

The corporate calendar and the timing of share repurchases and equity-based compensation*

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Abstract

This study examines whether the CEO uses share repurchases to sell her equity grants at inflated stock prices, a concern regularly voiced in politics and media. We document that the timing of buyback programs, like the timing of equity-based compensation, is largely determined by the corporate calendar through earnings announcement dates and blackout periods, inducing a spurious positive correlation between share repurchases and equity-based compensation. Accounting for the corporate calendar, share repurchases are no longer correlated with the granting and vesting of equity. The CEO is more likely to buy equity when the firm announces a buyback program and less likely to sell equity when the firm actually buys back shares. Equity compensation increases the CEO's propensity to launch a buyback program when it benefits long-term shareholder value. Our results suggest a novel channel of how equity-based compensation aligns the interests of shareholders with those of the CEO.

Keywords: Payout policy, share repurchases, equity-based incentives, short-termism

[JEL]-classification: G14, G35, M12, M52

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“We give stock to corporate managers to convince them to create the kind of long-term value that benefits American companies and the workers and communities they serve. Instead, what we are seeing is that executives are using buybacks as a chance to cash out their compensation at investor expense.” - SEC Commissioner Robert J. Jackson Jr, March 2019.

1. Introduction

The growth in buyback volumes over the past two decades has fueled concerns that CEOs use share repurchases to temporarily increase the stock price in order to sell their shares above fundamental value.¹ Share repurchases would consequently constitute a transfer of wealth from non-selling shareholders to selling shareholders, implying a detrimental effect on long-term shareholder value. While this concern has prompted calls for stricter regulation of share buybacks, systematic empirical evidence on the matter is still scarce, but tends to be supportive of the argument: research finds that insiders ([Bonaimé and Ryngaert, 2013](#)) and specifically the CEO ([Moore, 2020](#)) are more likely to sell equity when firms buy back stock. [Edmans et al. \(2021\)](#) provide evidence that share repurchases inflate the stock price when the CEO’s equity vests, at the expense of long-term shareholder value.

In this paper, we provide a comprehensive analysis of the interaction between share repurchases and the CEO’s equity-based compensation. We examine whether equity compensation affects the firm’s decision to initiate a buyback program and whether the CEO uses share buybacks to sell equity at inflated stock prices. We combine data on US buyback programs extracted from SEC-filings, the CEO’s equity grants and their vesting dates, and the CEO’s insider trades to answer these questions. We find that share repurchases and equity compensation largely coincide because both are aligned with the corporate calendar which we define as the firm’s schedule of regular financial events such as earnings announce-

¹On 17 October 2019, this concern was at the centre of a hearing before the U.S. House Committee on Financial Services (Hearing no. 116–58). Also, Appendix A.1 provides a list of commentaries pointing at the misuse of share repurchases.

ments and blackout periods. Two simple measures of the corporate calendar, fiscal-month fixed effects and the monthly share of blackout days, fully account for the positive correlation between share repurchases and equity-based compensation observed in the data. Hence, this correlation is spurious and, therefore, does not constitute evidence of opportunistic timing or price manipulation. To the contrary, we find that equity compensation increases the propensity to launch a buyback program when buying back shares is beneficial for long-term shareholder value.

We obtain data on US buyback programs executed in the open market from the firm's quarterly reports because detailed data on US buybacks is not readily available. We collect the number of shares authorized for repurchase under each buyback program, the number of shares repurchased, and the average price at which the shares were repurchased. From Equilar, we determine the dates and size of equity grants and when these grants vest. From Thomson Reuters, we obtain data on the CEO's and other insiders' trades in the company's stock. Our resulting monthly panel data set covers 2,222 repurchasing firms, 6,281 buyback programs, 60,879 months with open market repurchases, and 250,742 firm months for the period 2006-2019.

We start our analysis by plotting a firm's repurchase activity over its fiscal calendar. We document three stylized facts about the timing of share repurchases. First, buyback programs are often initiated the same time as earnings are announced. Second, from first to second month of the fiscal quarter, repurchase volume increases by 42% on average, because the earnings announcement usually takes place early in the second month in a fiscal quarter and many firms consider the period beforehand a blackout period in order to avoid litigation related to insider trading. Third, firms front-load their buyback programs to minimize price risk (Hillert et al., 2016), implying that repurchase activity is also not distributed equally over the fiscal calendar.

In the next step, we examine to what extent the granting, vesting, and selling of equity depends on the corporate calendar. We find patterns that are very similar to those doc-

umented for repurchases. A large share of equity grants is awarded in the first quarter of the fiscal year. Moreover, the CEO’s equity grants cluster in the 10 days after the earnings announcement date.² Granted equity normally vests at the exact same date some years or some quarters in the future. Therefore, the vesting of equity is also correlated with earnings announcements, peaking in the month when earnings are announced. [Edmans et al. \(2017\)](#) document that executives immediately sell some of their equity after it vests. We can confirm this relationship between equity vesting and CEO sales for our sample, implying that the CEO’s sales of equity also peak in the second month of a fiscal quarter.

We move on to examining the direct relationship between open market share repurchases and the CEO’s equity-based compensation, and ask to what extent that relationship is associated with the corporate calendar. We document a statistically significant relation between share repurchases and equity grants, and between share repurchases and vesting equity, in line with [Moore \(2020\)](#) and [Edmans et al. \(2021\)](#). However, after accounting for the firms’ corporate calendar by adding fiscal-month fixed effects and the share of blackout days in a calendar month as control variables, these correlations disappear entirely.³ We conclude that the vesting of equity does not have a direct influence on the execution of buyback programs in the open market.

If CEOs use share repurchases to sell their equity at higher prices, we should observe relatively more share repurchases when CEOs actually sell equity. However, we do not observe such a pattern in the data. Accounting for the corporate calendar, we find that CEOs are less likely to sell equity when their firms buy back shares. Moreover, CEOs turn out to sell larger shares of their vesting equity towards the end of the buyback program when repurchase volumes are relatively low. While we acknowledge that these results cannot be

²[Daines et al. \(2018\)](#) report that many firms grant options to their CEOs shortly after earnings announcements to minimize opportunism

³We perform additional analyses to alleviate endogeneity concerns. [Bagnoli et al. \(2002\)](#) and [DeHaan et al. \(2015\)](#) have documented that earnings announcements can be strategically postponed or delayed. To rule out that our measure of blackout periods is a bad control because it confounds some of the effect that should be captured in our compensation variables, we re-run all our regressions using the blackout-period of the same quarter in the previous year. All coefficient estimates remain quantitatively unchanged.

interpreted causally, they can certainly not be interpreted as evidence that the CEO trades against the firm.

After examining the trading behaviour of the firm, we move our attention to the firm's decision to initiate a buyback program and how this decision relates to equity-based compensation. Running a linear probability model of the start of buyback programs on monthly panel data, we find that CEOs are actually more likely to buy stock in the month in which the repurchase program starts. If CEOs buy equity worth one million dollar, the firm is ten times more likely to initiate a buyback program. Interestingly, we also find that the probability of launching a buyback program increases when the CEO's equity vests. If one million dollar of equity vests, the probability of a buyback program being initiated increases by 14%. Overall, these results suggest that CEOs initiate buyback programs when they believe that the stock is undervalued.

In order to understand the value implications of buyback programs when they are directly linked to the CEO's equity-based compensation, we estimate (long-run) abnormal returns. We find that buyback *programs* which coincide with the vesting of equity are followed by positive abnormal returns over the subsequent 48 months, and their performance is not different from the average buyback program. When CEOs sell large amounts of their equity in the first 12 months after the start of the program, the associated long-run performance over the subsequent 48 months is even more positive than the one observed for the average program, which is inconsistent with the notion that CEO sales of equity and long-run performance are negatively correlated. These results and the observation that equity grants increase the propensity of launching a buyback program, suggest that the interests of the CEO and the shareholders become more aligned through equity grants: CEOs seem to be more willing to undertake value-increasing share repurchases if they are profiting themselves.

Actual open market repurchases which coincide with the vesting or selling of equity are generally followed by positive abnormal returns. Furthermore, the average firm conducts these repurchases at prices below contemporaneous market prices. Firms, therefore, either

buy back shares before stock prices increase or they trade contrary to the market. Either way, there is no evidence that firms overpay for repurchased shares or use share repurchases to bid up the stock price. Taken together, these results do not support the conclusion that CEOs systematically misuse share repurchases to their benefit and at the expense of shareholder value.

Earlier research documents a negative correlation between share repurchases and net insider trading and our results are not in contradiction with this research. In line with [Bonaimé and Ryngaert \(2013\)](#), we find that share repurchases and net insider trading are negatively correlated, i.e., insiders sell more when firms buy back. Further analyses reveal that this correlation is not driven by the firm’s executives (who actually trade in the same direction as the firm) but mainly by large blockholders: large blockholders are also classified as insiders and they sell more when firms buy back stock. This finding is consistent with the results in [Hillert et al. \(2016\)](#) and [Busch and Obernberger \(2017\)](#) that firms provide liquidity when large blockholders sell their shares in order to provide price support at fundamental values.

Some studies report that CEOs sell many more shares shortly after buyback announcements than before buyback announcements (see, e.g., [Jackson Jr, 2019](#), and [Edmans et al., 2021](#)). [Bettis et al. \(2000\)](#) and [Klein and Maug \(2020\)](#) document that executives make more insider trades after the earnings announcement because they mark the end of firms’ blackout periods. We should, therefore, expect that CEOs sell more stock after buyback announcements merely because they largely coincide with earnings announcements. Consistent with this observation, we find that CEOs do not sell more of their stock when buyback announcements are not preceded by blackout periods. Hence, we conclude that the increase in CEO sales shortly after buyback announcements is again due to the corporate calendar.

In conclusion, we make several contributions to the literature. First, we highlight the relevance of the corporate calendar for the timing of share repurchases. We document that repurchase activity varies substantially within a fiscal quarter and within a fiscal year, which

to our knowledge has hitherto not been documented. As a consequence, any study of repurchase activity suffers from omitted variable bias if the variables of interest are correlated with the corporate calendar. Second, we demonstrate that the corporate calendar induces a spurious positive correlation between share repurchases and equity-based compensation. We conclude that the correlations between share repurchases and vesting equity reported in [Edmans et al. \(2017\)](#) and between share repurchases and CEO sales reported in [Moore \(2020\)](#) stem from omitted variable bias. More generally, our results suggest that the vesting of equity is not a valid instrument of equity sales if the dependant variable is linked to the corporate calendar. Third, we document that the initiation of a buyback program is more likely when the CEO's equity vests, which is beneficial also for long-term shareholder value. In earlier work, [Kahle \(2002\)](#) finds that managers announce buyback programs to maximize their personal wealth, whereas shareholders do not profit from these buyback programs. We add to the literature by showing that shareholders benefit as well. Fourth, we show that CEOs buy equity when the firm announces a buyback program and refrain from selling equity when the firm buys back stock in the open market. We show that institutional investors, rather than the CEO or other executive officers, trade against the firm, presumably because repurchases provide liquidity. These insights add to the literature on the relationship between insider trading and share repurchases, which for the most part has not distinguished between different types of insiders (cf. [Bonaimé and Ryngaert, 2013](#), and [Cziraki et al., 2019](#)).

We also contribute to the ongoing discussion of a tighter regulation of buybacks. We find no evidence that executives use share repurchases to increase their own personal wealth at the expense of shareholder value. Instead, equity grants appear to encourage the CEO to make use of buyback programs if they increase shareholder value. Therefore, further regulation of buybacks poses the risk of being detrimental to shareholder value, while the benefits of further regulation remain unclear. See Section 6 for a more detailed discussion and suggestions.

The paper is organized as follows: The next section discusses the related literature and Section 3 the regulation of share repurchases, equity grants, and insider trading. Section 4 contains our data and methodology, followed by our results in Section 5. Section 6 concludes.

2. Related literature

The literature on the relationship between share repurchases and equity-based compensation has focused on three different compensation-related events: equity grants, equity vesting, and sales of equity. Babenko (2009) finds that firms make fewer stock option and stock awards after repurchases. The author argues that share repurchases increase the pay-performance sensitivity of the equity grants: a higher pay-performance sensitivity would allow firms to issue lower equity grants in the future while maintaining the same level of incentivization. Kahle (2002) shows that firms announce repurchases when executives have large numbers of options outstanding and when employees have large numbers of options currently exercisable. Her results are consistent with managers repurchasing both to maximize their own wealth and to counter dilution from employee stock option exercises. Bens et al. (2003) find that executives use share repurchases to counter the dilutive effect of outstanding employee stock options on earnings per share. The dilution-channel has been recently confirmed in Bonaimé et al. (2020).

Moore (2020) uses equity vesting schedules to predict the CEO's sales of equity. The author finds that predicted CEO sales are positively related to the probability and size of share repurchases, concluding that the CEO's equity-based compensation motivates share repurchases. However, the author does not find any impact of the opportunistic timing on long-term shareholder value. Edmans et al. (2021) show that firms buy back more stock after managers' stock options vest. The authors find that stock returns are more positive in the two quarters surrounding repurchases, but more negative in the two years following repurchases, which is contrary to Moore (2020). Edmans et al. (2021) argue that both studies come to different conclusions because of different sample sizes. Edmans et al. (2021) also

document that CEOs sell more stock in the month after the buyback announcements than in the month before the buyback announcement. Overall, these papers argue that equity-based compensation creates short-term incentives to use share repurchases opportunistically.

[Bonaimé and Ryngaert \(2013\)](#) find that the probability of repurchases is highest in quarters with net insider selling. The authors conclude that share repurchases which coincide with insider selling are more likely done to support share prices or to avoid dilution, and are less likely motivated by undervaluation. [Babenko et al. \(2012\)](#) find that insider purchases ahead of buyback announcements are positively related to buyback announcement returns and post-announcement stock returns. [Cziraki et al. \(2019\)](#) document that insiders buy more stock than they sell prior to buyback announcements, which suggests that insiders and the firm share a consistent valuation of the firm's current market value.

To briefly review the more general literature on repurchases, several papers document a positive relation between buyback announcements and long-term shareholder value (cf, e.g., [Ikenberry et al., 1995](#), [Peyer and Vermaelen, 2009](#), [Lee et al., 2020](#)), between open market share repurchases and shareholder value ([Ben-Rephael et al., 2014](#), [Dittmar and Field, 2015](#)), and between open market share repurchases and price efficiency ([Busch and Obernberger, 2017](#)). [Almeida et al. \(2016\)](#) show that repurchases undertaken to meet earnings per share forecasts reduce employment, investment, and cash holdings, but these repurchases have no measurable impact on shareholder value. [Bargeron and Farrell \(2021\)](#) use the setting of dual-class shares to show that repurchases have a temporary price impact, but the authors argue that the price impact would be too small for CEOs to benefit from it.

3. Regulation of share repurchases, equity grants, and insider trading

3.1. U.S. regulation of share repurchase programs

The decision to initiate a buyback program concerns the firm's capital structure and payout policies and will usually be made on the executive level, with the implicit or explicit involvement of the CEO will. The firm's board of directors has to officially authorize a

program before it can start. There is no requirement to obtain approval from shareholders at the shareholders' meeting. Below, we discuss which aspects of buyback programs need to be disclosed to the public.

3.1.1. Disclosure of share repurchase programs and repurchase activity

There are no specific rules or regulations regarding the announcement of newly authorized buyback programs. Firms are in general required to disclose all material information as soon as possible. Buyback programs are usually considered material information because they affect shareholders (higher payout) and debtholders (potentially higher probability of default) alike.⁴ The decision to launch a buyback program is therefore usually communicated to the public via SEC's 8-K filings.

Item 703 of Regulation S-K (17 CFR § 229.703) requires the firm to provide information about its repurchase activity retrospectively in its quarterly reports (via SEC's 10-Q or 10-K). For each month covered by the report, the firm must report (a) the total number of shares purchased, (b) the average price paid per share, (c) the total number of shares purchased as part of publicly announced programs, and (d) the maximum number of shares that may yet be purchased under these programs. The firm must also disclose the type of transaction (open market repurchase, tender offer, privately negotiated repurchase, or accelerated share repurchase) and whether the purchase was made to satisfy the firm's obligations to provide shares to their employees as part of their compensation and pension schemes.⁵ For each publicly announced program, the firm must further disclose the program's date of announcement, the approved dollar value of the program, and the expiration date (if any).

⁴For example, the NYSE mentions buyback program starts as material information: https://www.nyse.com/publicdocs/nyse/regulation/nyse/NYSE_2020_Listed_Company_Compliance_Guidance_Memo.pdf

⁵The SEC rule provides a template for the repurchase table and clarifies the information to be disclosed in the footnote to the table: <https://www.govinfo.gov/app/details/CFR-2008-title17-vol2/CFR-2008-title17-vol2-sec229-703>.

