

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

Finance Working Paper N° 909/2023

April 2023

Ingolf Dittmann

Erasmus University Rotterdam, Tinbergen Institute
and ECGI

Amy Yazhu Li

Erasmus University Rotterdam

Stefan Obernberger

Erasmus University Rotterdam

Jiaqi Zheng

Oxford University

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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 corporate calendar—the firm’s schedule of earnings announcements and blackout periods—induces 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 or 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-based compensation increases the CEO’s propensity to set up a buyback program when it benefits long-term shareholder value. Overall, our results suggest that equity-based compensation promotes the adoption of value-increasing buyback programs, but it does not affect the execution of these programs.

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

JEL Classifications: G14, G35, M12, M52

Ingolf Dittmann

Professor of Corporate Governance and Managerial Accounting
Erasmus University Rotterdam, Erasmus School of Economics
Burgemeester Oudlaan 50
3062 PA Rotterdam, The Netherlands
phone: +31 104 081 283
e-mail: dittmann@ese.eur.nl

Amy Yazhu Li

Researcher
Erasmus University Rotterdam
E 02-34 E-Building, Burgemeester Oudlaan 50
3062PA Rotterdam, Netherlands
e-mail: y.li@ese.eur.nl

Stefan Obernberger*

Associate Professor of Finance
Erasmus University Rotterdam, Erasmus School of Economics
Burgemeester Oudlaan 50
3062 PA Rotterdam, The Netherlands
phone: +31 10 408 1329
e-mail: obernberger@ese.eur.nl

Jiaqi Zheng

Researcher
Oxford University
43 Woodstock Road
Oxford OX2 6HG, UK
phone: +44 (0)7410108476
e-mail: Jiaqi.Zheng.DPHIL@said.oxford.edu

*Corresponding Author

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

Ingolf Dittmann^a, Amy Yazhu Li^a, Stefan Obernberger^a, Jiaqi Zheng^b

^a*Erasmus School of Economics at Erasmus University Rotterdam*

^b*Saïd Business School at University of Oxford*

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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 a 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 the CEO uses share repurchases to sell equity at inflated stock prices and whether equity compensation affects the firm’s decision to initiate a buyback program. 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 center of a hearing before the U.S. House Committee on Financial Services (Hearing no. 116–58). Moreover, Appendix OA.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. On 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 2,377 repurchasing firms, 6,303 buyback programs, 59,082 months with open market repurchases, and 251,646 firm months for the period 2006-2019.

We start our analysis by plotting a firm's repurchase activity over its fiscal calendar. We document two stylized, but not widely acknowledged facts about the timing of share repurchases. First, buyback programs are often initiated at the same time as earnings are announced. Second, from the first to the second month of a fiscal quarter, repurchase volume increases by 42% on average, because the earnings announcement usually takes place early in the second month of a fiscal quarter and many firms consider the period beforehand as a blackout period in order to avoid litigation related to insider trading.

In the next step, we examine to what extent the granting, vesting, and selling of equity depend on the corporate calendar. We find patterns that are very similar to those documented 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 any such pattern in the data. Accounting for the corporate calendar, we find that CEOs are actually less likely to sell equity when their firms buy back shares. While we acknowledge that this result cannot be interpreted causally, it can certainly not be interpreted as evidence that the CEO trades against the firm.

After examining the trading behavior 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 com-

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.

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 dollars, the firm is four 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 dollars of equity vests, the probability of a buyback program being initiated increases by 12%. Overall, these results suggest that CEOs initiate buyback programs when they believe that the stock is undervalued.

As a final step, we examine the short-run and long-run performance of buyback programs for which we observe a direct link to equity-based compensation. We first study the timing of the start of a buyback program. We find that buyback announcements that coincide with the vesting of equity are followed by positive abnormal returns over the subsequent 48 months. Adding this result to the observation that equity-based compensation increases the propensity of launching a buyback program, we conclude that equity-based compensation motivates the CEO to undertake share repurchases which create shareholder value.

When CEOs sell 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 performance observed for buyback programs in general. *Actual* share repurchases in the open market which coincide with the vesting or selling of equity are also generally followed by positive abnormal returns. Furthermore, we find that these share repurchases are executed at prices below contemporaneous market prices, which is not consistent with the notion that firms manipulate the stock price by overpaying for repurchased shares or using share repurchases to bid up the stock price. Taken together, our results lend no support to the claim 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 shares. 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 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 dependent 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 tighter regulation of buybacks. We show that the alleged evidence of opportunistic timing of share repurchases by the CEO can be explained by the firm's corporate calendar and that any potential opportunistic timing observed in the data does not come at the expense of shareholder value. Instead, equity grants appear to encourage the CEO to make use of buyback programs if they increase long-term 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 the paper.

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 award fewer stock options and equity grants 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 incentives. [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 the vesting of their CEOs' equity. Contrary to [Moore \(2020\)](#), the authors find that stock returns are more positive in the two quarters surrounding repurchases, but more negative in the two years following repurchases. [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. Barger 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. 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 generally 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).

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 10b-5-1, 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.

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>.

SEC rule 10b-18 (17 CFR § 240.10b-18) 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 (4) 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. Generally, 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 board delegates to the compensation committee. Since 2003, the New York Stock Exchange (NYSE) and the NASDAQ Stock Exchange have accepted new rules which ask for 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

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

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 as 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 Online Appendix OA.2. Our repurchase data set, obtained from SEC's EDGAR system, covers all firms available in CRSP and contains 3,556 repurchasing firms, 10,107 buyback programs, and 94,388 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 excluded these industries because of being subject to severe regulatory restrictions (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 step, we remove all observations for which at least one of our control variables is missing. Our final dataset contains 2,377 repurchasing firms, 6,303 buyback programs, 59,082 open market repurchasing months, and 251,646 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

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>.

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 construct *Insider trading* to denote the net dollar amount of insider acquisitions minus insider disposals. Furthermore, 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.

⁷Firms regularly repurchase shares outside of publicly announced programs to satisfy obligations from employee stock option plans. 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%).

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 voluntarily disclosed insider trade policy, and actual insider trading history. Based on a survey, [Bettis et al. \(2000\)](#) find that 78.11% of 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% of insider trades happen within blackout periods. [Roulstone \(2003\)](#) argues that 31.6% of firms have blackout periods, based on his 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 that 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 blackout period, the length of a blackout period varies with the number of days it takes a firm before announcing its earnings. In our sample, the mean (median) length of a 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 251,646 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:

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

where $\text{Repurchases}_{i,t}$ measures firm i 's repurchase activity in month t and $\text{CEO-comp}_{i,t}$ 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 both 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 , we relate equity-based compensation to the decision to initiate a buyback program. Finally, in Section 5.4, we examine how the interaction between share repurchases and equity-based compensation affects stock prices.

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

We expect both 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, we expect earnings announcements to 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, we expect earnings announcements to determine when firms and insiders trade. Insiders avoid trading prior to the announcement of earnings, at which point the firm releases material information to the public. Guay et al., 2022 show that the trading period for insiders usually starts shortly after the earnings announcement and ends about 17-22 days before the end of the fiscal quarter. The remainder of the fiscal quarter is thus normally considered a blackout period.

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.

Our results are fully in line with these expectations. First, we find that buyback programs and equity grants are closely tied to the announcement of earnings. Figure 1, Panel A, plots the difference in calendar days between the announcement of a buyback program and the announcement of earnings. A large number of buyback programs are announced on the same day as the firm's quarterly earnings are announced. Panel B shows that equity grants cluster shortly after the earnings are announced. Hence, both events are not equally distributed over the corporate calendar, but cluster in close proximity to the announcement of earnings.⁹

Second, we find that the actual repurchase of shares by the firm and the selling of equity by the CEO are both hampered by trading restrictions related to the announcement of earnings. Figure 2 groups repurchase months into three categories according to how much of a month is covered by blackout days (Panel A).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%. This pattern is almost identical for CEO selling (Panel B).

These two aspects become also apparent when we consider a firm's fiscal time rather than calendar time. Figure 3 contains a decomposition of the firm's fiscal quarter into its three months and summarizes the within-fiscal quarter variation of share repurchases, granted equity, vesting equity, and equity sales. Across all variables, we find that the activity peaks in the second month of the fiscal quarter, which commonly is the month in which the earnings are announced (on average, earnings are announced 35 days after the start of the fiscal quarter of a firm). 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. Accordingly, we find that *Vesting equity* also peaks in the second month of the fiscal quarter. As earnings are announced early in the second month, it is also the month that contains the lowest estimated number of blackout days in our sample (first month: 29 days, second month: 7 days, third month: 22 days). Hence, Repurchase intensity and CEO selling peak in the second month,

⁹Figure 1, Panel B 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.

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

too.

Moreover, Figure 4 presents a complete fiscal year and shows that buyback program initiations and in particular equity grants are more likely to fall into the first quarter of a fiscal year. Therefore, it is essential to capture not only the within-fiscal quarter variation, but also the between-fiscal quarter variation.

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), 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% ($=50\% \times 0.1463$), which is almost 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 for 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.¹¹

¹¹We 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 around for the CEO's sale of equity. Moreover, we obtain very similar results and conclusions when we transform our dependent variables into binary variables, see Table OA2.

5.2. The relationship between share repurchases and equity-based compensation: 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 measures of the CEO's equity-based compensation. We ask to what extent the relationship is associated with the corporate calendar. The table has three panels and each panel is dedicated to one aspect of the CEO's equity-based compensation (Panel A: Equity grants, Panel B: Vesting equity, Panel C: CEO sales), In column (1) of Panel A, 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 0.0037, which means that an equity grant of one million dollars increases *Repurchase intensity* by 0.0037 percentage points on average, which is equal to 2.43% of the average *Repurchase intensity* (=0.1523%, from Table 2) in our sample. In 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. To check the robustness of these results, we alternatively use the natural logarithm of *Granted equity* or a binary indicator of whether equity is granted in columns (3) to (6). We find that none of our results is driven by the distributional properties of *Granted equity*.¹² We conclude that the correlation between *Repurchase intensity* and the granting of equity is driven by the corporate calendar and thus spurious.¹³

In Panel B, we repeat the analysis in Panel A using *Vesting equity*. In column (1), vesting equity in the amount of one million dollars increases *Repurchase intensity* by 0.0046 percentage points on average, which is equal to 3.02% of the average *Repurchase intensity* (=0.1523%, from Table 2) in our sample. Our coefficient estimate of *Vesting equity* is in

¹²Using the natural logarithm of our dependent variable, *Repurchase intensity*, does not have an impact on our results either, see Table OA3.

¹³In Table A1, we provide a discussion of the control variables and how well they blend in with the existing literature. Our general conclusion is that most of the control variables align well with the existing literature for our sample.

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 (2) as we account for the corporate calendar. Again, these results hold irrespective of how we define *Vesting equity* (compare columns 3 to 6).

