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Equity-based compensation and the timing of share repurchases: the role of the corporate calendar

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Abstract

We examine whether CEOs use share repurchases to sell their equity at inflated prices. We document that share repurchases, like equity-based compensation, are affected by the corporate calendar—the firm's schedule of earnings announcements and insider trading restrictions. The corporate calendar can fully explain why share repurchases and equity-based compensation coincide. The alignment with the corporate calendar is stricter in firms with strong internal governance or high external monitoring. When CEOs sell equity, firms are actually less likely to repurchase. Our findings reconcile earlier studies and highlight the importance of the corporate calendar for the timing of share repurchases.

Keywords: Payout policy, share repurchases, quarterly earnings announcement, equity-based compensation, insider trading, fiscal calendar

JEL Classifications: G14, G35, M12, M41, M52

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Equity-based compensation and the timing of share repurchases: the role of the corporate calendar*

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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

We examine the link between share repurchases and equity-based compensation and address the widely discussed concern that CEOs repurchase shares opportunistically.[1] Systematic empirical evidence on the matter remains scarce because of a lack of granular data but tends to support the concern: research finds that insiders (Bonaimé and Ryngaert, 2013) and specifically the CEO (Moore, 2023) are more likely to sell equity when firms buy back stock. Edmans et al. (2022) find that share repurchases boost the stock price when the CEO's equity vests, at the expense of long-term shareholder value. Yet the merits of these concerns continue to be debated (e.g., Bargeron and Farrell, 2021; DeAngelo, 2022; Guest et al., 2023).

We argue that the empirical evidence is best understood from the perspective of the corporate calendar, which we define as the firm's schedule of quarterly earnings announcements and insider trading restrictions over its fiscal year. Firms and insiders usually suspend trading when the firm has private information that is material for its stock price. Research has shown that trading restrictions, so-called blackout periods, usually end shortly after firms announce their earnings. We show that share repurchases and equity-based compensation coincide because both are aligned with the corporate calendar. Accounting for the calendar, the positive correlations between share repurchases and equity-based compensation vanish, and we find that firms are actually less likely to repurchase shares when the CEO sells equity.

[1] On 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 to the misuse of share repurchases.

For the empirical analysis, we combine data on U.S. buyback programs from SEC filings with data on CEOs' equity grants and vesting dates from Equilar and insider trades from Thomson Reuters. Our resulting firm-month panel dataset covers 2,377 repurchasing firms, 6,303 buyback programs, 59,082 months with open market repurchases, and 251,642 firm months in total for the period 2006-2019.

To understand the significance of the corporate calendar for the timing of share repurchases, we start by plotting a firm's repurchases over its fiscal calendar. Earnings are usually announced early in the second month of a fiscal quarter and many firms consider the weeks beforehand as a blackout period intended to avoid litigation related to insider trading. This perspective brings out a stylized but not widely acknowledged fact: from the first to the second month of a fiscal quarter, repurchase volume increases by 42% on average, consistent with the notion that many firms suspend trading during blackouts.

We also examine to what extent the granting, vesting, and selling of equity depend on the corporate calendar. We find patterns similar to those documented for repurchases. The CEO's equity grants cluster in the 10 days after the earnings announcement date.[2] Granted equity (or a part of it) vests on anniversaries, that is, on the exact same date some years in the future (cf., e.g., Gopalan et al., 2014). Therefore, the vesting of equity is also correlated with earnings announcements, peaking in the months of the announcements. Edmans et al. (2017) document that executives immediately sell some of their equity after it vests, and the authors use that insight to establish vesting equity as an instrument for equity sales. 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 next test the relation between open market repurchases and the CEO's equity-based compensation and examine the extent to which that relation is associated with the corporate calendar. We document highly significant correlations between repurchases and equity grants

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

and between repurchases and vesting equity, in line with Moore (2023) and Edmans et al. (2022). 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. This lack of a correlation is of particular importance because earlier research has used vesting as an instrument for the CEO's equity sales (cf., Moore, 2023 and Edmans et al., 2022). We conclude that there is no evidence of a causal relationship between equity sales and share repurchases once the corporate calendar is taken into account.

In further analyses, we examine firms that are more likely to be plagued by agency problems and show that, for them too, the corporate calendar can explain why share repurchases and equity-based compensation coincide. Moreover, we show that the corporate calendar effect is actually most pronounced in firms with strong governance or high external monitoring. Hence, repurchases and equity vesting mostly coincide when firms are less likely to grant their CEO discretion to time repurchases. Overall, these results support the notion that share repurchases coincide with equity-based compensation because both are aligned with the corporate calendar.

We 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 absorbs 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 three years earlier. All findings hold. We further show that the correlation between share repurchases and equity-based compensation is substantially weaker when the earnings announcement is delayed. Overall, we find no indication that strategic timing of the earnings announcement drives the corporate calendar effect.

If CEOs use repurchases to unload their equity at higher prices, we should observe relatively more repurchases when they actually sell equity. However, we do not observe that. We find that firms are in fact less likely to repurchase shares when the CEO sells equity.

Accounting for the corporate calendar strengthens this finding. While we acknowledge that this result cannot be interpreted causally, it also cannot be interpreted as evidence that the CEO trades against the firm.

Earlier research documents a negative correlation between share repurchases and net insider trading, and our results do not contradict this research. Like 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 of Hillert et al. (2016) and Busch and Obernberger (2017) that firms provide liquidity when large blockholders sell their shares to support prices at fundamental values.

As a final step, we analyze the shareholder-value consequences of repurchases that coincide with the CEO's equity-based compensation. Specifically, we examine whether these repurchases temporarily inflate the stock price. In this analysis, the corporate calendar does not play a direct role, but the results may allow us to further support the corporate calendar view if we observe a positive long-run performance of repurchases linked to equity-based compensation, in line with the performance generally observed for repurchases (cf., e.g., Peyer and Vermaelen, 2009, Dittmar and Field, 2015).

First, we study repurchases in the open market and identify those that coincide with the vesting or selling of equity. We find that these repurchases are executed at prices below contemporaneous market prices and are followed by positive abnormal returns. If firms were to overpay for repurchased shares to bid up the stock price, we should find the opposite results. Second, we examine the overall performance of buyback programs that coincide with CEO equity sales. If CEOs sell equity at some point within the first 12 months of a buyback program, then the program is followed by positive abnormal returns over the subsequent 48 months, even outperforming the average buyback program. This result is very difficult to

reconcile with the notion of short-termism. Taken together, our results do not support the claim that CEOs' incentives to boost stock prices in the short term come at the expense of long-run shareholder value.

Earlier studies have also shown that CEOs sell more shares shortly after buyback announcements than before (e.g., Jackson Jr, 2019, and Edmans et al., 2022). We find that CEOs sell equal amounts of shares before and after buyback announcements when buyback announcements are not preceded by blackout periods. Moreover, we document that the firm is more likely to initiate a program when CEOs buy equity. This finding is consistent with Cziraki et al. (2019), who document a similar trading pattern for insiders in general. Overall, the evidence is most consistent with the notion that CEOs are more inclined to initiate a buyback program when they believe that the stock is undervalued.

In conclusion, we make several contributions to the literature, which, taken together, challenge the perception that equity-based compensation affects the timing of repurchases, which then hurt shareholder value. First, we highlight the relevance of the corporate calendar. Repurchases are much more influenced by regulatory and institutional constraints than generally perceived in the literature. As a consequence, any study of repurchases potentially suffers from omitted variable bias if the variable of interest is also correlated with the corporate calendar. For example, a low repurchase frequency may not indicate the firm's attempt to time the market but rather the relatively long duration of its blackouts. Second, we highlight that the corporate calendar can explain the correlation between repurchases and equity-based compensation. The corporate calendar view therefore calls into question the causal interpretation of the correlation between share repurchases and equity vesting reported by Edmans et al. (2022) and Moore (2023) – especially because we find that the reported correlations are mostly present in firms that are less likely to grant their CEO a lot of discretion to time their repurchases. Third, we reconcile the literature on insider trading around share repurchases, which has produced conflicting results: some studies show that insiders buy when firms announce buyback programs (Lee et al., 1992, Babenko et al., 2012,

and Cziraki et al., 2019), while others show that insiders sell more shares after buyback announcements (Jackson Jr, 2019 and Edmans et al., 2022) and when the firm actually buys back shares in the open market (Bonaimé and Ryngaert, 2013). We find that CEOs' equity sales do not increase in months with buyback announcements but are merely postponed to after the end of the blackout period because of trading restrictions. Overall, we show that institutional investors trade against the firm, presumably because repurchases provide liquidity, while the CEO refrains from selling equity when the firm buys back stock in the open market. Hence, the CEO trades alongside the firm, even when firms repurchase shares in the open market.

We also contribute to the debate on tighter regulation of buybacks. We show that the purported CEO opportunism can be explained by the firm's corporate calendar and that repurchases that coincide with equity-based compensation are associated with positive long-run abnormal returns. Notably, the correlation appears to be driven by firms that implement stricter rules for insider trading. Therefore, regulators may find the results useful for understanding the potential costs and benefits of constraining repurchases. See Section 6 for more discussion and suggestions.

2. Literature

The literature on the relationship between repurchases and equity-based compensation has focused on three events: equity grants, equity vesting, and equity sales. Babenko (2009) finds that firms award fewer stock options and restricted stock after repurchases. The author argues that repurchases increase the pay-performance sensitivity of the 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 many options outstanding and when employees have many options currently exercisable. Her results are consistent with managers repurchasing to maximize their own wealth and counteract dilution from employee option exercises. Bens et al. (2003)

find that executives use share repurchases to counteract dilution from outstanding employee stock options on earnings per share. The dilution channel has been recently confirmed by Bonaimé et al. (2020).

Moore (2023) uses equity vesting schedules to predict the CEO's sales of equity. The author finds that predicted CEO sales relate positively to the probability and size of share repurchases. He concludes that the CEO's equity-based compensation motivates share repurchases. However, the author does not find any impact of opportunistic timing on long-term shareholder value. Edmans et al. (2022) show that firms buy back more stock when their CEOs' equity vests. Unlike Moore (2023), the authors find that stock returns are more positively correlated with equity vesting in the two quarters surrounding vesting but more negative in the two years afterward. Edmans et al. (2022) also document that CEOs sell more stock in the weeks after buyback announcements than in the weeks beforehand. Overall, these papers argue that equity-based compensation creates short-term incentives for opportunistic repurchases.

Bonaimé and Ryngaert (2013) find that the probability of repurchases is highest in quarters with net insider selling. The authors conclude that repurchases that coincide with insider selling are more likely done to support share prices or to avoid dilution and less likely motivated by undervaluation. Babenko et al. (2012) find that insider purchases ahead of buyback announcements relate positively to buyback announcement returns and post-announcement stock returns. Lee et al., 1992 and 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 have no measurable impact on shareholder value. Bargeron and Farrell (2021) use the setting of dual-class shares to show that repurchases have a temporary price impact, but the authors argue that impact would be too small for CEOs to benefit from it.[3]

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

3.1. U.S. regulation of share repurchase programs and open-market share repurchases

The decision to initiate a buyback program concerns the firm's capital structure and payout policies and will usually be made by executives, with the implicit or explicit involvement of the CEO. The board of directors must officially authorize a program. There is generally no requirement to obtain approval from shareholders at the shareholders' meeting.

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 generally must disclose all material information as soon as possible. Buyback programs are usually considered material information because they affect both shareholders (higher payout) and debtholders (potentially higher probability of default).[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 firms to provide information about their repurchases retrospectively in their quarterly reports (via SEC's 10-Q or 10-K). For each month covered by the report, firms 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

[3]For a recent and comprehensive review of the literature, see Bonaimé and Kahle (2022).

[4]For 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

be purchased under these programs. Firms 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 firms' obligations to provide shares to their employees as part of their compensation and pension schemes.[5] For each publicly announced program, firms must further disclose the program's date of announcement, its approved dollar value, and its expiration date (if any).

3.1.2. Regulation of share repurchases in the open market

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

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 several 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 they follow a written plan that either specifies the amounts, dates, and prices at which trading should occur or 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.