3.1.2. Regulation of the purchase of securities by the issuer

The firm's trading in its own stock is subject to SEC rules 10b-5 and SEC rule 10b5-1, which articulate that it is unlawful to employ "manipulative or deceptive devices" (17 CFR § 240.10b-5) and to trade on the basis of material non-public information (17 CFR § 240.10b-5-1). As such, the firm is liable for any damages caused by manipulation or insider trading.

SEC rule 10b-18 (17 CFR § 240.10b-18), whose amendment in 2003 paved the way for the growth in buyback activity, provides a safe harbor from liability for manipulation with respect to the manner, timing, price, and volume of repurchases, provided they adhere to a number of conditions. Most notably, repurchases are exempt from anti-manipulation provisions if the firm (1) uses only one broker per trading day, (2) refrains from trading at the beginning and at the end of the trading day, (3) purchases stock at prices lower than the highest independent bid, and purchases less than 25 percent of the average daily trading volume.

SEC Rule 10b5-1 exempts repurchases from prosecution for insider trading if repurchases follow a pre-defined, written plan that either specifies the amounts, dates, and prices at which trading should take place, or executes a pre-defined trading formula. [Bonaimé et al. \(2020\)](#) find that the announcement of a 10b5-1 program leads to a significantly positive abnormal return for the firm's stock. Our sample includes 10b5-1 programs.

3.2. U.S. regulation of equity grants, vesting periods, and insider trading

To overcome the agency problems stemming from the separation of ownership and control in publicly traded firms, executives are usually compensated by equity grants of the firm they manage. Usually, the compensation committee (a subcommittee of the board of directors) determines executive compensation. Equity awards may or may not require board approval, depending on how much authority the firm's compensation plan delegates to the compensation committee of the board. Since 2003, the New York Stock Exchange (NYSE) and the NASDAQ Stock Exchange have accepted new rules which ask shareholder approval of stock

option plans and other types of equity compensation. Since 2006, executive compensation packages have to be disclosed on a yearly level in the annual meeting’s proxy statement, including the executives’ equity grants and the vesting periods of any equity grants (DEF 14a).

The firm’s executives, together with directors and any owners of more than 10% of the firm’s shares, are commonly defined as insiders.⁶ Insider trades must be filed to the SEC within two business days by filling in the SEC Form 4. Moreover, each executive may have a personal 10b5-1 plan and these personal plans are seen controversial. For a detailed discussion of 10b5-1 trading plans and their use by insiders, see [Jagolinzer \(2009\)](#).

4. Data and methodology

To date, there is no commercial database that provides detailed repurchase activity on a monthly basis or includes details on the nature of the repurchases. Therefore, we obtain the repurchase data directly from the quarterly filings with the SEC. We provide a detailed step-by-step description of this process in the Internet Appendix. Our complete repurchase data set, obtained from SEC’s EDGAR system, covers all firms available in CRSP and contains 3,713 repurchasing firms, 10,023 buyback programs, and 97,179 open market repurchases (repurchase months) between 2006 and 2019. In line with earlier literature (cf., e.g., [Billett and Xue, 2007](#), [Bonaimé and Ryngaert, 2013](#), [Edmans et al., 2017](#), [Almeida et al., 2016](#), [Moore, 2020](#)), we exclude firms in financial services and utilities from the sample. The literature has resorted to excluding these industries because of industry-specific regulation hampering the timing of share repurchases and executive compensation (Financial Services) and the businesses’ not-for-profit nature (Utilities). After this step, we are left with 2,711 repurchasing firms, 7,421 buyback programs, and 72,074 repurchase months. In the final

⁶The SEC definition of insider trading does not provide a complete list of people who need to file. The SEC’s definition is “Illegal insider trading refers generally to buying or selling a security, in breach of a fiduciary duty or other relationship of trust and confidence, on the basis of material, nonpublic information about the security”. See <https://www.investor.gov/introduction-investing/investing-basics/glossary/insider-trading>.

step, we remove all observations for which one of our control variables is missing. Our final dataset, which contains 2,222 repurchasing firms, 6,281 buyback programs, 60,879 open market repurchasing months, and 250,742 firm months over the period 2006 to 2019.

4.1. Variables

The dependent variable in our baseline regression is *Repurchase intensity*, which is constructed as the monthly number of shares repurchased in the open market under a publicly announced program during the month, divided by the number of shares outstanding at the beginning of the month, multiplied by 100.⁷

4.1.1. Equity-based compensation and insider trading

We analyze three distinct events related to the CEO’s equity-based compensation: (1) The granting of equity, (2) the vesting of equity, and, finally, (3) the sale of equity. Below, we describe how we construct variables for each of these three events.

A CEO’s equity compensation consists of awarded stocks and awarded options. We use Equilar to observe the grant dates and dollar amounts of the awarded stocks and options. Determining when the CEO’s granted equity subsequently vests is more cumbersome, and different approaches need to be applied for stocks and options. In line with the methodology in [Edmans et al. \(2017\)](#) and [Edmans et al. \(2021\)](#), we construct *Vesting equity*, which is the dollar value of vesting equity on a monthly level.

We rely on Thomson Reuters Insider Data for detailed transaction data of firm insiders. We remove records with a cleanse indicator of “A” or “S”, which indicate that the data was not verified, following [Dai et al. \(2016\)](#) and [Rossi and Sahlström \(2019\)](#). We aggregate daily data to calculate monthly measures In line with [Bonaimé and Ryngaert \(2013\)](#) we

⁷Firms regularly buy back shares to satisfy obligations from employee stock option plans and these repurchases are usually made outside of publicly announced buyback programs. These buybacks are mechanically related to the CEO’s equity-based compensation. Hence, they are outside of the influence of the CEO and are thus not considered in this study. For a more detailed discussion of the differences between total repurchases and repurchases under a publicly announced program, see Section A.1.1 in [Hillert et al. \(2016\)](#). Repurchases outside of publicly announced programs constitute only a small fraction of the total number of shares repurchased (6.6%).

construct *Insider trading* to denote the net dollar amount of insider acquisitions minus insider disposals. We decompose *Insider trading* into the trading activity done by each group of insiders according to their functional role, which is provided by the Thomson Reuters Insiders Data Feed Manual. Based on this categorization, we classify trading done by the CEO, CxO (all Chief Officers except for the CEO), Officers, Directors, Beneficial owners, Affiliates, Committee members and Others.

4.1.2. *Blackout periods*

Most companies voluntarily impose blackout periods to restrict insider trading and avoid litigation risk. Firms have no obligation to disclose their insider trade policies, and only a small portion of firms voluntarily do so. Therefore, the blackout periods for most firms cannot be directly observed.

The literature estimates blackout periods with three main methods: survey, firm's disclosed insider trade policy, and actual insider trading history. Based on a survey, [Bettis et al. \(2000\)](#) find that 78.11% firms have blackout periods and that the most common policy allows a 10-day window for insider trading. [Jagolinzer et al. \(2011\)](#) collect and examine 522 insider trade policies that are voluntarily disclosed by firms, and conclude that the average blackout period includes 46 days before and one day after the earnings announcement. Furthermore, they find that 24% insider trades happen within blackout periods. [Roulstone \(2003\)](#) argues that 31.6% firms have blackout periods, based on the criteria that at least 75% of insider trades of a firm are within one month after its earnings announcements. A recent paper by [Guay et al. \(2022\)](#) estimates the lengths of blackout periods based on actual insider trades, and find that the median firm allows insider trades from three days after the earnings announcement until 17 to 22 days before the end of a fiscal quarter, depending on which cutoff percentile is used.

We rely on [Guay et al. \(2022\)](#) to compute our measure of blackout periods because the authors use the most comprehensive sample of all studies and cover a time period which is similar to ours. Hence, we define the blackout period as the period from 20 days before

the end of a firm’s fiscal quarter until three days after the following earnings announcement (Compustat item: RDQ date). To obtain our monthly measure, *Blackout ratio*, we compute the fraction of trading days that are blackout days within a month.

According to our definition of a blackout period, the length of blackout period varies with the number of days it takes a firm before announcing its earnings. In our sample, the mean (median) length of blackout period is 58 (56) days. On the monthly level, the mean (median) number of blackout days is 19 (21).

4.1.3. Control variables

Table A1 provides a detailed overview of all control variables used in the regressions. The table also provides the coefficient estimates of all control variables used in our baseline regressions.

4.2. Descriptive statistics

Table 1 provides an overview of all variables used in this paper along with their definition and data source. Table 2 presents the descriptive statistics for these variables. Our firm-level panel covers 250,742 observations. Our repurchase variables are similar to those reported in Hillert et al. (2016) and our measures of equity-based compensation are in the same order of magnitude as the corresponding measures reported in Edmans et al. (2017) and Bonaimé and Ryngaert (2013). The average *Blackout ratio* is 0.64, in line with Guay et al. (2022).

4.3. Research Design

Our analysis is based on a firm-level panel data set using monthly observations between 2006 and 2019. Our full specification regresses a measure of repurchase activity on measures related to the CEO’s equity based compensation, standard controls, controls for the corporate calendar (*Blackout ratio* and *Fiscal month dummies*), and time and firm fixed effects:

$$\begin{aligned}
 \text{Repurchases}_{i,t} = & \beta_1 \cdot \text{CEO-comp}_{i,t} + \delta \cdot \text{Blackout ratio}_{i,t} + \gamma \cdot \text{Controls}_{i,t} \\
 & + \lambda_j + \eta_t + \mu_i + \epsilon_{i,t}
 \end{aligned} \tag{1}$$

where $Repurchases_{i,t}$ measures firm i 's repurchase activity in month t and $CEO-comp_{i,t}$ measures firm i 's equity-based compensation of the CEO in month t (*Granted equity*, *Vesting equity*, or *CEO selling*). λ_j , η_t , and μ_i denote fiscal month fixed effects, time fixed effects, and firm fixed effects, respectively. The standard errors are clustered at the firm level, and regressions are unweighted.

5. Results

In Section 5.1, we examine to what extent share repurchases and the CEO's equity-based compensation depend on the corporate calendar, which we define as the firm's schedule of regular financial events such as earnings announcements and blackout periods. In Section 5.2, we examine the relationship between share repurchases and the CEO's equity based compensation and ask to what extent that relationship is moderated by the corporate calendar. In Section 5.3, we examine how the interaction between share repurchases and equity-based compensation affects stock prices.

5.1. *The corporate calendar and the timing of share repurchases and the CEO's equity based compensation*

We expect share repurchases and equity-based compensation to be correlated with the corporate calendar because their timing is linked to the earnings announcement in two ways. First, earnings announcements determine the timing of equity grants and buyback programs. Daines et al. (2018) report that many firms grant options to their CEOs shortly after earnings announcements to minimize opportunism. Because opportunism is also a concern with respect to buyback programs, firms may also opt to announce (i.e., initiate) buyback programs around the earnings announcement.⁸ Second, earnings announcements determine when firms and insiders can trade. Blackout periods confine share repurchases in the open market and

⁸Buyback programs need to be approved by the board. Vafeas (1999) and Adams et al. (2021) state that there are less than two board meetings in one quarter on average. Board meetings are, therefore, likely to take place ahead of the announcement of earnings. Hence, buyback announcements may coincide with earnings announcements because both buybacks and earnings are discussed on the board level.

insider trades to the same time period, which usually starts shortly after the earnings announcements and ends about 17-22 days before the end of the fiscal quarter (Guay et al., 2022).

Figure 1, Panel A, plots the *initiation* of buyback programs over the twelve months of a firm’s fiscal year. We find that a relatively large share of buyback programs is initiated at the beginning of the fiscal year. Moreover, we observe that most announcements take place in the second, fifth, eighth, and eleventh month. Figure 1, Panel B, plots the difference in calendar days between the announcement of a buyback program and the announcement of earnings. A large number of buyback programs is announced on the same day as the firm’s quarterly earnings, which regularly happens in the second month of the fiscal quarter. We conclude that the announcement and thus start of buyback programs is not randomly distributed over the corporate calendar.

Figure 2, Panel A, plots the *execution* of buyback programs in the open market from the month after the initiation of the program to 12 months later. For each program month, we compute the average of *Repurchase intensity* over all open buyback programs. We observe a clear pattern, first documented in Hillert et al. (2016): firms buy back their stock at a decreasing rate, which is consistent with how large, risk-averse block-traders execute their trades in order to minimize price risk.⁹ A second, to our knowledge novel pattern is revealed when repurchase activity is displayed in fiscal time: Figure 2, Panel B, translates the calendar-time plot presented in Panel A into fiscal time by assigning each program month to its corresponding month in the fiscal quarter. Hence, for buyback programs starting in the first month of the fiscal quarter (q, m=1), program month $t+1$ in Panel A translates into q, m=2 in Panel B. For programs starting in q, m=2 (q, m=3), program month $t+1$ in Panel A translates into q, m=3 (q+1, m=1) in Panel B. This transformation brings out a very persistent pattern of repurchase activity within buyback programs: repurchase activity

⁹Theoretical work on block trading strategies concludes that risk-averse investors with a limited time horizon should front-load their trades to reduce the exposure to stock price risk and to improve risk sharing (cf. Bertsimas and Lo, 1998, Almgren and Chriss, 2001, Vayanos, 2001, and He and Mamaysky, 2005).

is highest in the second month and lowest in the first month of each quarter and the average relative difference between the first and the second month is equal to 42%.

Figure 3 groups repurchase months into three categories according to how much of a month is covered by blackout days.¹⁰ We find that *Repurchase intensity* is 2.5 times larger in months with less than 25% blackout days than in months with more than 75%. Hence, we conclude that repurchase activity is largely determined by the timing of the earnings announcement and the firm’s blackout periods.

Figure 4, Panel A, shows that equity grants are predominantly granted in the first quarter of the fiscal year. Panel B furthermore indicates that equity grants cluster around earnings announcements.¹¹ The timing of equity grants prescribes at what date in the future equity vests because the vesting date usually falls on the same day in a future quarter. Furthermore, [Edmans et al. \(2018\)](#) document that CEOs immediately sell some of their vested equity, suggesting that the CEO’s trades in the company’s stock will also be correlated with earnings announcements. We, therefore, expect that the vesting and selling of equity is also linked to the announcement of earnings. In Panel A and Panel B of Figure 5, we plot the vesting of equity and the CEO’s sale of equity over the first 12 months of a buyback program. Again, we transform the graphs into fiscal time. We observe that volumes are roughly double in the second month of the fiscal quarter compared to the first or third month of the fiscal quarter. Notably, by comparing Panel A and Panel B, it furthermore becomes apparent that CEOs tend to sell more of their vested equity towards the end of the program: we observe that the level of CEO sales is relatively stable while vesting equity is negatively associated with the time since the start of the program.

In Table 3, we demonstrate that the patterns depicted in our figures can also be observed in a regression analysis using monthly panel data. We regress *Repurchase intensity* on *Blackout ratio* (column 1), fiscal-quarter months (column 2), fiscal-year months (column 3),

¹⁰See Section 4.1.2 for details on how we identify blackout days.

¹¹This pattern was first documented in [Yermack \(1997\)](#). [Daines et al. \(2018\)](#) report that many firms grant options to their CEOs shortly after earnings announcements to minimize opportunism.

and combinations of these variables (columns 4 and 5). We find that all corporate calendar-variables are highly predictive of *Repurchase intensity*. If the blackout period covers half of a given month, *Repurchase Intensity* will be lower by 0.073% ($=50\% \times 0.1465$), which is almost exactly half of the average *Repurchases Intensity* recorded for our sample. The fiscal-quarter month indicators in column (2) bring out the pattern observed earlier: repurchases peak in the second quarter. Using fiscal-year month indicators (column 3) documents that the pattern is more nuanced. Most notably, repurchase activity is highest in the third month (rather than the second month) of the first fiscal quarter because the earnings announcement of the past fiscal year is usually scheduled later in the quarter. Column (4) suggests that most of the within-quarter variation can be explained by the firm’s blackout periods, whereas column (5) suggests that adding fiscal-year months provides a more complete picture of the relationship between the corporate calendar and repurchase activity.¹²

5.2. Regressions of share repurchases on equity-based compensation and insider trading: the role of the corporate calendar

This section provides a detailed analysis of the interaction between share repurchases and the CEO’s equity-based compensation.

In Table 4, we examine the direct relationship between open market share repurchases and the CEO’s equity-based compensation, and to what extent that relationship is associated with the corporate calendar. In column (1), we regress *Repurchase intensity* on *Granted equity*, standard controls, and firm and time fixed effects. We obtain a statistically significant coefficient for *Granted equity* of 0.0010, which means that an equity grant of one million dollar increases *Repurchase intensity* by 0.001 percentage points on average, which is equal to 0.64% of the average *Repurchase intensity* ($=0.1568\%$, from Table 2) in our sample.¹³ In

¹²We document similar patterns for the CEO’s equity compensation (Table OA1, Panel A: equity grants, Panel B: vesting equity) and the CEO’s sale of equity (Panel C). For equity grants and vesting equity, the fiscal-year months have more explanatory power than the firm’s blackout ratio, whereas it is the other way round for the CEO’s sale of equity. Moreover, we obtain very similar results and conclusions when we transform our dependant variables into binary variables, see Table OA2.