In Panel C, we regress *Repurchase intensity* on measures of the CEO's sale of equity. We obtain a statistically highly significant relationship between share repurchases and CEO selling in column (1), which weakens if we take the natural logarithm in column (3) and entirely disappears if we resort to a binary variable in column (5). However, we obtain a statistically significant relationship between share repurchases and CEO sales in all cases if we account for the corporate calendar. The positive bias due to not accounting for the corporate calendar becomes statistically significant as soon as we account for the skewness in CEO selling in columns (3) to (6) (see t-tests in last line of Panel C). Overall, these results suggest that CEOs refrain from selling shares when the firm buys back shares in the open market.¹⁴

5.2.1. Robustness tests

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

¹⁴In 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 spurious correlation reported in Table 4.

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 behavior is not backed by earlier research finding that the earnings announcement is delayed when it is bad.

potential delay would be in the scale of days, a granularity that 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). In Table [OA5](#), we re-run all our regressions using the blackout-period of the same quarter in the previous year. All coefficient estimates remain quantitatively unchanged

[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 a lower risk of litigation. Table [OA6](#) 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

Finally, note that our analysis is based on open-market repurchases made under an authorized program. In Table [OA7](#), 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. This is not surprising as the relation between repurchases and equity-based compensation is mechanically and is not motivated by opportunistic timing. Furthermore, other studies analyzing the total number of share repurchases may also pick up the mechanical correlation between share repurchases and equity vesting, which is in our view incorrect.

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.

5.2.2. Share repurchases and insider trading

[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 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 split the insider trading variable into insider buying and insider selling, and we keep the corporate calendar controls in place. Insider buying turns out to have a highly significantly positive value and insider selling is insignificant. In column (4), 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 only beneficial owners trade against the firm and the other insiders buy or refrain from selling shares. 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.

5.3. Equity-based compensation and the decision to initiate a buyback program

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 emerges 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 of the relationship 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 dollars of equity vests, the probability of a buyback program being initiated increases by 12%.¹⁸ If the CEO buys stock worth one million dollars, the firm is four times more likely to initiate a buyback program. This result suggests that the CEO tends to believe that the stock is currently undervalued when she initiates a buyback program. The results hold irrespective of the distributional properties of our variables of equity-based compensation and insider trading (cf. columns 3 to 6). Moreover, we observe that part of the effect is again absorbed by the corporate calendar (cf. columns 2, 4, and 6).

Overall, we find no evidence consistent with the claim that CEOs use buyback announcements to cash out their equity. However, we observe that equity-based compensation is related to the decision to initiate a buyback program. Consequently, it will be important to understand the implications of this relationship for shareholder value, which will be the focus of the following section.

¹⁸The coefficient estimate of CEO vesting, 0.0030 (Table 7, specification (2)), divided by the unconditional probability of a buyback, 0.025, is equal to 12%. The unconditional buyback probability of 0.025 is computed as the ratio of 6,303 buyback announcements to 251,646 firm months.

5.4. *Share repurchases and equity-based compensation: prices and long-run returns*

In this section, we examine the shareholder value implications of two hypotheses of how equity-based compensation may affect the timing and execution of buyback programs. 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) in the long run.

Our second hypothesis is that equity compensation increases the likelihood of a buyback program when such a program is beneficial for shareholder value.¹⁹ Equity grants allow the CEO to profit from the positive (long-term) impact of buyback programs on stock prices. Note that the vast majority of the CEO's equity-based compensation normally does not vest on a single vesting date. Accordingly, it may be in the CEO's own best interest to pursue value-increasing firm policies. If buybacks create shareholder value, we should observe positive abnormal returns in the short run, which are not reversed in the long run or continue to materialize over a longer time period.

We test these two hypotheses 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 to up to four years later.²⁰ We build equally-weighted calendar-time buyback portfolios and perform calendar time-series regressions of buyback portfolio returns on the value-weighted

¹⁹As a tool of payout policy, share repurchases can create value for shareholders when the firm's agency costs of free cash flow are high and the firm's cash is worth more in the hands of shareholders (among others, [DeAngelo, 2022](#), makes this point in defense of buybacks). 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.

²⁰A well-established phenomenon in the buyback literature is the "buyback anomaly", which documents that the market's 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](#)).

market return and the risk factors high minus low (HML) and small minus big (SMB):²¹

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

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

For the full sample of 6,303 buyback announcements reported in Panel A of Table 8, we find significant monthly abnormal returns for each of the first three years after the buyback announcement. Overall, we find an average abnormal return of 0.22% over the 48 months following the buyback announcement. The average monthly returns translate into cumulative abnormal returns of 10.7% for the whole 48 months period (1-12 months: 3.5%, 13-24 3.0%, 25-36: 2.0%, and 37-48: 2.3%) by multiplying the number of months times the average abnormal monthly return over the respective time period. Thus, we find that the initiation of buyback programs is generally followed by positive abnormal returns, in line with the results in Lee et al. (2020) who also look at a recent time period.

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, on the one hand, the firm intends to repurchase shares and, on the other hand, the CEO holds equity that can be sold in the open market. In total, 1,196 buyback announcements fall into this category. For this sample, we obtain strictly positive abnormal returns, amounting to cumulative abnormal returns of 8.6% (=0.0018 times 48 months) over the subsequent 48 months. Hence, the buyback programs which fall into this sample create significant shareholder value on average. Notably, the abnormal stock price performance in the first year is larger than the performance of the whole sample in Panel A.

²¹We adopt this approach and its parameter choices from Peyer and Vermaelen (2009) and Dittmar and Field (2015) who both study the long-run performance of buybacks using similar data. All 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.

After 24 months, abnormal returns become practically zero. Overall, prices seem to adjust more quickly when the start of the buyback program coincides with the vesting of equity. There is no evidence of a reversal pattern and hence there is no evidence consistent with price manipulation.

The CEO's incentive to use share repurchases to either temporarily increase the stock price or to exploit undervaluation should be stronger, the higher the amount of her vesting equity (measured in dollar amounts). We, therefore, group the 1,196 buyback announcements used in Panel B into three portfolios according to the value of the CEO's equity vesting in the respective year. We find that buyback programs exhibit very large cumulative abnormal returns of 14.0% (=0.0029 times 48 months) over the 48 months window if they coincide with large dollar amounts of vesting equity. Adding the insight of Table 7 that buyback programs become more likely when large equity grants vest, these results suggest that vesting equity encourages the CEO to initiate a buyback program if it is beneficial for shareholder value.

In Table 8, Panel C, we consider only those buyback programs where the CEO sells some 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 both the firm and the CEO have actually traded in the open market. We do not record any sale of the CEO's equity for 58% 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. Overall, we find that these buyback programs perform much better over the subsequent 48 months than the average buyback program (cumulative average abnormal returns of 15.6% versus 9.1%) and we again observe the strongest effects for the subsample with the largest sales of equity by the CEO. In conclusion, 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 the announcement of the start of a buyback program. We cover shorter time periods over the subsequent 12 months, 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. In Panel A, we provide the results for our full sample of open market repurchases (N=59,082). We find that repurchases are followed by positive abnormal returns, consistent with the notion that share repurchases signal positive information to the market. 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, 9,009 repurchase firm-months fall into this category. For this sample, the abnormal long-run performance is comparable to the performance of the full sample 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.

In Panel C of Table 9, we specifically consider those open market repurchases which coincide with months in which the CEO sells her equity, which is relatively rare as only 5,896 repurchase firm-months fall into this category. The analysis in Panel C is highly endogenous, because stock returns or stock repurchases might cause CEO sales. For the event month, we document a positive and statistically significant abnormal return. Over the subsequent 12 months, we observe positive abnormal returns as well. Hence, share repurchases are associated with increases in shareholder value when CEOs sell their equity simultaneously. We do not observe a reversal pattern consistent with price manipulation.

The subsamples, which are based on the dollar amount of equity sales, reveal two interesting patterns. First, we observe that the abnormal returns in the window $[0,0]$ increase with the amount of equity sales. Second, the long-run abnormal returns move towards zero from the portfolio with lowest equity sales to the portfolio with highest equity sales, but the returns never become negative as the first hypothesis suggests. Recall that the first hypothesis says that repurchases are done to inflate the stock price.

To better understand these results, we compare them to how CEO sales perform generally (i.e., irrespective of whether a repurchase takes place) in Panel D. We find that CEO

sales are associated with positive abnormal returns in the event month, whereas subsequent returns are not abnormally high. These results are consistent with earlier research finding that insiders usually trade contrary to the market and that insider sales have no predictive ability (cf., e.g., [Lakonishok and Lee, 2001](#), and [Jeng et al., 2003](#)). We conclude that share repurchases that coincide with relatively large CEO sales do not contain information on average, as is normally the case with insider sales. In general, however, the stock performance after CEO sales turns out to be much more positive when CEO sales coincide with share repurchases (compare Panel C with Panel D).

[Edmans et al. \(2021\)](#) argue that CEOs manipulate stock prices by showing that the dollar value of 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 [OA8](#), Panel A). However, we show that the return pattern is driven by increases in the stock price, rather than increases in the number of vesting shares (Table [OA8](#), Panel B). If we change the definition of vesting equity such that the current price of the stock no longer plays a role, the return patterns actually disappear (Table [OA8](#), Panel C) or reverse (Table [OA8](#), Panel D). Moreover, using the calendar-time portfolio approach, we show that the abnormal returns are just less positive, but not negative, when vesting equity is high (Table [OA9](#)). 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 OA.3.

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 the average market price. In order to bid up the stock price, firms need to systematically bid above the market price or consume all liquidity in the market. Either way, repurchase prices should be at least as high as average

market prices, leading to zero or negative repurchase bargains.

Our results in Table 10 document that *Repurchase bargain* is positive on average, i.e., firms buy back their stock at prices that are generally lower than average market prices. We observe this result irrespective of whether equity vests simultaneously or not (Panel A). In the month of the repurchase, the repurchase discount is equal to 0.70% for vesting months and 0.80% for all other months. Hence, the discounts reported for both groups are of similar magnitude and generally constitute evidence of managerial timing ability. Furthermore, relative to the average market prices computed over the following six months, firms appear to be buying back at a much 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). Here, the average bargain in the repurchase month turns out to be larger if the CEO sells equity in the same month. Hence, contemporaneous CEO sales do not affect the firm's ability to buy back at a bargain. Again, we find no evidence consistent with price manipulation.

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. On the contrary, we show that vesting equity increases the likelihood

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 that are lower than average market prices.

of the CEO to initiate a repurchase program. Taken together with the fact that these buyback programs increase long-run shareholder wealth, this finding suggests that equity-based compensation 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 that maximizes shareholder value. More specifically, we caution the regulator against further confining 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 repurchases 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 one subject for further research. 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.

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A Appendix

Table A1

Overview of the standard control variables in our regressions of *Repurchase intensity*. This table provides an overview of the control variables included in our baseline regressions. The coefficient estimates reported in column Our results are taken from regression specification (2) in Table 4, Panel A. 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	Various buyback papers have shown either a positive, negative, or insignificant relationship.	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	An increase 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 in our sample period.
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 in our sample period.
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 (Hillert et al. (2016)).	-0.1036	No	The relative spread does not affect share repurchases in our sample period.
Repurchase intensity (lagged)	Busch and Oberberger (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.

