4.729)		(-7.794)	(-6.255)	(-7.851)
Log(Illiquidity)$_{m-1}$		-0.023***	-0.023***	-0.023***		-0.051***	-0.052***	-0.052***
		(-3.023)	(-3.010)	(-3.019)		(-6.540)	(-6.319)	(-6.440)
Log(Market Capitilization)$_{q-1}$		-0.017	-0.019	-0.020		-0.070***	-0.087***	-0.080***
		(-1.008)	(-0.958)	(-1.106)		(-4.234)	(-3.944)	(-4.376)
Cash$_{q-1}$		0.096	0.090	0.089		0.074	0.045	0.057
		(1.353)	(1.195)	(1.215)		(1.141)	(0.598)	(0.811)
Cash Flow$_{q-1}$		0.360*	0.346*	0.343		0.178	0.090	0.124
		(1.790)	(1.650)	(1.644)		(0.875)	(0.402)	(0.588)
Cash Flow Volatility$_{q-1}$		-0.947*	-0.939*	-0.937*		-0.624	-0.597	-0.607
		(-1.835)	(-1.794)	(-1.790)		(-1.326)	(-1.188)	(-1.246)
Leverage$_{q-1}$		-0.277***	-0.276***	-0.276***		-0.276***	-0.275***	-0.276***
		(-4.218)	(-4.175)	(-4.163)		(-4.689)	(-4.300)	(-4.459)
Book-to-Market$_{q-1}$		-0.028*	-0.027	-0.026*		-0.002	0.005	0.002
		(-1.809)	(-1.642)	(-1.682)		(-0.131)	(0.299)	(0.142)
Dilution$_{q-1}$		-0.329**	-0.330**	-0.330**		-0.097	-0.110	-0.105
		(-2.515)	(-2.493)	(-2.487)		(-0.777)	(-0.778)	(-0.782)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	69,830	41,692	41,692	41,692	69,830	41,692	41,692	41,692
R-squared	0.012	0.035	0.029	0.028	0.003	0.010	0.004	0.005

Table 2.6: Equity Sales and Share Repurchases: Instrumental Variable Analysis

This table models the decision to repurchase shares. I report results from two-stage least squared regression where the dependent variable takes a value of one if the firm repurchased shares in that given month and zero otherwise in Columns (1)-(4) and the number of shares repurchased scaled by shares outstanding in Columns (5)-(8). Fitted equity sold dummy is from a first stage of Sales Dummy on Vesting month (instrument) dummy and controls. Fitted equity is the fitted value from a first stage regression of Ln(1 + Sales) on Vesting value (instrument) and controls. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Quarterly variables are held constant across the three months of the quarter. Firm, year, and calendar month fixed effects are included in all specifications. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Dependent variable:	Repurchase Dummy				$Repurchases_m$			
Vesting instrument:	Stock & Options	Stock	Options	Stock & Options	Stock & Options	Stock	Options	Stock & Options
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fitted Equity Sold Dummy$_m$	0.914**	0.662**	0.603	0.740**				
	(2.245)	(2.550)	(1.343)	(2.237)				
Fitted Equity$_m$					0.054***	0.054**	0.087***	0.077***
					(2.830)	(2.522)	(2.606)	(3.118)
Unvested$_{m-1}$		0.002	0.002	0.002		-0.002	-0.003	-0.002
		(0.680)	(0.707)	(0.646)		(-0.768)	(-0.907)	(-0.877)
Vested$_{m-1}$		0.008	0.009	0.007		-0.003	-0.010	-0.007
		(0.833)	(0.833)	(0.686)		(-0.237)	(-0.746)	(-0.641)
Return$_{m-1}$		-0.245***	-0.235***	-0.260***		-0.447***	-0.540***	-0.512***
		(-4.488)	(-2.746)	(-3.867)		(-6.430)	(-5.407)	(-6.597)
Log(Illiquidity)$_{m-1}$		-0.030***	-0.030***	-0.030***		-0.067***	-0.067***	-0.067***
		(-2.774)	(-2.803)	(-2.723)		(-6.074)	(-5.439)	(-5.642)
Log(Market Capitilization)$_{q-1}$		-0.009	-0.006	-0.013		-0.078***	-0.103***	-0.095***
		(-0.315)	(-0.178)	(-0.413)		(-2.667)	(-2.683)	(-2.890)
Cash$_{q-1}$		0.093	0.101	0.081		0.071	0.009	0.028
		(0.765)	(0.756)	(0.629)		(0.618)	(0.064)	(0.218)
Cash Flow$_{q-1}$		0.279	0.293	0.260		0.001	-0.112	-0.078
		(0.864)	(0.880)	(0.770)		(0.002)	(-0.302)	(-0.219)
Cash Flow Volatility$_{q-1}$		-1.807*	-1.798*	-1.819*		-1.248	-1.369	-1.332
		(-1.828)	(-1.841)	(-1.829)		(-1.329)	(-1.332)	(-1.339)
Leverage$_{q-1}$		-0.347***	-0.348***	-0.346***		-0.386***	-0.380***	-0.382***
		(-3.075)	(-3.106)	(-3.027)		(-3.751)	(-3.298)	(-3.438)
Book-to-Market$_{q-1}$		-0.020	-0.022	-0.019		0.032	0.043	0.040
		(-0.619)	(-0.652)	(-0.559)		(0.860)	(1.055)	(1.010)
Dilution$_{q-1}$		-0.492**	-0.489**	-0.496**		-0.175	-0.219	-0.205
		(-2.066)	(-2.087)	(-2.045)		(-0.732)	(-0.757)	(-0.755)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	44,264	29,099	29,099	29,099	44,264	29,099	29,099	29,099
R-squared	0.007	0.038	0.044	0.032	0.005	0.011	0.004	0.005

Table 2.7: Dynamic Analysis

This table models the decision to repurchase shares using lagged equity vesting and equity sales. I report results from linear probability regressions where dependent variable, repurchase dummy, takes a value of one if the firm repurchased shares in that given month and zero otherwise. I also report results from panel regressions where the dependent variable, repurchases, is the number of shares repurchased scaled by shares outstanding. Fitted values are from a first stage regression where the instrument is vesting month and vesting value, respectively. Panel A looks at one to three month lags of vesting variables and Panel B looks at one to three months ex-post. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Quarterly variables are held constant across the three months of the quarter. Firm, year, and calendar month fixed effects are included in all specifications. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Panel A: Lagged Equity Vesting and Share repurchases							
Vesting Month:	*m-1*	*m-1*	*m-1*	*m-1*	*m-2*	*m-2*	*m-2*	*m-2*
Dependent variable:	Rep. Dummy$_m$	Rep. Dummy$_m$	Repurchases$_m$	Repurchases$_m$	Rep. Dummy$_m$	Rep. Dummy$_m$	Repurchases$_m$	Repurchases$_m$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Vest month dummy	0.008				-0.007			
	(1.405)				(-1.221)			
Fitted Equity Sold Dummy		0.227				-0.196		
		(1.337)				(-1.215)		
Vesting value			0.000				-0.000	
			(0.409)				(-0.708)	
Fitted Equity				0.004				-0.007
				(0.406)				(-0.707)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, Month, and Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	41,311	41,311	41,311	41,311	40,915	40,911	40,915	40,911
R-squared	0.052	0.029	0.036	0.035	0.052	0.027	0.037	0.033

Table 2.7: Dynamic Analysis, continued

Panel B: Forward Looking Equity Vesting and Share Repurchases

Vesting Month:	$m+1$	$m+1$	$m+1$	$m+1$	$m+2$	$m+2$	$m+2$	$m+2$
Dependent variable:	Rep. Dummy$_m$	Rep. Dummy$_m$	Repurchases$_m$	Repurchases$_m$	Rep. Dummy$_m$	Rep. Dummy$_m$	Repurchases$_m$	Repurchases$_m$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Vest month dummy	-0.013**				-0.004			
	(-2.216)				(-0.669)			
Fitted Equity Sold Dummy		-0.339**				-0.100		
		(-2.123)				(-0.667)		
Vesting value			-0.001*				0.000	
			(-1.719)				(0.965)	
Fitted Equity				-0.017*				0.010
				(-1.678)				(0.960)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, Month, and Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,100	41,100	41,100	41,100	40,504	40,502	40,504	40,502
R-squared	0.051	0.057	0.036	0.011	0.051	0.044	0.036	0.027

Table 2.8: Equity Vesting: Restricted sample

This table reports OLS regression and a 2SLS regression similar to Table 2.4 and 2.5. I restrict the sample of vesting months to option grant vesting where no options are simultaneously exercised. In Columns 5-8 I further restrict the sample to months where there was also no exercising of options in the prior month. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Quarterly variables are held constant across the three months of the quarter. Firm, year, and calender month fixed effects are included in all specifications. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Dependent variable:	Rep. Dummy$_m$ (1)	Repurchases$_m$ (2)	Rep. Dummy$_m$ (3)	Repurchases$_m$ (4)	Rep. Dummy$_m$ (5)	Repurchases$_m$ (6)	Rep. Dummy$_m$ (7)	Repurchases$_m$ (8)
Vest month dummy$_m$	0.014*				0.018**			
	(1.819)				(2.306)			
Vesting value$_m$		0.002***				0.002***		
		(3.157)				(3.356)		
Fitted Equity Sold Dummy$_m$			0.519*				0.689**	
			(1.733)				(2.150)	
Fitted Equity$_m$				0.073***				0.083***
				(2.720)				(2.906)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, Month, and Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,386	38,386	38,386	38,386	36,220	36,220	36,220	36,220
R-squared	0.053	0.037	0.048	0.006	0.053	0.038	0.037	0.005