¹³In Table A1, we provide a discussion of the control variables and how well they blend in with the existing

column (2), we add two controls for the corporate calendar: fiscal month-fixed effects and *Blackout ratio*. As a consequence, the coefficient estimate of *Granted equity* decreases to practically zero. We conclude that the correlation between *Repurchase intensity* and the granting of equity is driven by the corporate calendar and thus spurious.

In columns (3) and (4), we obtain very similar results for *Vesting equity*. In column (3), vesting equity in the amount of one million dollar increases *Repurchase intensity* by 0.0046 percentage points on average, which is equal to 2.93 of the average *Repurchase intensity* (=0.1568%, from Table 2) in our sample. Our coefficient estimate of *Vesting equity* is in the same order of magnitude as the coefficient estimates reported in earlier studies. [Edmans et al. \(2021\)](#) report a coefficient estimate of 0.0068 and [Moore \(2020\)](#) reports coefficient estimates in the range of 0.0020 and 0.0053. In line with our argument, the correlation between *Repurchase intensity* and *Vesting equity* disappears in column (4) as we account for the corporate calendar.

In column (5), we regress *Repurchase intensity* on CEO selling using all standard controls except our corporate calendar controls. For this setup, we observe a marginally significant, negative relationship between repurchases and CEO sales. In column (6), which represents the specification that accounts for the corporate calendar, we obtain highly significant correlation between the amount of CEO selling and *Repurchase intensity*: the estimate of *CEO selling* more than doubles relative to column (5). Hence, our results suggest that CEOs refrain from selling shares when the firm buys back shares in the open market.¹⁴

literature. Our general conclusion is that all control variables align well with the existing literature.

¹⁴We test the robustness of our results in Table 4 along several dimensions. In Table OA3, we use dummy variables of our variables of interest instead of dollar values, which does not change any of our results and conclusions. In Table OA4, we use either *Blackout ratio* or fiscal-year month dummies as controls for the corporate calendar. We find that each variable accounts for approximately half of the correlation reported in Table 4. Finally, note that our analysis is based on open market repurchases made under an authorized program. In Table OA5, we replicate the results of Table 4 for repurchases made to satisfy obligations from employee stock option plans which happen outside of authorized programs. We find that these repurchases are correlated with equity compensation irrespective of whether we account for the corporate calendar or not. We conclude that our corporate calendar variables do not confound mechanical correlations between share repurchases and equity compensation. Furthermore, we conclude that studies analyzing the total number of share repurchases may also pick up the mechanical correlation between share repurchases and equity vesting, which is not motivated by opportunistic timing.

We use the earnings announcement date to determine a firm’s blackout period and we acknowledge that earnings announcements are endogenous. [DeHaan et al. \(2015\)](#) and [Bagnoli et al. \(2002\)](#) have documented that earnings announcements can be strategically postponed or delayed after bad news.¹⁵ However, the strategic timing of earnings announcements would, if anything, disconnect buybacks and equity compensation from each other. Moreover, any potential delay would be in the scale of days, a granularity which most of our analyses (and all our key analyses) are not able to pick up. Nevertheless, to rule out that our measure of blackout periods is a bad control because it confounds some of the effect that should be captured in our compensation variables (see [Angrist and Pischke, 2009](#), for a discussion of the bad control problem), we re-run all our regressions using the blackout-period of the same quarter in the previous year. All coefficient estimates remain quantitatively unchanged (Table [OA6](#)).

[Bonaimé et al. \(2020\)](#) report that firms increasingly make use of SEC rule 10b5-1 when they buy back stock.¹⁶ Buybacks under 10b5-1 programs should be less dependent on the corporate calendar, in particular blackout periods, because there is lower risk of litigation. Table [OA7](#) shows that the correlation between share repurchases and equity compensation reported in columns (1), (3), and (5) in Table [4](#) are only present in flexible programs, but not in 10b5-1 programs, corroborating the notion that conventional buyback programs are hampered by trading restrictions directly related to the firm’s corporate calendar.¹⁷

[Bonaimé and Ryngaert \(2013\)](#) document a negative relationship between share repurchases and net insider trading. In order to reconcile our results reported in Table [4](#) with [Bonaimé and Ryngaert \(2013\)](#), we take a closer look at the CEO’s actual trades of equity

¹⁵The vesting of restricted stock is a taxable event for the executives who would want a low stock price on that date. Hence, executives have an incentive to announce earnings after the vesting date if earnings exceed expectations. However, such anticipated behaviour is not backed by earlier research finding that the earnings announcement is delayed when it is bad.

¹⁶We discuss the regulation of share repurchases under SEC-rule 10b5-1 in Section [3.1.2](#).

¹⁷15% (12%) of repurchase months in the most recent five (all) years of our sample are associated with SEC rule 10b5-1 (in these cases, firms have indicated that some or all repurchases may have taken place under 10b5-1; hence, this number constitutes the upper bound of repurchases under 10b5-1), suggesting that the corporate calendar will remain a significant factor for buyback activity for the foreseeable future.

in Table 5. First, we aim to establish common ground and regress *Repurchase intensity* on *Insider trading* and additional control variables used in the literature. In column (1), we find a negative relationship between share repurchases and net insider trading, which is statistically highly significant, in line with [Bonaimé and Ryngaert \(2013\)](#). Statistical and economic significance disappears once we control for the corporate calendar in column (2). In column (3), we decompose net insider trading into trading by the CEO, the other lead executive officers (CxO), other officers, directors, beneficial owners, and affiliates. We find that the CEO trades in the same direction as the firm. There is also no evidence that lead executive officers trade against the firm. However, other officers, directors and beneficial owners appear to be trading against the firm. When we account for the corporate calendar in column (4), only the negative correlation between beneficial owners and share repurchases remains. Beneficial owners are usually funds or trusts who hold large blocks of shares. This result is consistent with [Hillert et al. \(2016\)](#) and [Busch and Obernberger \(2017\)](#) who argue that firms provide liquidity when large blockholders sell their shares in order to provide price support at fundamental values.

In Table 6 and Table 7, we examine earlier reports that CEOs tend to sell their equity shortly after the firm announces the start of a new buyback program (cf., e.g., [Edmans et al., 2021](#), [Jackson Jr, 2019](#)). In Table 6, we examine differences in sales of equity between ten days before and ten days after the announcement of buyback programs. We find that CEOs indeed sell more equity after buyback announcements. Meanwhile, the number of blackout days turns out to be much larger before the buyback announcement. Hence, CEOs are much less restrained in their trading after the buyback announcement. A similar, but even more pronounced picture evolves when we perform the same analysis around earnings announcements. Moreover, if we perform the same analysis for those buyback announcements which do not have blackout days within the event period, we are no longer able to document differences in trading between the pre- and post-period. We conclude that the differences in CEO selling around buyback announcements are due to their clustering around earnings

announcements, which confines many CEOs to trading after the buyback announcement.

In order to obtain a more comprehensive picture on the connection between buyback announcements and CEO trading, we use a linear probability model of *Program initiation* on the CEO's equity compensation, the CEO's trading, and control variables. The results are presented in Table 7. We find that the probability of launching a buyback program increases when the CEO's equity vests. If one million dollar of equity vests, the probability of a buyback program being initiated increases by 14%.¹⁸ If the CEO buys stock worth one million dollar, the firm is ten times more likely to initiate a buyback program. Overall, these results suggest that the CEO tends to believe that the stock is undervalued when she initiates a buyback program. There is no evidence for the notion that the CEO uses buyback announcements to create short-term private benefits.

5.3. Share repurchases, equity-based compensation, and insider trading: prices and long-run returns

In this section, we test the shareholder value-implications of two hypotheses on the interaction of share repurchases and equity-based compensation. The first hypothesis posits that the CEO uses share repurchases to inflate the stock price above its fundamental value when she sells her equity. If buybacks move prices away from fundamental values, we should observe positive abnormal returns in the short-run and a reversal of these abnormal returns (i.e., negative abnormal returns) on the long run. The prediction of a reversal of abnormal returns is based on the assumption that deviations from fundamental value cannot be sustained permanently, a basic premise of efficient financial markets.

As an alternative, we test the hypothesis that equity compensation increases the likelihood of a buyback program when such a program is beneficial for shareholder value. As a tool of payout policy, share repurchases can create value for shareholders when the firm's

¹⁸The coefficient estimate of CEO vesting, 0.0034, divided by the unconditional probability of a buyback, 0.025, is equal to 14%. The unconditional buyback probability of 0.025 is computed as the ratio of 6,281 buyback announcements to 250,742 firm months.

agency costs of free cash flow are high and the firm’s cash is worth more in the hands of shareholders. Share repurchases can also create value for shareholders if firms manage to repurchase shares at prices below fundamental value. In this case, share repurchases simply transfer wealth from selling to non-selling shareholders. Equity grants provide an incentive to the CEO to launch a buyback program when she profits from its long-term impact on stock prices. If buybacks create shareholder value, we should observe positive abnormal returns in the short-run, which are not reversed on the long-run or continue to materialize over a longer time period.¹⁹

Hence, a direct link between equity-based compensation and share repurchases is not per se evidence of an agency problem. To constitute an agency problem, share repurchases have to *temporarily* move prices away from fundamental values. We examine this potential agency problem by looking at the long-run stock returns to buyback programs (Table 8) and open market repurchases (Table 9), and the prices paid for repurchased shares relative to market prices (Table 10).

We start our analysis by looking at the returns to buyback programs from their inception up to four years later. Table 8 presents the results of a calendar time-series regression of equally-weighted repurchase portfolio returns for 12 (24, 36, 48, respectively) months on the value-weighted market return and the Fama-French risk factors high minus low (HML) and small minus big (SMB):²⁰

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + \gamma_p SMB_t + \delta_p HML_t + \varepsilon_{pt} \quad (2)$$

The intercept of that regression denotes the average abnormal return over the respective

¹⁹A well established phenomenon in the buyback literature is the “buyback anomaly”, which documents that the market reaction to buyback announcements is too small and that buyback announcements are followed by positive abnormal returns for at least the following 48 months (cf. e.g., [Peyer and Vermaelen \(2009\)](#)).

²⁰All three factors are taken from Kenneth French’s Website. Stocks do not get a higher weight in our equally-weighted portfolios if they have more than one event during the event window. To determine the ranges of portfolios based on the value or amount of vesting equity or equity sales, we use all observations with non-zero values in a given calendar year. Hence, portfolios based on quintiles will not be of equal size.

time period.

For the full sample of 6,277 buyback announcements reported in Panel A, we find significant average monthly abnormal returns of 0.26% (0.24%, 0.20%, 0.19%, respectively) for all four event windows, in line with the results in [Lee et al. \(2020\)](#) who also look at a recent time period. The average monthly returns translate into cumulative abnormal returns of 3.1% (5.8%, 7.2%, 9.1%, respectively by calculating the number of months times the average abnormal monthly return from the table). Thus, the initiation of buyback programs is generally followed by positive abnormal returns, which continue to accumulate even after the first 12 months of the program.

In Table 8, Panel B, we consider only those buyback programs where the start of the program coincides with the month in which the CEO's equity vests. Hence, we look at time periods during which the firm and the CEO can certainly trade against each other in the open market. In total, 1,190 buyback announcements fall into this category. For this sample, we obtain strictly positive abnormal returns which are marginally higher than the results shown in Panel A (full sample).

The CEO's incentive to use share repurchases to temporarily increase the stock price increases in the amount of her vesting equity. In Panel B, we, therefore, group the 1,190 buyback announcements into three portfolios according to the value of the CEO's vesting equity. We find that buyback programs exhibit relatively large positive abnormal returns on the long-run if they coincide with relatively large dollar-amounts of vesting equity. From Table 7 we know that equity grants increase the likelihood of a buyback program being launched (Table 7). Hence, taken together, our results suggest that vesting equity encourages the CEO to initiate a buyback program if it is beneficial for shareholder value. The results are not consistent with the notion of stock price manipulation.²¹

In Table 8, Panel C, we consider only those buyback programs where the CEO sells some

²¹In Table OAS, we sort buyback announcements into three quintiles according to within-firm variation of the dollar-value of vesting equity. Here, we find that the smallest portfolios exhibit the largest positive abnormal returns, but the results are in general still inconsistent with the notion of stock price manipulation.

or all of her vested equity within the first 12 months of the program. Hence, the event window spans over a time period during which the firm and the CEO have actually traded against each other in the open market. We do not record any sale of the CEO's equity for 60% of buyback programs, which might be because the CEO thinks that the stock is currently undervalued or because the firm prohibits simultaneous sales of equity. We find that these buyback programs perform better over the subsequent 48 months than the average buyback program (cumulative average abnormal returns of 15.1% versus 9.8%) and we again observe the strongest effects for the sample with the largest sales of equity by the CEO. Overall, we do not find any evidence that buyback programs are associated with negative long-run returns if CEOs sell equity during the buyback program.

In Table 9, we use the same methodology as in Table 8 to study actual repurchases in the open market, rather than their announcement. Since we wish to more closely examine the temporary impact of share repurchases on stock prices when the CEO's equity vests or the CEO sells her equity, we cover shorter time-periods over the subsequent 12 months. In Panel A, we provide the results for our full sample of open market repurchases (N=59,281). The results suggest managerial timing ability because repurchases are followed by positive abnormal returns. We do not find evidence of a positive price impact in the month of the repurchase.

In Panel B, we only consider those open market repurchases which coincide with the month in which the CEO's equity vests. In total, 9,053 repurchase months fall into this category. For this sample, we obtain values of very similar size as the results shown in Panel A. Sorting into three portfolios according to the dollar-value of the vesting equity does not provide any patterns consistent with stock price manipulation or short-termism either.

[Edmans et al. \(2021\)](#) argue the case of stock price manipulation by showing that vesting equity and subsequent abnormal returns are negatively correlated when firms buy back stock in the same month (cf. Table 3, Panel A, in their paper). We replicate their analysis and confirm their results (Table OA9, Panel A). However, in the Online Appendix we show that

the abnormal returns are just less positive, but not negative, when vesting equity is high (Table OA10), and, secondly, that the return pattern is driven by increases in the stock price, rather than increases in the number of vesting shares. (Table OA9, Panel B). If we change the definition of vesting equity such that the value of the stock no longer plays a role, the return patterns actually disappear (Table OA9, Panel C) or reverse (Table OA9, Panel D). In conclusion, we can confirm the results in Edmans et al. (2021), but do not find them to be convincing evidence of stock price manipulation. For a more thorough discussion of these aspects, we refer the reader to our Online Appendix.

In Panel C, we specifically consider those open market repurchases which coincide with months in which CEOs sell their equity. For the event month, we document a positive and statistically significant abnormal return, which may suggest that share repurchases have a relatively high price impact. Meanwhile, this result may simply be explained by the fact that CEOs are more likely to sell their equity after an abnormal increase in the stock price, coinciding with repurchase activity. Over the following 12 months, we document positive abnormal returns on average, which strictly increase over time (when we consider cumulative abnormal returns: 0.22%, 3 months 0.75%, 6 months 0.95%, and 12 months 1.80%). Sorting repurchase months into three samples according to the value of the CEO's contemporaneous equity sales does not reveal a clear pattern. Most notably, none of the portfolios exhibits negative long-run returns. While we acknowledge that these results cannot be interpreted causally, the results are still helpful in ruling out systematic price manipulation when CEOs sell their shares.

As a final test, we compare repurchase prices to average market prices to check whether firms buy back at a discount or at a premium when equity vests. Our variable of interest, *Repurchase bargain*, is defined as the difference between the monthly average market price and the monthly average repurchase price, scaled by average market price. If firms buy back stock with the intention of bidding up the stock price, repurchase prices should be higher than average market prices, leading to negative repurchase bargains. We expect a similar

outcome if CEOs would sell their shares directly back to the company at a premium.

Our results in Table 10 suggest that *Repurchase bargain* is positive on average, i.e., firms buy back their stock at prices which are generally lower than average market prices. This insight holds true for repurchases when equity vests and for repurchases when no equity vests (Panel A). In the month of the repurchase, the repurchase discount is equal to 0.69% for vesting months and 0.82% for all other months. Even though the difference of 0.13% is statistically significant, the discounts reported for both groups are of similar magnitude and constitute evidence of managerial timing ability. Relative to the average market prices computed over the following six months, firms appear to be buying back at a larger discount if the repurchase coincides with the vesting of equity. The results are very similar when we look at CEOs' sales of equity (Panel B). Hence, contemporaneous CEO sales do not affect the firm's ability to buy back at a bargain.