Continued on next page

Table A1 continued

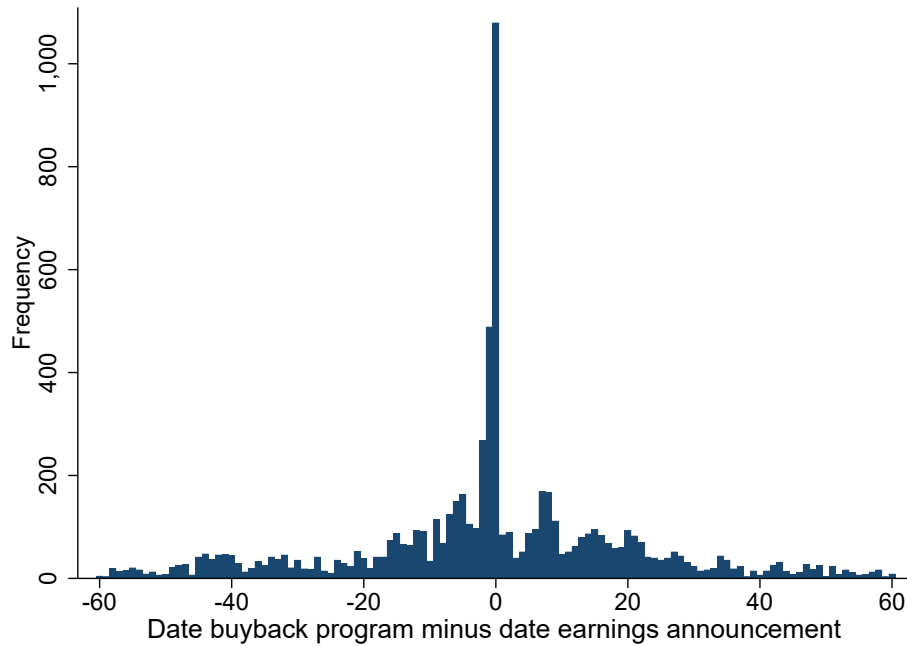
Trading volume	This variable is used in Hillert et al. (2016) as a control variable to proxy for lagged market liquidity.	0.0339**	Yes	Firms buy back more when the trading volume is high.
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B Figures

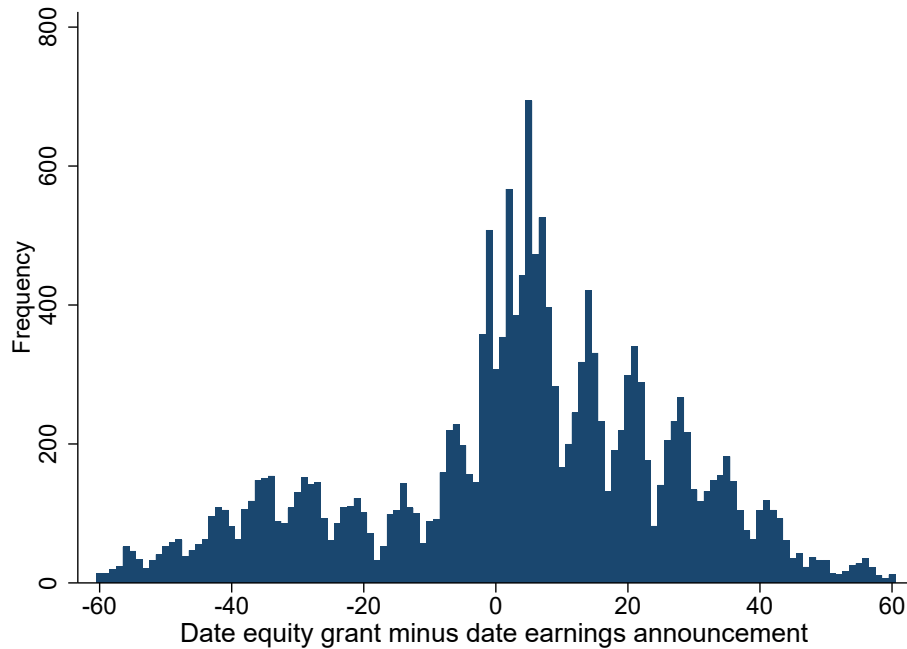
Figure 1

The timing of buyback programs and equity grants from the perspective of the earnings announcement

Panel A: Buyback program announcement date versus earnings announcement date



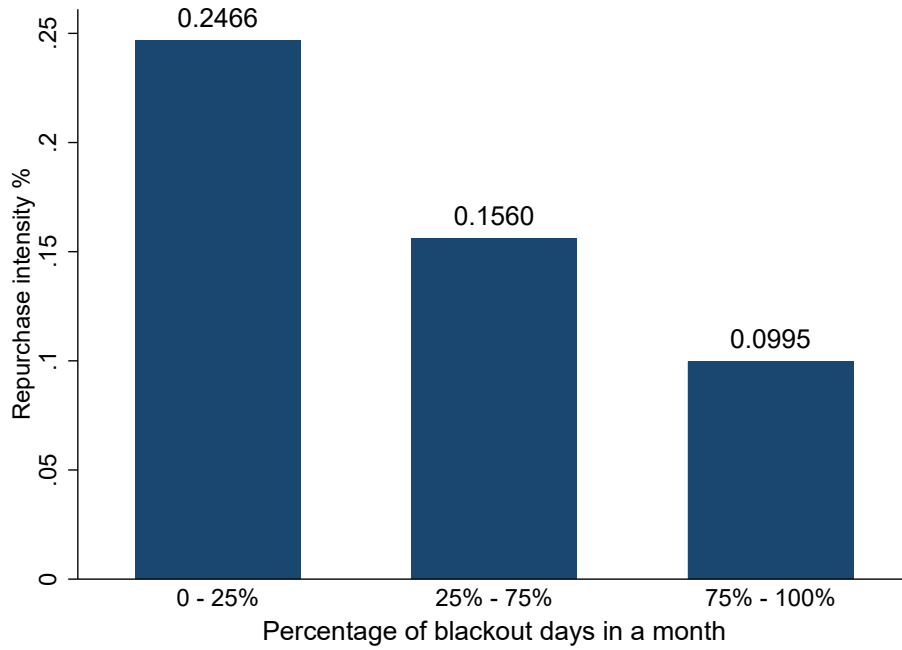
Panel B: Equity grant date versus earnings announcement date



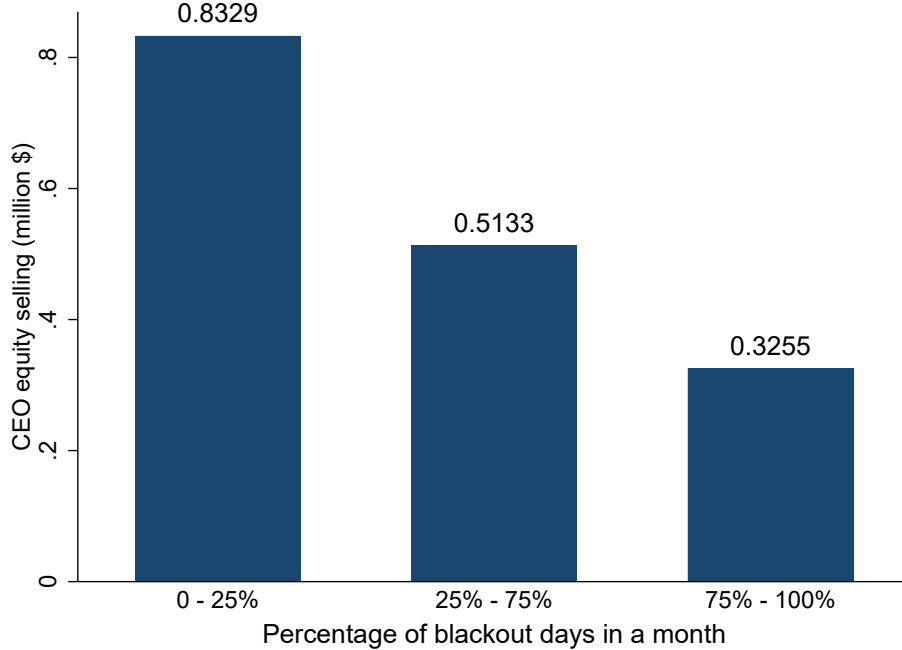
The graphs depict the timing of events relative to earnings announcements. Panel A shows the difference in calendar days between the announcement of a buyback program and the announcement of earnings. Panel B shows the difference in calendar days between the granting of equity and the announcement of earnings.

Figure 2
Trading activity during trading windows and blackout periods

Panel A: Share repurchases during trading windows and blackout periods

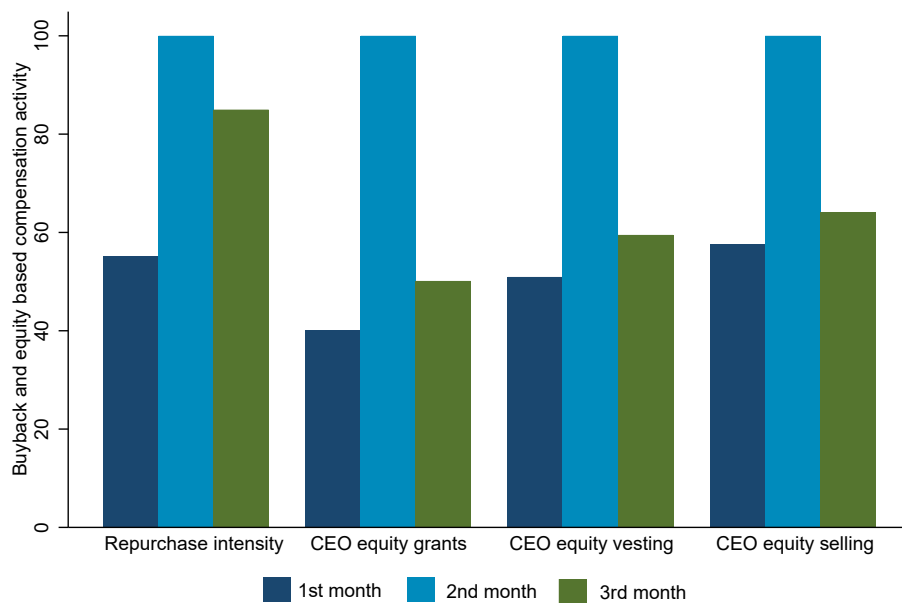


Panel B: CEO equity selling during trading windows and blackout periods



The graphs show the average of trading activity over different percentages of blackout days in a given quarter-month. 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. A detailed discussion of this measure can be found in Section 4.1.2. Panel A depicts the *Repurchase intensity* by the firm and Panel B depicts equity selling by the CEO.