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

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

Since 2003, the New York Stock Exchange (NYSE) and the NASDAQ Stock Exchange have implemented rules that seek shareholder approval of stock option plans and other types of equity compensation. Since 2006, a detailed description of executive compensation packages must be disclosed in the annual meeting's proxy statement, including the executives' equity grants and the vesting schedule 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 defined as insiders according to Section 16 of the Securities Exchange Act. Insider trades must be filed with the SEC within two business days by filling in the SEC Form 4. Each executive may also 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, no commercial database 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 quarterly SEC filings. (See Online Appendix OA.2 for details of the sample construction.) Our repurchase dataset, obtained from SEC EDGAR, covers all firms available in CRSP that conducted at least one repurchase in the sample period. In line with the literature (cf., e.g., Billett and Xue, 2007, Bonaimé and Ryngaert, 2013, Edmans et al., 2017, Almeida et al., 2016, Moore, 2023), we exclude firms in financial services and utilities from the sample. 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 251,642 firm months in total over the period 2006 to 2019. The sample begins in 2006 because the 2006 disclosure requirement for executive compensation allows to estimate vesting equity with precision.

4.1. Variables

The dependent variable in our baseline regression is *Repurchase intensity*, which is constructed as the monthly number of shares repurchased in the open market under a publicly announced program during the month, divided by the number of shares outstanding at the beginning of the month, multiplied by 100.[6]

4.1.1. Equity-based compensation and insider trading

We analyze three 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.

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 granted equity* subsequently vests is more cumbersome, and different approaches need to be applied for stocks and options. In line with the methodology of Edmans et al. (2017) and Edmans et al. (2022), we construct *CEO 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 unverified data, 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 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

[6]Firms regularly repurchase shares outside of publicly announced programs to satisfy obligations from employee stock option plans. These buybacks relate mechanically to the CEO's equity-based compensation. Hence, they are outside of the influence of the CEO and are not considered in this study. For details about 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%).

except for the CEO), officers, directors, beneficial owners, and affiliates.

4.1.2. Blackouts

Most companies voluntarily impose blackout periods to restrict insider trading and reduce litigation risk. Firms do not need to disclose their insider trade policies, and only a few voluntarily do so. Therefore, blackouts for most firms cannot be directly observed.

The literature estimates blackout periods with three main methods: surveys, firms' voluntarily disclosures, and actual insider trading histories. 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 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 finds 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 blackout measure because the authors use the most comprehensive sample of all studies and cover a period 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. We acknowledge that this variable has measurement error, leading to attenuation bias in the estimate of its coefficient. However, attenuation bias raises the hurdle for our estimated blackout ratio to fully account for the correlation between dependent and other explanatory variables, ultimately working against us.

According to our definition of blackout period, the length 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 describes 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 of our variables along with their definitions and data sources. Table 2 presents the descriptive statistics for these variables. Our firm-level panel covers 251,642 observations. Our repurchase variables resemble those reported by Hillert et al. (2016), and our measures of equity-based compensation are in the same order of magnitude as the corresponding measures reported by 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-month level panel dataset using monthly observations between 2006 and 2019. Our full specification regresses a measure of repurchases 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:

$$\begin{aligned} Repurchases_{i,t} = \beta_1 \cdot CEO\text{-}comp_{i,t} + \delta \cdot Blackout\ ratio_{i,t} + \gamma \cdot Controls_{i,t} \\ + \lambda_j + \eta_t + \mu_i + \epsilon_{i,t}, \end{aligned} \tag{1}$$

where $Repurchases_{i,t}$ measures firm i's repurchases in year-month t and $CEO\text{-}comp_{i,t}$ measures firm i's equity-based compensation of the CEO in year-month t (*CEO granted equity,*

CEO vesting equity, or *CEO selling*). λ_j, η_t, and μ_i denote fiscal month fixed effects, calendar time fixed effects, and firm fixed effects, respectively. The standard errors are clustered at the firm level, and regressions are unweighted.

5. Results

5.1. The corporate calendar and the timing of share repurchases

Equity-based compensation and insider trading are clearly aligned with the corporate calendar through earnings announcements dates and blackout periods (cf., e.g., Yermack, 1997; Bettis et al., 2000; Daines et al., 2018). In this section, we aim to establish that this is also true for repurchases and that the corporate calendar generates repurchase patterns that resemble those observed for equity grants, vesting equity, and insider trades.[7] First, we expect that buybacks are initiated when earnings are announced to alleviate concerns about opportunism.[8] Firms generally follow such an approach when awarding equity: Daines et al. (2018) document that many firms grant options to their CEOs shortly after earnings announcements to minimize opportunism. Second, we expect earnings announcements to determine when the firm trades: insiders are usually prohibited from trading prior to the earnings announcement, when the firm releases material information to the public. Being privy to private information, the firm's repurchases also qualify as insider trades and should thus also be suspended during blackout periods.

Our results comport 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 closest announcement of earnings. Many buyback programs are announced on the same day

[7] Bonaimé et al. (2020) point out that large blackout windows increase the likelihood that firms introduce a buyback program under rule 10b5-1. We are unaware of any other study relating buybacks to the corporate calendar, and no study shows to what extent the corporate calendar affects repurchases.

[8] Also, buyback programs need to be approved by the board. Vafeas (1999) and Adams et al. (2021) state that there are fewer than two board meetings in one quarter on average. Board meetings are likely to occur ahead of the announcement of earnings. Therefore, buyback announcements may coincide with earnings announcements because both buybacks and earnings are discussed by the board.

as the firm's earnings. Panel B shows that equity grants cluster shortly after earnings are announced. Hence, both events are not equally distributed over the corporate calendar but instead cluster close to the announcement of earnings.[9]

Second, we find that trading restrictions limit actual repurchases by the firm and sales of equity by the CEO. 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 more than two 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 also become apparent when we consider the firm's repurchases in fiscal time. Figure 3 contains a decomposition of the firm's fiscal quarter into its three months and summarizes the within-fiscal quarter variation of *Repurchases intensity*, *CEO granted equity*, *CEO vesting equity*, and *CEO selling*. Across all variables, we find that the activity peaks in the second month of the fiscal quarter, which usually is the month of the earnings announcement. (On average, earnings are announced 35 days after the start of the fiscal quarter of a firm.) The timing of equity grants prescribes on what future date equity vests because the vesting date usually falls on the same day in a future year. Accordingly, we find that *CEO 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 fewest estimated blackout days in our sample (first month: 29 days, second month: seven days, third month: 22 days). Hence, *Repurchase intensity* and *CEO selling* peak in the second month, too.

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

In Table 3, we demonstrate that the patterns depicted in our figures can also be observed

[9]Figure 1 Panel B was first documented by Yermack (1997). Daines et al. (2018) report that many firms grant options to their CEOs shortly after earnings announcements to minimize opportunism.

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

in a regression analysis using monthly panel data. We regress *Repurchase intensity* on *Blackout ratio* (column 2), fiscal-quarter months (column 3), fiscal-year months (column 4), and combinations of these variables (column 5). We find that all corporate calendar variables predict *Repurchase intensity*. If the blackout period covers half of a given month, *Repurchase Intensity* will fall by 0.073% (=50% × 0.1463), which is almost half of the average *Repurchases intensity* recorded for our sample. The fiscal-quarter month indicators in column (3) bring out the pattern observed in Figure 3: repurchases peak in the second month of the fiscal quarter. Using fiscal-year month indicators (column 4) shows more nuance. Most notably, repurchasing is highest in the third month (rather than the second) of the first fiscal quarter because the earnings announcement of the past fiscal year is usually scheduled for later in the quarter. Column (5) suggests that using both *Blackout ratio* and fiscal-year months better depicts the relationship between the corporate calendar and repurchases.

We document similar patterns for the CEO's equity compensation (Table A2, Panel A: equity grants, Panel B: vesting equity) and the CEO's sale of equity (Panel C). For equity grants and equity vesting, the fiscal-year months have more explanatory power than the firm's blackout ratio, whereas it is the opposite for the CEO's sale of equity. Notably, year-month fixed effects, fiscal month fixed effects, and the blackout period increase the explained variation in the CEO's vesting equity by about 100% from 7% to 14%. We obtain very similar results when we transform our dependent variables into binary variables; see Table OA1.[11]

[11] Graham et al. (2012) analyze annual differences in executive pay, and their models achieve much higher explanatory power than ours in Table A2. The differences in explanatory power can be explained by the level of granularity of the analyses. We examine the monthly timing of equity-based compensation within the year, and firm-fixed effects have naturally much less power to explain the timing of equity-based compensation on specific months of the year. To show that the differences do not arise from differences in the data or variable construction, Table A3 examines *CEO vesting equity* on the annual level. These regressions achieve much higher explanatory power than the ones in Table A2. The explanatory power of 60% in specification 3, which is the most comparable specification, is in the approximate range of Graham et al. (2012), who report 66% in specification 2 of Table 3. The sample in Table A3 changes substantially over the different models. In Table OA8 in the internet appendix, we show that we obtain similar R-squareds in columns (1) to (4) if we condition the sample to the sample used in column (5).

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 repurchases and the CEO's equity-based compensation. In Table 4, we examine the direct relationship between open market repurchases and measures of the CEO's equity-based compensation. We examine the the extent to which the relationship is associated with the corporate calendar. The table has three panels, and each is dedicated to one aspect of the CEO's equity-based compensation (Panel A: Equity grants, Panel B: Vesting equity, Panel C: Selling equity), In column (1) of Panel A, we regress *Repurchase intensity* on *CEO granted equity*, standard controls, and firm and time fixed effects. We obtain a statistically significant coefficient for *CEO granted equity* of 0.0036, which means that an equity grant of one million dollars increases *Repurchase intensity* by 0.0036 percentage points on average, which equals 2.36% 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 *CEO granted equity* decreases to practically zero. To check the robustness of these results, we alternatively use the natural logarithm of *CEO granted equity*, the number of shares granted, or a binary indicator of whether equity is granted in columns (3) to (8). The results of the even columns, accounting for the corporate calendar, approach zero (statistically and economically). We conclude that none of our results is driven by the distributional properties of *CEO granted equity*[12] and that the corporate calendar drives the correlation between *Repurchase intensity* and equity grants.[13]

In Panel B, we repeat the analysis in Panel A using *CEO vesting equity*. In column (1), vesting equity increases *Repurchase intensity* by 0.0038 percentage points on average, which

[12]Using the natural logarithm of our dependent variable, *Repurchase intensity*, does not affect our results either; see Table OA2. Also in Table OA3, 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.

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

equals 2.50% of the average *Repurchase intensity* (=0.1523%, from Table 2) in our sample. Our coefficient estimate of *CEO vesting equity* is in the same order of magnitude as the coefficient estimates reported elsewhere. Edmans et al. (2022) report a coefficient estimate of 0.0068, and Moore (2023) reports a range of 0.0020 to 0.0053. In line with our argument, the correlation between *Repurchase intensity* and *CEO vesting equity* disappears in column (2), as we account for the corporate calendar. These results also hold when we take the natural logarithm of *CEO Vesting equity* (compare columns 3 and 4).

The amount of vesting equity depends on the number of vesting shares and the current stock price. Consider the 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. To examine whether the correlations are driven by changes in the stock price or changes in the quantity of vesting shares, we include the log value of the number of vesting shares and the log value of the price of a vesting share in columns (5) and (6). Only *CEO vesting shares (ln)* is positively associated with an increase in *Repurchase intensity* in column (5).[14] In column (6), the positive correlation between *CEO vesting shares (ln)* and *Repurchase Intensity* can be fully accounted for by our corporate calendar controls. The *CEO vesting price* becomes significantly negative in column (6), suggesting that firms refrain from repurchases when the CEO's vesting equity has a relatively high valuation. This result makes sense, as firms usually buy shares at low prices (cf., e.g., Dittmar and Field, 2015). Columns (7) and (8) further show that the results hold for *CEO vesting dummy*, which simplifies the number of vesting shares into a binary structure. Hence, the correlation appears to be driven by when equity vests, rather than by

[14]The coefficient estimate in column (5) exceeds the one in column (3) by a factor of 10. To assess the economic significance of these coefficient estimates, we examine the standard deviations of *CEO vesting equity* and *CEO vesting shares*, which are reported in Table 2. The standard deviation of *CEO vesting equity (ln)* equals 0.3486. Hence, a one standard deviation increase in *CEO vesting equity (ln)* will increase *Repurchase intensity* by 0.0039 (=0.0112 x 0.3486). The standard deviation of *CEO vesting shares (ln)* is equal to 0.0331. Hence, a one standard deviation increase in *CEO vesting shares (ln)* will increase *Repurchase intensity* by 0.0035 (=0.1058 x 0.0331). We conclude that the coefficient estimates in column (3) and column (5) of Table 4 convey very similar economic magnitudes.

how much equity vests, which corroborates the corporate calendar argument.