Overall, the results presented in this section are consistent with earlier research suggesting that firms time their repurchases well and buy back at relatively low prices.²² These results generally hold for the subsample of repurchases that coincide with the vesting or sale of the CEO's equity. We find that the empirical evidence suggests a novel channel of how equity-based compensation benefits shareholder value: equity-based compensation increases the CEO's propensity to start a buyback program when the stock is currently undervalued.

6. Conclusion and areas of further research

In this paper, we document that the corporate calendar creates a spurious correlation between share repurchases and the CEO's equity compensation. We find no evidence that executives use share repurchases to increase their own personal wealth at the expense of shareholder value. To the contrary, our analysis of abnormal returns around share repurchases, the vesting of equity, and the sale of vested equity suggests that equity-based compensation

²²The following studies cover parts of our sample period: Lee et al. (2020) report similar results for buyback announcement returns. Dittmar and Field (2015) and Ben-Rephael et al. (2014) document that firms buy back at prices which are lower than average market prices.

better aligns the interests of shareholders and the CEO.

In light of the results of this study, we find that additional regulation of share repurchases may come at a significant cost for the U.S. capital market. In general, any regulation tailored towards reducing the size of buyback programs may hamper the firm in setting up a payout policy which maximizes shareholder value. More specifically, we caution the regulator to further confine the trading periods of the CEO and the firm by, for example, imposing separate trading periods for the firm and the CEO. Recall that the blackout period lasts two-thirds of an average month. Restricting the remaining one-third of a month will affect the timing of a repurchase and will likely impose additional costs to the firm in the form of lower stock liquidity and higher return volatility.

We would like to suggest two areas of potential regulation for further research. First, establishing 10b5-1 repurchase plans as the default option for executing buyback programs may extend trading periods and alleviate concerns of price manipulation at the same time. An interesting question in this context is why firms have not yet adapted 10b5-1 programs more widely. Second, requiring the firm to provide daily accounts of their repurchase activity in a more timely manner might help to further alleviate concerns. Here, it remains an open question whether requiring daily disclosure will level the field between market participants or whether it will put the firm at an informational disadvantage relative to other market participants.

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A Appendix

Table A1

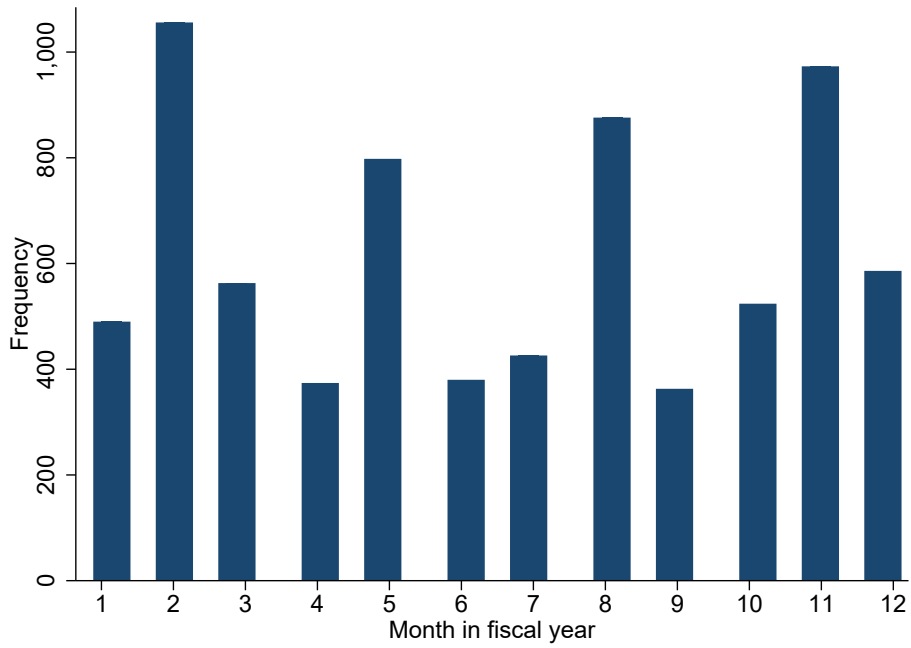
Overview of the standard control variables in our regressions of *Repurchase intensity*. The coefficient estimates reported in column "Our results" are taken from regression specification (2) in Table 4. The coefficient estimates are quantitatively very similar throughout all specifications in Table 4 and Table 5.

Control variable	Reason for use and references	Our results	Consistency with literature	Interpretation of our results
Acquiror	Bagwell (1991) developed a theoretical model to show that repurchases may serve as a takeover defense. However, an empirical relationship between being an acquiror and share repurchases has not been established.	0.0137	Yes	There is no relation between being an acquiror and the execution of share repurchases.
Assets	Dittmar (2000) : Small firms are more likely to be misvalued and more likely to repurchase stock.	0.0352***	Yes	Holding more assets increases share repurchases.
Book-to-market	Dittmar (2000) finds that firms buy back more when their book-to-market ratio is higher, which is in line with the undervaluation hypothesis for share repurchases.	0.0308***	Yes	A higher book-to-market ratio is related to more share repurchases.
Cash-to-assets	Stephens and Weisbach (1998) find that firms tend to repurchase more shares if they have stronger cash flows.	0.1187***	Yes	A higher cash-to-assets ratio is related to more share repurchases.
Change in short interest	Firms increase repurchases to provide price support for a stock that is deemed overvalued by short sellers.	2.4314***	Yes	A larger change in short selling is related to a higher level of share repurchases.
Dividends-to-assets	Grullon and Michaely (2002) find that firms have gradually substituted dividends for repurchases.	-0.2209***	Yes	Lower dividend payout is associated with higher share repurchases.
EBITDA-to-assets	Stephens and Weisbach (1998) find that firms tend to repurchase more shares if they have stronger cash flows.	0.1975***	Yes	A higher EBITDA-to-assets ratio is related to more share repurchases.
Leverage	Dittmar (2000) shows that firms use repurchases to increase leverage.	-0.1710***	Yes	Higher leverage is associated with conducting fewer repurchases.
Options exercised	Dittmar (2000) finds that options exercised have a positive impact on repurchases, most likely because firms want to hold the number of shares outstanding constant and avoid dilution from option exercises.	-0.0127	No	Options exercised does not affect the number of actual shares repurchased under publicly announced programs.
Options outstanding	According to the management incentive hypothesis, firms with more outstanding stock options will repurchase more stock (Dittmar (2000) ; Fenn and Liang (2001)).	-0.0144	No	Options exercised does not affect share repurchases under publicly announced programs.
Relative spread	Liquidity influences how firms execute repurchase programs: On average, firms buy back more when liquidity is high, in order to save transaction costs (Hilbert et al. (2016)).	-0.1036	No	The relative spread does not affect share repurchases.
Repurchase intensity (lagged)	Busch and Oberberger (2017) (2017) suggest that the lagged Repurchase intensity is the best predictor for current Repurchase intensity.	0.2307***	Yes	Lagged share repurchase activity predicts current share repurchase activity.
Return (t-1)	A motivation for share repurchases is undervaluation and one indication of undervaluation is a history of low returns. Stephens and Weisbach (1998) and Dittmar (2000) find that share repurchases are driven by lagged returns.	-0.1406***	Yes	Firms repurchase more when previous returns were low.
Target	Bagwell (1991) developed a theoretical model to show that repurchases may serve as a takeover defense and Dittmar (2000) finds that firms that are at a higher risk of being a target conduct more share repurchases.	0.0294**	Yes	Being a target for takeover is positively related to share repurchases.
Trading volume	This variable was used in Hilbert et al. (2016) as a control variable to proxy for lagged market liquidity.	0.0339**	Yes	Firms buy back more when the trading volume is high.

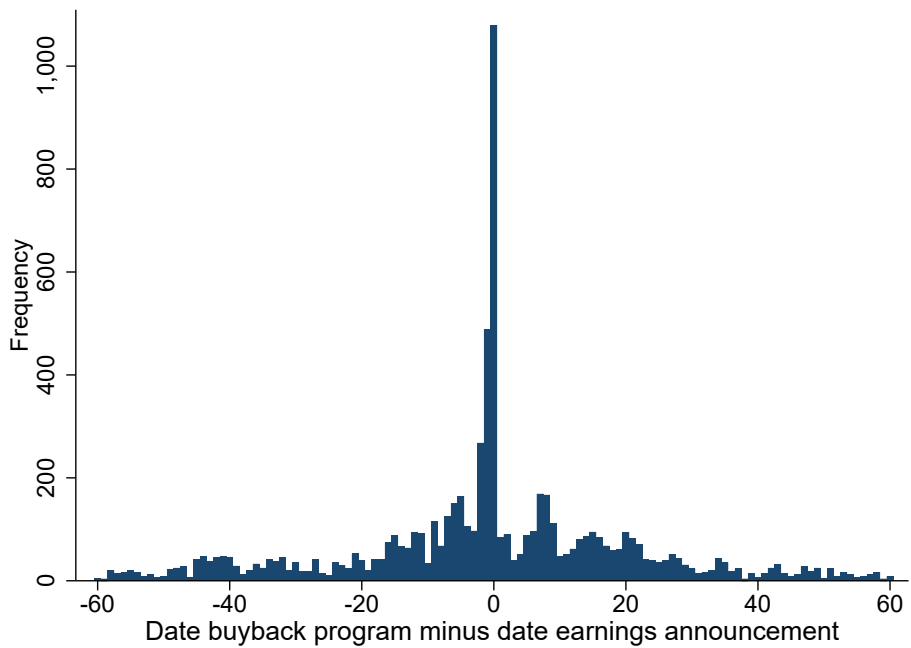
B Figures

Figure 1
Share repurchases and the corporate calendar

Panel A: Buyback program initiations during fiscal year



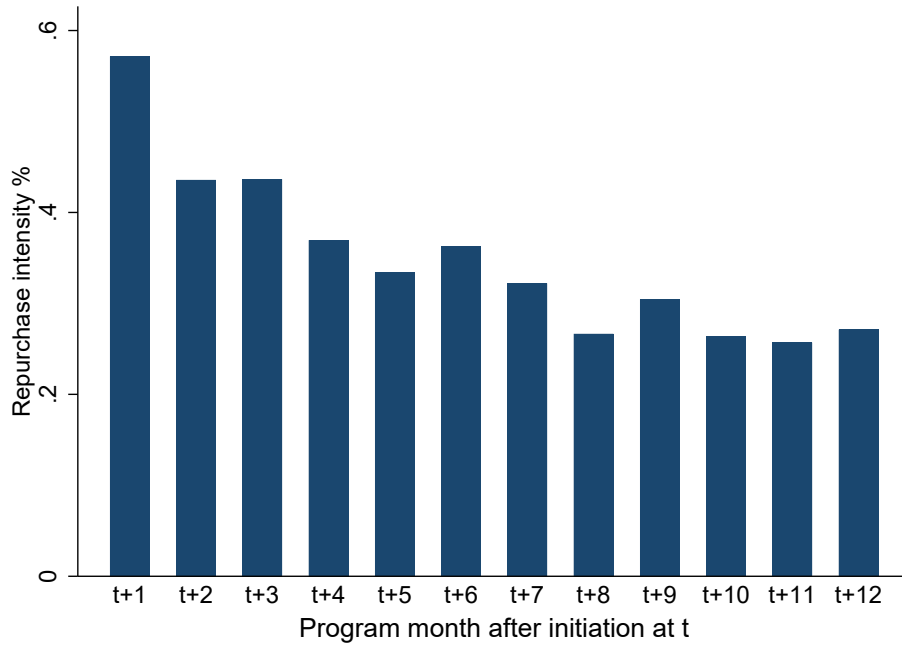
Panel B: Repurchase program start date versus earnings announcements



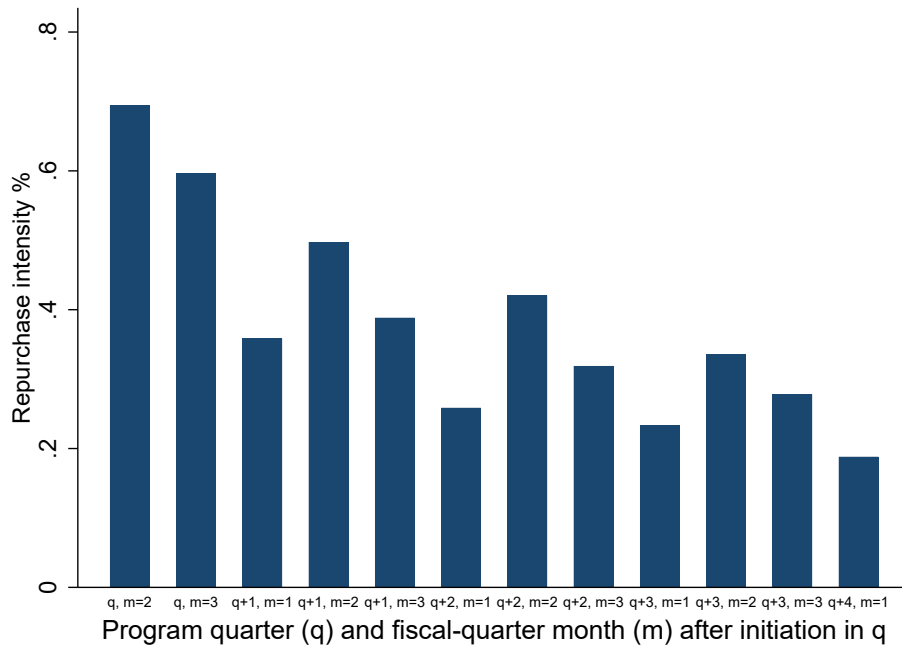
The graphs plot the timing of the announcement of buyback programs. Panel A depicts the initiation of buyback programs over the twelve months of the corporate calendar. Panel B plots the difference in calendar days between the announcement of a buyback program and the announcement of earnings.

Figure 2
Execution of buyback programs in the open market

Panel A: Share repurchases over program months in calendar time

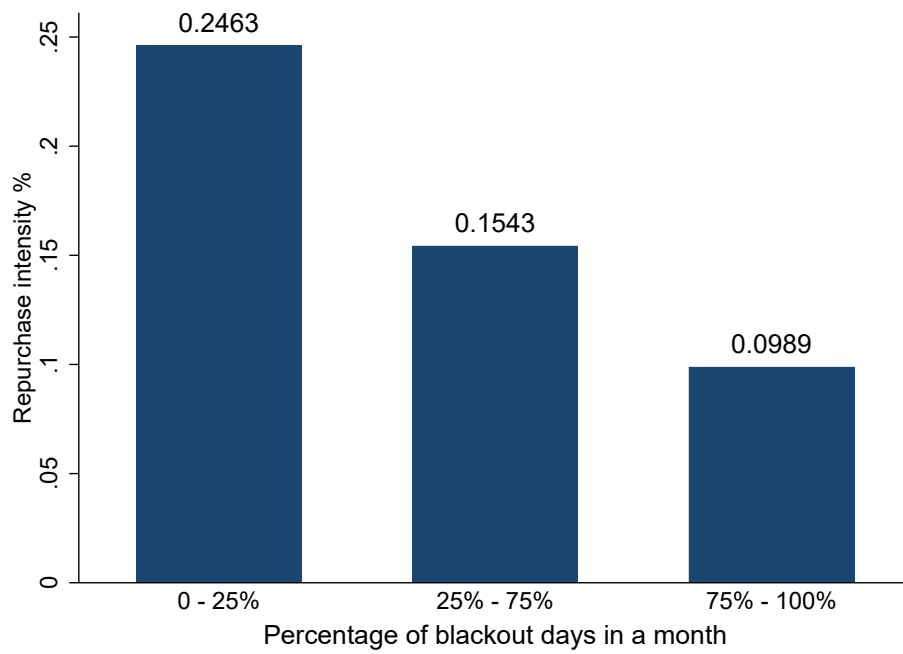


Panel B: Share repurchases over program months in fiscal time



The graphs depict the average of *Repurchase intensity* from the month after the initiation of the buyback program to 12 months later. Panel A presents the execution of share repurchases in calendar-time, whereas in Panel B the calendar-months are transformed according to corporate time, by adjusting the program month for those programs that do not start in the first month of the fiscal quarter. For programs starting in the second (third) month of the quarter, we shift program month by one (two) month(s).