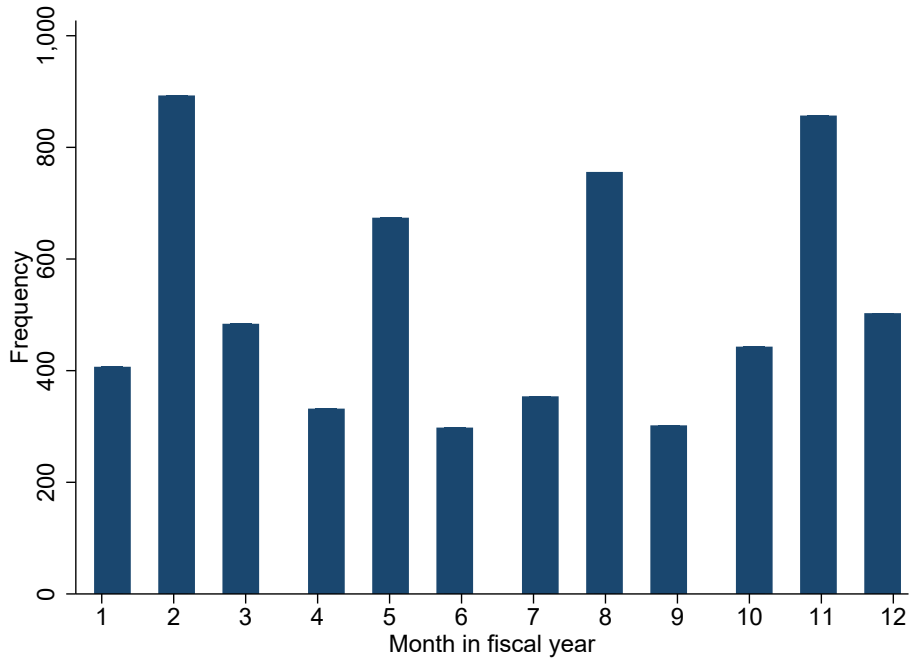
Figure 3
Timing of share repurchases and equity-based compensation over fiscal quarters



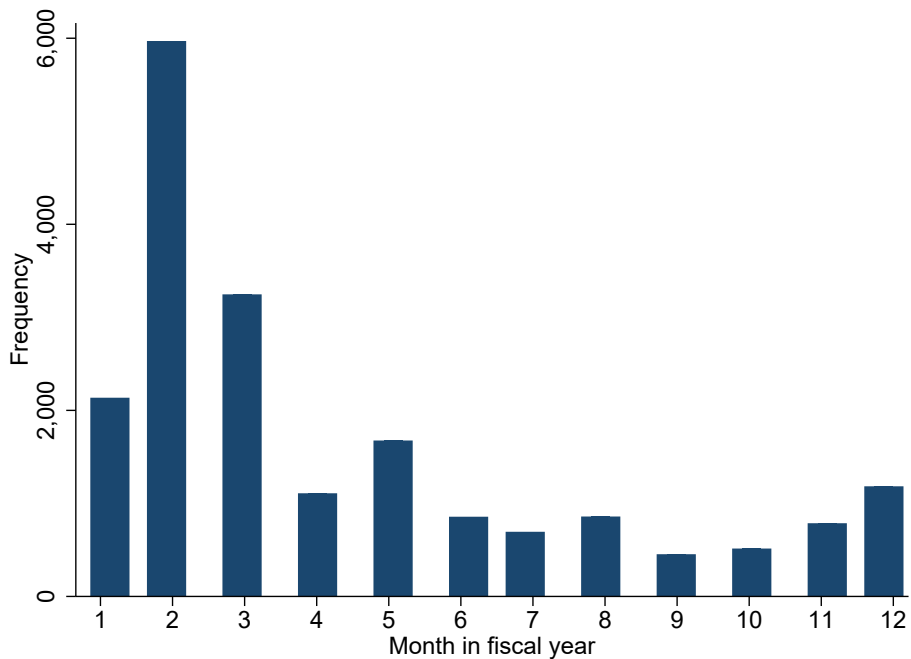
The graph plots the average of *Repurchase intensity* and the CEO's equity grants (*Granted equity*), the CEO's vesting equity (*Vesting equity*), and the CEO's equity sales (*CEO selling*) over the three months in a fiscal quarter. The numbers are normalized such that the second fiscal quarter-month represents 100 for each category.

Figure 4
Buyback program initiations and equity grants over the fiscal year

Panel A: Buyback program initiations over the fiscal year



Panel B: Equity grants over the fiscal year



The graphs plot the timing of corporate events throughout the fiscal year. Panel A depicts the initiation of buyback programs over the twelve months of the fiscal year and Panel B depicts the granting of equity over the twelve months of the fiscal year.

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 using the formula $\ln(1+x)$ where x is the variable in question.

Name	Definition	Source	Unit
Program and repurchase variables			
Program length	The total number of months the repurchase program lasts	SEC	Integer
Program size	The maximal number of shares (maximal dollar amount) that could be purchased divided by the number of shares outstanding (market capitalization) at the time of the announcement	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	Percent
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 (Compustat: <i>apdtedateq</i>) until three days after the following earnings announcement (Compustat: <i>rdq</i>), following Guay et al. (2022) . See Section 4.1.2 for further details.	Compustat	Ratio
Granted dummy	1 if equity is granted in a month	Equilar	Binary
Granted equity	Total granted equity in a month	Equilar	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			
Affiliates buying	Total insider buying by Affiliates in a month (ln)	TR Insider Data	Million \$
Affiliates selling	Total insider sales by Affiliates in a month (ln)	TR Insider Data	Million \$
CEO buying	Total CEO purchases in a month (ln)	TR Insider Data	Million \$
CEO selling	Total CEO sales in a month (ln)	TR Insider Data	Million \$
CxO buying	1 if there are CEO sales in a month	TR Insider Data	Binary \$
CxO selling	Total insider buying by CFOs, CIs, Cos and CTs in a month (ln)	TR Insider Data	Million \$
Directors buying	Total insider sales by Directors in a month (ln)	TR Insider Data	Million \$
Directors selling	Total insider buying by Directors in a month (ln)	TR Insider Data	Million \$
Insider trading	Net insider trading (Insider buying (ln) - Insider selling (ln)) in a month	TR Insider Data	Million \$
Insider buying	Total insider buying in a month (ln)	TR Insider Data	Million \$
Insider selling	Total insider sales in a month (ln)	TR Insider Data	Million \$
Officers buying	Total insider buying by Officers in a month (ln)	TR Insider Data	Million \$
Officers selling	Total insider sales by Officers in a month (ln)	TR Insider Data	Million \$
Owners buying	Total insider buying by Beneficial owners in a month (ln)	TR Insider Data	Million \$
Owners selling	Total insider sales by Beneficial owners in a month (ln)	TR Insider Data	Million \$
Control variables			
Acquirer	1 if the firm is currently (time between announcement and end of the offer)	SDC	Binary

Continued on next page

Table 1 continued

Assets	bidding for another company	Compustat	Million \$
Book-to-market	Total assets (Compustat item: atq) (ln)	Compustat	Ratio
Cash-to-assets	Book value equity (Compustat item: ceqq) divided by market cap	Compustat	Ratio
Change in short interest	Cash and short-term investments (Compustat item: cheq) divided by total assets 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 (Compustat item: dvt) divided by total assets	Compustat	Ratio
EBITDA-to-assets	Operating income before depreciation (Compustat item: oibdpq) divided by total assets	Compustat	Ratio
Leverage	(Total asset - book value equity) / (total asset - book value equity + market cap)	Compustat/CRSP	Ratio
Market capitalization	Monthly average of daily market capitalization (ln)	CRSP	Million \$
Options exercised	Number of shares obtained by option exercises of corporate insiders in the respective month scaled by shares outstanding	TR Insider Data	Ratio
Options outstanding	Outstanding options scaled by shares outstanding	Compustat	Ratio
Program month	The n-th month after the repurchase program initiation	SEC	Binary
Relative spread	The monthly average of the daily relative spread calculated as $2 * (\text{ask} - \text{bid}) / (\text{bid} + \text{ask})$	CRSP	Ratio
Return	Monthly holding period stock return	CRSP	Ratio
Shares outstanding	Number of shares outstanding at last trading day of month	CRSP	Million
Target	1 if firm is currently (time between announcement and end of the offer) a target of another company	SDC	Binary
Trading volume	Monthly total trading volume excluding repurchases scaled by shares outstanding at the last trading day of the previous month	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 25th percentile, the 75th percentile of the distribution, the minimum value, and the maximum value are 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)	25th Perc.	75th Perc.	Min	Max	Skewness	Observations
Program and repurchase statistics										
Program length	20.5092	13	21.1659	14.9768	7	25	1	160	2.3840	6,303
Program size	0.0799	0.0627	0.0662	0.0402	0.0385	0.1006	0	0.4999	2.5368	6,303
Repurchase dummy	0.2347	0	0.4239	0.3646	0	0	0	1	1.2514	251,646
Repurchase intensity (%)	0.1523	0	0.5727	0.5527	0	0	0	27.1562	11.9182	251,646
Repurchase intensity > 0 (%)	0.6489	0.3526	1.0368	0.9154	0.1343	0.7746	0	27.1563	7.0206	59,082
Repurchase intensity (ln)	0.0954	0	0.2528	0.2468	0	0	0	3.3378	3.7651	251,646
Main variables of interest										
Blackout ratio	0.6360	0.7000	0.3438	0.3338	0.3667	1	0	1	-0.6899	251,646
Month in fiscal quarter	2.0022	2	0.8165	0.8165	1	3	1	3	-0.0041	251,646
Month in fiscal year	6.5413	7	3.4476	3.4447	4	10	1	12	-0.0141	251,646
Granted equity	0.2128	0	1.0117	0.9874	0	0	0	7.6085	5.4933	251,646
Granted equity (ln)	0.0838	0	0.3496	0.3421	0	0	0	2.1527	4.5299	251,646
Granted dummy	0.0773	0	0.2671	0.2629	0	0	0	1	3.1657	251,646
Vesting equity	0.1945	0	0.7807	0.7535	0	0	0	6.8261	5.2540	251,646
Vesting equity (ln)	0.0958	0	0.3214	0.3095	0	0	0	2.0574	3.9368	251,646
Vesting dummy	0.1481	0	0.3552	0.3409	0	0	0	1	1.9813	251,646
Insider trading variables										
Affiliates selling (ln)	0.0102	0	0.0660	0.0628	0	0	0	0.7006	7.4197	251,646
CEO buying (ln)	0.0011	0	0.0116	0.0114	0	0	0	0.2499	14.7008	251,646
CEO selling (ln)	0.1128	0	0.4825	0.4503	0	0	0	3.9960	4.9053	251,646
CEO selling	0.5046	0	3.2001	3.0649	0	0	0	53.3791	10.7148	251,646
CEO selling dummy	0.0808	0	0.2725	0.2501	0	0	0	1.0000	3.0776	251,646
CxO buying (ln)	0	0	0.0009	0.0008	0	0	0	0.0232	22.5359	251,646
CxO selling (ln)	0.0549	0	0.2598	0.2452	0	0	0	2.3598	5.6352	251,646
Directors buying (ln)	0.0105	0	0.0760	0.0746	0	0	0	1.2527	9.8796	251,646
Directors selling (ln)	0.1521	0	0.5773	0.5404	0	0	0	4.4904	4.5709	251,646
Insider buying (ln)	0.0150	0	0.0970	0.0945	0	0	0	2.0105	9.7725	251,646
Insider selling (ln)	0.4109	0	0.9170	0.8215	0	0.1490	0	5.4420	2.4743	251,646
Insider trading (ln)	-0.3959	0	0.9208	0.8249	-0.1387	0	-5.4420	2.0071	-2.4224	251,646
Officers buying (ln)	0.0003	0	0.0037	0.0036	0	0	0	0.0938	19.4319	251,646
Officers selling (ln)	0.1953	0	0.6323	0.5802	0	0	0	4.3377	3.8397	251,646
Owners buying (ln)	0.0034	0	0.0568	0.0550	0	0	0	1.5228	21.8156	251,646