Table 2.9: Robustness: Split Sample

This table reports results from 2SLS regressions where the dependent variable , repurchase dummy, takes a value of one if the firm repurchased shares in that given month and zero otherwise. I also report results where the dependent variable, repurchases, is the number of shares repurchased scaled by shares outstanding. Fitted values are from a first stage regression where the instrument is vesting month and vesting value, respectively. Subsample splits based on the sample median. All variables are defined in Appendix B continuous variables are winsorized at the 1st and 99th percentiles. Control variables from Table 2.5 are included in all specifications and quarterly variables are held constant across the three months of the quarter. Firm, year, and calendar month fixed effects are included in all specifications. I report the p-values of a chi-squared test comparing the coefficient of fitted equity across subsamples. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Dependent variable:	Firm				Governance and CEO			
	Rep. Dummy$_m$		Repurchases$_m$		Rep. Dummy$_m$		Repurchases$_m$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cash				Institutional Ownership			
	Low	High	Low	High	Low	High	Low	High
Fitted Equity Sold Dummy	0.211	0.846**			0.368**	0.573*		
	(1.301)	(2.241)			(2.079)	(1.678)		
Fitted Equity			0.025*	0.059***			0.043***	0.049**
			(1.758)	(2.714)			(2.757)	(2.336)
p-value of the χ^2 test	0.051*		0.122		0.535		0.880	
Observations	20,846	20,844	20,846	20,844	19,210	19,213	19,210	19,213
	Market-to-Book				Age			
	Low	High	Low	High	Low	High	Low	High
Fitted Equity Sold Dummy	0.629***	0.355			0.631**	0.316		
	(2.649)	(1.511)			(2.252)	(1.421)		
Fitted Equity			0.054***	0.041**			0.049**	0.045**
			(3.136)	(2.129)			(2.543)	(2.375)
p-value of the χ^2 test	0.344		0.541		0.328		0.869	
Observations	20,846	20,842	20,846	20,842	20,164	17,290	20,164	17,290
	Cash Flow				Tenure			
	Low	High	Low	High	Low	High	Low	High
Fitted Equity Sold Dummy	0.456**	0.469**			0.501**	0.550*		
	(1.987)	(2.161)			(2.151)	(1.676)		
Fitted Equity			0.037**	0.053***			0.039**	0.067***
			(2.164)	(2.858)			(2.432)	(2.612)
p-value of the χ^2 test	0.959		0.458		0.886		0.229	
Observations	20,848	20,844	20,848	20,844	18,330	17,907	18,330	17,907
	Cash Flow Volatility				Chairman			
	Low	High	Low	High	Low	High	Low	High
Fitted Equity Sold Dummy	0.161	0.985**			0.499**	0.338		
	(0.887)	(2.276)			(2.068)	(1.396)		
			0.031**	0.055**			0.028*	0.067***
			(2.111)	(2.494)			(1.951)	(2.791)
p-value of the χ^2 test	0.019**		0.281		0.599		0.089*	
Observations	20,845	20,846	20,845	20,846	21,168	20,522	21,168	20,522
	Illiquidity				Wealth Performance Sensitivity			
	Low	High	Low	High	Low	High	Low	High
Fitted Equity Sold Dummy	0.427**	0.469*			0.459*	0.395*		
	(2.214)	(1.672)			(1.789)	(1.738)		
Fitted Equity			0.060***	0.028*			0.033*	0.065***
			(3.244)	(1.717)			(1.831)	(3.167)
p-value of the χ^2 test	0.887		0.111		0.829		0.158	
Observations	20,813	20,825	20,813	20,825	18,893	18,874	18,893	18,874
Controls (all panels)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, calendar month, and firm FE (all panels)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.10: Abnormal Return Analysis

In this table, I report abnormal returns for the period *m+1* and Quarter + 1 (*m+1* to *m+3*), for firms that either repurchased shares, had CEO equity sales, and CEO experienced equity vesting of grants, or for firms that did not experience these events. Monthly returns are adjusted using the matched Fama-French 25 size and book-to-market portfolios or DGTW portfolio returns. Quarterly abnormal returns are calculated as follows:

$$AbRet_{i,t} = \prod_{t=1}^{3}(1 + r_{i,t}) - \prod_{t=1}^{3}(1 + r_{p,t})$$

where $r_{i,t}$ is the return on stock i in month t and $r_{p,t}$ is the return on either the matched Fama-French 25 size and book-to-market portfolio or DGTW portfolio returns. All returns are calculated using equal weights. t-statistics are reported in parentheses. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Repurchases=1		Vest=1; Sale=0	Vest=1; Sale=1	Repurchases=0 Sale=1	Vest=1; Sale=1	(2)-(1)	(4)-(3)	(2)-(5)	(4)-(6)
	Sale =0	Sale =1	Sale=0	Sale=1	Sale=1	Sale=1				
	(1)	(2)	(3)	(4)	(5)	(6)				
Monthly Size and Book-to-Market Adjusted	0.199***	0.008	0.457***	-0.015	0.427***	0.762***	-0.191	-0.472	-0.419*	-0.778*
	(3.263)	(0.052)	(3.148)	(-0.051)	(3.17)	(3.202)	(-1.060)	(-1.397)	(-1.792)	(-1.852)
Monthly DGTW adjusted	0.274***	0.177	0.546***	0.223	0.485***	0.869***	-0.097	-0.323	-0.307	-0.646
	(4.530)	(1.106)	(3.752)	(0.734)	(3.634)	(3.589)	(-0.544)	(-0.955)	(-1.336)	(-1.525)
Quarterly Size and Book-to-Market Adjusted	0.716***	0.403	1.281***	0.880	0.940***	1.272***	-0.313	-0.401	-0.537	-0.392
	(6.512)	(1.309)	(4.827)	(1.444)	(3.638)	(2.748)	(-0.956)	(-0.636)	(-1.197)	(-0.476)
Quarterly DGTW adjusted	0.948***	0.831***	1.435***	1.441**	1.134***	1.697***	-0.117	0.006	-0.303	-0.255
	(8.649)	(2.699)	(5.347)	(2.364)	(4.454)	(3.643)	(-0.360)	(0.010)	(-0.688)	(-0.310)

Appendix A: Variable Definitions for Chapter 1

This appendix defines variables used in our empirical analysis. All continuous variables are winsorized at the 1st and 99th percentile.

Variable name	Description	Hypothesis
8-K reporting frequency	The total number of 8-Ks filed by the company in the 6 month period following the repurchase announcement.	Blackout window
Blackout window	The minimum number of days over the past 12 quarters during which the firm was likely to observe a blackout window, calculated as the sum of the days elapsed between each quarter end and the release of earnings for that quarter.	Blackout window
Book-to-market	Total common equity over market capitalization.	Abandonment option
Cash	Cash and short-term securities scaled by assets.	Abandonment option
Cash flow	Operating income before depreciation scaled by assets.	Abandonment option
Dilution	The difference in the number of common shares used to calculate diluted earnings per share (diluted shares) and the number of common shares outstanding used to calculate basic earnings per share (basic shares), divided by the number of basic shares.	Control
Dividend payer	An indicator variable equal to 1 if total dividends if the firm paid a dividend during the prior fiscal year.	Abandonment option
Dividend premium	The difference in the logs of average market-to-book ratios of dividend-paying and non-dividend-paying stocks, following Baker and Wurgler (2004).	Control
EPS bonus dummy	From Cheng, Harford and Zhang (2015): An indicator variable equal to one if the CEO's bonus is tied to earnings per share. Data span through 2009.	Control
Financial crisis	An indicator variable equal to 1 for announcements made during 2008 or 2009.	N/A

Financial sophistication	An indicator dummy variable equal to 1 if the firm reports a non-missing value for gain/loss on ineffective hedges (HEDGEGL) found in Compustat and zero otherwise.	Timing
Institutional ownership	Shares held by institutions (from Thomson Reuters 13F filings database) as a percentage of shares outstanding, measured at the end of the calendar quarter prior to the announcement.	Control
Leverage	The sum of long-term debt and debt in current liabilities scaled by total assets.	Abandonment option
Litigation risk	Using the model to predict litigation risk from Kim and Skinner (2012) we create a probability of facing a class action lawsuit for each firm from the predicted values of the logit model found in Table IA2 of the Internet Appendix.	Litigation
Ln(Age)	The natural log of the age of the firm, measured as number of years since the firm's IPO year.	Timing
Ln(illiquidity)	The natural log of the Amihud (2002) measure of illiquidity: the ratio of the daily absolute return to the dollar trading volume on that day. We average daily illiquidity for each firm over the period starting 255 trading days prior to the repurchase announcement and ending 46 trading days prior to the announcement.	Abandonment option
Ln(Market Cap)	The natural log of the firm's market capitalization.	Timing
Market returns	12-month buy-and-hold returns on the value-weighted CRSP index.	Control
No active repurchase program	An indicator variable equal to 1 if the firm did not announce a repurchase program from January 1, 1998 to December 31, 2000, and zero otherwise. Require the firm to exist in the year 2000.	Payout at 10b5-1 enactment
No dividend	An indicator variable equal to 1 if the firm did not pay a dividend from January 1, 1998 to December 31, 2000, and zero otherwise. Require the firm to exist in the year 2000.	Payout at 10b5-1 enactment

No payout	An indicator variable equal to 1 if the firm did not announce a repurchase program or pay dividend from January 1, 1998 to December 31, 2000, and zero otherwise. Require the firm to exist in the year 2000.	Payout at 10b5-1 enactment
Options	The sum of all executive unexercised exercisable options and all executive unexercised unexercisable options, scaled by shares outstanding.	Control
Percent shares outstanding sought	The percentage of shares outstanding sought in the share repurchase.	Control
Prior stock performance	The cumulative abnormal return starting 46 trading days prior to the announcement and ending 6 days prior to the announcement.	Abandonment option
Repurchase frequency	The portion of the prior 12 quarters during which the firm repurchased any stock.	Control
Repurchase timing	The percentage difference in repurchase volume-weighted stock price and volume-weighted stock price. The repurchase volume-weighted price is the sum of quarterly shares repurchased times the average quarterly repurchase price per share, divided by the total number of shares repurchased. Volume-weighted price is the trading volume weighted average daily closing price over the prior fiscal year. Positive values are associated with poor repurchase timing and negative values with good timing.	Timing
Standard deviation of cash flow	The standard deviation of quarterly operating income before depreciation scaled by assets calculated over the 12 quarters preceding the repurchase announcement.	Abandonment option

Standard deviation of cash flow (seasonally adjusted)	The standard deviation of seasonally adjusted cash flow calculated over the 12 quarters preceding the repurchase announcement. Seasonally adjusted cash flow is defined as quarterly operating income before depreciation scaled by assets minus Fama-French 49 industry median quarterly operating income before depreciation scaled by assets.	Control
Standard deviation of repurchases	The standard deviation of quarterly repurchases over the previous 12 quarters. Repurchases are calculated as the number of shares repurchase times the average price paid per share.	Control
Standard deviation of returns	The standard deviation of daily stock returns over the period from 255 to 46 trading days prior to the repurchase announcement. We require a minimum of 100 trading days.	Abandonment option
Trend	A count variable equal to 1 for observations in 2004, 2 for observations in 2005, etc.	Control

Appendix B: Variable Definitions for Chapter 2

This appendix defines variables used in my empirical analysis for Chapter 2 of this paper. All continuous variables are winsorized at the 1st and 99th percentile.

Variable name	Description
Repurchase Dummy	An indicator variable equal to one if the firm repurchased any shares in a given month and zero otherwise.
Repurchases	Shares repurchased as a percentage of shares outstanding. Calculated as the number of shares repurchased under a publically announced program in given month divided by prior month-end shares outstanding.
Vest Month Dummy	An indicator variable equal to one if the CEO has any grants vesting in a given month and zero otherwise.
Vesting Value	The dollar change in the value of all CEO option and stock grants vesting in a given month for a 100% change in the stock price. Calculated as the aggregate delta of vesting equity in a given month multiplied by the prior month end stock price.
Vest Month Dummy Stock	An indicator variable equal to one if the CEO has any option grants vesting in a given month and zero otherwise.
Vesting Value Stock	The dollar change in the value of all CEO stock grants vesting in a given month for a 100% change in the stock price. Calculated as the number of vesting shares in a given month multiplied by the prior month end stock price.
Vest Month Dummy Option	An indicator variable equal to one if the CEO has any stock grants vesting in a given month and zero otherwise.
Vesting Value Option	The dollar change in the value of all CEO option grants vesting in a given month for a 100% change in the stock price. Calculated as the aggregate delta of vesting options in a given month multiplied by the prior month end stock price.
Sales Dummy	An indicator variable equal to one if the CEO sold any equity in the firm in a given month and zero otherwise.