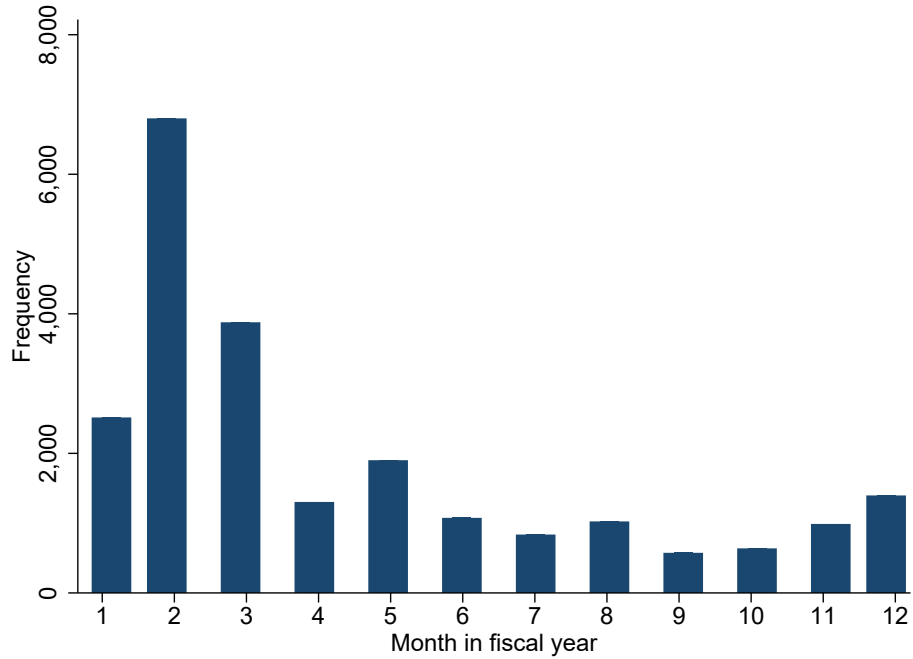
Figure 3
Share repurchases during trading windows and blackout periods



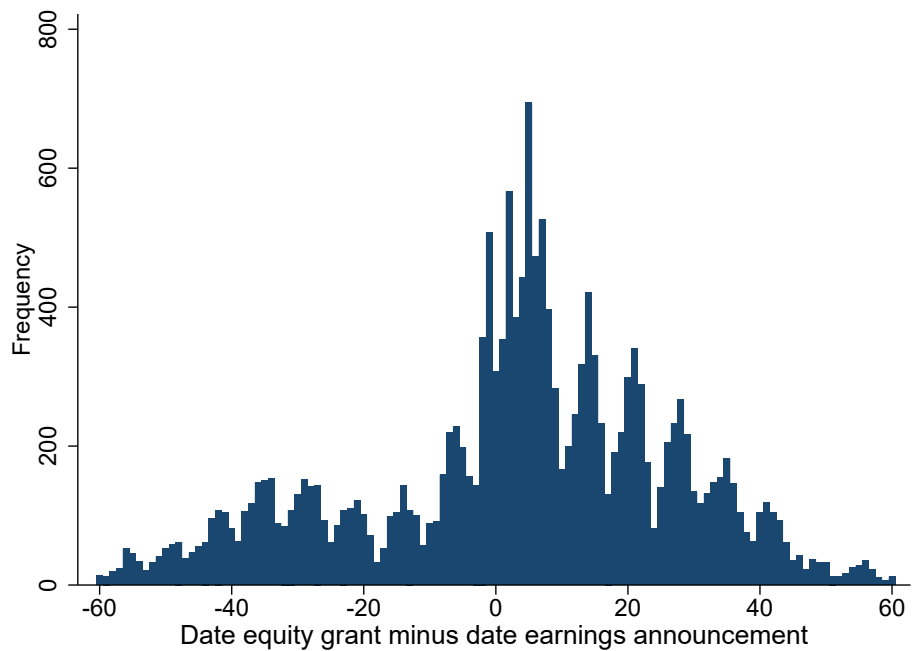
The graph shows the average of *Repurchase intensity* over different fractions of blackout days in a given quarter-month. Repurchase months are grouped into three categories (none, partial, full) according to how much of a month is covered by blackout days.

Figure 4
CEO Equity compensation and the corporate calendar

Panel A: Equity grants over the fiscal year



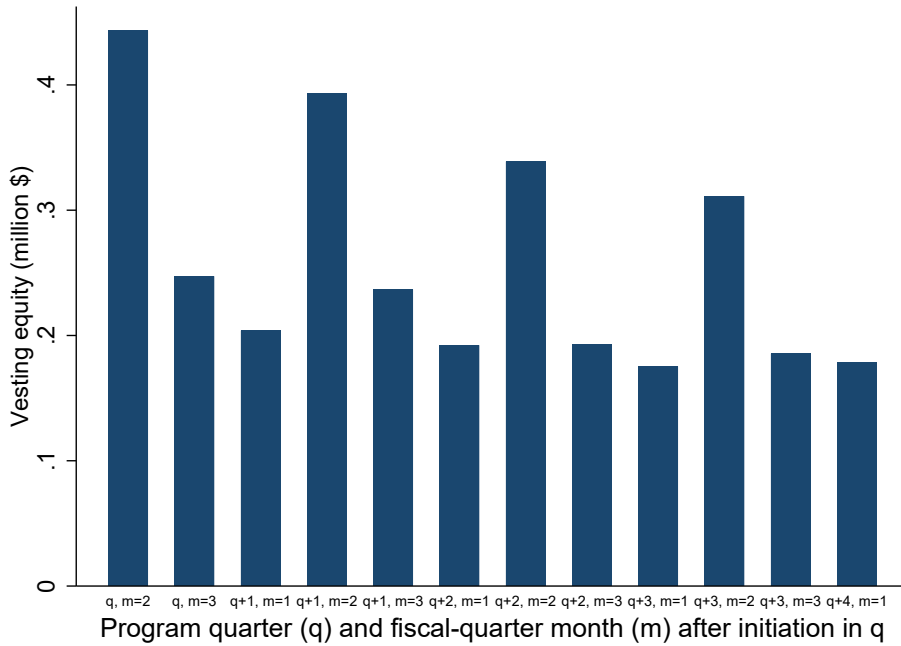
Panel B: Equity grants versus earnings announcements



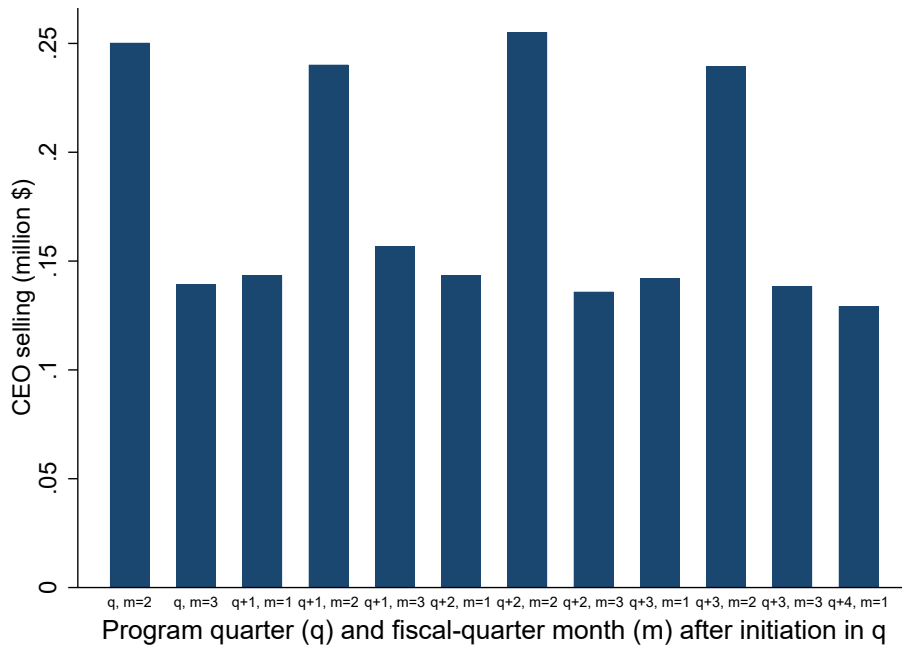
The graphs plot the timing of CEO grants. Panel A depicts the granting of equity over the twelve months of the corporate calendar. Panel B plots the difference in calendar days between the granting of equity and the announcement of earnings.

Figure 5
CEO Equity vesting and CEO sales

Panel A: Equity vesting during buyback programs in fiscal time



Panel B: CEO sales during buyback programs in fiscal time



The graphs examine vesting equity and sales of CEOs over the first 12 months of a buyback program in fiscal time. Panel A plots the vesting of CEO equity and Panel B plots the sales of CEO equity.

C Tables

Table 1
Definition of variables

This table presents all variables used in this paper. For each variable the table reports the definition, the data source, and the unit of measurement. Variables denoted with (ln) are expressed as natural logarithms.

Name	Definition	Source	Unit
Program and repurchase variables			
Program length	The total number of months the repurchase program lasted	SEC	Unit
Program size	The number of shares to be repurchased under a program scaled by shares outstanding	SEC	Ratio
Repurchase dummy	1 if repurchase transaction takes place in a month	SEC	Binary
Repurchase intensity	Number of shares repurchased under a program during the month divided by the number of shares outstanding at the beginning of the month, multiplied by 100	SEC/CRSP	Ratio
Main variables of interest			
Blackout ratio	Fraction of blackout days within a month. We define the blackout period as from 20 days before the end of a firm's fiscal quarter (<i>Compustat: apdateq</i>) until three days after the following earnings announcement (<i>Compustat: rdq</i>), following Guay et al. (2022) . See Section 4.1.2 for further details.	Compustat	Ratio
CEO buying	Total CEO purchases in a month	TR Insider Data	Million \$
CEO selling	Total CEO sales in a month	TR Insider Data	Million \$
CEO selling dummy	1 if there are CEO sales in a month	TR Insider Data	Binary \$
Granted equity	Total granted equity in a month	Equilar	Million \$
Granted equity dummy	1 if equity is granted in a month	Equilar	Binary
Insider trading	Net insider trading (buying minus selling) in a month	TR Insider Data	Million \$
Vesting dummy	1 if equity vests in a month	Equilar	Binary
Vesting equity	Total equity vesting in a month	Equilar	Million \$
Insider trading variables decomposed			
Affiliates trading	Net insider trading by Affiliates in a month	TR Insider Data	Million \$
CEO trading	Net insider trading by CEOs in a month	TR Insider Data	Million \$
CxO trading	Net insider trading by CFOs, CJs, Cos and CTs in a month	TR Insider Data	Million \$
Directors trading	Net insider trading by Directors in a month	TR Insider Data	Million \$
Officers trading	Net insider trading by Officers in a month	TR Insider Data	Million \$
Owners trading	Net insider trading by Beneficial owners in a month	TR Insider Data	Million \$
Control variables			
Acquiror	1 if firm is currently (time between announcement and end of the offer) bidding for another company	SDC	Binary
Assets	Total assets (<i>Compustat item: atq</i>) (ln)	Compustat	Million \$
Book-to-market	Book value equity (<i>Compustat item: ceq</i>) divided by market cap	Compustat	Ratio
Cash-to-assets	Cash and short-term investments (<i>Compustat item: cheq</i>) divided by total assets	Compustat	Ratio
Change in short interest	Change in short interest as of the 15th business day scaled by the shares outstanding at the end of the previous month	Compustat	Ratio
Dividends-to-assets	Total dividends (<i>Compustat item: dvt</i>) divided by total assets	Compustat	Ratio

Continued on next page

Table 1 continued

EBITDA-to-assets	Operating income before depreciation (Compustat item: oibdpq) divided by total assets (Total asset - book value equity) / (total asset - book value equity + market cap)	Compustat	Ratio
Leverage	Monthly average of daily market capitalization (ln)	Compustat/CRSP	Ratio
Market capitalization	Number of shares obtained by option exercises of corporate insiders in the respective month scaled by shares outstanding	CRSP	Million \$
Options exercised	Outstanding options scaled by shares outstanding	TR Insider Data	Ratio
Options outstanding	The n-th month after the repurchase program initiation	Compustat	Ratio
Program month	The monthly average of the daily relative spread calculated as $2 * (\text{ask-bid}) / (\text{bid} + \text{ask})$	SE/C	Binary
Relative spread	Monthly holding period stock return	CRSP	Ratio
Return	Number of shares outstanding at last trading day of month	CRSP	Unit
Shares outstanding	1 if firm is currently (time between announcement and end of the offer) a target of another company	CRSP	Million
Target	Monthly total trading volume excluding repurchases scaled by shares outstanding at the last trading day of the previous month	SDC	Binary
Trading volume		CRSP	Ratio

Table 2
Descriptive statistics

This table reports the descriptive statistics for the dependent variables, main independent variables, and the control variables for firms that conducted at least one share repurchase between 2006 and 2019. All variables are defined in Table 1. For each variable, the arithmetic mean, the median, the standard deviation, the within-firm standard deviation, the 1st percentile, and the 99th percentile of the distribution is reported. Within-firm variation is calculated from a regression of the respective variable on firm fixed effects. Variables denoted with (ln) are expressed as natural logarithms. All continuous variables are winsorized at the 1st and 99th percentile.

	Mean	Median	SD	SD (within)	1st Perc.	99th Perc.	N
Program and repurchase statistics							
Program length	20.5028	13	21.1278	14.9414	1	104	6,281
Program size	0.0887	0.0707	0.0717	0.04428	0.0067	0.4075	6,281
Repurchase dummy	0.2428	0	0.4288	0.3678	0	1	250,742
Repurchase intensity (%)	0.1568	0	0.6020	0.5805	0	2.4440	250,742
Repurchase intensity>0 (%)	0.6632	0.3543	1.0941	0.9631	0.0006	4.8870	60,879
Main variables of interest							
Blackout ratio	0.6354	0.7000	0.3439	0.3340	0	1	250,742
CEO buying	0.0006	0	0.0060	0.0058	0	0.0237	250,742
CEO selling	0.1337	0	0.6373	0.5937	0	3.8389	250,742
CEO selling dummy	0.0811	0	0.2730	0.2540	0	1	250,742
Fiscal month in quarter	2.0020	2	0.8165	0.8165	1	3	250,742
Fiscal month in year	6.5364	7	3.4489	3.4458	1	12	250,742
Granted equity	0.2814	0	2.5603	2.5201	0	7.9780	250,742
Granted dummy	0.0774	0	0.2672	0.2630	0	1	250,742
Insider trading	-0.5183	0	1.5295	1.3724	-7.7996	0.1686	250,742
Vesting dummy	0.1481	0	0.3552	0.3409	0	1	250,742
Vesting equity	0.1961	0	0.7878	0.7602	0	5.0994	250,742
Insider trading variables							
Affiliates trading	-0.0081	0	0.0535	0.0510	-0.3010	0	250,742
CEO trading	-0.1331	0	0.6375	0.5982	-3.8390	0.0237	250,742
CxO trading	-0.0447	0	0.2212	0.2090	-1.2313	0.0000	250,742
Directors trading	-0.1435	0	0.6618	0.6224	-4.4376	0.1486	250,742
Officers trading	-0.1806	0	0.6674	0.6108	-4.0730	0.0011	250,742
Owners trading	-0.0084	0	0.1004	0.0959	-0.2805	0.0020	250,742
Control variables							
Acquiror	0.0348	0	0.1832	0.1578	0	1	250,742
Assets (ln)	6.8746	6.8663	1.9205	0.4118	2.7719	11.4366	250,742
Book-to-market	0.5509	0.4380	0.6118	0.4349	-0.5319	2.9103	250,742
Cash-to-assets	0.1809	0.1150	0.1849	0.0847	0.0008	0.7704	250,742
Change in short interest	0.0001	0	0.0116	0.0115	-0.0381	0.0410	250,742
Dividends-to-assets	0.0142	0	0.0305	0.0213	0	0.1664	250,742
EBITDA-to-assets	0.0301	0.0315	0.0372	0.0261	-0.0956	0.1149	250,742
Leverage	0.3363	0.2997	0.2158	0.1060	0.0222	0.9047	250,742
Options exercised	0.0007	0	0.0238	0.0235	0	0.0070	250,742
Options outstanding	0.0641	0.0479	0.0618	0.0364	0	0.2933	250,742
Program month	12.8312	2	21.7798	15.7800	0	102	250,742
Relative spread (ln)	-4.8469	-5.0554	0.3085	0.2822	-5.1463	-4.3581	250,742
Return	0.0107	0.0070	0.1356	0.1351	-0.3226	0.4020	250,742
Target	0.0279	0	0.1648	0.1441	0	1	250,742
Trading volume	0.2007	0.1488	0.1908	0.1348	0.0055	1.0262	250,742

Table 3
The corporate calendar and the timing of share repurchases

The table presents regressions of share repurchases and equity-based compensation on *Blackout ratio* and fiscal-month fixed effects. The dependent variable is *Repurchase intensity*. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Repurchase intensity				
Blackout ratio	-0.1465*** (-22.51)			-0.1741*** (-19.57)	-0.1980*** (-18.74)
Month in fiscal quarter=2		0.0876*** (17.45)		-0.0287*** (-4.42)	
Month in fiscal quarter=3		0.0455*** (8.38)		0.0079 (1.39)	
Month in fiscal year=2			0.0582*** (8.43)		-0.0236*** (-3.41)
Month in fiscal year=3			0.0684*** (9.09)		0.0257*** (3.43)
Month in fiscal year=4			0.0154** (2.54)		0.0060 (1.00)
Month in fiscal year=5			0.1027*** (12.55)		-0.0555*** (-5.41)
Month in fiscal year=6			0.0343*** (4.45)		-0.0183** (-2.22)
Month in fiscal year=7			-0.0037 (-0.63)		-0.0130** (-2.21)
Month in fiscal year=8			0.0945*** (11.45)		-0.0644*** (-5.96)
Month in fiscal year=9			0.0359*** (4.93)		-0.0162** (-2.15)
Month in fiscal year=10			-0.0031 (-0.51)		-0.0137** (-2.22)
Month in fiscal year=11			0.1032*** (13.41)		-0.0558*** (-5.49)
Month in fiscal year=12			0.0522*** (7.69)		-0.0006 (-0.09)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0170	0.0149	0.0153	0.0172	0.0175
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Table 4**The corporate calendar and the correlation between share repurchases and equity compensation**