In Panel C, we regress *Repurchase intensity* on measures of the CEO's sale of equity. Edmans et al. (2022) and Moore (2023) have not performed this analysis because it cannot establish causality. In our context, however, we are more interested in the direction of the relationship between share repurchases and CEO selling than in causality. Furthermore, the analysis can highlight the potential bias induced by the corporate calendar. We obtain a statistically highly significant, negative relationship between share repurchases and CEO selling in column (1), which weakens if we take the natural logarithm in column (3) and disappears if we resort to the number of shares in column (5) and a binary variable in column (7). However, we obtain a statistically significant, negative relationship between 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 include the natural logarithm of *CEO vesting equity* or use a dummy variable to account for the skewness of *CEO vesting equity* (see t-tests in the last line of Panel C). Overall, the results highlight that firms are actually less likely to repurchases shares when their CEOs sell equity.

A valid concern is that controlling for firm fixed effects and the firm's corporate calendar may remove any meaningful variation in equity vesting. In Panel B of Table A2, we find that our extensive fixed effect structure and the variable *Blackout ratio* together explain 13.9% of the monthly variation in *CEO vesting equity*. Hence, more than 86% of the monthly variation in equity vesting cannot be explained by our extensive fixed effect structure. In Table A4, we examine the relationship between *CEO vesting equity* and a number of explanatory variables in the presence of our extensive fixed effects structure. We find that an additional 21.0% of the variation in *CEO vesting equity* is explained by 13 variables, including CEO ownership, CEO tenure, and vesting schedule, which is the yearly weighted vesting schedule of all outstanding grants. Our overall conclusion is that, even with our extensive fixed effects structure, there is still substantial and economically meaningful variation in *CEO vesting*

equity that could lead to changes in repurchases.[15]

To rule out that our measure of blackout periods is a bad control because it captures some of the effects that should be captured in our compensation variables (see Angrist and Pischke, 2009, for a discussion of the bad proxy control problem), we re-run all our regressions using the blackout period of the same fiscal month three years ago. Table OA4 reports that all coefficient estimates remain quantitatively unchanged for this specification.

5.2.1. The role of the corporate calendar across different types of firms

While the results above do not support the notion that CEOs use share repurchases opportunistically in the average firm, we cannot rule out on the basis of Table 4 alone that this behavior is not present in the cross-section for a smaller set of firms. Specifically, proponents of the opportunistic timing hypothesis argue that the problem is most likely to be found among firms with weak governance. For these firms, the proponents of opportunistic timing would expect that the correlation between share repurchases and vesting equity may be less well explained by the corporate calendar. In contrast, according to the corporate calendar view, the corporate calendar effect should be more pronounced among firms that have robust governance, which requires that share repurchases and equity-based compensation be aligned with the corporate calendar. According to this view, the corporate calendar effect will be mostly present in firms that are strictly governed and monitored.

In Table 5, we test these hypotheses by forming subsamples based on whether the firm has strong corporate governance (no *CEO duality* or high *Board independence*) or high external monitoring (more analysts or large firm size). In Panel A, we repeat the analysis of Table 4, Panel B for these subsamples, excluding corporate calendar controls. We find that, for all measures, the corporate calendar effect is much more pronounced in firms with strong governance or high external monitoring. Hence, the correlation is mostly present in those

[15]The sample in Table A4 changes substantially over the different models. In Table OA9 in the internet appendix, we show that we obtain similar R-squareds in columns (1)-(6) if we condition the sample to the sample used in column (7).

firms where CEOs are unlikely to have extensive discretion with respect to the timing of share repurchases. Moreover, the correlations are mostly statistically indistinguishable from zero when the firm is characterized by weak governance or low monitoring, which means that there is hardly any indication of opportunistic timing to begin with for these groups of firms. Panel B shows that all effects disappear as soon as we control for the corporate calendar—also for firms with weak governance or little external monitoring. Overall, these results support the notion that share repurchases coincide with equity-based compensation when both are aligned with the corporate calendar.[16]

We use the earnings announcement date to determine a firm's blackout period, and we acknowledge that earnings announcements can be endogenous. Specifically, DeHaan et al. (2015) and Bagnoli et al. (2002) have documented that some firms strategically postpone or delay the earnings announcement if it contains negative information. These papers motivate us to consider the impact of a strategic delay of the earnings announcement on the correlation between share repurchases and equity vesting. We examine whether share repurchases and equity vesting coincide more or less in firms that frequently delay the announcement of earnings and to what extent our corporate calendar controls can explain these correlations.

In Table 5, columns (9) and (10), we distinguish firms that keep the earnings announcement date relatively constant over our sample period from those that tend to delay it relatively often. To this end, we compute *EA delay*, which measures the delay in days between the actual earnings announcement date and the expected earnings announcement date, based on the earnings announcement date in the previous years. We then calculate the mean of this variable for each firm and split firms into two samples according to the median value of the average *EA delay*. In column (9) of Panel A, we find that the effect weakens and is barely statistically significant for firms that tend to delay earnings announcements more frequently. This result suggests that share repurchases are less likely to coincide with vesting

[16]Table A5 repeats the analysis in Table 5 for *CEO vesting shares* instead of *CEO vesting equity*. We observe very similar patterns, and all our conclusions hold for this specification.

equity when earnings are strategically timed. In column (9) of Panel B, we furthermore show that the corporate calendar can fully account for the remaining correlation between vesting equity and share repurchases reported for firms with high *EA delay*. Overall, we conclude that the correlation between share repurchases and equity vesting is not driven by strategic delays of the earnings announcement.

5.2.2. Further robustness tests

In Table OA5 in the internet appendix, we repeat the analyses in Table 4 using yearly variables. On an annual basis, we find no correlations between share repurchases and equity-based compensation. These results further support the corporate calendar view, as they indicate that annual payout through repurchases is not higher when the CEO's equity vests. Hence, within a (fiscal) year, repurchases fall in the same periods as equity-based compensation, but equity-based compensation is not associated with the overall level of payout.

Bonaimé et al. (2020) report that firms increasingly make use of SEC rule 10b5-1 when they buy back stock.[17] Buybacks under 10b5-1 programs should depend less 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 Table 4 is 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.[18]

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 that happen outside of authorized programs. We find that these repurchases are correlated with equity compensation, irrespective

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

[18] Fifteen percent (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 voluntarily indicated that some or all repurchases may have taken place under 10b5-1.) The small increase in the number of disclosed 10b5-1 programs suggests that the corporate calendar will remain a significant factor for buybacks for the foreseeable future.

of whether we account for the corporate calendar. This is consistent with our expectations as the relation between repurchases and equity-based compensation is mechanical and is not motivated by opportunistic timing. Furthermore, other studies analyzing the total number of share repurchases may also capture the mechanical correlation between repurchases and equity vesting, which is in our view incorrect.

5.2.3. Repurchases and insider trading

Bonaimé and Ryngaert (2013) document a negative relationship between repurchases and net insider trading. To reconcile our results reported in Table 4 with Bonaimé and Ryngaert (2013), we more closely examine the CEO's actual trades of equity in Table 6. 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 while keeping 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 executives (CxO), other officers, directors, beneficial owners, and affiliates. We find that only beneficial owners trade against the firm while all other insiders buy or refrain from selling shares. Beneficial owners are usually funds or trusts that 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 to provide price support at fundamental values. Finally, in column (5), we repeat the same exercise as in column (4) without the corporate calendar proxies. A comparison between columns (4) and (5) reveals whether the corporate calendar plays a role for some groups of insiders. We find that it does play a major role for equity sales of officers and directors. For them, the positive correlation between equity sales and repurchases disappears when we

account for the corporate calendar. Executives' trading seems to be mostly unrelated to the firm's buybacks, even in the absence of corporate calendar controls. As pointed out earlier, CEOs appear to refrain from selling when their firms repurchase shares.

5.3. Buyback announcements and insider trading by the CEO

Edmans et al. (2022) and Jackson Jr (2019) note that CEOs are more likely to sell their equity shortly after the firm announces the start of a buyback program. Bettis et al. (2000) and Klein and Maug (2020) find that executives make more insider trades after earnings announcements because those announcements mark the end of firms' blackout periods. We document in Figure 1 Panel A that buyback programs are often initiated at the same time as earnings are announced. We therefore expect that CEOs sell more stock after buyback announcements simply because the the former announcements largely coincide with the latter ones. In line with our expectations, we find that CEOs do not sell more of their stock when blackout periods do not precede buyback announcements (cf., Table A6). Running a linear probability model of the initiation of a buyback program on monthly panel data, we document that the firm is not more likely to initiate a buyback program when the CEOs sell equity. However, the firm is more likely to do so when CEOs buy equity, suggesting that CEOs are more inclined to initiate buybacks when they believe that the stock is undervalued. (cf. Table A7). For a detailed discussion of CEO trading around buyback announcements, we refer the reader to Section A.1 in the appendix.

5.4. The shareholder value implications of share repurchases associated with the CEO's equity sales

In this section, we examine whether 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 (i.e., negative abnormal returns) in the long run. We estimate abnormal returns using calendar time-series regressions of equally weighted buyback portfolios on the value-

weighted market return and the risk factors high minus low (HML) and small minus big (SMB):[19]

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

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

In Table 7, we study the performance of actual share repurchases in the open market that coincide with *CEO vesting equity*, which is used as a proxy for equity sales by Edmans et al. (2022) and Moore (2023), or equity sales. 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 over the subsequent 12 months, consistent with the notion that repurchases signal or exploit positive information. We do not find evidence of a positive price impact in the month of the repurchase.

In Panel B, we only consider open market repurchases that happen in the month in which the CEO's equity vests. In total, 9,486 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. In Panel B, we also sort the repurchasing months in each year that coincide with CEO's equity vesting into three portfolios based on the dollar value of the vesting equity. These portfolios do not provide any patterns consistent with stock price manipulation or short-termism.

In Panel C, we specifically consider those open market repurchases that happen in months in which the CEO sells her equity, which is relatively rare, as only 5,869 repurchase firm-months fall into this category. The analysis in Panel C is highly endogenous, because stock returns or repurchases might cause CEO sales. For the event month, we document a positive

[19]We 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 of vesting equity or equity sales, we use all observations with nonzero values in a given calendar year. Hence, portfolios based on terciles will not be of equal size.

and statistically significant abnormal return. Over the subsequent 12 months, we observe positive abnormal returns as well. Hence, repurchases are associated with increases in shareholder value when CEOs sell their equity simultaneously. We do not observe a reversal pattern consistent with the notion that short-term stock returns come at the expense of long-run shareholder value. The subsamples in Panel C, which are based on the dollar amount of equity sales, reveal two interesting patterns. First, the abnormal returns in the window [0,0] increase with the amount of equity sales. Second, the long-run abnormal returns move toward zero from the portfolio with the lowest equity sales to the portfolio with the highest equity sales, but the returns never become negative.

To better understand these results, we compare them to how CEO sales generally perform (i.e., irrespective of whether a repurchase occurs) 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 against the market and that insider sales have no predictive ability (cf., e.g., Lakonishok and Lee, 2001, 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 long-run 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). In any case, we find no evidence that prices overshoot and then reverse.

As an additional 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.[20] 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. To bid up the stock price, firms need to systematically bid above the market price or consume all

[20] Dittmar and Field (2015) and Ben-Rephael et al. (2014) document that firms generally buy back at prices that are lower than average market prices.

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 8 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 (Panel A). In the month of the repurchase, the repurchase discount equals 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 do not 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 consider 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 harm the firm's ability to buy back at a bargain. Again we find no evidence of price manipulation.

To conclude the analysis of the impact of share repurchases on shareholder value, we take a broader view in Table 9 and study the long-run returns to buyback programs from their inception to up to four years later.[21] For the full sample of 6,303 buyback announcements reported in Panel A, 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-month period (one–12 months: 3.5%, 13–24: 3.0%, 25–36: 1.9%, and 37–48: 2.3%) by multiplying the number of months by the average abnormal monthly return over the respective period. Thus, we document that the initiation of buyback programs is generally followed by positive abnormal returns, in line with the results of Lee et al. (2020), who also examine a recent period.

[21] A 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).

In Table 9 Panel B, we consider only those buyback programs where the CEO sells equity within the first 12 months of the program. Hence, the event window spans over a 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 62% 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 the buyback programs singled out in Panel B perform much better over the subsequent 48 months than the average buyback program (cumulative average abnormal returns of 15.1% versus 10.7%), and we 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 within the first 12 months of the program.

Overall, the results in this section are consistent with earlier research suggesting that firms time their repurchases well and buy back at relatively low prices. These results generally hold for the subsamples of repurchases that coincide with the vesting or sale of the CEO's equity. Hence, we find no evidence for the notion that the CEO uses repurchases to inflate the stock price above its fundamental value when she sells her equity.