Ln(1 + Sales)	The natural log of 1 + the value of shares sold calculated as the number of shares sold multiplied by the prior month end stock price.
Unvested	The dollar change in the value of all unvested equity held by the CEO for a 100% change in the stock price. Calculated as the sum of aggragate delta of unvested options and the number of unvested shares in a given month multiplied by the prior month end stock price.
Vested	The dollar change in the value of all vested equity held by the CEO for a 100% change in the stock price. Calculated as the sum of aggragate delta of vested options and the number of vested shares held in a given month multiplied by the prior month end stock price.
Return	One-month past return
Log(Illiquidity)	The natural log of the Amihud (2002) measure of illiquidity: the ratio of the daily absolute return to the dollar trading volume on that day. We average daily illiquidity for each firm over the prior month.
Market Capitilization	The natural log of the firm's market capitalization.
Cash	Cash and short-term securities scaled by assets.
Cash Flow	Operating income before depreciation scaled by assets.
Cash Flow Volatility	The standard deviation of quarterly operating income before depreciation scaled by assets calculated over the prior 12 quarters.
Leverage	The sum of long-term debt and debt in current liabilities scaled by total assets.
Book-to-Market	Total common equity over market capitalization.
Dilution	The difference in the number of common shares used to calculate diluted earnings per share (diluted shares) and the number of common shares outstanding used to calculate basic earnings per share (basic shares), divided by the number of basic shares. Measured quarterly
Institutional Ownership	The number of shares held by institutions as a percentage of shares outstanding. Measured quarterly
Age	The age of the CEO.

Tenure	The number of months the Current CEO has been CEO at the current firm.
Chairman	Equal to 1 if the CEO is also the Chairman of the Board, zero otherwise.
Wealth Performance Sensitivity	The dollar change in CEO wealth for a 100 percentage point change in firm value, divided by annual flow compensation. See Edmans, Gabaix, and Landier (2009) for detail on variable construction. Variable is downloaded from Alex Edmans personal website.

Internet Appendix

In this Internet Appendix, we present examples of preset repurchase announcements in Section I. We present plan details for pure Rule 10b5-1 plans in Section II. Section III shows models for litigation risk and propensity score matching, and Section IV shows full summary statistics and univariate tests for firms announcing preset repurchases, open market repurchases, and all other firms. Section V provides additional results on repurchase timing in preset plans. Section VI shows that our main results are robust to alternative specifications and offer several additional results. Section VII presents similar results on accelerated share repurchases.

I. Examples of preset repurchase announcements

Pure: Announcement to conduct the entire repurchase program under a preset plan.

Excerpt from March 1, 2007 Business Wire article "Clifton Savings Bancorp, Inc. Announces Fourth Stock Repurchase Plan"

> Clifton Savings Bancorp, Inc. (NASDAQ:CSBK) announced today that the Company's board of directors has approved the repurchase for up to 615,000 shares, or approximately 5% of the Company's outstanding common stock held by persons other than Clifton MHC. **These repurchases will be conducted solely through a Rule 10b5-1 repurchase plan with Keefe, Bruyette & Woods, Inc., based upon parameters of the Rule 10b5-1 repurchase plan.** Repurchased shares will be held in treasury. The Rule 10b5-1 repurchase plan allows the Company to repurchase its shares during periods when it would normally not be active in the market due to its internal trading blackout period.

Partial: Announcements that definitely contain a preset component.

Excerpt from February 25, 2010 Canada Stockwatch article "THI Tim Hortons to buy back $200-million worth of shares"

> Tim Hortons Inc.'s board has approved a new 12-month, $200-million share repurchase program to commence in March, 2010, subject to receipt of final regulatory approval. The company's common shares will be purchased under the program **through a combination of a 10b5-1 automatic trading plan as well as at management's discretion** in compliance with regulatory requirements, and given market, cost and other considerations.

Expected: Announcements that "expect to/intend to" have a preset component.

Excerpt from March 2, 2012 US Fed News article "Lattice Semiconductor files current report"

> Lattice Semiconductor Corporation (the "Company") issued a press release announcing that its Board of Directors has authorized a share repurchase program of up to $20.0 million of the Company's common stock over the next 12 months. **In connection with the new stock repurchase program, the Company intends to enter into a 10b5-1 plan**, which will allow for repurchases of up to $20.0 million. How much common stock, if any, will be repurchased will depend on market conditions, including the price of the common stock.

Boilerplate: Announcements that "may" have a preset component.

Excerpt from October 1, 2012 Theflyonthewall.com article "TRW Automotive announces $1B share repurchase program"

> TRW Automotive announced that its board has authorized a $1B share repurchase program. The repurchase program, which will commence in the fourth quarter of this year, is expected to be executed over two years. In implementing the program, **the company may utilize a variety of methods, which may include negotiated block transactions, accelerated share repurchase transactions or open market purchases, some of which may be effected through Rule 10b5-1 plans, or by any combination of the foregoing.**

Preset repurchase mentions in other announcements

Excerpt from August 1, 2005 Business Wire article "Post Properties Announces Second Quarter 2005 Earnings"

> From April 1, 2005 through August 1, 2005, **the Company repurchased 412,600 shares of its common stock totaling approximately $13.6 million under 10b5-1 stock purchase plans**, the most recent of which will expire on August 31, 2005. These shares were repurchased at an average price of $32.95 per share. Year-to-date through August 1, 2005, **the Company has repurchased 698,400 shares of its common stock totaling approximately $22.6 million under 10b5-1 stock purchase plans at an average price of $32.42 per share.**

II. Pure Rule 10b5-1 plan details

Table IA1: Pure Rule 10b5-1 plan details

This table presents summary statistics on pure Rule 10b5-1 plan details, which are only available for the subset of non-boilerplate announcements that include such details. "Pure" preset plans represent repurchase programs executed fully under Rule 10b5-1. We report the size of the preset repurchase as a percentage of shares outstanding, in millions of dollars, or as a percentage of the total repurchase plan. Time to commencement is the number of days between the repurchase announcement and the start of the preset plan. Plan duration is the number of days during which the Rule 10b5-1 plan is effective.

	N	Mean	10th percentile	Median	90th percentile	Std. Dev.
% shares outstanding	163	6.51	1.15	4.52	11.81	10.36
$ millions	213	56.33	1.76	10.60	140.42	137.43
% total repurchase	323	100	100	100	100	0
Time to commencement (in days)	57	14.68	0	5	40	19.43
Plan duration (in days)	93	217.55	53	184	366	146.16

III. Litigation risk and propensity score matching models

Table IA2: Model for litigation risk

This table reports results from a logit regression predicting litigation risk for all Compustat firms with non-missing data for the period 1996-2014. The dependent variable is set equal to one if the firm faced a class action lawsuit according to the filings listed on Stanford Law School Securities Class Action Clearinghouse (http://securities.stanford.edu) during the year and zero otherwise. Following Kim and Skinner (2012) we exclude fillings related to IPOs, hedge funds, mutual funds, and analysts. High litigation industry and standard deviation of returns are as defined in Appendix A. Ln (assets) is the natural log of assets at the end of year t - 1. Sales growth is year t -1 sales minus year t t - 2 sales scaled by total assets at the beginning of year t - 1. Return is the market adjusted value-weighted 12-month stock return for the year t - 1. Return skewness is the skewness of the firm's 12-month return for year t -1. Turnover is trading volume accumulated over the 12-month period ending with the t -1 fiscal year-end before lawsuit scaled by beginning of year t - 1 shares outstanding. All return measures and turnover require at least 200 trading days. t-statistics are reported in parentheses and are based on robust standard errors. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

High litigation industry$_t$	0.551***
	(9.446)
Ln(Assets)$_{t-1}$	0.225***
	(14.185)
Sales growth$_{t-1}$	0.536***
	(9.077)
Return$_{t-1}$	0.040
	(0.969)
Return skewness$_{t-1}$	-0.186***
	(-5.429)
Standard deviation of returns$_{t-1}$	7.810***
	(4.989)
Turnover$_{t-1}$	0.154***
	(18.689)
Constant	-6.309***
	(-44.177)
Observations	74,913
Pseudo R2	0.0748

Table IA3: Logit regressions for propensity score matching

This table reports results from logit regressions where the dependent variable takes a value of zero for open market repurchases in all specifications and a value of one for the specified group of Rule 10b5-1 announcers. Panel A includes the full sample of repurchase announcements. Panel B corresponds to the subsample of repurchase not announced contemporaneously with earnings. Independent variables are as defined in Appendix B. Year fixed effects are included in all specifications. Industry controls are based on Fama and French (1997) (1997) 12 industry classifications and are included in all specifications. Z-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

IV. Summary statistics

V. Repurchase timing

VI. Alternative specifications of main results and additional results

Panel A: Completion rate propensity score matching

	(1)	(2)	(3)	(4)
		Expected, Partial,		
	All Rule 10b5-1	& Pure	Partial & Pure	Pure
Percent shares outstanding sought	-0.015**	-0.028**	-0.020	-0.107***
	(-2.190)	(-2.429)	(-1.379)	(-3.522)
Cash	1.288***	1.490***	1.700***	2.846***
	(4.597)	(3.757)	(3.327)	(3.968)
Cash flow	3.867**	-0.059	2.577	1.631
	(2.205)	(-0.024)	(0.790)	(0.365)
Standard deviation of cash flow	-12.439***	-7.396	-9.698	-6.778
	(-2.917)	(-1.280)	(-1.243)	(-0.656)
Leverage	-0.175	-0.545	-0.995	0.129
	(-0.631)	(-1.203)	(-1.603)	(0.158)
Dividend payer	-0.428***	-0.137	-0.289	-0.088
	(-4.255)	(-0.898)	(-1.468)	(-0.319)
Book-to-market	0.656***	0.437**	0.488*	1.005***
	(4.405)	(2.019)	(1.819)	(2.795)
Prior stock performance	0.198	0.255	0.027	-0.270
	(0.635)	(0.567)	(0.048)	(-0.353)
Standard deviation of returns	0.787	-2.817	-4.513	8.069
	(0.137)	(-0.347)	(-0.437)	(0.592)
Ln(illiquidity)	-0.092*	-0.143**	-0.072	-0.056
	(-1.813)	(-1.992)	(-0.820)	(-0.463)
Financial sophistication	0.067	0.010	0.079	0.110
	(0.668)	(0.066)	(0.389)	(0.375)
Ln(Market Cap)	-0.051	-0.276**	-0.363**	-0.517**
	(-0.685)	(-2.501)	(-2.536)	(-2.481)
Blackout window (days)	0.002***	0.002***	0.002***	0.002
	(4.413)	(4.048)	(3.356)	(1.521)
Standard deviation of repurchases	0.032	0.055	-0.062	0.029
	(0.725)	(0.875)	(-0.693)	(0.248)
Repurchase frequency	-0.229*	0.017	0.113	0.125
	(-1.665)	(0.081)	(0.399)	(0.302)
Institutional ownership	-0.162	-0.362	0.548	1.288**
	(-0.708)	(-1.091)	(1.262)	(2.111)
Dilution	1.387	1.505	0.234	0.937
	(1.351)	(1.010)	(0.115)	(0.349)
Constant	-4.915***	-5.792***	-5.729***	-17.510
	(-5.702)	(-4.859)	(-3.531)	(-0.037)
Observations	5,327	4,866	4,742	4,654
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Pseudo R-squared	0.0732	0.0715	0.0927	0.148