Continued on next page

Table 2 continued

Owners selling (ln)	0.0153	0	0.1419	0.1350	0	0	0	2.0563	10.2951	251,646
Control variables										
Acquiror	0.0346	0	0.1829	0.1577	0	0	0	1	5.0896	251,646
Assets (ln)	6.8681	6.8612	1.9145	0.4129	5.5550	8.1589	0.9262	12.3357	0.0690	251,646
Book-to-market	0.5467	0.4384	0.5385	0.3668	0.2532	0.7178	-2.6271	6.2211	2.4432	251,646
Cash-to-assets	0.1806	0.1148	0.1846	0.0847	0.0406	0.2607	0.0004	0.9739	1.4550	251,646
Change in short interest	0.0001	-0.0001	0.0107	0.0106	-0.0034	0.0033	-0.0581	0.0546	0.1566	251,646
Dividends-to-assets	0.0142	0	0.0305	0.0213	0	0.0174	0	0.3266	4.6074	251,646
EBITDA-to-assets	0.0301	0.0315	0.0373	0.0263	0.0181	0.0461	-0.7273	0.1375	-3.4727	251,646
Leverage	0.3358	0.3002	0.2143	0.1043	0.1630	0.4740	0.0096	0.9894	0.6642	251,646
Options exercised	0.0007	0	0.0270	0.0267	0	0	0	7.1065	149.6175	251,646
Options outstanding	0.0642	0.0480	0.0677	0.0431	0.0188	0.0893	0	3.1210	6.9455	251,646
Relative spread (ln)	-4.8959	-5.0489	0.2483	0.2276	-5.1108	-4.6110	-5.1463	-4.4882	0.4160	251,646
Return	0.0107	0.0070	0.1358	0.1353	-0.0550	0.0693	-0.9354	4.1404	2.4955	251,646
Target	0.0280	0	0.1651	0.1443	0	0	0	1	2.4955	251,646
Trading volume	0.2010	0.1490	0.1913	0.1351	0.0822	0.2532	0.0019	1.9021	2.5670	251,646

Table 3
The corporate calendar and the timing of share repurchases

This table presents OLS regressions of *Repurchase intensity* on *Blackout ratio* and fiscal-month fixed effects. 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	-0.1463*** (-23.31)			-0.1760*** (-19.91)	-0.2059*** (-19.23)
Month in fiscal quarter=2		0.0894*** (18.98)		-0.0297*** (-4.75)	
Month in fiscal quarter=3		0.0475*** (9.08)		0.0092* (1.65)	
Month in fiscal year=2			0.0579*** (8.82)		-0.0277*** (-4.22)
Month in fiscal year=3			0.0684*** (9.38)		0.0234*** (3.18)
Month in fiscal year=4			0.0132** (2.23)		0.0035 (0.59)
Month in fiscal year=5			0.1038*** (13.03)		-0.0630*** (-6.09)
Month in fiscal year=6			0.0331*** (4.68)		-0.0219*** (-2.84)
Month in fiscal year=7			-0.0055 (-0.97)		-0.0155*** (-2.75)
Month in fiscal year=8			0.0948*** (12.13)		-0.0727*** (-6.90)
Month in fiscal year=9			0.0357*** (5.15)		-0.0189*** (-2.62)
Month in fiscal year=10			-0.0084 (-1.47)		-0.0194*** (-3.39)
Month in fiscal year=11			0.1000*** (13.54)		-0.0677*** (-6.66)
Month in fiscal year=12			0.0522*** (7.84)		-0.0031 (-0.43)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0181	0.0159	0.0163	0.0183	0.0187
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-based compensation**

This table presents OLS regressions of *Repurchase intensity* on the granting, vesting, and selling of equity, and controls for the corporate calendar. In Panel A, the relationship between share repurchases and granted equity is examined. Panels B and C present the relationship between share repurchases and vesting equity, and share repurchases and CEO sales, respectively. For each of the panels, the dollar amount of the equity-based compensation variable is presented in columns (1) and (2), the logarithmic values are shown in columns (3) and (4), and the binary variant is shown in columns (5) and (6). We include the standard controls which are described in Table A1 throughout all specifications. T-statistics, adjusted for clustering at the firm level, are presented in parentheses. The difference between the equity-based compensation coefficients of the specification without corporate calendar controls and the specification with corporate calendar controls is tested using a two-sample t-test. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Panel A: Share repurchases, the CEO's granted equity, and the corporate calendar

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Granted equity	0.0037*** (2.96)	0.0003 (0.23)				
Granted equity (ln)			0.0110*** (3.05)	0.0009 (0.24)		
Granted dummy					0.0114** (2.58)	-0.0003 (-0.07)
Blackout ratio		-0.2058*** (-18.74)		-0.2058*** (-18.74)		-0.2060*** (-18.83)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0742	0.0793	0.0742	0.0793	0.0742	0.0793
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):	-2.6615**	(4)-(3):	-2.9627***	(6)-(5):	-2.6880**

Panel B: Share repurchases, the CEO's vesting equity, and the corporate calendar

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Vesting equity	0.0046*** (3.07)	0.0002 (0.10)				
Vesting equity (ln)			0.0119*** (3.20)	0.0005 (0.14)		
Vesting dummy					0.0082** (2.36)	-0.0004 (-0.13)
Blackout ratio		-0.2059*** (-18.71)		-0.2059*** (-18.69)		-0.2061*** (-18.78)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0742	0.0793	0.0742	0.0793	0.0742	0.0793
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):	-2.4899**	(4)-(3):	-3.4011***	(6)-(5):	-2.5595**

Continued on next page

Table 4 continued

Panel C: Share repurchases, the CEO's equity sales, and the corporate calendar

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			Repurchase intensity			
CEO selling	-0.0011*** (-3.00)	-0.0016*** (-4.60)				
CEO selling (ln)			-0.0047** (-1.99)	-0.0102*** (-4.36)		
CEO selling dummy					-0.0003 (-0.06)	-0.0114** (-2.29)
Blackout ratio		-0.2072*** (-19.01)		-0.2078*** (-19.04)		-0.2072*** (-18.95)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0742	0.0794	0.0742	0.0794	0.0741	0.0794
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):	-1.3991	(4)-(3):	-2.3397**	(6)-(5):	-2.2248**

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

This table presents OLS regressions of *Repurchase intensity* on insider trading variables and controls for the corporate calendar. We furthermore include the standard controls which are described in Table A1 throughout all specifications. In column (1), we define *Insider trading* (ln) as the difference between *Insider buying* (ln) and *Insider selling* (ln). 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 (ln)	-0.0082*** (-4.56)	-0.0012 (-0.66)		
Insider buying (ln)			0.1006*** (4.61)	
Insider selling (ln)			0.0024 (1.37)	
CEO buying (ln)				0.1570 (0.84)
CEO selling (ln)				-0.0117*** (-4.93)
CxO buying (ln)				1.1150 (0.48)
CxO selling (ln)				-0.0034 (-0.58)
Officers buying (ln)				0.9954* (1.89)
Officers selling (ln)				0.0018 (0.73)
Directors buying (ln)				0.1196*** (4.68)
Directors selling (ln)				0.0027 (0.91)
Owners buying (ln)				0.0116 (0.29)
Owners selling (ln)				0.0604*** (3.91)
Affiliates selling (ln)				0.0091 (0.51)
Blackout ratio		-0.2052*** (-18.93)	-0.2026*** (-18.69)	-0.2038*** (-18.77)
Observations	251,646	251,646	251,646	251,646
Adjusted R^2	0.0743	0.0793	0.0796	0.0800
Standard controls	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	Yes	Yes

Table 6
CEO sales around buyback program announcements

This table presents three events together with the CEO sales 10 days before the event (in column (2)), the CEO sales 10 days after the event (in column (3)), and the difference between them (in column (4)). The events are buyback announcement, earnings announcement, and buyback announcement without any days in [-10, 10] that fall in the blackout period. The table also presents the blackout days 10 days before the event (in column (5)), the blackout days 10 days after the event (in column (6)), and the difference between them (in column (7)). Columns (4) and (7) show t-tests of the difference between pre and post-period. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.

Event	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Observations	CEO sales over		(3) - (2)	Blackout days		(6) - (5)
		[-10, 0]	(0, +10]		[-10, 0]	(0, +10]	
Buyback announcement	4,379	0.0038	0.0076	0.0038*** (4.56)	0.6809	0.4194	-0.2615*** (-32.92)
Earnings announcement	65,817	0.0018	0.0124	0.0106*** (28.52)	1.0000	0.2219	-0.7781*** (-1223.00)
Buyback ann. no blackout	444	0.0061	0.0053	-0.0008 (-0.30)	0.0000	0.0000	0.0000 (.)

Table 7**Equity-based compensation and the decision to initiate a buyback program**

This table estimates linear probability models of buyback program announcements. The dependent variable is an indicator that is equal to one if there is a repurchase program announcement in the current month and zero otherwise. We include the standard controls which are described in Table A1 throughout all specifications. 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)	(4)	(5)	(6)
Granted equity	0.0020*** (3.74)	0.0011** (2.14)				
Vesting equity	0.0039*** (5.52)	0.0030*** (4.16)				
CEO selling	0.0002 (1.31)	0.0001 (0.63)				
CEO buying	0.1305*** (3.93)	0.1186*** (3.58)				
Granted equity (ln)			0.0058*** (3.91)	0.0033** (2.24)		
Vesting equity (ln)			0.0089*** (5.48)	0.0065*** (3.97)		
CEO selling (ln)			0.0012 (1.50)	0.0004 (0.44)		
CEO buying (ln)			0.1473*** (4.06)	0.1340*** (3.70)		
Granted dummy					0.0073*** (4.21)	0.0041** (2.37)
Vesting dummy					0.0052*** (4.40)	0.0032*** (2.66)
CEO selling dummy					0.0012 (0.86)	-0.0006 (-0.45)
CEO buying dummy					0.0165*** (5.35)	0.0153*** (4.99)
Blackout ratio		-0.0319*** (-9.25)		-0.0320*** (-9.29)		-0.0332*** (-9.70)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
R ²	0.0093	0.0116	0.0093	0.0115	0.0091	0.0114
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 8
The initiation of buyback programs and long-run shareholder value