5.5. A discussion of the long-run performance results of Edmans et al. (2022)

Edmans et al. (2022) argue that CEOs boost short-term stock prices at the expense of long-term shareholder value 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 the analysis of Edmans et al. (2022) and find similar results (cf., Panel A in Table 10). How can we reconcile these results with our results in Table 7 Panel B suggesting that share repurchases unambiguously create shareholder value when the CEO's equity vests?

First, Edmans et al. (2022) compute buy-and-hold abnormal returns, whereas we compute abnormal calendar-time portfolio returns. We use this approach because it is well established in the buyback literature (cf., e.g., Peyer and Vermaelen, 2009, and Dittmar and Field, 2015).

In Table 10 Panel E, we show that long-run buy-and-hold abnormal returns are generally positive when firms buy back shares and equity vests simultaneously, which is consistent with our results in Table 7. Hence, this design choice cannot explain the differences in results. Moreover, both approaches lead to the same conclusion that share repurchases generally create shareholder value when the CEO's equity vests simultaneously.

Second, Edmans et al. (2022) run a regression of buy-and-hold abnormal returns on *CEO vesting equity*, whereas we form portfolios based on *CEO vesting equity*. The authors document a negative correlation between share repurchases and vesting equity, but this finding alone is insufficient evidence that repurchases have destroyed shareholder value when equity vests. In Panel E, we also form three portfolios based on *CEO vesting equity*. We find that abnormal long-run returns are highest in the lowest tercile, which is consistent with the results of Edmans et al. (2022). However, note that all portfolios generate positive abnormal returns. Hence, even though there is a negative correlation between *CEO vesting equity* and subsequent buy-and-hold abnormal returns, all portfolios create shareholder value.

Third, the setup of Edmans et al. (2022) may create a mechanical correlation between buy-and-hold abnormal returns and *CEO vesting equity* because *CEO vesting equity* reflects both the number of vesting shares and the current stock price. Especially, in the most extreme scenario, where the number of vesting shares stays constant, this setup basically regresses abnormal changes in the stock price on stock prices itself. Table 10 Panels B to D suggests that the results of Edmans et al. (2022) are indeed largely driven by changes in the stock price and not by the timing or quantity of vesting equity. In Panel B, we show that the return patterns around vesting equity are even more pronounced when the firm does not repurchase shares. Hence, the reversal pattern observed by Edmans et al. (2022) is also present in the absence of share repurchases and, if anything, share repurchases mitigate the reversal pattern. Subsequently, we change the measurement of vesting equity so that the current price of the stock no longer plays a role. We observe that the return patterns actually disappear when we use a dummy variable for vesting equity (Panel C) and even

reverse when we use the number of vesting shares (Panel D).

In conclusion, we find that Edmans et al. (2022) do not establish that share repurchases induced by *CEO vesting equity* destroy shareholder value. The negative relationship between *CEO vesting equity* and subsequent buy-and-hold abnormal returns is insufficient evidence in this regard. More importantly, irrespective of methodological choices, we show that share repurchases create shareholder value when the CEO's equity vests simultaneously. Our analysis suggests that the observed negative correlation is mechanical because variables on both sides of the equation measure changes in the stock price. We find no evidence that would supports the conclusion that short-term concerns "induce CEOs to boost current returns at the expense of long-run value."

6. Conclusion

We highlight the role of the corporate calendar in the timing of share repurchases and show that the calendar can fully explain the positive correlations between share repurchases and the CEO's equity-based compensation. Our analyses further reveal that the trading of the firm and the CEO are consistent: the firm is less likely to repurchase shares when the CEO sells equity and more likely to announce a buyback program when the CEO buys equity. Our findings reconcile earlier studies of the (opportunistic) timing of share repurchases and their consequences for shareholder value and highlight the first-order importance of the corporate calendar for research on repurchases.

In light of our results, we find that additional regulation of share repurchases may come at a significant cost for the U.S. capital market. Specifically, we would like to draw attention to the potential harms of further confining the trading periods of the CEO and the firm by, for example, imposing separate trading periods for each. Further reducing the trading window may constrain the firm's ability to provide stock liquidity when needed, and it may increase the temporary price impact of repurchases, as firms will have to buy back the same amount in shorter periods.

References

Adams, R. B., Ragunathan, V., Tumarkin, R., 2021. Death by committee? An analysis of corporate board (sub-) committees. Journal of Financial Economics 141, 1119–1146.

Almeida, H., Fos, V., Kronlund, M., 2016. The real effects of share repurchases. Journal of Financial Economics 119, 168–185.

Angrist, J. D., Pischke, J.-S., 2009. Mostly harmless econometrics: An empiricist's companion. Princeton university press.

Babenko, I., 2009. Share repurchases and pay-performance sensitivity of employee compensation contracts. The Journal of Finance 64, 117–150.

Babenko, I., Tserlukevich, Y., Vedrashko, A., 2012. The credibility of open market share repurchase signaling. Journal of Financial and Quantitative Analysis 47, 1059–1088.

Bagnoli, M., Kross, W., Watts, S. G., 2002. The information in management's expected earnings report date: A day late, a penny short. Journal of Accounting Research 40, 1275–1296.

Bagwell, L. S., 1991. Share repurchase and takeover deterrence. RAND Journal of Economics 22, 72–88.

Bargeron, L., Farrell, M., 2021. The price effect of stock repurchases: Evidence from dual class firms. Management Science 67, 5969–6627.

Ben-Rephael, A., Oded, J., Wohl, A., 2014. Do firms buy their stock at bargain prices? Evidence from actual stock repurchase disclosures. Review of Finance 18, 1299–1340.

Bens, D. A., Nagar, V., Skinner, D. J., Wong, M. F., 2003. Employee stock options, EPS dilution, and stock repurchases. Journal of Accounting and Economics 36, 51–90.

Bettis, J. C., Coles, J. L., Lemmon, M. L., 2000. Corporate policies restricting trading by insiders. Journal of Financial Economics 57, 191–220.

Billett, M. T., Xue, H., 2007. The takeover deterrent effect of open market share repurchases. The Journal of Finance 62, 1827–1850.

Bonaimé, A., Harford, J., Moore, D., 2020. Payout policy trade-offs and the rise of 10b5-1 preset repurchase plans. Management Science 66, 2762–2786.

Bonaimé, A. A., Kahle, K. M., 2022. Share repurchases. Available at SSRN 4074962 .

Bonaimé, A. A., Kahle, K. M., Moore, D., Nemani, A., 2020. Employee compensation still impacts payout policy. Available at SSRN 3180292 .

Bonaimé, A. A., Ryngaert, M. D., 2013. Insider trading and share repurchases: Do insiders and firms trade in the same direction? Journal of Corporate Finance 22, 35–53.

Busch, P., Obernberger, S., 2017. Actual share repurchases, price efficiency, and the information content of stock prices. The Review of Financial Studies 30, 324–362.

Cziraki, P., Lyandres, E., Michaely, R., 2019. What do insiders know? Evidence from insider trading around share repurchases and SEOs. Journal of Corporate Finance p. 101544.

Dai, L., Fu, R., Kang, J.-K., Lee, I., 2016. Corporate governance and the profitability of insider trading. Journal of Corporate Finance 40, 235–253.

Daines, R. M., McQueen, G. R., Schonlau, R. J., 2018. Right on schedule: CEO option grants and opportunism. Journal of Financial and Quantitative Analysis 53, 1025–1058.

DeAngelo, H., 2022. The attack on share buybacks. European Financial Management .

DeHaan, E., Shevlin, T., Thornock, J., 2015. Market (in) attention and the strategic scheduling and timing of earnings announcements. Journal of Accounting and Economics 60, 36–55.

Dittmar, A., 2000. Why do firms repurchase stock? The Journal of Business 73, 331–55.

Dittmar, A., Field, L. C., 2015. Can managers time the market? evidence using repurchase price data. Journal of Financial Economics 115, 261–282.

Edmans, A., Fang, V. W., Huang, A., 2022. The long-term consequences of short-term incentives. Journal of Accounting Research 60, 1007–1046.

Edmans, A., Fang, V. W., Lewellen, K. A., 2017. Equity Vesting and Investment. Review of Financial Studies 30, 2229–2271.

Fama, E., French, K., 1996. Multifactor explanations of asset pricing anomalies. Journal of Finance 51, 55–84.

Fama, E. F., French, K. R., 1993. Common risk factors in the returns on stocks and bonds. Journal of Financial Economics 33, 3–56.

Fenn, G. W., Liang, N., 2001. Corporate payout policy and managerial stock incentives. Journal of Financial Economics 60, 45–72.

Gopalan, R., Milbourn, T., Song, F., Thakor, A. V., 2014. Duration of executive compensation. The Journal of Finance 69, 2777–2817.

Graham, J. R., Li, S., Qiu, J., 2012. Managerial attributes and executive compensation. The Review of Financial Studies 25, 144–186.

Grullon, G., Michaely, R., 2002. Dividends, share repurchases, and the substitution hypothesis. Journal of Finance 57, 1649–1684.

Guay, W. R., Kim, S., Tsui, D., 2022. Determinants of insider trading windows. Available at SSRN 3844986 .

Guest, N., Kothari, S., Venkat, P., 2023. Share repurchases on trial: Large-sample evidence on share price performance, executive compensation, and corporate investment. Financial Management 52, 19–40.

Hillert, A., Maug, E., Obernberger, S., 2016. Stock repurchases and liquidity. Journal of Financial Economics 119, 186–209.

Ikenberry, D., Lakonishok, J., Vermaelen, T., 1995. Market underreaction to open market share repurchases. Journal of Financial Economics 39, 181–208.

Jackson Jr, R. J., 2019. Letter on stock buybacks and insiders' cashouts. In: *Harvard Law School Forum on Corporate Governance and Financial Regulation*.

Jagolinzer, A. D., 2009. SEC rule 10b5-1 and insiders' strategic trade. Management Science 55, 224–239.

Jagolinzer, A. D., Larcker, D. F., Taylor, D. J., 2011. Corporate governance and the information content of insider trades. Journal of Accounting Research 49, 1249–1274.

Jeng, L. A., Metrick, A., Zeckhauser, R., 2003. Estimating the returns to insider trading: A performance-evaluation perspective. Review of Economics and Statistics 85, 453–471.

Kahle, K. M., 2002. When a buyback isn't a buyback: open market repurchases and employee options. Journal of Financial Economics 63, 235–261.

Klein, D., Maug, E., 2020. How do executives exercise their stock options? Review of Corporate Finance Studies 9, 302–339.

Lakonishok, J., Lee, I., 2001. Are insider trades informative? The Review of Financial Studies 14, 79–111.

Lee, D. S., Mikkelson, W. H., Partch, M. M., 1992. Managers' trading around stock repurchases. The Journal of Finance 47, 1947–1961.

Lee, I., Park, Y. J., Pearson, N. D., 2020. Repurchases after being well known as good news. Journal of Corporate Finance 62, 1–29.

Moore, D., 2023. Strategic repurchases and equity sales: Evidence from equity vesting schedules. Journal of Banking & Finance 146, 106717.

Peyer, U., Vermaelen, T., 2009. The nature and persistence of buyback anomalies. Review of Financial Studies 22, 1693–1745.

Rossi, A., Sahlström, P., 2019. Equity issuance motives and insider trading. Journal of Corporate Finance 58, 726–743.

Roulstone, D. T., 2003. The relation between insider-trading restrictions and executive compensation. Journal of Accounting Research 41, 525–551.

Stephens, C., Weisbach, M., 1998. Actual share reacquisitions in open-market repurchase programs. Journal of Finance 53, 313–333.

Vafeas, N., 1999. Board meeting frequency and firm performance. Journal of Financial Economics 53, 113–142.

Yermack, D., 1997. Good timing: CEO stock option awards and company news announcements. The Journal of Finance 52, 449–476.

A Appendix

A.1 Buyback announcements and insider trading by the CEO

Edmans et al. (2022) and Jackson Jr (2019) note that CEOs are more likely to sell their equity shortly after the firm announces the start of a new buyback program. This observation gives rise to the concern that CEOs announce new buyback programs for the sole purpose of selling their shares amid the positive market reaction to the announcement.[22] In this section, we examine the merits of this concern.

In Table A6, we examine differences in sales of equity between 10 days before and 10 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 buyback announcements. 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 buyback announcements that do not have blackout days within the event period, we can no longer document differences in trading between the pre- and post-periods. 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.