	(1)	(2)	(3)	(4)
Panel B: Five-day cumulative abnormal return propensity score matching				
		Expected, Partial,		
	All Rule 10b5-1	& Pure	Partial & Pure	Pure
Percent shares outstanding sought	-0.008	-0.029**	-0.029*	-0.100***
	(-1.025)	(-2.133)	(-1.650)	(-2.948)
Cash	1.256***	1.330***	1.404**	2.602***
	(3.690)	(2.836)	(2.321)	(3.170)
Cash flow	2.818	-0.149	1.998	2.335
	(1.341)	(-0.051)	(0.535)	(0.479)
Standard deviation of cash flow	-12.505**	-6.066	-8.330	-4.493
	(-2.374)	(-0.899)	(-0.930)	(-0.395)
Leverage	-0.563*	-0.677	-1.087	0.344
	(-1.662)	(-1.288)	(-1.532)	(0.387)
Dividend payer	-0.324***	-0.102	-0.309	0.046
	(-2.679)	(-0.575)	(-1.364)	(0.154)
Book-to-market	0.726***	0.497**	0.616**	1.061***
	(4.102)	(1.973)	(2.009)	(2.633)
Prior stock performance	0.159	0.300	0.037	-0.152
	(0.438)	(0.591)	(0.059)	(-0.179)
Standard deviation of returns	0.397	-1.301	0.749	5.028
	(0.058)	(-0.139)	(0.064)	(0.327)
Ln(illiquidity)	-0.119**	-0.216**	-0.141	-0.071
	(-1.963)	(-2.535)	(-1.373)	(-0.532)
Financial sophistication	0.101	0.053	0.096	-0.081
	(0.842)	(0.287)	(0.404)	(-0.233)
Ln(Market Cap)	-0.055	-0.378***	-0.462***	-0.488**
	(-0.622)	(-2.885)	(-2.767)	(-2.161)
Blackout window (days)	0.002***	0.002***	0.002**	0.001
	(4.116)	(3.102)	(2.475)	(1.173)
Standard deviation of repurchases	0.057	0.165**	0.043	0.085
	(1.066)	(2.413)	(0.427)	(0.650)
Repurchase frequency	-0.135	-0.073	-0.200	-0.001
	(-0.813)	(-0.290)	(-0.600)	(-0.002)
Institutional ownership	-0.118	-0.191	0.884*	1.265*
	(-0.432)	(-0.497)	(1.773)	(1.871)
Dilution	0.515	0.606	0.224	1.486
	(0.367)	(0.324)	(0.093)	(0.511)
Constant	-5.190***	-6.127***	-5.929***	-17.755
	(-5.429)	(-4.643)	(-3.419)	(-0.030)
Observations	3,506	3,190	3,101	3,038
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	No
Pseudo R-squared	0.0814	0.0754	0.100	0.133

Table IA4: Summary statistic of repurchasing firms

This table presents more detailed summary statistics on characteristics of firms that announce Rule 10b5-1 repurchase plans (Panel A), firms that announce open market repurchases (OMRs) without a Rule 10b5-1 or accelerated component (Panel B), and all other non-repurchasing firms (Panel C) between 2004 and 2014. We collapse our data to the firm-year level, implying that firms with at least one Rule 10b5-1 are considered Rule 10b5-1 firms in the year of the announcement. Each repurchase announcement is matched to annual data from the prior fiscal year-end, unless otherwise noted. Our sample generally consists of 1,014 Rule 10b5-1 firm-year observations and 3,611 non-preset OMR firm-year observations but drops to 685 (608; 578; 368) Rule 10b5-1 observations and 2,264 (1,827; 2,114; 2,129) non-preset OMR observations for our measure of repurchase timing (age; options; EPS bonus dummy). The non-repurchasing firm sample generally consists of 25,342 firm-year observations and drops to 13,258 (9,317; 15,606) for age (options; EPS bonus dummy). ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively, for difference in means tests.

Panel A: Rule 10b5-1 firm-years							
	Mean	Std. Dev.	Min	25th percentile	Median	75th percentile	Max
Abandonment option hypothesis							
Cash	0.206	0.197	0.002	0.052	0.139	0.302	0.807
Cash flow	0.035	0.027	-0.059	0.018	0.033	0.049	0.159
Standard deviation of cash flow	0.011	0.012	0.000	0.004	0.008	0.014	0.100
Leverage	0.157	0.172	0	0.002	0.109	0.240	0.832
Dividend payer	0.443	0.497	0	0	0	1	1
Book-to-market	0.574	0.369	-0.037	0.295	0.499	0.756	2.080
Prior stock performance	-0.025	0.131	-0.496	-0.090	-0.016	0.053	0.315
Standard deviation of returns	0.024	0.010	0.009	0.017	0.023	0.029	0.061
Ln(illiquidity)	-19.830	2.669	-24.870	-21.630	-20.240	-18.430	-10.970
Timing hypothesis							
Financial sophistication	0.207	0.405	0	0	0	0	1
Ln(Market Cap)	7.165	1.769	2.420	6.011	7.145	8.272	11.680
Ln(Age)	2.370	0.574	0.693	3.258	1.946	2.485	2.833
Repurchase timing	-0.014	0.098	-0.366	-0.0533	-0.0107	0.0285	0.273
Blackout window hypothesis							
Blackout window (days)	392.763	108.681	167	315	387	455	805
8-K reporting frequency	6.772	3.333	1	5	6	8	19
Litigation risk hypothesis							
Litigation risk	0.0249	0.0180	0.0042	0.013	0.020	0.031	0.111
Payout at 10b5-1 enactment							
No active repurchase program	0.712	0.453	0	0	1	1	1
No dividend	0.645	0.479	0	0	1	1	1
No payout	0.495	0.500	0	0	0	1	1
Additional controls							
Standard deviation of repurchases	0.876	1.060	0	0.034	0.563	1.266	5.187
Repurchase frequency	0.468	0.365	0	0.083	0.423	0.833	1
Institutional ownership	0.740	0.246	0.013	0.595	0.800	0.914	1.187
Dilution	0.025	0.037	0	0.006	0.014	0.028	0.306
EPS bonus dummy	0.220	0.415	0	0	0	0	1
Options	0.0242	0.0227	0	0.009	0.019	0.032	0.126

Panel B: Open market repurchase (without preset component) firm-years

	Mean		Std. Dev.	Min	25th percentile	Median	75th percentile	Max
Abandonment option hypothesis								
Cash	0.170	***	0.172	0.002	0.039	0.103	0.252	0.807
Cash flow	0.034		0.030	-0.059	0.013	0.031	0.048	0.173
Standard deviation of cash flow	0.012		0.014	0.000	0.004	0.008	0.015	0.119
Leverage	0.174	***	0.171	0	0.027	0.142	0.255	0.832
Dividend payer	0.559	**	0.497	0	0	1	1	1
Book-to-market	0.539	***	0.354	-0.037	0.298	0.461	0.704	2.080
Prior stock performance	-0.039	***	0.134	-0.496	-0.106	-0.029	0.039	0.315
Standard deviation of returns	0.024		0.010	0.009	0.016	0.021	0.028	0.061
Ln(illiquidity)	-19.470	***	3.098	-24.870	-21.750	-19.990	-17.600	-10.970
Timing hypothesis								
Financial sophistication	0.195		0.396	0	0	0	0	1
Ln(Market Cap)	7.088		1.962	2.420	5.664	7.094	8.412	11.680
Ln(Age)	2.372		0.513	0	2.079	2.485	2.773	3.258
Repurchase timing	-0.021	*	0.096	-0.366	-0.056	-0.011	0.022	0.273
Blackout window hypothesis								
Blackout window (days)	371.7	***	120.2	167	285	351	439	805
8-K reporting frequency	6.493	**	3.307	1	4	6	8	19
Litigation risk hypothesis								
Litigation risk	0.024		0.017	0.004	0.012	0.019	0.030	0.111
Payout at 10b5-1 enactment								
No active repurchase program	0.625	***	0.484	0	0	1	1	1
No dividend	0.549	***	0.498	0	0	1	1	1
No payout	0.400	***	0.490	0	0	0	1	1
Additional controls								
Standard deviation of repurchases	0.732	***	0.943	0	0.007	0.434	1.031	5.187
Repurchase frequency	0.452		0.369	0	0.083	0.417	0.833	1
Institutional ownership	0.688	***	0.278	0.013	0.527	0.764	0.889	1.187
Dilution	0.027		0.040	0	0.005	0.015	0.030	0.306
EPS bonus dummy	0.167	**	0.373	0	0	0	0	1
Options	0.024		0.024	0	0.007	0.016	0.033	0.126

	Mean		Std. Dev.	Min	25th percentile	Median	75th percentile	Max
Panel C: All other firms								
Abandonment option hypothesis								
Cash	0.178	***	0.208	0.000	0.031	0.094	0.249	0.990
Cash flow	0.016	***	0.079	-5.140	0.005	0.023	0.040	0.276
Standard deviation of cash flow	0.022	**	0.129	0.000	0.005	0.010	0.020	6.933
Leverage	0.205	***	0.233	0.000	0.023	0.153	0.310	7.485
Dividend payer	0.457		0.498	0.000	0.000	0.000	1.000	1.000
Book-to-market	0.652	***	0.781	-9.001	0.304	0.529	0.840	5.358
Standard deviation of returns	0.031	***	0.017	0.009	0.019	0.027	0.038	0.099
Ln(illiquidity)	-17.897	***	3.470	-24.247	-20.564	-18.384	-15.607	-9.549
Timing hypothesis								
Financial sophistication	0.186		0.389	0.000	0.000	0.000	0.000	1.000
Ln(Market Cap)	6.205	***	2.104	-0.240	4.687	6.151	7.631	11.131
Ln(Age)	2.389	***	0.496	0.000	2.079	2.485	2.773	3.526
Blackout window hypothesis								
Blackout window (days)	432.2	***	149.492	193	322	413	521	1351
8-K reporting frequency	6.534	**	3.526	0	4	6	8	19
Litigation risk hypothesis								
Litigation risk	0.021	***	0.018	0.004	0.010	0.015	0.025	0.116
Payout at 10b5-1 enactment								
No active repurchase program	0.717		0.450	0	0	1	1	1
No dividend	0.566	***	0.496	0	0	1	1	1
No payout	0.443	*	0.497	0	0	0	1	1
Additional controls								
Institutional ownership	0.557	***	0.320	0.001	0.271	0.594	0.830	1.198
Dilution	0.019	***	0.039	0.000	0.000	0.006	0.021	0.306
EPS bonus dummy	0.076	***	0.265	0.000	0.000	0.000	0.000	1.000
Options	0.023		0.024	0.000	0.006	0.016	0.032	0.147