This table presents the relationship between actual monthly share repurchases and equity based compensation. The dependent variable is *Repurchase intensity*, which denotes the number of shares repurchased during the month divided by the number of shares outstanding at the last trading day of the previous month, multiplied by 100. The relationship between granted equity and share repurchases, vesting equity and share repurchases and CEO sales and share repurchases is examined respectively. We include the standard controls which are described in Table A1 throughout all specifications. The estimates for these controls are qualitatively similar to those reported. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. The difference between the equity based compensation-coefficients of two specifications is tested using a t-stat and reported below the table. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Granted Equity	0.0010** (2.19)	0.0001 (0.41)				
Vesting equity			0.0046*** (3.04)	0.0005 (0.31)		
CEO selling					-0.0033* (-1.76)	-0.0072*** (-3.97)
Blackout ratio		-0.2012*** (-18.79)		-0.2011*** (-18.71)		-0.2029*** (-18.97)
Observations	250,742	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0728	0.0775	0.0729	0.0775	0.0728	0.0776
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes
T-stat of the difference	(2)-(1):	-2.4587**	(4)-(3):	-2.6218**	(6)-(5):	2.0722**

Table 5
Share repurchases, insider trading, and the corporate calendar

This table presents the relationship between actual monthly share repurchases and insider trading. The dependent variable is *Repurchase intensity*, which denotes the number of shares repurchased during the month divided by the number of shares outstanding at the last trading day of the previous month, multiplied by 100. Columns 1-2 present the relationship between share repurchases and net insider trading, defined as insider buying activity minus insider selling activity. Columns 3-4 show the relation for insider trading decomposed in different groups. We include the standard controls which are described in Table A1 throughout all specifications. The estimates for these controls are qualitatively similar to those reported. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)
Dependent variable:	Repurchase intensity			
Insider trading	-0.0033*** (-2.91)	0.0003 (0.30)		
CEO trading			0.0070*** (3.81)	0.0084*** (4.60)
CxO trading			0.0004 (0.07)	0.0058 (0.90)
Officers trading			-0.0069*** (-2.99)	-0.0018 (-0.78)
Directors trading			-0.0072** (-2.55)	-0.0038 (-1.34)
Owners trading			-0.0684*** (-3.25)	-0.0674*** (-3.21)
Affiliates trading			-0.0331 (-1.13)	-0.0134 (-0.46)
Blackout ratio		-0.2017*** (-18.97)		-0.2015*** (-18.95)
Observations	250,742	250,742	250,742	250,742
Adjusted R^2	0.0729	0.0775	0.0731	0.0777
Standard controls	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes

Table 6
CEO sales around buyback announcements

This table reports the results of a series of t-tests to show how CEO equity sales distribute around buyback program announcements. For comparison, this table also reports how CEO equity sales distribute around earnings announcements and around a subsample of buyback announcements with no blackout days within [-10, 10] trading days. Column (2) reports the average CEO equity sales as a fraction of firm market capitalization in the 10 trading days before buyback/earnings announcements, while Column (3) reports the CEO sales in the symmetric 10 trading days following those announcements. Column (4) shows the difference between post- and pre- announcement CEO sales. Column (5) reports the average fraction of blackout days in the 10 trading days before buyback/earnings announcements, while Column (6) reports the fraction of blackout days in the symmetric 10 trading days following those announcements. Column (7) shows the difference between post- and pre- announcement blackout ratio. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Event	Observations	CEO sales over		(3) - (2)	Blackout days		(6) - (5)
		[-10, 0)	(0, +10]		[-10, 0)	(0, +10]	
Buyback announcement	4671	0.0053	0.0111	0.0059*** (4.28)	0.6818	0.4212	-0.2606*** (-33.69)
Earnings announcement	70,840	0.0031	0.0153	0.0122*** (24.58)	1.0000	0.2232	-0.7768*** (-1232.85)
Buyback ann. no blackout	461	0.0079	0.0084	0.0006 (0.18)	0.0000	0.0000	0.0000 (.)

Table 7
Linear probability model of buyback announcements

This table reports the results of linear probability model regression of repurchase program announcements on CEO trading and other controls. The dependent variable is an indicator that equals one if there is a repurchase program announcement in the current month and zero otherwise. The regressors include Granted equity, Vesting equity, CEO buying and CEO selling, corporate calendar variables (*Blackout ratio* and *Month in fiscal year*), and other controls. The year-month fixed effect and firm fixed effect are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Dependent variable:	Indicator of buyback announcement		
	(1)	(2)	(3)
Granted equity	0.0004** (2.04)	0.0004** (2.02)	0.0003 (1.60)
Vesting equity	0.0049*** (6.79)	0.0046*** (6.48)	0.0034*** (4.77)
CEO selling	0.0008 (1.28)	0.0007 (1.08)	0.0000 (0.07)
CEO buying	0.2859*** (4.23)	0.2767*** (4.13)	0.2468*** (3.69)
Blackout ratio			-0.0304*** (-9.65)
Observations	250,742	250,742	250,742
R^2	0.0058	0.0093	0.0116
Standard controls	No	Yes	Yes
Year-month FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Fiscal month FE	No	No	Yes

Table 8
The initiation of buyback programs and long-run shareholder value

The table reports Fama and French calendar-time portfolio regressions for various event windows following the initiation (announcement) of 6,277 buyback programs between 2006 and 2019. Portfolios are rebalanced each month and an equally-weighted excess return is calculated. We regress the monthly excess return of this portfolio on the Fama-French three factors (Fama and French, 1993, Fama and French, 1996). Each stock can enter the monthly portfolio only once, even if the stock has experienced more than one event during the event window. For the window of [0, 0], a firm enters this portfolio if it announces a buyback program in the current month. For the other windows, a firm enters this portfolio if it announces a buyback program in the previous month and stays in the portfolio for 12 (24, 36, 48, respectively) months. Panels B and C provide results for subsamples. Panel B examines buyback programs which are initiated when the CEO's equity vests simultaneously. Panel C examines buyback programs where the CEO sells equity within the first 12 months of the program. Tercile ranges for terciles T1 through T3 are based on all non-zero values of *Vesting equity* (CEO sales of equity in 12 months) in a given calendar year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Long-run abnormal returns of buyback programs

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Equally-weighted portfolio return				
Event window:	[0, 0]	[1, 12]	[1, 24]	[1, 36]	[1, 48]
Intercept	0.0102*** (5.60)	0.0026*** (2.85)	0.0024*** (2.77)	0.0020** (2.39)	0.0019** (2.17)
SMB	0.7225*** (8.68)	0.5994*** (14.32)	0.6153*** (15.82)	0.6396*** (16.83)	0.6518*** (16.11)
HML	-0.0468 (-0.67)	0.0890** (2.53)	0.1535*** (4.70)	0.1714*** (5.37)	0.2036*** (6.00)
MktRF	0.9281*** (19.94)	1.0241*** (43.72)	1.0455*** (48.05)	1.0554*** (49.62)	1.0642*** (47.01)
Observations	168	168	168	168	168
R^2	0.8098	0.9502	0.9593	0.9623	0.9587

Panel B: Long-run abnormal returns of buyback programs when the CEO's equity vests simultaneously

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Equally-weighted portfolio return				
Event window:	[0, 0]	[1, 12]	[1, 24]	[1, 36]	[1, 48]
Full sample (N=1,190)	0.0149*** (3.48)	0.0033*** (3.00)	0.0031*** (3.16)	0.0021** (2.18)	0.0018* (1.83)
Vesting equity low (N=267)	0.0228** (2.40)	0.0015 (0.56)	0.0014 (0.61)	0.0011 (0.50)	0.0015 (0.75)
Vesting equity medium (N=386)	0.0094 (1.53)	0.0011 (0.64)	0.0018 (1.38)	0.0005 (0.39)	-0.0001 (-0.12)
Vesting equity high (N=537)	0.0141*** (3.09)	0.0044*** (3.18)	0.0039*** (3.29)	0.0031*** (2.66)	0.0029** (2.49)

Panel C: Long-run abnormal returns of buyback programs when the CEO sells equity in the subsequent 12 months

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Equally-weighted portfolio return				
Event window:	[0, 0]	[1, 12]	[1, 24]	[1, 36]	[1, 48]
Full sample (N=2,621)	0.0157*** (7.58)	0.0063*** (6.39)	0.0036*** (4.86)	0.0031*** (4.07)	0.0030*** (3.61)
12-month equity sales low (N=703)	0.0139** (2.46)	0.0028* (1.74)	0.0014 (1.25)	0.0023** (2.10)	0.0021* (1.95)
12-month equity sales medium (N=934)	0.0150*** (3.92)	0.0067*** (5.61)	0.0043*** (5.24)	0.0029*** (3.56)	0.0030*** (3.55)
12-month equity sales high (N=984)	0.0185*** (5.99)	0.0092*** (7.82)	0.0051*** (5.13)	0.0044*** (4.91)	0.0041*** (4.08)

Table 9
The price impact of open market share repurchases

The table reports Fama and French calendar-time portfolio regressions for various event windows following 59,281 open market repurchases between 2006 and 2019. Portfolios are rebalanced each month and an equally-weighted excess return is calculated. We regress the monthly excess return of this portfolio on the Fama-French three factors (Fama and French, 1993, Fama and French, 1996). Each stock can enter the monthly portfolio only once, even if the stock has experienced more than one event during the event window. For the window of [0, 0], a firm enters this portfolio if it repurchases in the current month. For the other windows, a firm enters this portfolio if it repurchases in the previous month and stays in the portfolio for 1 (3, 6, 12, respectively) months. Panels B and C provide results for subsamples. Panel B examines repurchases when the CEO's equity vests simultaneously. Panel C examines repurchases when the CEO sells equity simultaneously. Tercile ranges for terciles T1 through T3 are based on all non-zero values of *Vesting equity* (*CEO equity sales*) in a given calendar year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Abnormal returns to open market share repurchases

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			Equally-weighted portfolio return		
Event window:	[0, 0]	[1, 1]	[1, 3]	[1, 6]	[1, 12]
Constant	0.0001 (0.17)	0.0030*** (3.64)	0.0029*** (3.70)	0.0023*** (3.01)	0.0022*** (2.61)
SMB	0.5394*** (15.77)	0.5055*** (13.47)	0.5484*** (15.14)	0.5600*** (15.74)	0.6000*** (15.68)
HML	0.0433 (1.51)	0.0748** (2.37)	0.0884*** (2.91)	0.1109*** (3.71)	0.1587*** (4.94)
MktRF	0.9754*** (50.97)	0.9943*** (47.34)	1.0054*** (49.62)	1.0196*** (51.23)	1.0259*** (47.92)
Observations	168	168	168	168	168
R ²	0.9618	0.9553	0.9601	0.9628	0.9591

Panel B: Abnormal returns to open market share repurchases when the CEO's equity vests simultaneously

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			Equally-weighted portfolio return		
Event window:	[0, 0]	[1, 1]	[1, 3]	[1, 6]	[1, 12]
Full sample (N=9,053)	0.0016 (1.19)	0.0019 (1.51)	0.0031*** (3.22)	0.0027*** (3.21)	0.0028*** (3.47)
Vesting equity low (N=2,093)	0.0055 (1.61)	0.0038 (1.11)	0.0047** (2.19)	0.0033* (1.79)	0.0028* (1.88)
Vesting equity medium (N=2,940)	-0.0021 (-1.05)	0.0012 (0.58)	0.0029** (2.34)	0.0022** (2.05)	0.0019* (1.89)
Vesting equity high (N=4,020)	0.0016 (0.87)	0.0001 (0.09)	0.0027** (2.50)	0.0021** (2.37)	0.0025*** (2.97)

Panel C: Abnormal returns to open market share repurchases when the CEO sells equity simultaneously

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			Equally-weighted portfolio return		
Event window:	[0, 0]	[1, 1]	[1, 3]	[1, 6]	[1, 12]
Full sample (N=6,595)	0.0084*** (3.64)	0.0022 (0.59)	0.0025 (1.55)	0.0016 (1.60)	0.0015** (2.03)
CEO equity sales low (N=1,703)	-0.0009 (-0.20)	0.0014 (0.31)	0.0026 (0.67)	0.0031 (0.86)	0.0013 (1.22)
CEO equity sales medium (N=2,353)	0.0132*** (6.24)	0.0014 (0.68)	0.0026* (1.80)	0.0026** (2.31)	0.0017** (1.99)
CEO equity sales high (N=2,539)	0.0147*** (7.88)	-0.0025 (-1.27)	-0.0009 (-0.69)	0.0002 (0.21)	0.0006 (0.61)

Table 10**Share repurchases and equity compensation: repurchase prices versus market prices.**

This table reports the results of a series of t-tests to show whether repurchase bargain varies with equity-based CEO compensation. Repurchase bargain is defined as the difference between market price and repurchase price, scaled by market price. The market price is averaged over the current month [0,0] (next month [+1,+1], next three months [+1,+3], next six months [+1,+6], respectively). Panel A compares repurchase bargains in months without versus with CEO equity vesting. Columns (1) and (3) report the number of months without vesting and the number of months with vesting, respectively. Columns (2) and (4) report the average repurchase bargains in months without vesting and months with vesting, respectively. Column (5) shows the difference between Column (2) and Column (4). Column (6) reports the t-statistics for the difference reported in column (5). Panel B compares repurchase bargains in months without versus with CEO sales. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Repurchase bargains in months without versus with CEO equity vesting

	(1)	(2)	(3)	(4)	(5)	(6)
	without vesting		with vesting			
Benchmark period	N	Average bargain	N	Average bargain	(2) – (4)	t-statistic
[0, 0]	43,209	0.0082***	7,699	0.0069***	0.0013**	2.49
[+1, +1]	43,209	0.0058***	7,699	0.0105***	-0.0048***	-3.88
[+1, +3]	43,209	0.0068***	7,699	0.0156***	-0.0088***	-5.30
[+1, +6]	43,209	0.0075***	7,699	0.0174***	-0.0098***	-4.44

Panel B: Repurchase bargains in months without versus with CEO equity sales

	(1)	(2)	(3)	(4)	(5)	(6)
	without CEO sales		with CEO sales			
Benchmark period	N	Average bargain	N	Average bargain	(2) – (4)	t-statistic
[0, 0]	45,788	0.0078***	5,120	0.0100***	-0.0022***	-3.52
[+1, +1]	45,788	0.0056***	5,120	0.0145***	-0.0090***	-6.13
[+1, +3]	45,788	0.0073***	5,120	0.0154***	-0.0081***	-4.07
[+1, +6]	45,788	0.0079***	5,120	0.0187***	-0.0107***	-4.07

D Online Appendix

OA.1 Quotes on share repurchases by media and politicians

Below, we cite commentaries linking share repurchases to stock price manipulation.

“With the majority of their compensation coming from stock options and stock awards, senior corporate executives have used open-market repurchases to manipulate their companies’ stock prices to their own benefit [...]”

William Lazonick, Mustafa Erdem Sakingç, and Matt Hopkins in the Harvard Business Review, January 2020.

Retrieved from: <https://hbr.org/2020/01/why-stock-buybacks-are-dangerous-for-the-economy>.

“[...] there are currently no meaningful limits to stop executives from using corporate money on stock buybacks to raise share prices for their own short-term gain.”

Leonore Palladino of the Roosevelt Institute in her testimony before the United States House of Representatives’ Committee on Financial Services, October 2019.

Retrieved from: <https://financialservices.house.gov/uploadedfiles/hhrg-116-ba16-wstate-palladinol-20191017.pdf>.

“Executives might also conduct repurchases to exert upward price pressure on the stock while selling their shares, which would systematically transfer value from public investors to themselves.”

Jesse M. Fried in his testimony before the United States House of Representatives’ Committee on Financial Services, October 2019.

Retrieved from: <https://financialservices.house.gov/uploadedfiles/hhrg-116-ba16-wstate-friedj-20191017.pdf>.

“We give stock to corporate managers to convince them to create the kind of long-term value that benefits American companies and the workers and communities they serve. Instead, what we are seeing is that executives are using buybacks as a chance to cash out their compensation at investor expense.”

SEC Commissioner Robert J. Jackson Jr, March 2019.