To obtain a comprehensive picture of the relationship between buyback announcements and the CEO's equity sales, we use a linear probability model of *Program initiation* on the CEO's trading and control variables. The results are presented in Table A7. We find that the probability of launching a buyback program increases when the CEO buys equity in the company: if the CEO buys stock worth one million dollars, the firm is four times more likely to initiate a buyback program.[23] This result suggests that the CEO will initiate a buyback program when she believes the stock is undervalued. There is only one significant correlation

[22] A related concern is that the CEO opportunistically sells her equity after a regular buyback announcement (as opposed to opportunistically timing the buyback announcement to precede planned equity sales). However, such opportunism would not affect the timing of share repurchases. Moreover, the CEO would trade on public information of a payout policy decision that is deemed sensible by the market. Nevertheless, we implicitly examine this concern in the subsequent analysis, too.

[23] The probability of launching a buyback program has an unconditional mean of 6,303/251,642 = 0.025.

between CEO selling and buyback announcements, which is again entirely absorbed by the corporate calendar controls. All results hold, irrespective of the distributional properties of our variables of the CEO's insider trading (cf. columns 3 to 6).

In conclusion, we again find that the empirical evidence is best understood from the perspective of the corporate calendar. CEOs appear to postpone some of their equity sales to after buyback announcements because the period beforehand is a blackout period. Equity sales are at best marginally elevated in buyback months, and this finding can again be fully accounted for by the corporate calendar.

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 regression. 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 6.

Control variable	Reason for use and references	Our results	Consistency with literature
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 repurchases has not been established.	0.0146*	No
Assets	Various buyback papers have shown either a positive, negative, or insignificant relationship.	0.0344***	Yes
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 repurchases.	0.0402***	Yes
Cash-to-assets	Stephens and Weisbach (1998) find that firms tend to repurchase more shares if they have stronger cash flows.	0.1148***	Yes
Change in short interest	Firms increase repurchases to provide price support for a stock that is deemed overvalued by short sellers.	1.7220***	Yes
Dividends-to-assets	Grullon and Michaely (2002) find that firms have gradually substituted dividends for repurchases.	-0.2231***	Yes
EBITDA-to-assets	Stephens and Weisbach (1998) find that firms tend to repurchase more shares if they have stronger cash flows.	0.1955***	Yes
Leverage	Dittmar (2000) shows that firms use repurchases to increase leverage.	-0.1849***	Yes
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.	-0.0215	No
Options outstanding	According to the management incentive hypothesis, firms with more outstanding stock options will repurchase more stock (Dittmar (2000); Fenn and Liang (2001)).	-0.0111	No
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)).	-0.1364	No
Repurchase intensity (lagged)	Busch and Obernberger (2017) suggest that the lagged Repurchase intensity is the best predictor for current Repurchase intensity.	0.2332***	Yes
Return (t-1)	A motivation for repurchases is undervaluation and one indication of undervaluation is a history of low returns. Stephens and Weisbach (1998) and Dittmar (2000)	-0.14746***	Yes
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 repurchases.	0.0272***	Yes
Trading volume	This variable is used in Hillert et al. (2016) as a control variable	0.0478***	Yes

Table A2
The corporate calendar and the timing of equity-based compensation

This table presents regressions of equity-based compensation on *Blackout ratio*, which is the fraction of blackout days within a month, on dummies for the month in fiscal quarter, and on dummies for the month in fiscal year. Year-month fixed effects and firm fixed effects are controlled for throughout specifications (2) - (6) 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: CEO granted equity and the corporate calendar

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			CEO granted equity			
Blackout ratio			-0.1711***			-0.6899***
			(-18.36)			(-31.24)
Month in fiscal quarter=2				0.2293***		
				(29.75)		
Month in fiscal quarter=3				0.0317***		
				(4.54)		
Month in fiscal year=2					0.7413***	0.4545***
					(41.39)	(27.07)
Month in fiscal year=3					0.1262***	-0.0243*
					(8.95)	(-1.65)
Month in fiscal year=4					-0.0997***	-0.1323***
					(-9.14)	(-12.08)
Month in fiscal year=5					-0.0348***	-0.5935***
					(-2.81)	(-27.59)
Month in fiscal year=6					-0.1545***	-0.3390***
					(-13.27)	(-26.29)
Month in fiscal year=7					-0.1870***	-0.2205***
					(-18.63)	(-21.84)
Month in fiscal year=8					-0.1205***	-0.6815***
					(-10.22)	(-32.03)
Month in fiscal year=9					-0.2128***	-0.3958***
					(-18.97)	(-31.61)
Month in fiscal year=10					-0.2144***	-0.2512***
					(-20.75)	(-24.18)
Month in fiscal year=11					-0.1639***	-0.7257***
					(-14.01)	(-34.15)
Month in fiscal year=12					-0.1312***	-0.3166***
					(-10.75)	(-23.25)
Observations	251,642	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.0391	0.0637	0.0653	0.0680	0.1008	0.1088
Year FE	Yes	No	No	No	No	No
Year-month FE	No	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: CEO vesting equity and the corporate calendar

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			CEO vesting equity			
Blackout ratio			-0.1563***			-0.6411***
			(-18.39)			(-33.93)
Month in fiscal quarter=2				0.1890***		
				(26.25)		
Month in fiscal quarter=3				0.0199***		
				(3.14)		
Month in fiscal year=2					0.5915***	0.3250***
					(36.99)	(21.82)
Month in fiscal year=3					0.1195***	-0.0204
					(9.15)	(-1.51)
Month in fiscal year=4					-0.1152***	-0.1455***
					(-11.30)	(-14.21)
Month in fiscal year=5					-0.0495***	-0.5687***
					(-4.28)	(-30.19)

Continued on next page

Table A2 continued

Month in fiscal year=6					-0.1883***	-0.3597***
					(-17.41)	(-30.48)
Month in fiscal year=7					-0.1847***	-0.2158***
					(-19.06)	(-22.15)
Month in fiscal year=8					-0.1334***	-0.6546***
					(-11.88)	(-34.97)
Month in fiscal year=9					-0.2300***	-0.4000***
					(-21.88)	(-34.73)
Month in fiscal year=10					-0.2396***	-0.2738***
					(-24.29)	(-27.62)
Month in fiscal year=11					-0.1875***	-0.7096***
					(-16.70)	(-37.64)
Month in fiscal year=12					-0.1590***	-0.3313***
					(-14.35)	(-27.08)
Observations	251,642	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.0694	0.0964	0.0981	0.1001	0.1306	0.1389
Year FE	Yes	No	No	No	No	No
Year-month FE	No	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel C: CEO selling and the corporate calendar

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			CEO selling			
Blackout ratio			-0.4902***			-0.8205***
			(-18.13)			(-17.07)
Month in fiscal quarter=2				0.2728***		
				(11.33)		
Month in fiscal quarter=3				0.0184		
				(0.85)		
Month in fiscal year=2					0.3506***	0.0095
					(8.78)	(0.24)
Month in fiscal year=3					0.1260***	-0.0530
					(3.42)	(-1.38)
Month in fiscal year=4					0.0703**	0.0315
					(2.10)	(0.94)
Month in fiscal year=5					0.3400***	-0.3245***
					(8.50)	(-5.93)
Month in fiscal year=6					0.0371	-0.1824***
					(1.07)	(-4.91)
Month in fiscal year=7					0.0798**	0.0400
					(2.52)	(1.26)
Month in fiscal year=8					0.3074***	-0.3598***
					(7.99)	(-6.66)
Month in fiscal year=9					0.0572*	-0.1604***
					(1.67)	(-4.36)
Month in fiscal year=10					0.0812**	0.0374
					(2.45)	(1.13)
Month in fiscal year=11					0.3252***	-0.3430***
					(7.98)	(-6.14)
Month in fiscal year=12					0.0855**	-0.1351***
					(2.45)	(-3.59)
Observations	251,642	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.0887	0.0910	0.0923	0.0916	0.0917	0.0928
Year FE	Yes	No	No	No	No	No
Year-month FE	No	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Table A3
Vesting equity on the annual level

This table presents regressions of *CEO vesting equity* on the annual level. Firm fixed effects are controlled for throughout all specifications and year fixed effects are controlled for in specifications (2) - (5). 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:			CEO vesting equity		
CEO duality			0.3443***	0.3238***	0.2709**
			(3.45)	(3.24)	(2.06)
CEO tenure (ln)			0.4231***	0.3891***	0.5664***
			(7.82)	(7.15)	(7.88)
Return			2.7897***	4.6475***	6.1622***
			(4.12)	(6.84)	(6.63)
Return_{t-1}			9.4063***	10.2787***	13.4068***
			(12.87)	(14.15)	(12.58)
$\text{Assets}_{t-1}(ln)$			1.1850***	1.3649***	1.6057***
			(12.33)	(14.36)	(12.74)
$\text{Book-to-market}_{t-1}$			-0.7420***	-0.4845***	-0.7350***
			(-7.71)	(-4.93)	(-5.11)
EBITDA-to-assets			7.6849***	6.8309***	6.3747***
			(4.50)	(4.09)	(2.78)
$\text{EBITDA-to-assets}_{t-1}$			3.0560*	-0.5147	0.1353
			(1.95)	(-0.33)	(0.06)
Leverage_{t-1}				-3.5886***	-3.6962***
				(-11.15)	(-8.48)
CEO ownership				1.0178	2.9437***
				(1.52)	(2.89)
CEO unvested				0.1723***	0.0953
				(3.44)	(1.30)
CEO vesting schedule					-0.2072***
					(-2.84)
CEO granted equity					0.1404***
					(6.88)
Observations	21,818	21,818	13,859	13,859	8,791
Adjusted R^2	0.4478	0.5598	0.6004	0.6053	0.6356
Year FE	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Table A4
Further analyses on CEO vesting equity

This table presents regressions of *CEO vesting equity* on thirteen explanatory variables, alongside the corporate calendar controls. The controls for the corporate calendar are *Blackout ratio*, which is the fraction of blackout days within a month, 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:				CEO vesting equity			
CEO duality		0.0421***	0.0367***			0.0279***	0.0191
		(6.68)	(3.55)			(2.71)	(1.49)
CEO ownership			0.0280			0.0952	0.2432***
			(0.45)			(1.53)	(2.76)
CEO unvested shares			0.0082			0.0086	-0.0007
			(1.34)			(1.40)	(-0.08)
CEO tenure (ln)			0.0312***			0.0246***	0.0589***
			(6.04)			(4.76)	(8.70)
Stock price				0.0008***		0.0014***	0.0021***
				(7.03)		(8.58)	(8.95)
Return				0.0021		-0.0016	0.0028
				(0.22)		(-0.10)	(0.14)
Return_{t-1}				0.0382***		0.0448***	0.0588***
				(4.00)		(2.85)	(2.90)
Assets				0.0738***		0.0712***	0.0528***
				(14.88)		(8.57)	(4.99)
Book-to-market				-0.0225***		-0.0229***	-0.0392***
				(-6.92)		(-4.04)	(-5.02)
Dividends-to-assets				-0.1620***		-0.2169**	-0.4224***
				(-2.81)		(-2.37)	(-3.15)
Leverage				-0.2253***		-0.2225***	-0.1921***
				(-13.45)		(-8.10)	(-5.21)
Vesting schedule					-0.0134***		-0.0253***
					(-2.81)		(-3.73)
CEO granted equity					0.4116***		0.4266***
					(71.44)		(66.18)
Blackout ratio	-0.6411***	-0.6546***	-0.7456***	-0.6258***	-0.4106***	-0.7318***	-0.3974***
	(-33.93)	(-33.01)	(-27.50)	(-33.17)	(-16.66)	(-27.01)	(-12.93)
Observations	251,642	233,654	157,314	251,642	130,644	157,314	95,780
Adjusted R^2	0.1389	0.1395	0.1496	0.1417	0.3367	0.1522	0.3489
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A5

Firm characteristics and the relation between share repurchases and the number of vesting equity

This table examines whether firm characteristics are relevant for the relation between the CEO's vesting equity in numbers and share repurchases. The sample is split into two halves based on whether the CEO acts as the board chair, whether the independence of the board is below the median within the same year, whether the number of analysts is smaller than the median in the same year, whether firm size (as measured by assets) is below the median in the same year, and whether the firm's average delay in their earnings announcements is above the median, respectively. The delay in earnings announcements is equal to the gap between the current announcement date and the announcement date for the same fiscal quarter in the previous year, and is set to zero if there are no delays in earnings announcements. In Panel A, we re-run model (7) of Table 4 and in Panel B, we re-run model (8) of Table 4. In both panels, we include year-month fixed effects, firm fixed effects, and the standard controls 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.