Table IA5: Repurchase timing by plan type

This table examines repurchase timing around Rule 10b5-1 repurchase announcements (by level of commitment) and around open market repurchase (OMR) announcements without a Rule 10b5-1 component. Panel A presents average pre- and post-announcement repurchase timing. Panel B presents difference in means tests controlling for firm characteristics using the five nearest neighbors from a propensity score matching process based on logit regressions presented in Table IA3 of the Internet Appendix. Repurchase timing is the percentage difference in repurchase volume-weighted stock price and volume-weighted stock price. The repurchase volume-weighted price is the sum of quarterly shares repurchased times the average quarterly repurchase price per share, divided by the total number of shares repurchased. Volume-weighted price is the trading volume weighted average daily closing price. Positive values are associated with poor repurchase timing and negative values with good timing. The pre-announcement period refers to the fiscal year prior to the repurchase announcement. The post-announcement period spans four quarters beginning the quarter of the repurchase announcement. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Mean repurchase timing by type

	Non-Rule 10b5-1	Boilerplate	Expected	Partial	Pure
Repurchase timing (pre-announcement)	-0.022	-0.011	-0.003	-0.022	-0.008
Repurchase timing (post-announcement)	-0.016	-0.025	-0.010	-0.013	-0.018

Panel B: Difference in mean repurchase timing controlling for firm characteristics using propensity score matching

	All Rule 10b5-1 OMR	Expected, Partial, & Pure - OMR	Partial & Pure OMR	Pure - OMR
Repurchase timing (pre-announcement)	0.020***	0.023***	0.018*	0.036***
Repurchase timing (post-announcement)	0.009	0.019**	0.005	0.001

Table IA6: Are governance characteristics related to preset repurchase adoption?

Using the sample of firms that announce a share repurchase, this table reports logit regressions modeling the decision to adopt a Rule 10b5-1 plan relative to an open market repurchase without a Rule 10b5-1 component. The dependent variable takes a value of one if a firm announced at least one a Rule 10b5-1 as part of its repurchase program and zero otherwise. Employee stock options are total employee stock options outstanding from Compustat, scaled by shares outstanding. Governance data are from ISS Governance and ISS Directors. Entrenchment index is the Bebchuk, Cohen, and Ferrell (2008) E-index constructed using the following six provisions: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments. Staggered board is an indicator variable equal to one if the firm's board of directors is divided into separate classes, i.e., staggered or classified, for elections. Dual CEO/Chairman is an indicator equal to one if the CEO is also chairman of the board. Turnover represents annual average of monthly trading volume (VOL/SHROUT from CRSP). We adjust NASDAQ stocks following Gao and Ritter (2010). Activist (fiscal yr) and Activist (prior 6 mo.) are indicator variables equal to one if the firm was targeted by an activist during the fiscal year or prior 6 months, respectively. We define an activist investor as any investor who files a 13D for more than one company. We include all Table 4 Model (1) control variables, which are defined in Appendix B; continuous variables are winsorized at the 1st and 99th percentiles. Year and on Fama and French (1997) 12 industry fixed effects are included in all specifications. Z-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Employee stock options	0.236	0.293						
	(0.198)	(0.250)						
Entrenchment index			0.103					
			(1.321)					
Staggered board				0.307*				
				(1.939)				
Dual CEO/Chairman					-0.161			
					(-1.166)			
Turnover						-0.330		
						(-0.682)		
Activist (fiscal yr.)							-0.026	
							(-0.152)	
Activist (prior 6 mo.)								0.055
								(0.269)
Options	0.372		-1.016	-0.895	-0.448	0.329	0.231	0.235
	(0.280)		(-0.423)	(-0.378)	(-0.186)	(0.266)	(0.187)	(0.190)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,431	4,431	2,039	2,039	1,923	4,625	4,625	4,625
Pseudo R-squared	0.0770	0.0770	0.0682	0.0698	0.0689	0.0793	0.0792	0.0792

Table IA7: Multinomial logits

Using the sample of firms that announce a share repurchase, this table presents multinomial logit regressions modeling the decision to adopt a Rule 10b5-1 plan relative to the decision to adopt an open market repurchase without a Rule 10b5-1 component using. The base case is open market repurchases not associated with a preset plan. We collapse our data to the firm-year level, implying that firms with at least one Rule 10b5-1 repurchase program are considered Rule 10b5-1 firms. If a firm announces multiple Rule 10b5-1 repurchase plans within the same year, we categorize it according to the announcement with the highest level of commitment. Independent variables are as defined in Appendix A. Table 1 and Internet Appendix Section I explain our categorization of Rule 10b5-1 announcements. Year and Fama and French (1997) 12 industry fixed effects are included in all specifications. Z-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	(1)				(2)			
	Boilerplate	Expected	Partial	Pure	Boilerplate	Expected	Partial	Pure
Abandonment option hypothesis								
Cash	0.878**	1.711***	0.024	1.957***	0.268	3.970***	-0.094	1.530**
	(2.276)	(2.849)	(0.058)	(3.154)	(0.530)	(5.024)	(-0.183)	(1.991)
Cash flow	4.690*	-3.910	3.439	-0.009	5.064*	-2.071	6.045**	1.840
	(1.957)	(-0.997)	(1.405)	(-0.002)	(1.663)	(-0.387)	(1.993)	(0.357)
Standard deviation of cash flow	-16.470***	-8.463	-13.376**	-15.459	-20.659***	-27.235**	-13.148*	-16.067
	(-2.767)	(-1.025)	(-2.197)	(-1.549)	(-2.826)	(-2.063)	(-1.845)	(-1.366)
Leverage	-0.330	-0.163	-1.318***	-0.178	-0.563	-0.622	-1.287***	-0.215
	(-0.947)	(-0.252)	(-3.255)	(-0.258)	(-1.257)	(-0.657)	(-2.647)	(-0.257)
Dividend payer	-0.515***	0.201	-0.353**	0.019	-0.460**	0.845**	-0.203	-0.110
	(-3.865)	(0.844)	(-2.545)	(0.076)	(-2.561)	(2.524)	(-1.136)	(-0.342)
Book-to-market	0.783***	0.122	-0.123	0.557*	0.524*	0.554	-0.171	0.568
	(4.098)	(0.345)	(-0.584)	(1.814)	(1.926)	(1.079)	(-0.620)	(1.502)
Prior stock performance	-0.061	1.301*	1.061**	0.246	-0.849	1.264	1.005*	-0.332
	(-0.143)	(1.771)	(2.349)	(0.353)	(-1.583)	(1.202)	(1.756)	(-0.408)
Standard deviation of returns	4.023	6.341	-6.675	9.930	1.587	-19.211	-0.245	10.251
	(0.509)	(0.510)	(-0.817)	(0.826)	(0.152)	(-1.044)	(-0.024)	(0.698)
Ln(illiquidity)	-0.125*	-0.252**	-0.167**	-0.115	-0.163*	-0.336**	-0.180*	0.009
	(-1.754)	(-2.125)	(-2.232)	(-1.062)	(-1.722)	(-1.977)	(-1.853)	(0.069)
Timing option hypothesis								
Financial sophistication	0.039	-0.312	-0.171	-0.348	-0.266	-0.194	-0.302	-0.493
	(0.306)	(-1.194)	(-1.187)	(-1.206)	(-1.439)	(-0.554)	(-1.592)	(-1.317)
Ln(Market Cap)	0.032	-0.208	-0.351***	-0.454**	0.031	-0.187	-0.261*	-0.228
	(0.319)	(-1.210)	(-3.202)	(-2.532)	(0.221)	(-0.748)	(-1.784)	(-0.980)
Ln(Age)					-0.588***	0.253	-0.129	-0.180
					(-4.345)	(0.923)	(-0.870)	(-0.698)
Blackout window hypothesis								
Blackout window (days)	0.002***	0.002*	0.002***	0.001	0.003***	0.003**	0.002***	0.002*
	(3.727)	(1.812)	(2.793)	(1.245)	(3.540)	(2.356)	(2.767)	(1.768)
Controls								
Standard deviation of repurchases	-0.052	0.142	0.147***	0.004	0.046	-0.020	0.148**	-0.000
	(-0.811)	(1.583)	(2.669)	(0.040)	(0.564)	(-0.138)	(2.037)	(-0.002)
Repurchase frequency	-0.281	-0.255	0.316*	0.196	-0.237	-0.162	0.524**	0.572
	(-1.593)	(-0.796)	(1.684)	(0.579)	(-0.985)	(-0.352)	(2.156)	(1.352)
Institutional ownership	0.276	-1.400***	0.476	0.479	0.081	-2.047***	0.379	0.750
	(0.877)	(-2.763)	(1.435)	(0.894)	(0.197)	(-2.943)	(0.879)	(1.092)
Dilution	1.033	1.739	-0.996	-1.393	-0.786	3.770	-2.945	-2.655
	(0.737)	(0.801)	(-0.593)	(-0.533)	(-0.354)	(1.258)	(-1.185)	(-0.731)
Observations		4,947				2,443		
Year fixed effects		Yes				Yes		
Industry fixed effects		Yes				Yes		
Pseudo R-squared		0.083				0.111		