Retrieved from: <https://www.sec.gov/news/speech/speech-jackson-061118>

“[...] buybacks were treated as stock manipulation for decades because that is exactly what they are,” she said. “The SEC needs to recognize that.”

Elizabeth Warren in the Boston Globe, June 4, 2015.

Retrieved from: <https://www.bostonglobe.com/news/nation/2015/06/04/sen-elizabeth-warren-decries-stock-buybacks-and-high-ceo-pay-seeks-overturn-rules/story.html>”

OA.2. Construction of repurchase data set

To date, there is no commercial database that provides detailed repurchase activity on a monthly basis or includes details on the nature of the repurchases. Hence, we resort to obtaining the repurchase data directly from the quarterly filings with the SEC. As a starting point, we use the CRSP monthly stock file to download a list of all firms available in CRSP between 2004 and 2019. We identify all ordinary shares (share code 10 and 11) that are traded on the NYSE, AMEX, and NASDAQ (exchange code 1, 2, and 3) between January 1st 2004 and December 31st 2019. If a firm (identified via permco) has more than one class of ordinary shares (identified via permno) on record in CRSP, we keep the permno with the largest market capitalization. Then we use the linking table in the CRSP-Compustat merged database to get the CIKs for the respective firms. There are 8,459 firms in CRSP. Out of these firms, 16 are not available in Compustat and 458 firms have missing CIK data. Furthermore, we use WRDS' SEC Suite to download a list of CIKs which have been active at some point during our sample period ("historical" CIKs). We obtain 341 additional CIKs from the SEC Suite.

We feed the resulting list of 8,326 CIKs into a Python script which uses these identifiers to download firms' quarterly reports (10-K and 10-Q) from SEC's EDGAR database. In the next step, we parse through the downloaded filings in search for repurchase information under Item 2(e) of Form 10-Q or under Item 5(c) of Form 10-K. For the filings that contain repurchase information, we extract the total number of shares purchased, the average price

paid per share, the total number of shares purchased as part of publicly announced programs, and the maximum number of shares or the total dollar amount that may yet be purchased under these programs.

Besides the numerical data in the repurchase table, firms disclose detailed information on the nature of the transaction and characteristics of repurchase programs. We write a separate Python-script that performs a textual analysis on the text surrounding the repurchase table. This textual analysis identifies relevant information on the characteristics of the buyback program. For example, we identify the transaction method (open market, private negotiation, or tender offer) and, in case of a publicly announced program, the program's date of announcement, approved dollar amount of the program, and, if applicable, the expiration date. We also record whether the buyback program was fully or partially executed under SEC's rule 10b5-10, which exempts liability for insider trading if the program is executed by an independent third party.

After the automated scripts have been run, a process of manual work follows to check and supplement the automatic output. The manual work is mainly for four purposes. First, some firms did not adhere to the standard format of reporting share repurchase activity, so for those respective filings we look up the repurchase information manually. Second, we aggregate our monthly repurchase dataset to the quarterly level and compare it with the Compustat quarterly variables for share repurchases. We examine the original SEC filings in case of substantial discrepancy between Compustat and our dataset. Third, since SDC Platinum is the standard data source for announcements of repurchase programs, we compare the announcement information in our dataset with that in SDC, and check the original SEC filing if there is any difference. Lastly, to avoid outliers due to errors in data collection, we manually check the highest percentiles of repurchases volume, repurchased stocks as a fraction of total shares outstanding, and repurchasing price, respectively. Any discrepancies between the original filings and the automated output were manually corrected. This process ensured that we had to drop only very few observations (less than 100) because the numbers were not consistent with other information provided by the firm.

Firms sometimes announce additional buyback programs while an older program is still ongoing. Furthermore, some firms announce modifications to their ongoing programs. We

treat both events as the start of a new buyback program.

Our final repurchase data set, which spans from 2004 to 2019, covers 3,965 repurchasing firms, 11,458 repurchase programs and 110,887 repurchase months between 2004 and 2019. For this project, we rely on data from Equilar which is not available before 2006. Therefore, we restrict the data set to the period between 2006 and 2019, reducing the data set to 3,714 repurchasing firms, 10,045 repurchase programs and 97,528 repurchase months left. In the final step, we remove all buybacks which have not been executed via the open market. These buybacks are used for a wide range of reasons and their timing is less flexible. Meanwhile, they constitute only a very small fraction of all buybacks: we end up with our final repurchase data set of 2,222 repurchasing firms, 6,281 repurchase programs and 60,879 repurchase months.

OA.3. Replication and robustness tests of Edmans et al. (2021)

[Edmans et al. \(2021\)](#) argue the case of stock price manipulation by showing that vesting equity and subsequent abnormal returns are negatively correlated when firms buy back stock in the same month (Table 3, Panel A, in their paper). We replicate their analysis and confirm their results (Table [OA9](#), Panel A). However, we have two concerns regarding their analysis. First, while their analysis documents lower abnormal returns when vesting equity is higher, the results do not indicate whether abnormal returns are in fact *negative* when vesting equity is high. We replicate the analysis in [Edmans et al. \(2021\)](#) using our methodology in Table [OA10](#), Panel A. We select all repurchase months which coincide with the vesting of equity and build five portfolios according to the within-firm variation in the dollar-value of the vesting equity. We find that the abnormal returns decrease from lowest to highest portfolio for (3) to (7), which is consistent with the results in [Edmans et al. \(2021\)](#). However, repurchase months are never followed by a significant negative abnormal returns after the event month, not even in the portfolio with highest vesting equity. Because the returns are just less positive, but not negative, the evidence does not satisfy the conditions of stock price manipulation. None of the portfolios suggests a negative impact on long-term shareholder value.

Second, we are concerned about the use of the *dollar*-value of vesting equity. The argument goes as follows: a typical stock or option grant vests over different periods of time. Consider a realistic setting where the number of shares that vests for a CEO is equally divided over the years, then the within-firm variation in the dollar-value of vesting equity will simply reflect changes in the stock price. Would the CEO really be more inclined to use repurchases to boost the stock price in periods when the stock price is already high? It seems more intuitive to expect the CEO to attempt to boost the stock price when prices are relatively low. In fact, we find that the pattern reverses largely when we sort portfolios according to the *number* of shares vesting (Table OA10, Panel B). We also run the specification of Edmans et al. (2021) for months where no repurchases take place and find that the observed price reversal is even more dramatic when equity vests and there are no simultaneous repurchases (Table OA9, Panel B). We, therefore, conjecture that the specification picks up a general reversal pattern, rather than a pattern specific to the interaction between share repurchases and vesting equity. Consistent with this conjecture, the relation between share repurchases and subsequent abnormal returns actually becomes close to zero when we use a repurchase dummy instead of the dollar-value of vesting equity (Table OA9, Panel C). Moreover, we even observe a pattern with opposite, i.e., positive signs when we use the number of vesting shares, rather than their dollar value (Table OA9, Panel D). In conclusion, we can confirm the results in Edmans et al. (2021), but do not find them to be convincing evidence of stock price manipulation.

Table OA1**The corporate calendar and the timing of equity-based compensation**

The table presents regressions of share repurchases and equity-based compensation on *Blackout ratio* and fiscal-month fixed effects. The dependent variable is *Granted equity* in Panel A, *Vesting equity* in Panel B, and *CEO selling* in Panel C. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Granted equity and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Granted equity				
Blackout ratio	-0.3175*** (-7.67)			-0.1084* (-1.70)	-1.0829*** (-10.48)
Month in fiscal quarter=2		0.3053*** (10.05)		0.2328*** (4.99)	
Month in fiscal quarter=3		0.0324 (0.94)		0.0090 (0.25)	
Month in fiscal year=2			0.9683*** (11.39)		0.5206*** (7.42)
Month in fiscal year=3			0.1514** (2.20)		-0.0824 (-1.15)
Month in fiscal year=4			-0.1262** (-2.57)		-0.1776*** (-3.57)
Month in fiscal year=5			-0.0651 (-1.17)		-0.9304*** (-9.35)
Month in fiscal year=6			-0.2365*** (-3.59)		-0.5242*** (-7.42)
Month in fiscal year=7			-0.2878*** (-6.13)		-0.3385*** (-7.16)
Month in fiscal year=8			-0.1719*** (-3.07)		-1.0411*** (-10.34)
Month in fiscal year=9			-0.2883*** (-4.68)		-0.5733*** (-8.79)
Month in fiscal year=10			-0.2903*** (-6.28)		-0.3481*** (-7.46)
Month in fiscal year=11			-0.2084*** (-3.89)		-1.0778*** (-10.88)
Month in fiscal year=12			-0.1987*** (-2.83)		-0.4876*** (-6.39)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0094	0.0097	0.0188	0.0098	0.0223
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel B: Vesting equity and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Vesting equity				
Blackout ratio	-0.1196*** (-6.87)			0.0287 (1.11)	-0.4563*** (-13.01)
Month in fiscal quarter=2		0.1503*** (9.97)		0.1696*** (7.49)	
Month in fiscal quarter=3		0.0207 (1.51)		0.0269* (1.80)	
Month in fiscal year=2			0.4633*** (14.10)		0.2746*** (9.25)
Month in fiscal year=3			0.1053*** (3.66)		0.0067 (0.23)
Month in fiscal year=4			-0.1062*** (-4.86)		-0.1278*** (-5.80)
Month in fiscal year=5			-0.0550** (-2.24)		-0.4196*** (-11.30)
Month in fiscal year=6			-0.1616***		-0.2829***

Continued on next page

Table OA1 continued

Month in fiscal year=7			(-6.99) -0.1662*** (-8.36)		(-11.32) -0.1875*** (-9.38)
Month in fiscal year=8			-0.1226*** (-4.97)		-0.4889*** (-12.92)
Month in fiscal year=9			-0.2029*** (-9.08)		-0.3230*** (-13.65)
Month in fiscal year=10			-0.2081*** (-10.32)		-0.2325*** (-11.46)
Month in fiscal year=11			-0.1619*** (-6.55)		-0.5282*** (-13.86)
Month in fiscal year=12			-0.1365*** (-5.94)		-0.2583*** (-10.38)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0388	0.0405	0.0703	0.0406	0.0771
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel C: CEO sales and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:					
					CEO selling
Blackout ratio	-0.1383*** (-16.48)			-0.1565*** (-15.07)	-0.2258*** (-16.18)
Month in fiscal quarter=2		0.0784*** (9.34)		-0.0262** (-2.48)	
Month in fiscal quarter=3		0.0052 (0.71)		-0.0286*** (-3.72)	
Month in fiscal year=2			0.1099*** (10.41)		0.0166 (1.60)
Month in fiscal year=3			0.0365*** (3.76)		-0.0122 (-1.22)
Month in fiscal year=4			0.0164** (2.39)		0.0057 (0.85)
Month in fiscal year=5			0.0846*** (8.43)		-0.0958*** (-6.65)
Month in fiscal year=6			0.0105 (1.30)		-0.0495*** (-5.57)
Month in fiscal year=7			0.0223*** (3.36)		0.0117* (1.79)
Month in fiscal year=8			0.0865*** (8.54)		-0.0947*** (-6.55)
Month in fiscal year=9			0.0106 (1.31)		-0.0488*** (-5.52)
Month in fiscal year=10			0.0148** (2.46)		0.0028 (0.47)
Month in fiscal year=11			0.0864*** (8.53)		-0.0948*** (-6.53)
Month in fiscal year=12			0.0170** (1.99)		-0.0432*** (-4.60)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0167	0.0151	0.0153	0.0168	0.0180
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Table OA2**The impact of the corporate calendar on share repurchases and equity based compensation**

The table presents the impact of variables based on the corporate calendar on share repurchases and equity based compensation. The dependent variable is *Share repurchase dummy* in Panel A, *Granted equity dummy* in Panel B, *Vesting equity dummy* in Panel C, and *CEO selling dummy* in Panel D. The independent variables are *Blackout ratio*, which is the fraction of blackout days within a month, dummies for 2nd and 3rd month in a fiscal quarter, and dummies for the month in fiscal year. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Share repurchases and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Share repurchase dummy				
Blackout ratio	-0.1046*** (-25.89)			-0.1347*** (-23.05)	-0.1683*** (-22.89)
Month in fiscal quarter=2		0.0601*** (17.27)		-0.0299*** (-6.36)	
Month in fiscal quarter=3		0.0451*** (12.17)		0.0160*** (4.20)	
Month in fiscal year=2			0.0627*** (13.26)		-0.0069 (-1.38)
Month in fiscal year=3			0.0711*** (13.55)		0.0348*** (6.57)
Month in fiscal year=4			0.0289*** (7.26)		0.0209*** (5.35)
Month in fiscal year=5			0.0835*** (15.91)		-0.0510*** (-6.88)
Month in fiscal year=6			0.0590*** (11.17)		0.0143** (2.54)
Month in fiscal year=7			0.0138*** (3.19)		0.0059 (1.38)
Month in fiscal year=8			0.0744*** (14.29)		-0.0607*** (-8.23)
Month in fiscal year=9			0.0483*** (9.39)		0.0040 (0.74)
Month in fiscal year=10			0.0043 (1.01)		-0.0047 (-1.15)
Month in fiscal year=11			0.0667*** (13.59)		-0.0684*** (-9.48)
Month in fiscal year=12			0.0489*** (10.05)		0.0040 (0.78)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0332	0.0306	0.0310	0.0340	0.0350
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel B: Granted equity and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Granted equity dummy				
Blackout ratio	-0.0306*** (-5.54)			0.0618*** (5.97)	-0.1225*** (-10.59)
Month in fiscal quarter=2		0.0659*** (14.70)		0.1072*** (11.88)	
Month in fiscal quarter=3		0.0108** (2.32)		0.0241*** (4.27)	
Month in fiscal year=2			0.1976*** (18.17)		0.1470*** (13.49)
Month in fiscal year=3			0.0477*** (5.19)		0.0212** (2.23)
Month in fiscal year=4			-0.0431*** (-6.96)		-0.0489*** (-7.89)
Month in fiscal year=5			-0.0147* (-1.54)		-0.1126*** (-10.59)

Continued on next page

Table OA2 continued

Month in fiscal year=6			(-1.91) -0.0605*** (-8.39)		(-9.21) -0.0931*** (-11.85)
Month in fiscal year=7			-0.0663*** (-11.19)		-0.0721*** (-12.21)
Month in fiscal year=8			-0.0495*** (-7.05)		-0.1478*** (-12.60)
Month in fiscal year=9			-0.0787*** (-11.69)		-0.1109*** (-15.13)
Month in fiscal year=10			-0.0790*** (-13.48)		-0.0856*** (-14.64)
Month in fiscal year=11			-0.0571*** (-8.02)		-0.1554*** (-13.14)
Month in fiscal year=12			-0.0531*** (-7.11)		-0.0858*** (-10.47)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0342	0.0384	0.0803	0.0398	0.0845
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel C: Vesting equity and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Vesting equity dummy				
Blackout ratio	-0.0278*** (-3.52)			0.0941*** (7.16)	-0.1299*** (-9.63)
Month in fiscal quarter=2		0.0793*** (11.69)		0.1422*** (12.05)	
Month in fiscal quarter=3		0.0151** (2.27)		0.0355*** (4.61)	
Month in fiscal year=2			0.2237*** (17.03)		0.1700*** (12.20)
Month in fiscal year=3			0.0800*** (6.07)		0.0519*** (3.85)
Month in fiscal year=4			-0.0603*** (-5.66)		-0.0665*** (-6.23)
Month in fiscal year=5			-0.0186 (-1.55)		-0.1225*** (-7.51)
Month in fiscal year=6			-0.0947*** (-8.57)		-0.1292*** (-11.06)
Month in fiscal year=7			-0.0989*** (-10.20)		-0.1050*** (-10.83)
Month in fiscal year=8			-0.0760*** (-6.72)		-0.1803*** (-11.39)
Month in fiscal year=9			-0.1304*** (-12.52)		-0.1646*** (-15.10)
Month in fiscal year=10			-0.1339*** (-13.38)		-0.1408*** (-14.07)
Month in fiscal year=11			-0.1035*** (-8.99)		-0.2078*** (-12.99)
Month in fiscal year=12			-0.0863*** (-7.95)		-0.1210*** (-10.49)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0480	0.0518	0.0969	0.0538	0.0996
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel D: CEO sales and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	CEO selling dummy				
Blackout ratio	-0.0669***			-0.0758***	-0.1050***