Panel A: Regression of Repurchase Intensity on CEO vesting equity without corporate calendar controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable:	Repurchase intensity									
	CEO Duality		Board Ind.		Analysts		Size		EA Delay	
	Yes	No	Low	High	Small	Large	Small	Large	High	Low
CEO vesting shares (ln)	0.0594	0.1368***	0.0538	0.1063**	0.0266	0.1392***	-0.0016	0.1513***	0.0497	0.1421***
	(1.12)	(2.94)	(0.94)	(2.43)	(0.51)	(3.09)	(-0.03)	(3.50)	(0.96)	(3.00)
Observations	106,155	123,859	110,709	114,447	112,289	112,253	124,345	123,131	115,207	116,434

Panel B: Regression of Repurchase Intensity on CEO vesting equity with corporate calendar controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable:	Repurchase intensity									
	CEO Duality		Board Ind.		Analysts		Size		EA Delay	
	Yes	No	Low	High	Small	Large	Small	Large	High	Low
CEO vesting shares (ln)	-0.0369	0.0513	-0.0170	0.0038	-0.0170	0.0377	-0.0528	0.0537	-0.0349	0.0453
	(-0.68)	(1.11)	(-0.29)	(0.09)	(-0.33)	(0.82)	(-1.11)	(1.22)	(-0.68)	(0.94)
Observations	106,155	123,859	110,709	114,447	112,289	112,253	124,345	123,131	115,207	116,434

Table A6
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.

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

Table A7
CEO trading and the decision to initiate a buyback program

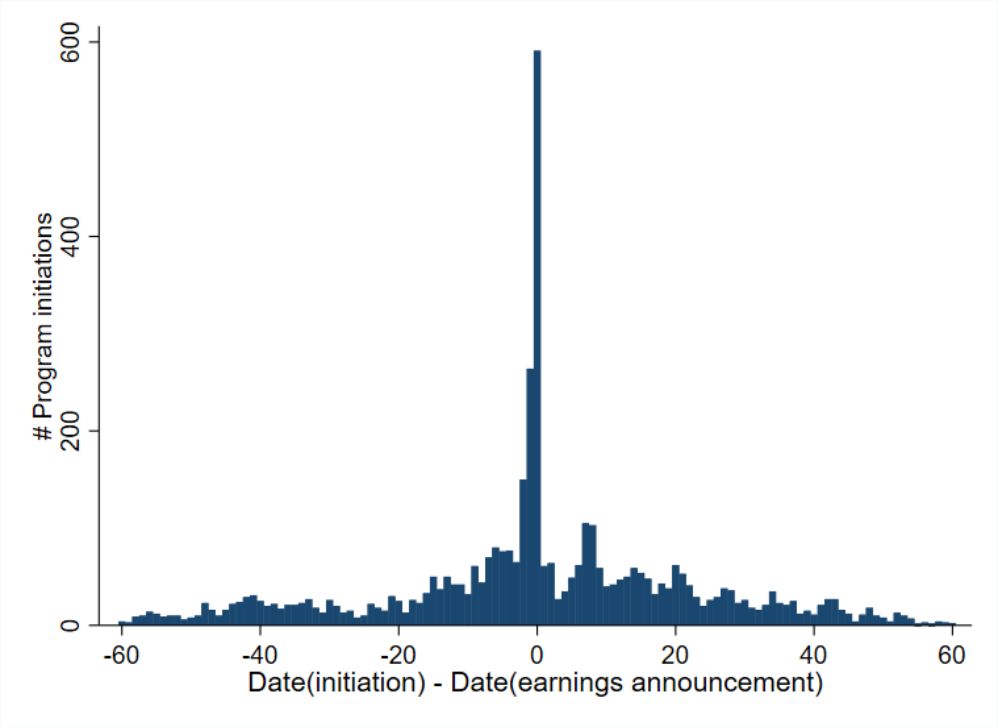
This table estimates linear probability models of buyback program announcements. The dependent variable is an indicator that is equal to one if there is a repurchase program announcement in the current month and zero otherwise. The columns with odd numbers show the regressions without controls for the corporate calendar and the columns with even numbers with controls for the corporate calendar. The controls for the corporate calendar are *Blackout ratio*, which is the fraction of blackout days within a month, and dummies for the month in fiscal year. 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)
CEO selling	0.0002	0.0001				
	(1.57)	(0.78)				
CEO buying	0.1309***	0.1187***				
	(3.94)	(3.57)				
CEO selling (ln)			0.0016*	0.0006		
			(1.93)	(0.68)		
CEO buying (ln)			0.1479***	0.1341***		
			(4.07)	(3.69)		
CEO selling dummy					0.0017	-0.0004
					(1.20)	(-0.29)
CEO buying dummy					0.0167***	0.0154***
					(5.34)	(4.93)
Blackout ratio		-0.0342***		-0.0341***		-0.0343***
		(-12.54)		(-12.52)		(-12.57)
Observations	251,642	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.0173	0.0199	0.0173	0.0199	0.0174	0.0199
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

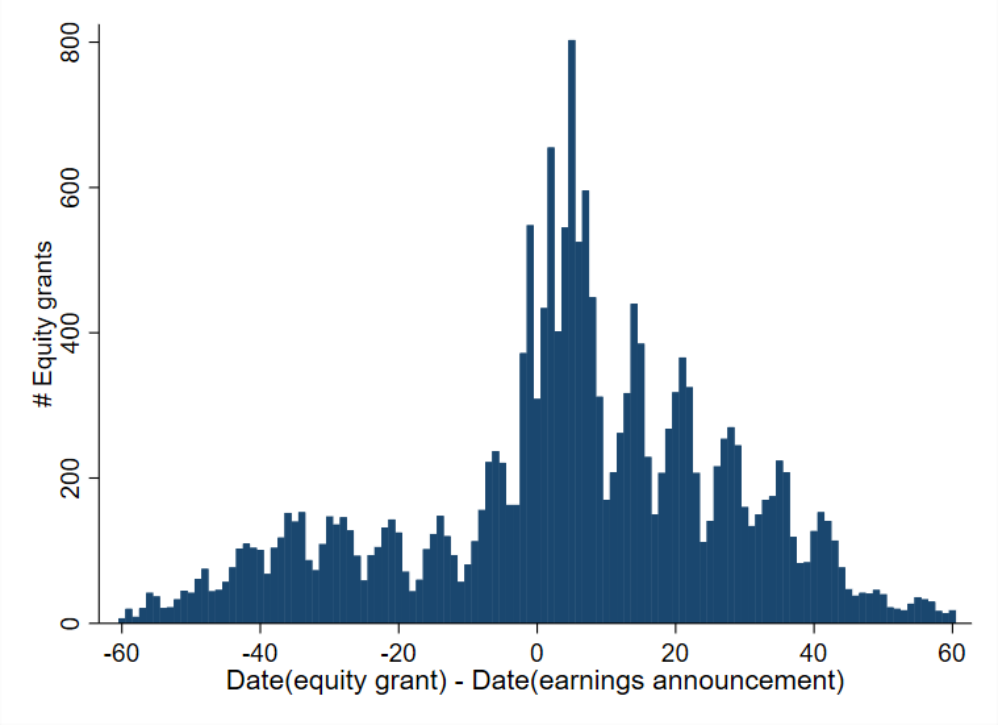
B Figures

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



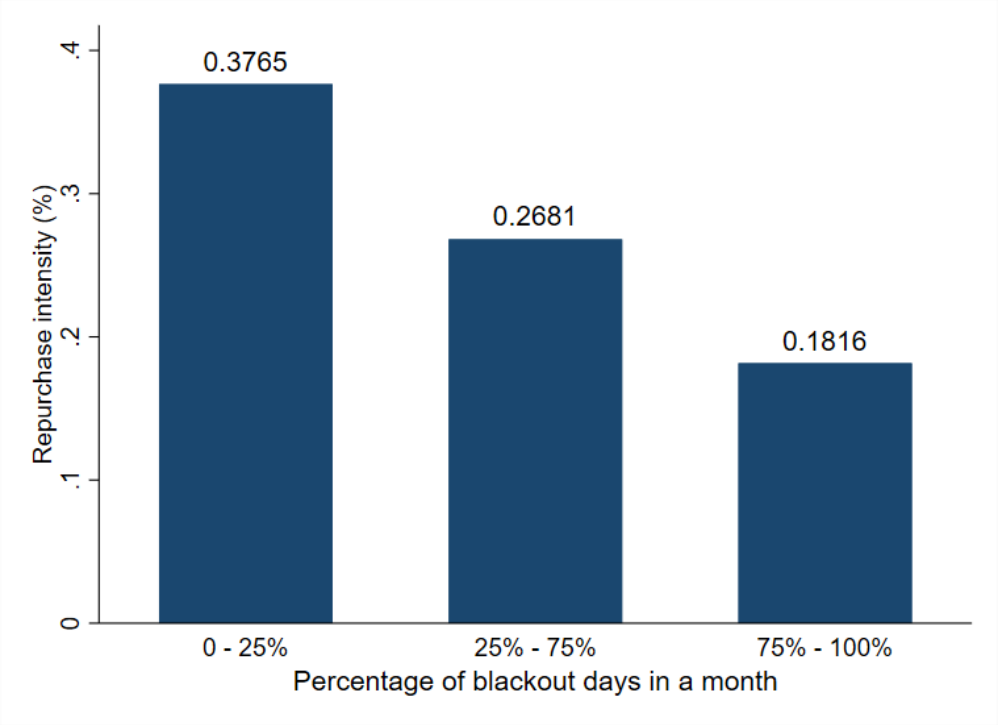
Panel B: CEO equity grant date versus earnings announcement date



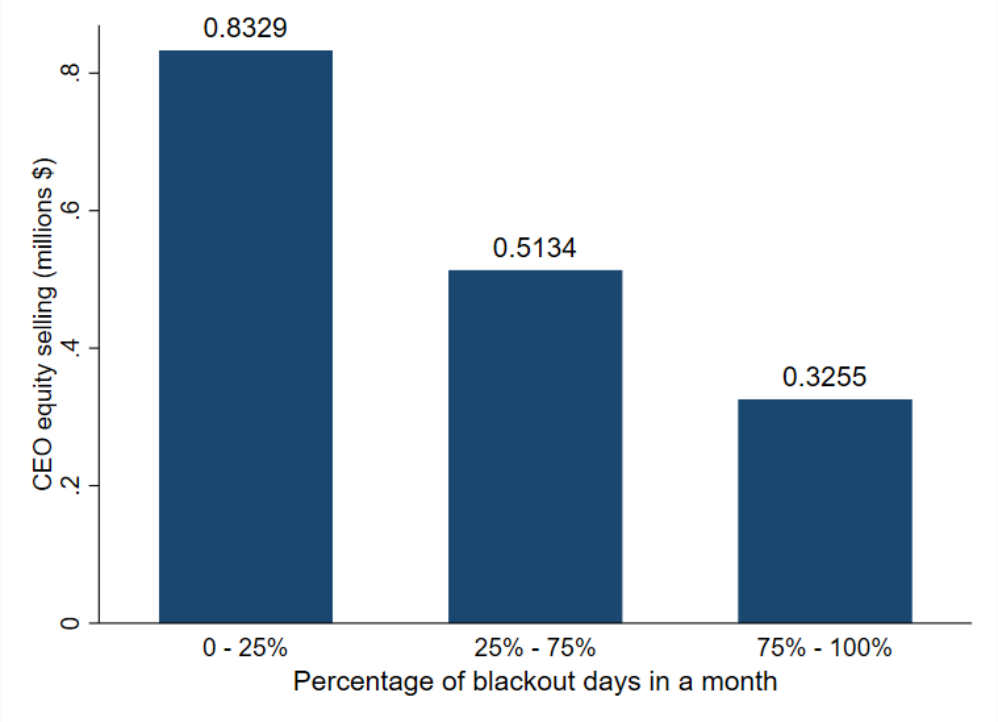
The graphs depict the timing of events relative to earnings announcements. Panel A shows the difference in calendar days between the announcement of a buyback program and the announcement of earnings. Panel B shows the difference in calendar days between the CEO equity grant and the announcement of earnings.