Table IA7: Multinomial logits, continued

	(3)				(4)			
	Boilerplate	Expected	Partial	Pure	Boilerplate	Expected	Partial	Pure
Abandonment option hypothesis								
Cash	1.071**	0.671	-0.691	1.703**	0.910**	0.369	0.007	2.066***
	(2.202)	(0.804)	(-1.378)	(2.167)	(2.279)	(0.545)	(0.018)	(3.289)
Cash flow	6.014**	-9.245*	5.107*	2.358	4.834**	-8.507**	3.936	0.610
	(2.008)	(-1.784)	(1.689)	(0.437)	(1.971)	(-2.032)	(1.593)	(0.143)
Standard deviation of cash flow	-19.819**	4.027	-27.027***	-25.982*	-16.716***	-3.251	-14.670**	-17.669*
	(-2.343)	(0.380)	(-3.073)	(-1.746)	(-2.736)	(-0.396)	(-2.358)	(-1.740)
Leverage	-0.582	-0.339	-1.763***	-0.013	-0.352	-0.816	-1.414***	-0.206
	(-1.244)	(-0.386)	(-3.605)	(-0.016)	(-0.990)	(-1.142)	(-3.442)	(-0.299)
Dividend payer	-0.717***	0.276	-0.401**	-0.280	-0.496***	0.284	-0.368***	0.027
	(-4.161)	(0.901)	(-2.472)	(-0.955)	(-3.655)	(1.132)	(-2.629)	(0.111)
Book-to-market	0.804***	-0.255	-0.393	0.816**	0.734***	-0.291	-0.211	0.540*
	(3.320)	(-0.516)	(-1.485)	(2.263)	(3.719)	(-0.746)	(-0.978)	(1.739)
Prior stock performance	-0.221	1.262	1.089**	0.160	-0.120	1.209	1.059**	0.370
	(-0.393)	(1.203)	(1.983)	(0.188)	(-0.275)	(1.563)	(2.326)	(0.529)
Standard deviation of returns	12.224	5.363	6.020	11.229	3.276	12.915	-6.867	8.415
	(1.218)	(0.306)	(0.613)	(0.745)	(0.406)	(0.993)	(-0.830)	(0.696)
Ln(illiquidity)	-0.101	-0.450**	-0.184*	-0.148	-0.161**	-0.268**	-0.174**	-0.119
	(-1.051)	(-2.262)	(-1.937)	(-1.071)	(-2.094)	(-2.062)	(-2.247)	(-1.087)
Timing option hypothesis								
Financial sophistication	0.219	-0.113	-0.177	-0.018	0.052	-0.327	-0.169	-0.356
	(1.410)	(-0.358)	(-1.045)	(-0.060)	(0.405)	(-1.185)	(-1.161)	(-1.233)
Ln(Market Cap)	0.074	-0.495*	-0.390***	-0.502**	-0.059	-0.352*	-0.401***	-0.477***
	(0.550)	(-1.855)	(-2.846)	(-2.255)	(-0.543)	(-1.856)	(-3.534)	(-2.623)
Repurchase Timing	0.870	2.113	0.329	2.282**				
	(1.193)	(1.575)	(0.462)	(2.070)				
Blackout window hypothesis								
Blackout window (days)	0.002***	0.001	0.002***	0.002	0.002***	0.000	0.001**	0.001
	(2.632)	(0.992)	(2.670)	(1.438)	(3.598)	(0.339)	(2.439)	(1.342)
8-K reporting frequency					0.037**	0.023	0.037**	0.060*
					(2.196)	(0.718)	(2.017)	(1.921)
Controls								
Standard deviation of repurchases	-0.032	0.234**	0.191***	-0.055	-0.058	0.155*	0.144***	-0.010
	(-0.433)	(2.321)	(3.033)	(-0.472)	(-0.894)	(1.670)	(2.586)	(-0.103)
Repurchase frequency	-0.292	0.284	0.143	-0.544	-0.231	-0.075	0.350*	0.157
	(-1.213)	(0.618)	(0.585)	(-1.293)	(-1.281)	(-0.224)	(1.847)	(0.464)
Institutional ownership	-0.282	-1.508**	0.449	0.022	0.395	-0.973*	0.487	0.320
	(-0.670)	(-2.043)	(1.094)	(0.033)	(1.191)	(-1.741)	(1.434)	(0.585)
Dilution	2.980*	2.564	0.332	-4.739	0.931	2.162	-1.205	-1.517
	(1.647)	(0.875)	(0.169)	(-1.214)	(0.661)	(0.955)	(-0.708)	(-0.580)
Observations	3,203				4,822			
Year fixed effects	Yes				Yes			
Industry fixed effects	Yes				Yes			
Pseudo R-squared	0.093				0.083			

Table IA7: Multinomial logits, continued

	(5)			
	Boilerplate	Expected	Partial	Pure
Abandonment option hypothesis				
Cash	0.485	1.897***	-0.615	3.113***
	(1.156)	(2.955)	(-1.385)	(3.022)
Cash flow	4.725*	-2.911	2.117	1.710
	(1.884)	(-0.697)	(0.809)	(0.377)
Standard deviation of cash flow	-15.773**	-7.642	-14.927**	-16.071
	(-2.519)	(-0.863)	(-2.273)	(-1.499)
Leverage	-0.623	0.394	-1.380***	0.226
	(-1.570)	(0.577)	(-3.221)	(0.298)
Dividend payer	-0.540***	0.068	-0.288**	0.047
	(-3.767)	(0.269)	(-1.976)	(0.179)
Book-to-market	0.359	0.349	-0.311	0.789**
	(1.549)	(0.885)	(-1.325)	(2.304)
Prior stock performance	0.022	1.695**	1.015**	0.205
	(0.050)	(2.172)	(2.128)	(0.284)
Standard deviation of returns	-9.429	7.806	-13.662	18.821
	(-1.015)	(0.553)	(-1.472)	(1.427)
Ln(illiquidity)	-0.048	-0.183	-0.186**	-0.204
	(-0.567)	(-1.294)	(-2.105)	(-1.496)
Timing option hypothesis				
Financial sophistication	-0.108	-0.304	-0.104	-0.366
	(-0.742)	(-1.091)	(-0.685)	(-1.129)
Ln(Market Cap)	-0.028	-0.159	-0.485***	-0.446**
	(-0.240)	(-0.818)	(-3.954)	(-2.135)
Blackout window hypothesis				
Blackout window (days)	0.001*	0.001	0.001	0.002
	(1.749)	(1.223)	(0.813)	(1.588)
Litigation risk hypothesis				
Litigation risk	5.418	3.952	3.391	-22.782*
	(1.262)	(0.545)	(0.691)	(-1.912)
Controls				
Standard deviation of repurchases	-0.085	0.129	0.129**	-0.042
	(-1.206)	(1.378)	(2.196)	(-0.371)
Repurchase frequency	-0.382*	-0.189	0.374*	0.289
	(-1.945)	(-0.542)	(1.835)	(0.759)
Institutional ownership	0.443	-0.959*	0.174	0.456
	(1.257)	(-1.707)	(0.482)	(0.773)
Dilution	1.638	1.044	-0.878	-0.807
	(1.101)	(0.429)	(-0.484)	(-0.305)
Observations		3,959		
Year fixed effects		Yes		
Industry fixed effects		Yes		
Pseudo R-squared		0.085		

Table IA8: Regression analysis: Abnormal returns around Rule 10b5-1 announcements

This table reports results from OLS regressions where the dependent variable equals the five-day cumulative abnormal returns around repurchase announcements. We remove observations with earnings announcements during this five-day window. Regressions include indicator variables equal to one if the announcement contains a Rule 10b5-1 component. We include all control variables from our base model (Table 4, Panel A, Model 1) as well as the percentage of shares outstanding sought in the repurchase program. Variables are defined in Appendix B. Table 1 and Appendix A explain our categorization of preset announcements. All specifications include standard controls and year fixed effects. Industry controls are based on Fama and French (1997) 12 industry classifications but are excluded in the specification with the high litigation industry indicator. t-statistics are reported in parentheses and are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	(1)	(2)	(3)	(4)
Rule 10b5-1	0.285			
	(1.077)			
Rule 10b5-1 excluding boilerplate		0.887**		
		(2.343)		
Rule 10b5-1: pure and partial			1.018**	
			(1.998)	
Rule 10b5-1: pure only				1.834**
				(2.456)
Percent shares outstanding sought	0.032	0.050**	0.051**	0.053**
	(1.508)	(2.363)	(2.438)	(2.515)
Constant	-2.502	-2.530	-2.390	-1.771
	(-1.524)	(-1.508)	(-1.414)	(-1.034)
Controls	Yes	Yes	Yes	Yes
Observations	3,525	3,209	3,120	3,049
R-squared	0.044	0.048	0.047	0.049
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table IA9: Long-run abnormal returns

This table presents long-run abnormal returns calculated over the 12-month window beginning the month after Rule 10b5-1 announcements. Monthly abnormal returns (α) are estimated from Fama-French five-factor calendar time portfolio regressions: $R_t - R_{f,t} = \alpha_1 + \beta_1(R_{mkt,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t$, where R_t is the return on an equally weighted portfolio of stocks at time t. $R_{f,t}$ and $R_{mkt,t}$ are the risk-free rate and the return on the market at time t. SMB_t, HML_t, RMW_t, and CMA_t are the monthly returns on the Fama-French size, book-to-market, operating profitability, and investment factors in month t. The intercept term (α) of the regression represents the average monthly abnormal return. The last row represents the difference in abnormal returns in preset repurchase firms and firms that announced an open market repurchase without a preset component. t-statistics are in parentheses. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

| | (1) | (2) No Rule | (3) | (4) Expected, partial, | (5) Partial | (6) | (7) | (8) | (9) |
	Full sample	10b5-1	Rule 10b5-1	& pure	& pure	Boilerplate	Expected	Partial	Pure
Alpha	0.291***	0.284***	0.604***	0.511**	0.446*	0.526**	0.062	0.245	0.570
	(3.002)	(2.809)	(3.438)	(2.399)	(1.715)	(2.328)	(0.258)	(0.740)	(1.410)
Rm - Rf	0.913***	0.912***	0.922***	0.904***	0.905***	0.968***	0.908***	0.992***	0.774***
	(32.658)	(31.309)	(18.220)	(14.745)	(12.233)	(15.031)	(13.562)	(10.723)	(6.784)
SMB	0.478***	0.469***	0.558***	0.558***	0.676***	0.492***	0.452***	0.461***	0.771***
	(10.080)	(9.491)	(6.511)	(5.334)	(5.340)	(4.498)	(3.940)	(2.881)	(3.945)
HML	-0.028	-0.031	0.011	0.033	-0.016	-0.042	0.008	-0.367**	0.276
	(-0.597)	(-0.643)	(0.124)	(0.326)	(-0.130)	(-0.390)	(0.071)	(-2.257)	(1.379)
RMW	-0.130*	-0.114	-0.223*	-0.227	-0.254	-0.260	-0.143	-0.352	-0.313
	(-1.810)	(-1.527)	(-1.719)	(-1.444)	(-1.328)	(-1.528)	(-0.785)	(-1.396)	(-1.006)
CMA	-0.081	-0.057	-0.263*	-0.061	-0.143	-0.432**	0.308	0.252	-0.530
	(-1.050)	(-0.712)	(-1.888)	(-0.360)	(-0.688)	(-2.349)	(1.535)	(0.907)	(-1.566)
Observations	132	132	132	131	128	127	122	121	124
R-squared	0.949	0.945	0.870	0.819	0.774	0.819	0.787	0.684	0.591
Difference in alpha			0.320	0.227	0.162	0.242	-0.222	-0.039	0.286
			(1.577)	(0.964)	(0.586)	(0.990)	(-0.881)	(-0.116)	(0.705)