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Table OA2 continued

	(-20.72)			(-17.67)	(-18.61)
Month in fiscal quarter=2		0.0394*** (13.21)		-0.0112*** (-2.91)	
Month in fiscal quarter=3		0.0097*** (3.60)		-0.0067** (-2.40)	
Month in fiscal year=2			0.0465*** (12.10)		0.0031 (0.82)
Month in fiscal year=3			0.0250*** (6.90)		0.0023 (0.63)
Month in fiscal year=4			0.0039 (1.51)		-0.0010 (-0.41)
Month in fiscal year=5			0.0416*** (10.68)		-0.0423*** (-7.53)
Month in fiscal year=6			0.0082** (2.49)		-0.0197*** (-5.49)
Month in fiscal year=7			0.0042 (1.48)		-0.0007 (-0.27)
Month in fiscal year=8			0.0401*** (10.33)		-0.0442*** (-7.79)
Month in fiscal year=9			0.0082** (2.50)		-0.0194*** (-5.47)
Month in fiscal year=10			0.0046* (1.72)		-0.0010 (-0.36)
Month in fiscal year=11			0.0422*** (11.03)		-0.0421*** (-7.41)
Month in fiscal year=12			0.0102*** (3.13)		-0.0178*** (-5.02)
Observations	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0172	0.0150	0.0151	0.0173	0.0185
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Table OA3**The corporate calendar and the correlation between share repurchases and equity compensation using dummy variables**

This table presents the relationship between actual monthly share repurchases and equity based compensation. The dependent variable is *Repurchase intensity*, which denotes the number of shares repurchased during the month divided by the number of shares outstanding at the last trading day of the previous month, multiplied by 100. The relationship between granted equity dummy and share repurchases, vesting equity dummy and share repurchases and CEO sales dummy and share repurchases is examined respectively. We include the standard controls which are described in Table A1 throughout all specifications. The estimates for these controls are qualitatively similar to those reported. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. The difference between the equity based compensation-coefficients of two specifications is tested using a t-stat and reported below the table. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Granted dummy	0.0105** (2.36)	-0.0006 (-0.14)				
Vesting dummy			0.0082** (2.26)	0.0000 (0.01)		
CEO selling dummy					-0.0022 (-0.43)	-0.0131** (-2.57)
Blackout ratio		-0.2014*** (-18.81)		-0.2013*** (-18.76)		-0.2026*** (-18.92)
Observations	250,742	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0729	0.0775	0.0729	0.0775	0.0728	0.0776
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes
T-stat of the difference	(2)-(1):	-2.2755**	(4)-(3):	-2.1369**	(6)-(5):	2.1344**

Table OA4**Correlation between share repurchases and equity compensation using only one of the corporate calendar controls**

This table presents the relationship between actual monthly share repurchases and equity based compensation. The dependent variable is *Repurchase intensity*, which denotes the number of shares repurchased during the month divided by the number of shares outstanding at the last trading day of the previous month, multiplied by 100. The relationship between granted equity and share repurchases, vesting equity and share repurchases and CEO sales and share repurchases is examined respectively. We include the standard controls which are described in Table A1 throughout all specifications. The estimates for these controls are qualitatively similar to those reported. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Granted Equity	0.0005 (1.45)	0.0008** (2.00)				
Vesting equity			0.0027* (1.81)	0.0037** (2.40)		
CEO selling					-0.0067*** (-3.67)	-0.0049*** (-2.67)
Blackout ratio	-0.1577*** (-22.85)		-0.1575*** (-22.83)		-0.1587*** (-22.99)	
Observations	250,742	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0771	0.0753	0.0771	0.0753	0.0771	0.0753
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes

Table OA5
Repurchases outside a program and equity based compensation

This table presents the relationship between actual monthly share repurchases that were conducted outside of a repurchase program and equity based compensation. These repurchases are (mostly) made to satisfy obligations from compensation schedules. The dependent variable is Repurchase intensity (non-program), which denotes the number of shares repurchased outside a program during the month divided by the number of shares outstanding at the last trading day of the previous month, multiplied by 100. The relationship between granted equity and share repurchases, vesting equity and share repurchases and CEO sales and share repurchases is examined respectively. We include the standard controls which are described in Table A1 throughout all specifications. The estimates for these controls are qualitatively similar to those reported. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. The difference between the equity based compensation-coefficients of two specifications is tested using a t-stat and reported below the table. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity outside a program					
Granted Equity	0.0005* (1.88)	0.0004* (1.65)				
Vesting equity			0.0053*** (6.69)	0.0048*** (6.15)		
CEO selling					-0.0002 (-0.19)	-0.0004 (-0.51)
Blackout ratio		-0.0169*** (-4.46)		-0.0152*** (-3.96)		-0.0174*** (-4.51)
Observations	250,742	250,742	250,742	250,742	250,742	250,742
Adjusted R^2	0.0012	0.0014	0.0014	0.0015	0.0012	0.0014
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes
T-stat of the difference	(2)-(1):	-0.2751	(4)-(3):	-0.6358	(6)-(5):	0.2155

Table OA6**Correlation between share repurchases and equity compensation using lagged Blackout ratio**

This table presents the relationship between actual monthly share repurchases and equity based compensation. The dependent variable is *Repurchase intensity*, which denotes the number of shares repurchased during the month divided by the number of shares outstanding at the last trading day of the previous month, multiplied by 100. The relationship between granted equity and share repurchases, vesting equity and share repurchases and CEO sales and share repurchases is examined respectively. We include the standard controls which are described in Table A1 throughout all specifications. The estimates for these controls are qualitatively similar to those reported. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. The difference between the equity based compensation-coefficients of two specifications is tested using a t-stat and reported below the table. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Granted Equity	0.0010** (2.19)	0.0003 (0.80)				
Vesting equity			0.0046*** (3.04)	0.0011 (0.69)		
CEO selling					-0.0033* (-1.76)	-0.0064*** (-3.44)
Blackout ratio _{t-12}		-0.1637*** (-15.72)		-0.1636*** (-15.67)		-0.1652*** (-15.87)
Observations	250,742	235,386	250,742	235,386	250,742	235,386
Adjusted R^2	0.0728	0.0779	0.0729	0.0779	0.0728	0.0780
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes
T-stat of the difference	(2)-(1):	-1.6754**	(4)-(3):	-2.2520**	(6)-(5):	1.6598*

Table OA7
Flexible and preset repurchases and equity based compensation

This table presents the relationship between actual monthly share repurchases both under flexible programs (not pursuant to SEC's Rule 10b5-1) in columns (1) to (3) and preset programs (pursuant to SEC's Rule 10b5-1) in columns (4) to (6) and equity based compensation. The dependent variable is *Repurchase intensity*, which denotes the number of shares repurchased during the month divided by the number of shares outstanding at the last trading day of the previous month, multiplied by 100. The relationship between granted equity and share repurchases, vesting equity and share repurchases and CEO sales and share repurchases is examined respectively. We include the standard controls which are described in Table A1 throughout all specifications. The estimates for these controls are qualitatively similar to those reported. Year-month fixed effects and firm fixed effects are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Program type:	Flexible Programs			Preset (10b5-1) Programs		
Dependent variable:	Repurchase intensity					
Granted Equity	0.0011* (1.90)			-0.0031 (-0.71)		
Vesting equity		0.0056** (2.51)			0.0088 (0.43)	
CEO selling			-0.0006 (-0.23)			-0.0161 (-1.09)
Observations	112,012	112,012	112,012	3,071	3,071	3,071
Adjusted R^2	0.0687	0.0687	0.0687	0.1348	0.1348	0.1349
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	No	No	No	No	No

Table OA8**Program initiation and long-run shareholder value, quintiles based on within-firm variation of *Vesting equity***

The table reports Fama and French calendar-time portfolio regressions for various event windows following 1,173 buyback programs which are initiated in a month where the CEO's equity vests simultaneously. The time period is between 2006 and 2019. Portfolios are rebalanced each month and an equally-weighted excess return is calculated. We regress the monthly excess return of this portfolio on the Fama-French three factors (Fama and French, 1993, Fama and French, 1996). Each stock can enter the monthly portfolio only once, even if the stock has experienced more than one event during the event window. For the window of [0, 0], a firm enters this portfolio if it announces a buyback program in the current month. For the other windows, a firm enters this portfolio if it announces a buyback program in the previous month and stays in the portfolio for 12 (24, 36, 48, respectively) months. Panels B and C provide results for subsamples. Quintile ranges for quintiles Q1 through Q5 are computed for each firm separately and are, therefore, based on all non-zero values of *Vesting equity* of a given firm in a given calendar year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Returns to program initiation when the CEO's equity vests simultaneously, sorted by within-firm-year variation in the dollar value of vesting equity

	(1)	(2)	(3)	(4)	(5)
Numbers in this table:	Abnormal return for the equally-weighted portfolio with the event window below				
Event window:	[0, 0]	[1, 12]	[1, 24]	[1, 36]	[1, 48]
Full sample	0.0149*** (3.47)	0.0033*** (2.94)	0.0030*** (3.03)	0.0021** (2.21)	0.0018* (1.91)
Vesting equity Q1	0.0221*** (3.81)	0.0036** (2.43)	0.0037*** (3.07)	0.0032*** (2.80)	0.0030** (2.61)
Vesting equity Q2	0.0103 (1.19)	0.0032 (1.30)	0.0034* (1.78)	0.0027 (1.56)	0.0019 (1.13)
Vesting equity Q3	0.0019 (0.32)	-0.0008 (-0.33)	-0.0005 (-0.32)	-0.0015 (-0.96)	-0.0018 (-1.21)
Vesting equity Q4	0.0222*** (2.64)	0.0051* (1.92)	0.0033 (1.48)	0.0031 (1.54)	0.0026 (1.32)
Vesting equity Q5	0.0641* (1.98)	-0.0037 (-0.66)	-0.0040 (-0.93)	-0.0012 (-0.36)	-0.0028 (-0.81)

Table OA.9

Share repurchases, equity compensation, and abnormal returns

This table reports the results of regression of buy-and-hold abnormal return (BHAR) on measures of CEO vesting in months with and without repurchases. The dependent variable in all panels is the BHAR over various time periods (from two months before to four years after the current month), subtracting the value-weighted market return. In Panel A, the sample is the repurchasing months. The regressor, *Vesting equity in billions*, is the value of equity being vested to the CEO in the current month measured in billions of US dollars. In Panel B, the sample is the non-repurchasing months and the regressor is also *Vesting equity in billions*. In Panel C, the sample is the repurchasing months and the regressor is *Vesting dummy*. *Vesting dummy* equals one if some of the CEO's equity is vested in the current month and zero otherwise. In Panel D, the sample is the repurchasing months and the regressor is *Vesting number*. *Vesting number* is the number of equity being vested to the CEO in the current month. The firm fixed effect are controlled for throughout all specifications in this table. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: CEO equity vesting and abnormal returns in repurchasing months

Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Vesting equity in billions	0.3371 (1.17)	0.9959*** (3.04)	0.2076 (0.66)	-2.4090** (-2.28)	-1.7368* (-1.69)	-2.2672** (-2.12)	-1.9822* (-1.76)
Constant	0.0056 (1.14)	-0.0133*** (-3.32)	0.0032 (0.54)	-0.0071 (-0.33)	-0.0149 (-0.65)	-0.0393 (-1.55)	-0.0353 (-1.42)
Observations	57,745	57,754	58,828	45,477	44,638	43,863	43,363
R ²	0.0291	0.0274	0.0286	0.0239	0.0262	0.0281	0.0290

Panel B: CEO equity vesting and abnormal returns in non-repurchasing months

Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Vesting equity in billions	1.1375*** (3.67)	1.9578*** (6.24)	-0.4570 (-1.54)	-10.9138*** (-7.25)	-10.2915*** (-6.71)	-9.2614*** (-6.07)	-8.8053*** (-5.66)
Constant	0.0137*** (4.26)	0.0071** (2.51)	0.0497*** (14.52)	0.0161 (1.15)	0.0273*** (1.98)	-0.0089 (-0.64)	-0.0166 (-1.15)
Observations	184,044	184,629	189,923	141,801	138,896	137,526	135,666
R ²	0.0377	0.0381	0.0376	0.0550	0.0547	0.0547	0.0552

Panel C: CEO equity vesting dummy and abnormal returns in repurchasing months

Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Vesting dummy	0.0003 (0.32)	-0.0003 (-0.26)	0.0031*** (2.81)	0.0046 (1.10)	0.0065 (1.49)	0.0049 (1.11)	0.0037 (0.79)
Constant	0.0056 (1.14)	-0.0133*** (-3.32)	0.0031 (0.52)	-0.0074 (-0.34)	-0.0153 (-0.67)	-0.0396 (-1.56)	-0.0355 (-1.42)
Observations	57,745	57,754	58,828	45,477	44,638	43,863	43,363
R ²	0.0291	0.0273	0.0287	0.0238	0.0262	0.0280	0.0290

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Table OA9 continued

Panel D: CEO equity vesting number and abnormal returns in repurchasing months							
Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Vesting number	0.0045 (1.03)	-0.0019 (-0.46)	0.0131** (2.56)	0.0389** (2.30)	0.0397** (2.53)	0.0413** (2.44)	0.0364** (2.01)
Constant	-0.0011 (-0.09)	-0.0028 (-0.29)	-0.0067 (-0.31)	0.0087 (0.25)	0.0072 (0.22)	-0.0345 (-0.98)	-0.0393 (-1.10)
Observations	10385	10336	10576	8384	8278	8176	8134
R^2	0.0455	0.0462	0.0460	0.0584	0.0655	0.0601	0.0560

Table OA10

Share repurchases, equity compensation, and abnormal returns (alternatives of Table 9, Panel B)

The table reports Fama and French calendar-time portfolio regressions for various event windows around repurchases between 2006 and 2019. The time windows are consistent with the Table 3 in [Edmans et al. \(2021\)](#). For each row, we conduct separate Fama-French three-factor regressions for the seven calendar portfolios with different window lengths. We report the abnormal returns but not the factor loadings in the table. The first row of Panel A uses a portfolio of firms that repurchases when the CEO's equity vests simultaneously in the corresponding time window. For the remaining rows, quintile ranges for quintiles Q1 through Q5 are based on all non-zero values of *Vesting equity* of a given firm in a given calendar year. In Panel B, quintile ranges for quintiles Q1 through Q5 are based on all non-zero numbers of the CEO's vesting equity of a given firm in a given calendar year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Abnormal returns to open market share repurchases when the CEO's equity vests simultaneously, sorted by within-firm-year variation in *Vesting equity*

Dependent variable: Event window:	Equally-weighted portfolio return						
	[-2, -2]	[-1, -1]	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Full sample	-0.0021 (-1.63)	-0.0025 (-1.63)	0.0016 (1.13)	0.0026*** (3.27)	0.0023** (2.37)	0.0015 (1.43)	0.0019 (1.22)
Vesting equity Q1	-0.0038** (-2.33)	-0.0083*** (-3.92)	0.0091*** (5.47)	0.0033*** (4.06)	0.0020** (2.03)	0.0016 (1.58)	0.0019 (1.21)
Vesting equity Q2	0.0019 (0.65)	0.0017 (0.44)	-0.0043 (-1.26)	0.0019 (1.62)	0.0027* (1.27)	0.0026 (1.27)	0.0027 (1.20)
Vesting equity Q3	0.0003 (0.09)	0.0003 (0.10)	0.0057* (1.67)	0.0005 (0.36)	0.0026** (2.02)	0.0008 (0.44)	0.0018 (0.67)
Vesting equity Q4	-0.0041 (-1.12)	0.0097** (2.41)	-0.0096** (-2.14)	0.0015 (1.14)	0.0019 (1.33)	-0.0013 (-0.73)	0.0022 (0.84)
Vesting equity Q5	0.0020 (0.26)	0.0046 (0.58)	-0.0046 (-0.74)	-0.0000 (-0.00)	0.0030 (0.92)	-0.0007 (-0.24)	-0.0000 (-0.01)

Panel B: Abnormal returns to open market share repurchases when the CEO's equity vests simultaneously, sorted by within-firm-year variation in the number of vesting shares

Dependent variable: Event window:	Equally-weighted portfolio return						
	[-2, -2]	[-1, -1]	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
# Vesting shares Q1	-0.0009 (-0.56)	-0.0031 (-1.56)	0.0042** (2.53)	0.0023*** (2.81)	0.0022** (2.12)	0.0020* (1.98)	0.0025 (1.46)
# Vesting shares Q2	-0.0068* (-1.80)	-0.0023 (-0.52)	-0.0025 (-0.64)	0.0027** (1.99)	0.0024 (1.60)	0.0016 (0.99)	0.0019 (1.28)
# Vesting shares Q3	-0.0002 (-0.07)	-0.0058** (-1.99)	0.0009 (0.28)	0.0028** (2.41)	0.0036*** (2.89)	0.0009 (0.61)	-0.0012 (-0.71)
# Vesting shares Q4	-0.0048 (-1.31)	-0.0020 (-0.57)	0.0010 (0.27)	0.0031** (2.24)	0.0041** (2.33)	0.0001 (0.09)	0.0011 (0.64)
# Vesting shares Q5	-0.0066 (-1.03)	-0.0036 (-0.45)	0.0084 (1.29)	0.0031 (1.06)	-0.0010 (-0.36)	-0.0000 (-0.01)	-0.0016 (-0.57)