Figure 2
Trading activities during trading windows and blackout periods

Panel A: Share repurchases during trading windows and blackout periods

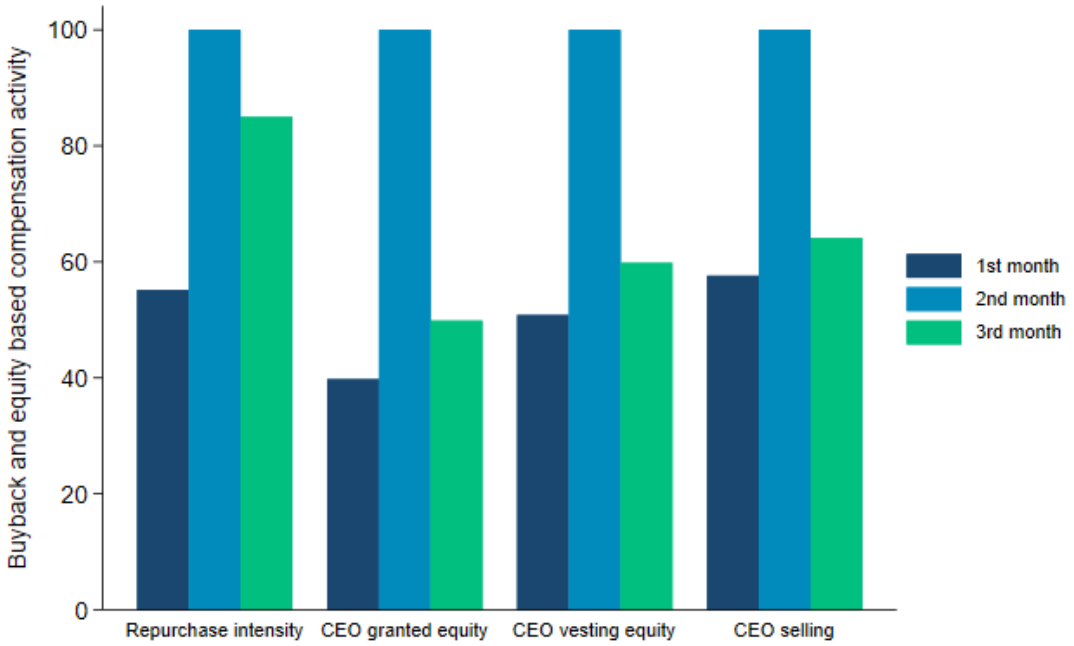


Panel B: CEO equity selling during trading windows and blackout periods



The graphs show the average of trading activities over different percentages of blackout days in a given 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.

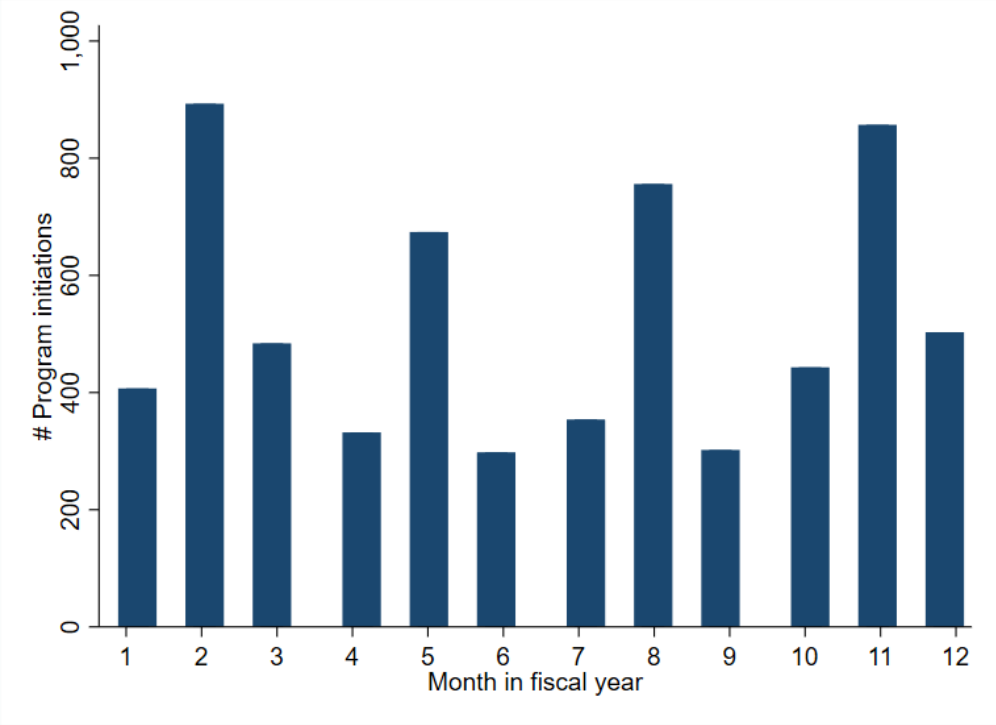
Figure 3
Timing of share repurchases and equity-based compensation within a fiscal quarter



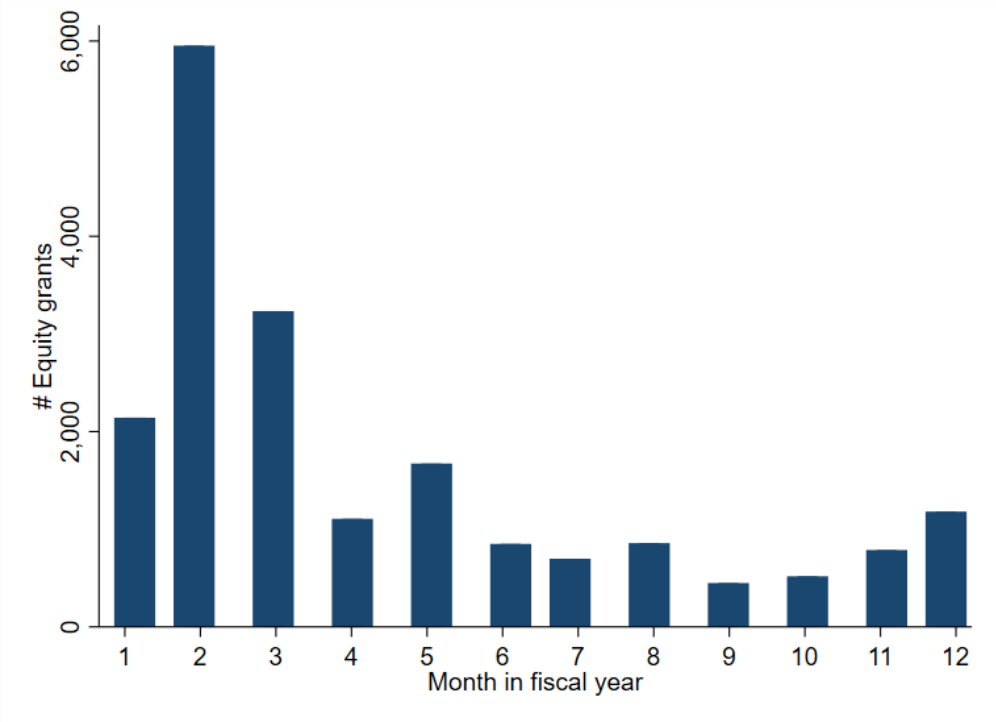
The graph plots the average of *Repurchase intensity*, *CEO granted equity*, *CEO vesting equity*, and *CEO selling* over the three months in a fiscal quarter. The numbers are normalized such that the second fiscal quarter-month represents 100 for each category.

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

Panel A: Buyback program initiations over the fiscal year



Panel B: CEO 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 number of the CEO equity grants 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. In the following tables, variables denoted with (ln) are expressed as natural logarithms using the formula ln(1+x) where x is the variable in question (in the rest of the paper, we call it "natural logarithms" for brevity).

Name	Definition	Source	Unit
Program and repurchase variables			
Program length	Total number of months the repurchase program lasts	SEC	Integer
Program size	Maximal number of shares (maximal dollar amount) that could be purchased divided by the number of shares outstanding 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
Corporate calendar and equity compensation variables			
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: *apdedateq*) until three days after the following earnings announcement (Compustat: *rdq*), following Guay et al. (2022). See Section 4.1.2 for further details.	Compustat	Ratio
CEO unvested shares	Total number of unvested shares in a year, stock-split adjusted	Equilar	Million
CEO granted dummy	1 if equity is granted in a month	Equilar	Binary
CEO granted equity	Total volume of granted equity in a month	Equilar	Million $
CEO granted shares	Total number of granted shares in a month, stock-split adjusted	Equilar	Million
CEO granted price	*CEO granted equity* divided by (*CEO granted shares* ∗1,000,000); 0 if there is no granting	Equilar	Million $
CEO vesting dummy	1 if equity vests in a month	Equilar	Binary
CEO vesting equity	Total volume of equity vesting in a month	Equilar	Million $
CEO vesting shares	Total number of vesting shares in a month, stock-split adjusted	Equilar	Million
CEO vesting price	*CEO vesting equity* divided by (*CEO vesting shares* ∗ 1,000,000); 0 if there is no vesting	Equilar	Million $
CEO vesting schedule	Sum of the number of securities granted in a particular year multiplied by their respective vesting period, divided by the total number of securities granted in that particular year	Equilar	Ratio
Insider trading variables			
Affiliates buying	Total insider purchases by Affiliates in a month	TR Insider Data	Million $
Affiliates selling	Total insider sales by Affiliates in a month	TR Insider Data	Million $
CEO buying	Total CEO purchases in a month	TR Insider Data	Million $
CEO selling	Total CEO sales in a month	TR Insider Data	Million $
CEO selling dummy	1 if there are CEO sales in a month	TR Insider Data	Binary
CEO selling shares	Total stock-split adjusted number of shares sold by the CEO in a month	TR Insider Data	Million
CEO selling price	*CEO selling* divided by (*CEO selling shares* ∗ 1,000,000); 0 if there is no CEO selling	Equilar	Million $
CxO buying	Total insider buying by CFOs, CIs, COs and CTs in a month	TR Insider Data	Million $
CxO selling	Total insider sales by CFOs, CIs, COs and CTs in a month	TR Insider Data	Million $
Directors buying	Total insider buying by Directors in a month	TR Insider Data	Million $
Directors selling	Total insider sales by Directors in a month	TR Insider Data	Million $

Continued on next page

Table 1 continued

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	TR Insider Data	Million $
Insider selling	Total insider sales in a month	TR Insider Data	Million $
Officers buying	Total insider buying by Officers in a month	TR Insider Data	Million $
Officers selling	Total insider sales by Officers in a month	TR Insider Data	Million $
Owners buying	Total insider buying by Benefical owners in a month	TR Insider Data	Million $
Owners selling	Total insider sales by Benefical owners in a month	TR Insider Data	Million $
Control variables			
Acquiror	1 if the firm is currently (time between announcement and end of the offer) bidding for another company	SDC	Binary
Assets (ln)	Total assets (Compustat item: atq)	Compustat	Million $
Board independence	Ratio of directors who are independent	Boardex	Ratio
Book-to-market	Book value equity (Compustat item: ceqq) divided by market capitalization	Compustat	Ratio
Cash-to-assets	Cash and short-term investments (Compustat item: cheq) divided by total assets	Compustat	Ratio
Change in short interest	Change in short interest as of the 15th business day scaled by the shares outstanding at the end of the previous month	Compustat	Ratio
CEO duality	1 if the CEO also serves as the chair of the board	Execucomp/Boardex	Binary
CEO ownership	Sum of "Shares Held" and "Total Exercisable Options", divided by "Shares Outstanding"	Equilar	Ratio
CEO tenure	Number of years of the CEO's tenure	Equilar	Integer
Dividends-to-assets	Total dividends (Compustat item: dvt) divided by total assets	Compustat	Ratio
EA delay	Delay in earnings announcement date relative to the date in the previous year. 0 if there is no delay.	Compustat	Days
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 capitalization)	Compustat/CRSP	Ratio
Market capitalization (ln)	Monthly average of daily market capitalization	CRSP	Million $
Number of analysts	Number of analysts who follow the firm	I/B/E/S	Integer
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	Monthly average of the daily relative spread calculated as 2*(ask-bid)/(bid+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) an acqusition target	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 explanatory 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, the maximum value and the skewness 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 (except for *Repurchase intensity*, which has been manually checked).