Table IA10: How have preset repurchases changed payout decisions? Alternative model

This table presents multinomial logit models of dividends and repurchases in the pre-Rule 10b5-1 period (1990-2000) and the post-Rule 10b5-1 period (2004-2014), as well as the difference in coefficients across the two time periods. The base group is firm-years with zero repurchases and dividends. The other groups include: (i) firm-years with positive dividends but zero repurchases, (ii) firm-years with positive dividends and repurchases, and (iii) firm-years with zero dividends but positive repurchases. Independent variables are measured at the end of fiscal year t-1 and defined in Appendix B. All continuous variables are winsorized at the 1st and 99th percentiles. Industry controls are based on Fama and French (1997) 12 industry classifications. Z-statistics are reported in parentheses and are based on robust standard errors clustered by firm; p-values associated with differences are in brackets. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Pre-Rule 10b5-1 period (1990-2000)			Post-Rule 10b5-1 period (2004-2014)			Difference		
	Dividend increase	Dividend increase & Repurchase	Repurchase	Dividend increase	Dividend increase & & Repurchase	Repurchase	Dividend increase	Dividend increase & Repurchase	Repurchase
Cash	0.290	0.308	1.270***	-0.427**	0.087	0.394***	-0.718	-0.222	-0.876***
	(0.696)	(0.716)	(7.284)	(-2.079)	(0.416)	(3.297)	[0.113]	[0.658]	[0.000]
Cash flow	5.623***	11.001***	7.064***	7.484***	8.593***	4.054***	1.852	-2.421	-3.006***
	(3.631)	(6.391)	(10.806)	(8.521)	(9.072)	(7.895)	[0.497]	[0.369]	[0.003]
Standard deviation of cash flow	-2.769	-10.765***	-4.031***	0.218	-6.393***	-1.773**	2.986	4.363	2.262
	(-0.944)	(-3.113)	(-3.155)	(0.388)	(-4.167)	(-2.177)	[0.569]	[0.464]	[0.24]
Leverage	-1.135***	-2.490***	-0.738***	-0.906***	-1.429***	-0.341***	0.229	1.061***	0.397**
	(-4.086)	(-8.276)	(-5.078)	(-5.869)	(-8.777)	(-3.288)	[0.485]	[0.005]	[0.051]
Dividend payer	6.070***	5.952***	-0.749***	5.466***	5.172***	-0.540***	-0.603***	-0.78***	0.209
	(42.250)	(37.201)	(-4.506)	(69.669)	(60.345)	(-5.674)	[0.001]	[0.000]	[0.308]
Book-to-market	0.169*	-0.112	0.027	-0.209***	-0.254***	-0.011	-0.378***	-0.143	-0.038
	(1.804)	(-1.075)	(0.645)	(-4.161)	(-4.041)	(-0.312)	[0.005]	[0.352]	[0.507]
Prior stock performance	0.489***	0.110	-0.278***	0.185***	0.242***	-0.076*	-0.304***	0.132	0.202***
	(5.039)	(1.001)	(-5.882)	(2.948)	(3.503)	(-1.867)	[0.008]	[0.311]	[0.001]
Standard deviation of returns	-48.817***	-50.146***	-11.629***	-34.993***	-58.692***	-12.749***	13.793**	-8.599	-1.122
	(-11.113)	(-10.237)	(-6.071)	(-14.198)	(-20.738)	(-7.676)	[0.017]	[0.202]	[0.705]
Ln(illiquidity)	0.244***	0.201***	-0.035	0.155***	0.149***	-0.004	-0.089	-0.052	0.030
	(4.834)	(3.738)	(-1.399)	(6.281)	(5.719)	(-0.235)	[0.129]	[0.406]	[0.378]
Ln(Market Cap)	0.384***	0.330***	-0.050	0.489***	0.532***	0.088***	0.104	0.202**	0.137**
	(4.917)	(4.003)	(-1.185)	(12.187)	(12.742)	(2.807)	[0.277]	[0.042]	[0.018]
Blackout window (days)	-0.010*	-0.009	0.000	-0.001***	0.006***	0.007***	0.008	0.015**	0.007**
	(-1.720)	(-1.496)	(0.018)	(-3.660)	(20.803)	(33.188)	[0.175]	[0.025]	[0.022]
Standard deviation of repurchases	-0.057	-0.004	0.051**	-0.001	-0.012	0.007	0.055	-0.008	-0.044
	(-1.088)	(-0.078)	(2.102)	(-0.046)	(-0.390)	(0.362)	[0.447]	[0.909]	[0.197]
Repurchase frequency	0.368	4.270***	3.791***	0.176	4.538***	4.591***	-0.192	0.268	0.799***
	(1.435)	(17.522)	(27.399)	(1.325)	(37.051)	(51.531)	[0.543]	[0.355]	[0.000]
Institutional ownership	-0.223	0.296	0.651***	-0.627***	-0.229	0.529***	-0.404	-0.525	-0.123
	(-0.737)	(0.947)	(4.216)	(-4.444)	(-1.568)	(5.356)	[0.217]	[0.128]	[0.541]
Dilution	1.827**	0.363	-0.438	-0.047	0.908	0.753*	-1.872**	0.549	1.191**
	(2.403)	(0.435)	(-1.125)	(-0.065)	(1.256)	(1.664)	[0.091]	[0.677]	[0.070]
Dividend premium	0.169	0.502	-0.415*	3.510***	2.557***	1.219***	3.365***	2.09***	1.636***
	(0.340)	(0.986)	(-1.823)	(6.305)	(4.520)	(3.270)	[0.000]	[0.007]	[0.000]
Market returns	0.614	0.669	-0.203	0.930***	0.429**	-0.317**	0.320	-0.234	-0.114
	(1.336)	(1.419)	(-0.900)	(4.593)	(2.109)	(-2.363)	[0.507]	[0.633]	[0.676]
Observations		13,288			33,005				
Year fixed effects		No			No				
Industry fixed effects		Yes			Yes				
Pseudo R-squared		0.532			0.576				

Table IA11: Payout initiations

This table reports the probability of initiating a payout for each year from 2001 to 2014 for the 5,688 firms with zero payout in the pre-Rule period (1990-2000) that initiated a payout between 2001 and 2014. Payout (repurchase) initiations are defined as the first payout (repurchase) since 1990. We classify repurchases as greater than zero if we observe at least one open market repurchase announcement in the period and zero otherwise. Dividends are greater than zero for the period if at any time we observe the firm paying a dividend and zero otherwise. Rule 10b5-1 is greater than zero if at any time in the 2001-2013 period the firm made a Rule 10b5-1 announcement.

	Payout initiations					Repurchase initiations	
Year	Repurchases >0 Dividends = 0 Rule 10b5-1 = 0	Repurchases >0 Dividends = 0 Rule 10b5-1 >0	Repurchases = 0 Dividends >0	Repurchases >0 Dividends >0 Rule 10b5-1 = 0	Repurchases >0 Dividends >0 Rule 10b5-1 >0	Repurchases >0 Rule 10b5-1 = 0	Repurchases >0 Rule 10b5-1 >0
2001	64.21%	0.31%	34.22%	1.26%	0.00%	99.65%	0.35%
2002	57.21%	1.44%	40.14%	1.20%	0.00%	98.19%	1.81%
2003	38.50%	2.77%	58.45%	0.28%	0.00%	95.07%	4.93%
2004	33.08%	3.76%	60.90%	2.26%	0.00%	93.59%	6.41%
2005	37.38%	6.64%	54.84%	1.14%	0.00%	87.61%	12.39%
2006	35.84%	8.85%	53.76%	1.11%	0.44%	83.61%	16.39%
2007	50.29%	11.00%	36.54%	1.77%	0.39%	83.60%	16.40%
2008	61.26%	12.13%	25.20%	1.42%	0.00%	83.74%	16.10%
2009	45.54%	4.69%	48.83%	0.94%	0.00%	89.36%	10.64%
2010	33.23%	8.63%	56.23%	1.60%	0.32%	80.42%	19.58%
2011	33.80%	10.89%	53.63%	0.84%	0.84%	73.49%	26.51%
2012	20.89%	8.88%	67.89%	0.78%	1.57%	66.08%	33.92%
2013	18.14%	7.17%	72.15%	2.11%	0.42%	72.80%	27.20%
2014	35.96%	14.47%	48.68%	0.44%	0.44%	69.15%	30.85%

VII. Accelerated share repurchases

Table IA12: Accelerated share repurchases plan details

Panel A divides accelerated share repurchase (ASR) announcements by level of commitment. "Pure" ("Partial") preset plans represent repurchase programs that are executed fully (in part) through an ASR. We refer to preset plans as "expected" if the firm indicates that it expects to or intends to adopt an ASR plan to execute its announced repurchase. "Boilerplate" refers to announcements that shares may be repurchased through an ASR or through other means. For further details of our categorization, please see the Section I of the Internet Appendix. Panel B present summary statistics on plan details, which are only available for the subset of announcements that voluntarily disclose such details. We report the size of the preset repurchase as a percentage of shares outstanding, in millions of dollars, or as a percentage of the total repurchase plan. Time to commencement is the number of days between the repurchase announcement and the commencement of the preset plan. Duration of the plan is the number of days during which the Rule 10b5-1 trading plan is effective.