This table reports Fama and French calendar-time portfolio regressions for various event windows following the initiation (announcement) of buyback programs. Equally-weighted calendar-time portfolios are built and rebalanced for each month between 2007 and 2019, using the initiations (announcements) of 6,303 buyback programs between 2006 and 2019. During the first year, 2006, after the start of the new regulation about equity-based compensation, not all firms were immediately reporting to the new standard. Hence, in order to avoid biased portfolios at the beginning of the sample, we start the time series regressions in 2007. We regress the monthly excess return of this portfolio on the Fama-French three factors (Fama and French, 1993, Fama and French, 1996). Each included stock has an equal weight in the monthly portfolio, regardless of whether it has one or more events 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 has announced a buyback program in the corresponding range of past months. For example, a firm enters the portfolio of [1, 12] if it has announced a buyback program within the previous twelve months (the current month excluded). 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 low, medium, and high are based on all non-zero values of *Vesting equity* (for Panel C, *CEO selling* 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)	(6)
Dependent variable:	Equally-weighted portfolio return					
Event window:	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]	[1, 48]
Intercept	0.0106*** (5.49)	0.0029*** (2.99)	0.0025*** (2.66)	0.0016* (1.78)	0.0019 (1.63)	0.0022** (2.36)
MktRF	0.9344*** (19.69)	1.0213*** (42.82)	1.0399*** (44.76)	1.0381*** (46.00)	1.0521*** (36.89)	1.0602*** (45.73)
SMB	0.7064*** (8.00)	0.6082*** (13.71)	0.6050*** (14.00)	0.6377*** (15.19)	0.6169*** (11.64)	0.6637*** (15.39)
HML	-0.0287 (-0.40)	0.0973*** (2.67)	0.1814*** (5.10)	0.1783*** (5.17)	0.2520*** (5.79)	0.2084*** (5.88)
Observations	156	156	156	156	154	156
R ²	0.8127	0.9514	0.9563	0.9591	0.9396	0.9593

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

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Equally-weighted portfolio return					
Event window:	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]	[1, 48]
Full sample (N=1,196)	0.0172*** (4.34)	0.0034*** (3.03)	0.0023 (1.61)	0.0002 (0.09)	0.0011 (0.54)	0.0018* (1.91)
Vesting equity low (N=263)	0.0215** (2.42)	0.0018 (0.73)	0.0024 (0.67)	0.0054 (1.30)	0.0030 (0.99)	0.0029* (1.72)
Vesting equity medium (N=389)	0.0124** (1.98)	0.0015 (0.90)	0.0009 (0.50)	-0.0030 (-1.25)	0.0008 (0.28)	-0.0004 (-0.39)
Vesting equity high (N=544)	0.0156*** (3.45)	0.0043*** (2.99)	0.0024 (1.54)	0.0014 (0.62)	-0.0021 (-1.29)	0.0029** (2.45)

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

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Equally-weighted portfolio return					
Event window:	[0, 0]	[1, 12]	[13, 24]	[25, 36]	[37, 48]	[1, 48]
Full sample (N=2,343)	0.0166*** (7.66)	0.0064*** (6.27)	0.0018** (2.09)	0.0024** (2.36)	0.0020 (1.50)	0.0033*** (3.69)
12-month equity sales low (N=631)	0.0175*** (3.02)	0.0040*** (2.72)	0.0014 (1.07)	0.0027 (1.59)	0.0036* (1.82)	0.0029*** (2.77)
12-month equity sales medium (N=845)	0.0157*** (3.94)	0.0060*** (4.20)	0.0015 (1.37)	0.0009 (0.65)	0.0001 (0.08)	0.0026*** (2.73)
12-month equity sales high (N=867)	0.0134*** (4.00)	0.0090*** (7.97)	0.0025* (1.92)	0.0037*** (2.89)	0.0024 (1.54)	0.0040*** (4.04)

Table 9
The price impact of open market share repurchases

This table reports Fama and French calendar-time portfolio regressions for various event windows following open market repurchases. Equally-weighted calendar-time portfolios are built and rebalanced for each month between 2007 and 2019, using 59,082 open market repurchases between 2006 and 2019. During the first year, 2006, after the start of the new regulation about equity-based compensation, not all firms were immediately reporting to the new standard. Hence, in order to avoid biased portfolios at the beginning of the sample, we start the time series regressions in 2007. We regress the monthly excess return of this portfolio on the Fama-French three factors (Fama and French, 1993, Fama and French, 1996). Each included stock has an equal weight in the monthly portfolio, regardless of whether it has one or more events 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 has repurchased in the corresponding range of past months. For example, a firm enters the portfolio of [1, 1] if it has repurchased within the previous month. 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. Panel D examines CEO sales in general (not restricting to repurchase months). Tercile ranges for low, medium, and high are based on all non-zero values of *Vesting equity* (for Panels C and D, *CEO selling*) 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)	(6)
Dependent variable:	Equally-weighted portfolio return					
Event window:	[0, 0]	[1, 1]	[2, 3]	[4, 6]	[7, 12]	[1, 12]
Constant	0.0006 (0.73)	0.0032*** (3.76)	0.0032*** (3.87)	0.0025*** (3.05)	0.0021** (2.35)	0.0025*** (2.86)
MktRF	0.9718*** (50.91)	0.9936*** (46.63)	0.9923*** (48.06)	1.0066*** (49.73)	1.0119*** (45.11)	1.0226*** (46.73)
SMB	0.5460*** (15.38)	0.5105*** (12.88)	0.5345*** (13.92)	0.5564*** (14.78)	0.5814*** (13.94)	0.6049*** (14.86)
HML	0.0560* (1.92)	0.0798** (2.45)	0.0967*** (3.06)	0.1230*** (3.97)	0.1894*** (5.52)	0.1673*** (5.00)
Observations	156	156	156	156	156	156
R ²	0.9641	0.9568	0.9600	0.9631	0.9570	0.9598

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

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Equally-weighted portfolio return					
Event window:	[0, 0]	[1, 1]	[2, 3]	[4, 6]	[7, 12]	[1, 12]
Full sample (N=9,009)	0.0018 (1.31)	0.0013 (1.03)	0.0040*** (3.52)	0.0021** (2.09)	0.0027*** (2.97)	0.0029*** (3.45)
Vesting equity low (N=2,060)	0.0062* (1.97)	0.0035 (1.00)	0.0042* (1.77)	0.0018 (0.78)	0.0029* (1.79)	0.0026** (1.99)
Vesting equity medium (N=2,926)	-0.0021 (-0.99)	-0.0001 (-0.02)	0.0034** (2.06)	0.0012 (0.86)	0.0013 (1.10)	0.0018* (1.73)
Vesting equity high (N=4,023)	0.0017 (0.92)	-0.0004 (-0.29)	0.0041*** (2.88)	0.0018* (1.76)	0.0024** (2.21)	0.0026*** (2.89)

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

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Equally-weighted portfolio return					
Event window:	[0, 0]	[1, 1]	[2, 3]	[4, 6]	[7, 12]	[1, 12]
Full sample (N=5,869)	0.0092*** (3.72)	0.0029 (0.72)	0.0018 (1.42)	0.0017 (1.57)	0.0015 (1.40)	0.0020** (2.58)
CEO equity sales low (N=1,656)	-0.0014 (-0.31)	0.0029 (0.60)	0.0020 (0.99)	0.0013 (0.68)	0.0039*** (2.97)	0.0031*** (2.92)
CEO equity sales medium (N=2,157)	0.0146*** (6.16)	-0.0010 (-0.43)	0.0013 (0.79)	0.0022 (1.54)	0.0015 (1.30)	0.0018** (2.27)
CEO equity sales high (N=2,056)	0.0176*** (7.19)	-0.0009 (-0.40)	0.0015 (0.76)	0.0009 (0.53)	-0.0001 (-0.10)	0.0007 (0.65)

Panel D: Abnormal returns to CEO sales in general (not conditioning on repurchase months)

Continued on next page

Table 9 continued

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			Equally-weighted portfolio return			
Event window:	[0, 0]	[1, 1]	[2, 3]	[4, 6]	[7, 12]	[1, 12]
Full sample (N=20,321)	0.0140*** (10.50)	-0.0011 (-0.92)	-0.0009 (-0.87)	-0.0009 (-0.92)	0.0006 (0.73)	0.0002 (0.34)
CEO equity sales low (N=6,777)	0.0064*** (2.75)	0.0014 (0.64)	0.0001 (0.06)	-0.0022 (-1.51)	0.0026 (1.33)	0.0008 (0.89)
CEO equity sales medium (N=7,351)	0.0177*** (10.93)	-0.0033** (-2.28)	-0.0011 (-0.89)	-0.0011 (-0.94)	0.0002 (0.27)	-0.0001 (-0.12)
CEO equity sales high (N=6,193)	0.0199*** (10.50)	-0.0004 (-0.23)	-0.0022 (-1.62)	-0.0015 (-1.30)	-0.0001 (-0.06)	-0.0005 (-0.47)

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

This table examines whether repurchase prices are higher or lower than market prices when repurchases coincide with the CEO's equity-based compensation. Repurchase bargain is defined as the difference between average market price in a given month and average repurchase price reported in the firm's quarterly filing, scaled by market price. The market price is the daily closing price taken from CRSP and is averaged over the current month [0,0], the following month [+1,+1], the following three months [+1,+3], or the following six months [+1,+6]. Panel A compares repurchase bargains in months without versus with CEO equity vesting. Panel B compares repurchase bargains in months without versus with CEO sales. Column (5) shows the difference between column (2) and column (4). Column (6) tests whether the difference is statistically significant using a two-sample t-test. ***, **, 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]	43,460	0.0080***	7,728	0.0070***	0.0010**	2.10
[+1, +1]	43,460	0.0060***	7,728	0.0105***	-0.0050***	-3.85
[+1, +3]	43,460	0.0070***	7,728	0.0155***	-0.0085***	-5.15
[+1, +6]	43,460	0.0075***	7,728	0.0170***	-0.0095***	-4.25

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]	46,073	0.0080***	5,115	0.0100***	-0.0020***	-3.45
[+1, +1]	46,073	0.0055***	5,115	0.0145***	-0.0090***	-6.10
[+1, +3]	46,073	0.0075***	5,115	0.0155***	-0.0080***	-4.05
[+1, +6]	46,073	0.0080***	5,115	0.0190***	-0.0110***	-4.05

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 the characteristics of repurchase programs. We write a separate Python script that performs a textual analysis of 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 three 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, since SDC Platinum is the usual 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. The manual correction ensured that we had to drop only very few observations (less than 100).

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 3,803 repurchasing firms, 11,529 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 3,556 repurchasing firms, 10,107 repurchase programs and 94,388 repurchase months left. In the final step, we remove all buybacks which have not been executed via the open market. We also exclude buybacks of firms in the financial and utility sectors, and repurchase-months of which there are missing observations for any of the control variables. We end up with our final repurchase data set of 2,377 repurchasing firms, 6,303 repurchase programs and 59,082 repurchase months.

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

[Edmans et al. \(2021\)](#) argue that CEOs manipulate stock prices 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 [OA8](#), 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 [OA9](#), 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 the lowest to the highest portfolio for specifications (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 (specification (4) to (7)), not even in the portfolio with the 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 OA9, 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 OA8, 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 OA8, 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 OA8, 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**

This table presents regressions of 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	-0.1708*** (-7.39)			0.0929** (2.36)	-0.6867*** (-12.22)
Month in fiscal quarter=2		0.2297*** (12.83)		0.2926*** (9.17)	
Month in fiscal quarter=3		0.0316* (1.90)		0.0518*** (2.78)	
Month in fiscal year=2			0.7400*** (15.73)		0.4545*** (11.40)
Month in fiscal year=3			0.1240*** (3.59)		-0.0258 (-0.72)
Month in fiscal year=4			-0.1021*** (-4.18)		-0.1346*** (-5.45)
Month in fiscal year=5			-0.0353 (-1.26)		-0.5914*** (-11.32)
Month in fiscal year=6			-0.1555*** (-5.64)		-0.3392*** (-11.31)
Month in fiscal year=7			-0.1884*** (-8.58)		-0.2217*** (-10.09)
Month in fiscal year=8			-0.1210*** (-4.38)		-0.6793*** (-13.03)
Month in fiscal year=9			-0.2141*** (-8.09)		-0.3961*** (-13.93)
Month in fiscal year=10			-0.2156*** (-9.45)		-0.2522*** (-11.02)
Month in fiscal year=11			-0.1648*** (-6.11)		-0.7241*** (-14.12)
Month in fiscal year=12			-0.1320*** (-4.43)		-0.3166*** (-9.59)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0287	0.0315	0.0657	0.0317	0.0740
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	-0.1198*** (-6.99)			0.0461* (1.69)	-0.5066*** (-13.56)
Month in fiscal quarter=2		0.1528*** (10.66)		0.1840*** (7.91)	
Month in fiscal quarter=3		0.0222* (1.71)		0.0322** (2.23)	
Month in fiscal year=2			0.4720*** (14.74)		0.2614*** (9.14)
Month in fiscal year=3			0.1062*** (3.82)		-0.0043 (-0.15)
Month in fiscal year=4			-0.1068*** (-5.10)		-0.1308*** (-6.18)
Month in fiscal year=5			-0.0510** (-2.13)		-0.4613*** (-11.98)
Month in fiscal year=6			-0.1601***		-0.2955***

Continued on next page

Table OA1 continued

Month in fiscal year=7			(-7.16) -0.1604*** (-8.32)		(-12.12) -0.1850*** (-9.56)
Month in fiscal year=8			-0.1190*** (-4.98)		-0.5310*** (-13.69)
Month in fiscal year=9			-0.1964*** (-9.08)		-0.3308*** (-14.23)
Month in fiscal year=10			-0.2063*** (-10.47)		-0.2333*** (-11.77)
Month in fiscal year=11			-0.1604*** (-6.75)		-0.5731*** (-14.63)
Month in fiscal year=12			-0.1325*** (-5.99)		-0.2687*** (-11.03)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0388	0.0408	0.0717	0.0409	0.0795
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	-0.4902*** (-14.98)			-0.5819*** (-12.68)	-0.8205*** (-13.05)
Month in fiscal quarter=2		0.2728*** (8.15)		-0.1210*** (-2.59)	
Month in fiscal quarter=3		0.0184 (0.64)		-0.1083*** (-3.48)	
Month in fiscal year=2			0.3506*** (7.91)		0.0095 (0.20)
Month in fiscal year=3			0.1260*** (3.04)		-0.0530 (-1.22)
Month in fiscal year=4			0.0703** (2.15)		0.0315 (0.98)
Month in fiscal year=5			0.3400*** (7.68)		-0.3245*** (-4.76)
Month in fiscal year=6			0.0371 (1.04)		-0.1824*** (-4.59)
Month in fiscal year=7			0.0798*** (2.58)		0.0400 (1.31)
Month in fiscal year=8			0.3074*** (7.14)		-0.3598*** (-5.33)
Month in fiscal year=9			0.0572 (1.60)		-0.1604*** (-4.05)
Month in fiscal year=10			0.0812*** (2.82)		0.0374 (1.31)
Month in fiscal year=11			0.3252*** (7.15)		-0.3430*** (-5.01)
Month in fiscal year=12			0.0855** (2.31)		-0.1351*** (-3.27)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0204	0.0196	0.0197	0.0205	0.0209
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 (dummy) or equity-based compensation (dummy)**

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 the month in 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	-0.1017*** (-25.47)			-0.1342*** (-22.87)	-0.1728*** (-23.43)
Month in fiscal quarter=2		0.0594*** (17.60)		-0.0314*** (-6.83)	
Month in fiscal quarter=3		0.0445*** (12.72)		0.0153*** (4.28)	
Month in fiscal year=2			0.0593*** (12.79)		-0.0126*** (-2.61)
Month in fiscal year=3			0.0688*** (13.52)		0.0311*** (6.10)
Month in fiscal year=4			0.0265*** (6.90)		0.0183*** (4.84)
Month in fiscal year=5			0.0807*** (15.76)		-0.0593*** (-8.17)
Month in fiscal year=6			0.0563*** (10.96)		0.0101* (1.84)
Month in fiscal year=7			0.0107** (2.55)		0.0023 (0.56)
Month in fiscal year=8			0.0721*** (13.98)		-0.0685*** (-9.44)
Month in fiscal year=9			0.0464*** (9.16)		0.0006 (0.10)
Month in fiscal year=10			0.0016 (0.39)		-0.0076* (-1.87)
Month in fiscal year=11			0.0642*** (13.12)		-0.0766*** (-10.64)
Month in fiscal year=12			0.0458*** (9.67)		-0.0007 (-0.14)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R ²	0.0303	0.0278	0.0283	0.0310	0.0321
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	-0.0297*** (-5.37)			0.0723*** (6.66)	-0.1371*** (-10.96)
Month in fiscal quarter=2		0.0657*** (14.80)		0.1146*** (12.17)	
Month in fiscal quarter=3		0.0106** (2.32)		0.0264*** (4.63)	
Month in fiscal year=2			0.1990*** (18.39)		0.1420*** (13.06)
Month in fiscal year=3			0.0467*** (5.16)		0.0168* (1.78)
Month in fiscal year=4			-0.0444*** (-7.21)		-0.0509*** (-8.26)
Month in fiscal year=5			-0.0151** (-1.97)		-0.1261*** (-9.79)

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Table OA2 continued

Month in fiscal year=6			-0.0620*** (-8.70)		-0.0987*** (-12.54)
Month in fiscal year=7			-0.0674*** (-11.48)		-0.0741*** (-12.69)
Month in fiscal year=8			-0.0511*** (-7.37)		-0.1626*** (-13.20)
Month in fiscal year=9			-0.0794*** (-11.94)		-0.1158*** (-15.72)
Month in fiscal year=10			-0.0803*** (-13.79)		-0.0877*** (-15.10)
Month in fiscal year=11			-0.0608*** (-8.74)		-0.1725*** (-13.96)
Month in fiscal year=12			-0.0542*** (-7.38)		-0.0911*** (-11.11)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0336	0.0380	0.0815	0.0397	0.0862
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	-0.0270*** (-3.42)			0.1092*** (7.88)	-0.1439*** (-9.79)
Month in fiscal quarter=2		0.0801*** (12.09)		0.1539*** (12.59)	
Month in fiscal quarter=3		0.0163** (2.52)		0.0401*** (5.24)	
Month in fiscal year=2			0.2261*** (17.54)		0.1663*** (11.98)
Month in fiscal year=3			0.0819*** (6.33)		0.0505*** (3.79)
Month in fiscal year=4			-0.0613*** (-5.81)		-0.0681*** (-6.44)
Month in fiscal year=5			-0.0180 (-1.51)		-0.1346*** (-7.87)
Month in fiscal year=6			-0.0971*** (-8.94)		-0.1355*** (-11.67)
Month in fiscal year=7			-0.1000*** (-10.49)		-0.1070*** (-11.22)
Month in fiscal year=8			-0.0754*** (-6.76)		-0.1924*** (-11.59)
Month in fiscal year=9			-0.1278*** (-12.36)		-0.1660*** (-15.15)
Month in fiscal year=10			-0.1350*** (-13.64)		-0.1427*** (-14.40)
Month in fiscal year=11			-0.1070*** (-9.49)		-0.2242*** (-13.40)
Month in fiscal year=12			-0.0868*** (-8.17)		-0.1255*** (-10.99)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0476	0.0516	0.0983	0.0541	0.1013
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	-0.0668*** (-20.77)			-0.0772*** (-17.86)	-0.1123*** (-19.44)

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Table OA2 continued

Month in fiscal quarter=2		0.0396*** (13.48)		-0.0126*** (-3.32)	
Month in fiscal quarter=3		0.0096*** (3.68)		-0.0072*** (-2.70)	
Month in fiscal year=2			0.0473*** (12.46)		0.0006 (0.16)
Month in fiscal year=3			0.0250*** (6.99)		0.0005 (0.14)
Month in fiscal year=4			0.0045* (1.74)		-0.0008 (-0.31)
Month in fiscal year=5			0.0425*** (10.95)		-0.0484*** (-8.56)
Month in fiscal year=6			0.0084*** (2.58)		-0.0217*** (-6.13)
Month in fiscal year=7			0.0042 (1.51)		-0.0013 (-0.47)
Month in fiscal year=8			0.0402*** (10.46)		-0.0511*** (-8.97)
Month in fiscal year=9			0.0074** (2.29)		-0.0224*** (-6.49)
Month in fiscal year=10			0.0041 (1.52)		-0.0019 (-0.72)
Month in fiscal year=11			0.0413*** (10.88)		-0.0502*** (-8.79)
Month in fiscal year=12			0.0106*** (3.29)		-0.0196*** (-5.60)
Observations	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0171	0.0150	0.0152	0.0172	0.0187
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 (ln) and equity-based compensation**

This table presents the relationship between actual monthly share repurchases and equity-based compensation. The dependent variable is *Repurchase intensity (ln)*. In Panel A, the relationship between share repurchases and granted equity is examined. Panels B and C present the relationship between share repurchases and vesting equity, and share repurchases and CEO sales, respectively. For each of the panels, the dollar amount of the equity-based compensation variable is presented in columns (1) and (2), the logarithmic values are shown in columns (3) and (4), and the binary variant is shown in columns (5) and (6). Every form of the equity-based compensation variable is regressed controlling for the corporate calendar in every even numbered column. 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.