Panel A: Preset repurchase announcements by level of commitment

	Pure	Partial	Expected	Boilerplate	Total
ASR announcements	285	217	46	284	832
	34.25%	26.08%	5.53%	34.13%	100.00%

Panel B: Accelerated share repurchase plan details

	N	Mean	10th percentile	Median	90th percentile	Standard Deviation
% shares outstanding	361	6.22	1.24	3.87	12.40	8.51
$ millions	442	604.82	50.00	250.00	1200.00	1536.04
% total repurchase	416	91.11	50.00	100.00	100.00	21.11
Time to commencement (in days)	20	7.70	0	3	19	12.96
Duration of plan (in days)	79	173.16	30	143	356	156.26

Table IA13: Rule 10b5-1 adoptions versus accelerated share repurchase adoption

Using the sample of firm-years with a Rule 10b5-1 or ASR announcement, this table reports logit regressions modeling the decision to adopt a Rule 10b5-1 plan relative to an ASR. The dependent variable takes a value of one if a firm announced at least one Rule 10b5-1 as part of its repurchase program and zero otherwise. All variables are defined in Appendix A; continuous variables are winsorized at the 1st and 99th percentiles. Year and Fama and French (1997) 12 industry fixed effects are included in all specifications. Z-statistics (in parentheses) are based on robust standard errors clustered by firm. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cash	0.696	-0.521	0.004	0.526	0.073	0.224	2.072**	0.444
	(1.067)	(-0.630)	(0.006)	(0.772)	(0.112)	(0.314)	(2.064)	(0.551)
Cash flow	9.233**	7.212	5.765	7.873*	10.032**	7.806	5.288	7.310
	(1.986)	(1.304)	(1.113)	(1.705)	(2.060)	(1.489)	(0.811)	(1.139)
Standard deviation of cash flow	-23.002***	-28.047***	-29.813***	-21.392**	-17.609*	-20.948**	-23.378**	-19.738
	(-2.805)	(-3.148)	(-2.844)	(-2.525)	(-1.896)	(-2.296)	(-2.025)	(-1.400)
Leverage	-0.330	-0.511	-0.425	-0.350	-0.845	-0.606	0.096	-0.408
	(-0.501)	(-0.642)	(-0.537)	(-0.529)	(-1.188)	(-0.805)	(0.086)	(-0.487)
Dividend payer	-0.013	0.059	-0.286	0.000	0.004	0.094	-0.393	0.051
	(-0.049)	(0.161)	(-0.876)	(0.001)	(0.012)	(0.314)	(-1.008)	(0.176)
Book-to-market	0.788*	-0.080	0.560	0.754	0.665	0.883*	1.517*	0.902*
	(1.707)	(-0.145)	(1.044)	(1.599)	(1.360)	(1.826)	(1.712)	(1.683)
Prior stock performance	0.069	-0.195	0.140	0.068	0.195	-0.110	0.489	0.179
	(0.104)	(-0.201)	(0.180)	(0.103)	(0.274)	(-0.153)	(0.502)	(0.235)
Standard deviation of returns	30.516*	11.798	35.705*	33.303**	9.858	49.495***	48.051*	43.313**
	(1.840)	(0.600)	(1.884)	(2.052)	(0.569)	(2.645)	(1.724)	(2.292)
Ln(illiquidity)	0.489***	0.466*	0.329	0.433**	0.538***	0.539***	0.502**	0.197
	(2.987)	(1.918)	(1.578)	(2.447)	(2.865)	(2.961)	(2.331)	(0.818)
Financial sophistication	-0.061	-0.338	-0.068	-0.039	-0.031	-0.035	-0.044	0.079
	(-0.264)	(-1.109)	(-0.255)	(-0.168)	(-0.124)	(-0.136)	(-0.108)	(0.301)
Ln(Market Cap)	0.115	0.049	-0.044	0.063	0.049	0.222	0.175	-0.217
	(0.543)	(0.165)	(-0.167)	(0.263)	(0.208)	(0.935)	(0.623)	(-0.713)
Ln(Age)		-0.100						
		(-0.356)						
Repurchase timing			-0.270					
			(-0.282)					
Blackout window (days)	0.001	0.004**	0.001	0.001	0.001	0.001	0.001	0.001
	(1.250)	(2.017)	(0.614)	(1.062)	(0.730)	(0.902)	(0.595)	(0.906)
8-K reporting frequency				-0.037				
				(-1.260)				
Litigation risk					5.038			
					(0.747)			
No repurchase when Rule 10b5-1 enacted						-0.298		
						(-0.800)		
No dividend when Rule 10b5-1 enacted						0.498		
						(1.086)		
No payout when Rule 10b5-1 enacted						-0.029		
						(-0.056)		
Standard deviation of repurchases	-0.109	-0.106	-0.090	-0.098	-0.105	-0.111	-0.046	-0.181*
	(-1.211)	(-0.797)	(-0.946)	(-1.077)	(-1.114)	(-1.167)	(-0.323)	(-1.839)
Repurchase frequency	-0.101	-0.296	-0.139	-0.066	-0.462	-0.114	-0.047	0.111
	(-0.317)	(-0.711)	(-0.357)	(-0.205)	(-1.330)	(-0.321)	(-0.092)	(0.305)
Institutional ownership	-0.819	-0.986	-1.613**	-0.597	-0.595	-0.876	-0.142	-1.072
	(-1.259)	(-1.139)	(-1.970)	(-0.869)	(-0.788)	(-1.224)	(-0.159)	(-1.290)
Dilution	2.209	8.722*	5.085	2.129	3.042	2.067	1.496	
	(0.821)	(1.944)	(1.453)	(0.788)	(1.016)	(0.798)	(0.427)	
EPS bonus dummy							0.335	
							(1.019)	
Options								0.469
								(0.079)
Observations	1,258	708	888	1,219	1,079	1,064	498	799
Pseudo R-squared	0.212	0.206	0.206	0.207	0.221	0.0729	0.231	0.172

Table IA14: Abnormal returns around ASR announcements

This table reports five-day cumulative abnormal returns and differences in returns by type of repurchase announcement. We remove observations with earnings announcements during this five-day window. Panel A shows abnormal returns by type of repurchase announcement, along with statistical significance. Table 1 and section I of the Internet Appendix explain our categorization of announcements. Panel B examines the difference in abnormal returns between groups of preset repurchase plans and open market repurchase plans that do not include a preset component. Significance of mean abnormal returns is assessed using a t-test or propensity score matching, as indicated. We use the five nearest neighbors identified from the logit regressions in Table IA3 as matched control firms then calculate the difference in means. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Abnormal returns at announcement by type of repurchase

	Accelerated share repurchase				
	All	Boilerplate	Expected	Partial	Pure
Mean	1.827	1.320	1.760	2.661	1.665
t-stat	7.771	2.910	0.960	4.780	5.469
N	382	143	9	61	145

Panel B: Difference in means tests

	Accelerated share repurchase			
	All - OMR	Expected, Partial, & Pure - OMR	Partial & Pure - OMR	Pure - OMR
Difference in means	0.573*	0.825**	0.834**	0.538
Propensity score matching	0.777***	1.396***	1.300***	1.302***

Figure IA1: Example of Rule 10b5-1 Contract Details

This figure provides an example of a Rule 10b5-1 contract. The following contract outlines the condition under which JPMorgan Chase may execute repurchases for Sprint Corporation.

Annex A

Price Range	Purchases1 based on % of composite trading volume	Additional Purchases1 if Sprint is trading below the 5 Day Moving Average	Total Purchases1
Above 11.00	up to 1%	up to 1% additional	up to 2%
9.00 to 10.99	up to 2%	up to 2% additional	up to 4%
8.00 to 8.99	up to 3%	up to 3% additional	up to 6%
7.50 to 7.99	up to 5%	up to 4% additional	up to 9%
7.00 to 7.49	up to 10%	up to 4% additional	up to 14%
6.75 to 6.99	up to 15%	up to 5% additional	up to 20%
6.50 to 6.74	up to 20%	up to 5% additional	up to 25%
6.25 to 6.49	up to 30%	up to 7.5% additional	up to 37.5%
6.00 to 6.24	up to 40%	up to 10% additional	up to 50%
Below 6.00	10b-18 maximum		

The above share percentages for maximum daily repurchase limits are to be followed on a trade-by-trade basis. If during the day the stock price increases to a higher price category, as set forth above, purchases must cease, if the maximum percentage for that limit price has already been purchased. If during the trading day the stock price falls to a lower price category, as set forth above, purchases may resume, subject to the maximum daily amount for the lower price, which shall be aggregated with any prior purchases for such trading day. Notwithstanding anything in this Annex A to the contrary, in all circumstances JPMS will make such purchases pursuant to the safe harbor provided by Rule 10b-18.

1. The aggregate maximum number of Securities to be purchased following the execution of the Plan may not exceed the lesser of (i) 33,160,922 shares or (ii) such number of shares that result in an aggregate purchase price of $95,582,294.10 inclusive of all fees, commissions and other expenses related thereto.

https://www.sec.gov/Archives/edgar/data/101830/000119312513370515/d600406dex9912.htm

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Zhang, Hua, 2005, Share price performance following actual share repurchases, *Journal of Banking & Finance* 29, 1887–1901.

David R Moore

EDUCATION

University of Tennessee at Chattanooga

Masters in Business Administration   2012

- Outstanding Masters Student - MBA program
- John C. Stophel Distinguished Student Award

B.S. in Engineering Technology Management, *Summa Cum Laude*   2010

- NCAA-Capital One Academic All-American Men's Track and Field / Cross-Country
- Dayle May Award - Highest GPA among graduating student-athletes

WORKING PAPERS

"Managerial Self-Interest and Strategic Repurchases: Evidence from Equity Vesting Schedules"

- Presented at Binghamton University SUNY, California State University Long Beach, Eastern Finance Association, Florida International University, Loyola Marymount University, the University of Kentucky, the University of Mississippi, the University of Wisconsin-Whitewater.

"Commitment and Financial Flexibility in Payout Decisions" (with Alice Bonaimé and Jarrad Harford) **Revise and Resubmit at** *Management Science*

- Presented at the American Finance Association*, Eastern Finance Association, Financial Management Association, UK/UT Conference, Midwest Finance Association, Northern Finance Association, the University of Arizona*, the University of Kentucky, the University of South Carolina*, and the Washington University Corporate Finance Conference (Early ideas)*.

"The Evolution of Employee Compensation, Dilution, and Payout Policy" (with Alice Bonaimé, Kathleen Kahle, and Alok Nemani)

- Presented at the Eastern Finance Association*, Midwest Finance Association, Miami University*, University of Arizona*

(* indicates presentations by coauthor)

TEACHING

University of Kentucky

Intro to Corporate Finance

> Summer 2016. *Average Rating 4.60/5.0*

Technology for Business Solutions

> Instructor: Summer 2016, Summer 2017, Fall 2017, Spring 2018.
> *Average Rating: 4.73/5.0*
> Teaching Assistant: Fall 2014, Spring 2015, Fall 2015, Spring 2016,
> Fall 2016, Spring 2017.

FELLOWSHIPS AND AWARDS

University of Kentucky

2017	Mullineaux Award - Best Ph.D. student in the Gatton College
2017	Schnatter Institute Fellowship - Summer research grant
2016	AFA Doctoral Student Travel Grant
2014–2017	Gatton Doctoral Fellowship
2014	Outstanding Graduate Assistant
2013–2014	Max Steckler Fellowship
2012–2014	James E. and Christine D. Luckett Endowment

University of Tennessee at Chattanooga

2010 & 2011	NCAA-Capital One Academic All-District Team
2010	Outstanding Senior Award - College of Engineering
2010	SoCon Student Athlete of the Week
2006-2011	SoCon All-Academic Team and Commissioner Medal recipient

CONFERENCES AND PRESENTATIONS

2018 Eastern Finance Association (Program Committee, Session Chair(x2), Discussant, Presenter)

2017 American Finance Association; Financial Management Association

2016 American Finance Association; Financial Management Association (Discussant(x2) & Session Chair(x2)); Northern Finance Association (Discussant)

2015 Midwest Finance Association (Presenter & Discussant); Eastern Finance Association (Presenter, Discussant, & Session Chair); UK/UT Conference (Presenter); Northern Finance Association (Presenter); Financial Management Association (Presenter, Discussant(x2), & Session Chair)

2014 Êstimate - Michigan State University