Panel A: Share repurchases, the corporate calendar, and the CEOs granted equity

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity (ln)					
Granted equity	0.0029*** (4.65)	0.0008 (1.25)				
Granted Equity (ln)			0.0087*** (4.92)	0.0023 (1.33)		
Granted dummy					0.0098*** (4.77)	0.0023 (1.14)
Blackout ratio		-0.1177*** (-22.36)		-0.1177*** (-22.37)		-0.1180*** (-22.48)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.1626	0.1719	0.1626	0.1719	0.1625	0.1719
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):	-5.8555***	(4)-(3):	-6.2896***	(6)-(5):	-5.9427***

Panel B: Share repurchases, the corporate calendar, and the CEOs vesting equity

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity (ln)					
Vesting equity	0.0034*** (4.39)	0.0006 (0.81)				
Vesting equity (ln)			0.0089*** (4.77)	0.0018 (0.97)		
Vesting dummy					0.0067*** (4.28)	0.0012 (0.76)
Blackout ratio		-0.1180*** (-22.38)		-0.1179*** (-22.39)		-0.1181*** (-22.50)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.1625	0.1719	0.1625	0.1719	0.1625	0.1719
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):	-5.2080***	(4)-(3):	-5.7503***	(6)-(5):	-5.0248***

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Table OA3 continued

Panel C: Share repurchases, the corporate calendar, and the CEOs equity sales

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity (ln)					
CEO selling	-0.0002 (-1.13)	-0.0005*** (-2.97)				
CEO selling (ln)			0.0002 (0.13)	-0.0030*** (-2.63)		
CEO selling dummy					0.0029 (1.35)	-0.0035 (-1.63)
Blackout ratio		-0.1187*** (-22.64)		-0.1188*** (-22.68)		-0.1186*** (-22.64)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.1624	0.1719	0.1624	0.1719	0.1624	0.1719
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):	-1.7368 *	(4)-(3):	-2.0675**	(6)-(5):	-2.9799***

Table OA4**Correlation between share repurchases and equity-based 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*. 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	0.0021* (1.73)	0.0029** (2.31)				
Vesting equity			0.0027* (1.82)	0.0035** (2.33)		
CEO selling					-0.0015*** (-4.39)	-0.0013*** (-3.69)
Blackout ratio	-0.1572*** (-23.72)		-0.1572*** (-23.71)		-0.1583*** (-23.87)	
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0788	0.0770	0.0788	0.0770	0.0789	0.0770
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**The corporate calendar and the correlation between share repurchases and equity-based 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*. In Panel A, the relationship between share repurchases and granted equity is examined. Panels B and C present the relationships between share repurchases and vesting equity, and share repurchases and CEO sales, respectively. For each of the panels, the dollar amount of the equity-based compensation variable is presented in columns (1) and (2), the logarithmic values are shown in columns (3) and (4), and the binary variant is shown in columns (5) and (6). Every form of the equity-based compensation variable is regressed controlling for the corporate calendar in every even numbered column. 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.

Panel A: Share repurchases, the corporate calendar, and the CEOs granted equity

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Granted equity	0.0037*** (2.96)	0.0009 (0.69)				
Granted equity (ln)			0.0110*** (3.05)	0.0026 (0.70)		
Granted dummy					0.0114** (2.58)	0.0014 (0.31)
Blackout ratio _{t-12}		-0.1633*** (-15.19)		-0.1633*** (-15.19)		-0.1637*** (-15.27)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R ²	0.0742	0.0799	0.0742	0.0799	0.0742	0.0799
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):	-2.1918**	(4)-(3):	-2.6378**	(6)-(5):	-2.2383**

Panel B: Share repurchases, the corporate calendar, and the CEOs vesting equity

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
Vesting equity	0.0046*** (3.07)	0.0007 (0.48)				
Vesting equity (ln)			0.0119*** (3.20)	0.0015 (0.39)		
Vesting dummy					0.0082** (2.36)	-0.0004 (-0.11)
Blackout ratio _{t-12}		-0.1635*** (-15.19)		-0.1636*** (-15.20)		-0.1639*** (-15.27)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R ²	0.0742	0.0799	0.0742	0.0799	0.0742	0.0799
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):	-3.7742***	(4)-(3):	-2.7491***	(6)-(5):	-2.4181**

Continued on next page

Table OA5 continued

Panel C: Share repurchases, the corporate calendar, and the CEOs equity sales

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			Repurchase intensity			
CEO selling	-0.0011*** (-3.00)	-0.0015*** (-3.92)				
CEO selling (ln)			-0.0047** (-1.99)	-0.0089*** (-3.69)		
CEO selling dummy					-0.0003 (-0.06)	-0.0103** (-2.05)
Blackout ratio _{t-12}		-0.1649*** (-15.41)		-0.1652*** (-15.44)		-0.1648*** (-15.40)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0742	0.0800	0.0742	0.0800	0.0741	0.0799
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):	1.0673	(4)-(3):	-1.7595*	(6)-(5):	1.4564

Table OA6
Flexible and preset repurchases and equity-based compensation

This table presents the relationship between actual monthly share repurchases and equity based compensation for two subsamples. The first sample is restricted to flexible programs (not pursuant to SEC's Rule 10b5-1) in columns (1) to (3) and the second sample is restricted to preset programs (pursuant to SEC's Rule 10b5-1) in columns (4) to (6). The dependent variable is *Repurchase intensity*. 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	0.0053*** (2.77)			0.0010 (0.31)		
Vesting equity		0.0058*** (2.60)			0.0043 (1.04)	
CEO selling			-0.0013** (-2.03)			-0.0039*** (-3.25)
Observations	112,084	112,084	112,084	25,184	25,184	25,184
Adjusted R^2	0.0711	0.0710	0.0710	0.0892	0.0892	0.0894
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 OA7
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). The relationships between granted equity and share repurchases, vesting equity and share repurchases, and CEO sales and share repurchases are 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	0.0028*** (4.13)	0.0022*** (3.19)				
Vesting equity			0.0058*** (6.45)	0.0052*** (5.84)		
CEO selling					-0.0001 (-0.30)	-0.0001 (-0.52)
Blackout ratio		-0.0197*** (-4.65)		-0.0186*** (-4.35)		-0.0212*** (-4.97)
Observations	251,646	251,646	251,646	251,646	251,646	251,646
Adjusted R^2	0.0013	0.0014	0.0014	0.0016	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):	-0.8774	(4)-(3):	-0.6705	(6)-(5):	0.1103

Table OA8

Share repurchases, equity-based compensation, and abnormal returns

This table reports the results of regressions 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 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 regressor is also *Vesting equity in billions*, but the sample is non-repurchasing months. In Panel C, the sample is 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 repurchasing months, and the regressor is *Vesting number*. *Vesting number* is the number of shares being vested to the CEO in the current month. 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.

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	0.4037 (1.39)	0.5455* (1.66)	0.2247 (0.71)	-3.2163*** (-3.09)	-2.6456*** (-2.60)	-2.9848*** (-2.88)	-2.4973** (-2.26)
Observations	58,620	58,883	59,082	50,439	49,743	49,031	48,477
R ²	0.0279	0.0268	0.0273	0.0250	0.0271	0.0299	0.0317

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	1.2314*** (3.98)	0.6651** (2.20)	-0.5074* (-1.72)	-11.7224*** (-7.46)	-11.3492*** (-7.05)	-10.7387*** (-6.74)	-10.1994*** (-6.40)
Observations	189,301	190,900	192,564	163,231	161,171	159,140	156,973
R ²	0.0394	0.0395	0.0396	0.0598	0.0598	0.0597	0.0600

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	0.0008 (0.75)	-0.0002 (-0.16)	0.0030*** (2.70)	0.0022 (0.61)	0.0048 (1.27)	0.0023 (0.59)	0.0023 (0.54)
Observations	58,620	58,883	59,082	50,439	49,743	49,031	48,477
R ²	0.0279	0.0267	0.0274	0.0249	0.0270	0.0298	0.0317

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	0.0008 (0.75)	-0.0002 (-0.16)	0.0030*** (2.70)	0.0022 (0.61)	0.0048 (1.27)	0.0023 (0.59)	0.0023 (0.54)
Observations	58,620	58,883	59,082	50,439	49,743	49,031	48,477
R ²	0.0279	0.0267	0.0274	0.0249	0.0270	0.0298	0.0317

Continued on next page

Table OAS continued

Vesting number	0.0030 (0.70)	-0.0006 (-0.15)	0.0104** (2.06)	0.0425*** (2.69)	0.0395*** (2.60)	0.0387** (2.49)	0.0336* (1.96)
Observations	10,455	10,498	10,522	9,208	9,111	9,014	8,969
R^2	0.0427	0.0459	0.0446	0.0641	0.0672	0.0610	0.0566

Table OA.9

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

This table reports Fama and French calendar-time portfolio regressions for various event windows around open market repurchases. Equally-weighted calendar-time portfolios are built and rebalanced for each month between 2007 and 2019, using 59,082 open market repurchases between 2006 and 2019. The time windows are consistent with the Table 3 in [Edmans et al. \(2021\)](#). For each row, we conduct Fama-French three-factor regressions for the seven calendar portfolios with different window lengths, respectively. We report the abnormal returns but not the factor loadings in the table. The first row of Panel A includes firms that repurchase when the CEO's equity vests simultaneously in the corresponding time window. For the remaining rows, quintile ranges 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 Q1 through Q5 are based on all non-zero *Vesting number* 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	-0.0008 (-0.63)	-0.0026* (-1.68)	0.0018 (1.31)	0.0029*** (3.45)	0.0020* (1.98)	0.0022** (1.99)	0.0025 (1.64)
Vesting equity Q1	-0.0043** (-2.44)	-0.0049** (-2.34)	0.0091*** (5.11)	0.0030*** (3.71)	0.0019* (1.82)	0.0024** (2.14)	0.0025 (1.64)
Vesting equity Q2	0.0060* (1.90)	-0.0004 (-0.11)	-0.0041 (-1.27)	0.0028** (2.29)	0.0013 (0.84)	0.0008 (0.42)	0.0034 (1.36)
Vesting equity Q3	0.0032 (1.10)	-0.0055** (-2.06)	-0.0039 (-1.28)	0.0017 (1.59)	0.0029** (2.26)	0.0012 (0.65)	0.0024 (0.83)
Vesting equity Q4	-0.0026 (-0.79)	0.0064 (1.36)	-0.0066** (-2.08)	0.0014 (1.30)	0.0025* (1.79)	-0.0002 (-0.10)	0.0016 (0.74)
Vesting equity Q5	0.0007 (0.10)	0.0023 (0.28)	-0.0001 (-0.02)	0.0018 (0.60)	0.0022 (0.90)	-0.0001 (-0.05)	0.0001 (0.02)

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	0.0004 (0.22)	-0.0041* (-1.96)	0.0048*** (2.72)	0.0024*** (2.85)	0.0020* (1.79)	0.0028** (2.60)	0.0032* (1.88)
# Vesting shares Q2	-0.0043 (-1.11)	-0.0041 (-0.99)	-0.0021 (-0.51)	0.0028** (2.17)	0.0024 (1.55)	0.0014 (0.77)	0.0019 (1.31)
# Vesting shares Q3	0.0002 (0.07)	-0.0052* (-1.80)	-0.0001 (-0.03)	0.0028** (2.58)	0.0038*** (3.05)	0.0012 (0.90)	-0.0011 (-0.61)
# Vesting shares Q4	-0.0018 (-0.51)	0.0016 (0.40)	-0.0005 (-0.19)	0.0023** (2.07)	0.0042** (2.41)	-0.0004 (-0.23)	0.0013 (0.57)
# Vesting shares Q5	-0.0048 (-0.74)	-0.0047 (-0.68)	0.0092 (1.40)	0.0057* (1.96)	-0.0008 (-0.36)	-0.0005 (-0.20)	0.0005 (0.18)

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