	Mean	Median	SD	SD (within)	25th Perc.	75th Perc.	Min	Max	Skewness	Observations
Program and repurchase statistics										
Program length	20.5093	13	21.1660	14.9769	7	25	1	160	2.3840	6,303
Program size	0.0799	0.0628	0.0663	0.0403	0.03855	0.1007	0	0.4999	2.5368	6,303
Repurchase dummy	0.2348	0	0.4239	0.3646	0	0	0	1	1.2514	251,642
Repurchase intensity (%)	0.1523	0	0.5727	0.5527	0	0	0	27.1563	11.9182	251,642
Repurchase intensity>0 (%)	0.6488	0.3526	1.0368	0.9151	0.1343	0.7746	0	27.1563	7.0206	59,082
Repurchase intensity (ln)	0.0954	0	0.2528	0.2370	0	0	0	3.3378	3.7652	251,642
Corporate calendar and equity compensation variables										
Blackout ratio	0.6360	0.7000	0.3438	0.3338	0.3667	1	0	1	-0.6899	251,642
Month in fiscal quarter	2.0023	2	0.8165	0.8165	1	3	1	3	-0.0041	251,642
Month in fiscal year	6.5413	7	3.4476	3.4447	4	10	1	12	-0.0141	251,642
CEO unvested	0.3831	0.1482	0.9196	0.6821	0.003319	0.4122	0	36.3439	11.8857	251,642
CEO granted equity	0.2133	0	1.0137	0.9896	0	0	0	7.6673	5.4912	251,642
CEO granted equity (ln)	0.0839	0	0.3501	0.3426	0	0	0	2.1596	4.5276	251,642
CEO granted dummy	0.0773	0	0.2671	0.2630	0	0	0	1	3.1644	251,642
CEO granted shares	0.0110	0	0.0846	0.0834	0	0	0	18.2627	81.2243	247,491
CEO granted shares (ln)	0.0094	0	0.0489	0.0479	0	0	0	2.9582	10.9659	247,491
CEO granted price (ln)	0.0000	0	0.0007	0.0007	0	0	0	.2909	355.3809	251,642
CEO vesting equity	0.2280	0	0.9247	0.8937	0	0	0	8.2282	5.4375	251,642
CEO vesting equity (ln)	0.1055	0	0.3486	0.3361	0	0	0	2.2223	3.9035	251,642
CEO vesting dummy	0.1537	0	0.3606	0.3471	0	0	0	1	1.9206	251,642
CEO vesting number	0.0091	0	0.0378	0.0365	0	0	0	1.4231	8.8549	247,491
CEO vesting number (ln)	0.0084	0	0.0331	0.0319	0	0	0	0.8850	6.8777	247,491
CEO vesting price (ln)	0.0000	0	0.0003	0.0003	0	0	0	.08696	156.1188	251,642
CEO vesting schedule	2.4447	2.5	0.7884	0.4533	2	3	0	6	0.3440	130,648
Insider trading variables										
Affiliates buying (ln)	0	0	0	0	0	0	0	0	0	251,642
Affiliates selling (ln)	0.0102	0	0.0660	0.0628	0	0	0	0.7006	7.4197	251,642
CEO buying (ln)	0.0011	0	0.0116	0.0114	0	0	0	0.2499	14.7008	251,642
CEO selling (ln)	0.1128	0	0.4825	0.4503	0	0	0	3.9960	4.9053	251,642
CEO selling	0.5046	0	3.2001	3.0648	0	0	0	53.3791	10.7148	251,642
CEO selling dummy	0.0808	0	0.2725	0.2501	0	0	0	1	3.0776	251,642
CEO selling shares	0.0171	0	0.1463	0.1399	0	0	0	28.1786	59.5012	247,491
CEO selling shares (ln)	0.0129	0	0.0774	0.0729	0	0	0	3.3734	10.2265	247,491

Continued on next page

Table 2 continued

CEO selling price (ln)	0.0000	0	0.0008	0.0008	0	0	0	.2831	333.8970	251,642
CxO buying (ln)	0.0000	0	0.0009	0.0008	0	0	0	0.0232	22.5359	251,642
CxO selling (ln)	0.0549	0	0.2598	0.2452	0	0	0	2.3598	5.6352	251,642
Directors buying (ln)	0.0105	0	0.0760	0.0746	0	0	0	1.2527	9.8796	251,642
Directors selling (ln)	0.1521	0	0.5773	0.5404	0	0	0	4.4904	4.5709	251,642
Insider buying (ln)	0.0150	0	0.0970	0.0945	0	0	0	2.0104	9.7725	251,642
Insider selling (ln)	0.4109	0	0.9170	0.8215	0	0.1490	0	5.4419	2.4743	251,642
Insider trading (ln)	-0.3959	0	0.9208	0.8249	-0.1387	0	-5.4420	2.0071	-2.4224	251,642
Officers buying (ln)	0.0003	0	0.0037	0.0036	0	0	0	0.0938	19.4319	251,642
Officers selling (ln)	0.1953	0	0.6323	0.5802	0	0	0	4.3377	3.8397	251,642
Owners buying (ln)	0.0034	0	0.0568	0.0550	0	0	0	1.5228	21.8156	251,642
Owners selling (ln)	0.0153	0	0.1419	0.1350	0	0	0	2.0563	10.2951	251,642
Control variables										
Acquiror	0.0348	0	0.1833	0.1580	0	0	0	1	5.0760	251,642
Assets (ln)	6.8681	6.8612	1.9145	0.4129	5.5550	8.1589	0.9262	12.3357	0.0690	251,642
Board independence	0.7796	0.8000	0.1228	0.0619	0.7143	0.8750	0.1111	1	-1.1063	243,256
Book-to-market	0.5467	0.4384	0.5385	0.3668	0.2532	0.7178	-2.6271	6.2211	2.4432	251,642
Cash-to-assets	0.1806	0.1148	0.1846	0.0847	0.0406	0.2607	0.0004	0.9739	1.4550	251,642
Change in short interest	0.0001	-0.0001	0.0107	0.0107	-0.0034	0.0033	-0.0581	0.0546	0.1566	251,642
CEO duality	0.4612	0	0.4985	0.2936	0	1	0	1	0.1558	233,654
CEO ownership	0.0362	0.0115	0.0687	0.0404	0	0.0373	0	0.4847	3.4858	251,642
CEO tenure (ln)	1.9459	1.9601	0.7576	0.4944	1.3863	2.5014	0.09531	4.0448	-0.0944	168,644
Dividends-to-assets	0.0142	0	0.0305	0.0213	0	.0174	0	0.3266	4.6074	251,642
EA delay	1.5203	0	3.1018	3.0092	0	1	0	30	2.9499	217,594
EBITDA-to-assets	0.0301	0.0315	0.0373	0.0263	0.0181	0.0461	-0.7273	0.1375	-3.4727	251,642
Leverage	0.3358	0.3002	0.2143	0.1043	0.1630	0.4740	0.0096	0.9894	0.6642	251,642
Number of analysts	54.4204	43	41.9597	14.8014	23	77	1	300	1.2284	229,677
Options exercised	0.0007	0	0.0270	0.0267	0	0	0	7.1065	149.6178	251,642
Options outstanding	0.0642	0.0480	0.0677	0.0432	0.0188	0.0893	0	3.1210	6.9455	251,642
Relative spread (ln)	-4.8959	-5.049	0.2483	0.2277	-5.1108	-4.6110	-5.1463	-4.4882	0.4160	251,642
Return	0.0107	0.0070	0.1358	0.1354	-0.0550	0.0693	-0.9354	4.1404	2.4955	251,642
Target	0.0281	0	0.1651	0.1444	0	0	0	1	5.7165	251,642
Trading volume	0.2009	0.1489	0.1911	0.1351	0.08219	0.2532	0.0019	1.9481	2.5675	251,642

Table 3
The corporate calendar and the timing of share repurchases

This table presents regressions of *Repurchase intensity* on *Blackout ratio*, which is the fraction of blackout days within a month, on dummies for the month in fiscal quarter, and on 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.

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			Repurchase intensity		
Blackout ratio		-0.1463***			-0.2059***
		(-27.53)			(-23.70)
Month in fiscal quarter=2			0.0894***		
			(20.52)		
Month in fiscal quarter=3			0.0475***		
			(11.13)		
Month in fiscal year=2				0.0579***	-0.0277***
				(8.87)	(-3.91)
Month in fiscal year=3				0.0684***	0.0234***
				(9.60)	(3.19)
Month in fiscal year=4				0.0132**	0.0035
				(2.22)	(0.58)
Month in fiscal year=5				0.1038***	-0.0630***
				(13.50)	(-6.32)
Month in fiscal year=6				0.0331***	-0.0219***
				(4.86)	(-3.00)
Month in fiscal year=7				-0.0055	-0.0155***
				(-1.00)	(-2.83)
Month in fiscal year=8				0.0948***	-0.0727***
				(12.36)	(-6.97)
Month in fiscal year=9				0.0357***	-0.0189**
				(5.03)	(-2.53)
Month in fiscal year=10				-0.0084	-0.0194***
				(-1.52)	(-3.51)
Month in fiscal year=11				0.1000***	-0.0677***
				(13.21)	(-6.59)
Month in fiscal year=12				0.0522***	-0.0031
				(7.62)	(-0.43)
Observations	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.0727	0.0765	0.0744	0.0748	0.0770
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 CEO granted equity is examined. Panels B and C present the relationship between share repurchases and CEO vesting equity, and share repurchases and CEO selling, respectively. For each of the panels, the dollar amount of the equity-based compensation variable is presented in columns (1) and (2), and the logarithmic values are shown in columns (3) and (4). The number of shares of the equity-based compensation variable in logs and the corresponding price is presented in columns (5) and (6). Here, the number of observations is lower because we need to account for stock splits using the variable "cfacshrm" from CRSP and this variable is not available in all instances. Lastly, the binary variant is shown in columns (7) and (8). The columns with odd numbers show the regressions without controls for the corporate calendar and the columns with even numbers with controls for the corporate calendar. The controls for the corporate calendar are *Blackout ratio*, which is the fraction of blackout days within a month, and dummies for the month in fiscal year. We include the standard controls which are described in Table A1 throughout all specifications. 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 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)	(7)	(8)
Dependent variable:	Repurchase intensity							
CEO granted equity	0.0036***	0.0002						
	(3.25)	(0.15)						
CEO granted equity (ln)			0.0105***	0.0004				
			(3.27)	(0.11)				
CEO granted shares (ln)					0.0650**	0.0098		
					(2.54)	(0.38)		
CEO granted price (ln)					-0.5207	-0.5975		
					(-1.44)	(-1.40)		
CEO granted dummy							0.0107***	-0.0010
							(2.66)	(-0.24)
Blackout ratio		-0.2061***		-0.2061***		-0.2047***		-0.2063***
		(-24.04)		(-24.04)		(-23.84)		(-24.17)
Observations	251,642	251,642	251,642	251,642	247,489	247,489	251,642	251,642
Adjusted R^2	0.1291	0.1340	0.1292	0.1340	0.1298	0.1346	0.1291	0.1340
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes	No	Yes
T-statistics of the differences between ...	(2)-(1):	-2.7738***	(4)-(3):	-2.9443***	(6)-(5):	-2.1486**	(8)-(7):	-2.8569 ***

Continued on next page

Table 4 continued

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:				Repurchase intensity				
CEO vesting equity	0.0038***	-0.0002						
	(3.39)	(-0.14)						
CEO vesting equity (ln)			0.0112***	0.0001				
			(3.66)	(0.03)				
CEO vesting shares (ln)					0.1058***	0.0070		
					(3.11)	(0.20)		
CEO vesting price (ln)					-1.1698	-2.0424***		
					(-1.39)	(-2.36)		
CEO vesting dummy							0.0092***	0.0004
							(3.05)	(0.13)
Blackout ratio		-0.2063***		-0.2062***		-0.2047***		-0.2061***
		(-24.08)		(-24.05)		(-23.82)		(-24.12)
Observations	251,642	251,642	251,642	251,642	247,489	247,489	251,642	251,642
Adjusted R^2	0.1291	0.1340	0.1292	0.1340	0.1298	0.1346	0.1291	0.1340
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes	No	Yes
T-stat of the difference	(2)-(1):	-3.1152***	(4)-(3):	-3.4691***	(6)-(5):	-2.6655 **	(8)-(7):	-2.8882***

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:				Repurchase intensity				
CEO selling	-0.0011***	-0.0016***						
	(-3.22)	(-4.86)						
CEO selling (ln)			-0.0047**	-0.0102***				
			(-2.16)	(-4.66)				
CEO selling shares (ln)					-0.0068	-0.0301**		
					(-0.46)	(-2.04)		
CEO selling price (ln)					-0.5378**	-0.8351***		
					(-2.22)	(-3.65)		
CEO selling dummy							-0.0003	-0.0114**
							(-0.07)	(-2.54)
Blackout ratio		-0.2074***		-0.2080***		-0.2056***		-0.2074***
		(-24.40)		(-24.42)		(-24.04)		(-24.33)
Observations	251,642	251,642	251,642	251,642	247,489	247,489	251,642	251,642
Adjusted R^2	0.1291	0.1340	0.1291	0.1340	0.1297	0.1347	0.1291	0.1340
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Continued on next page

Table 4 continued

Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	No	Yes	No	Yes	No	Yes
T-stat of the difference	(2)-(1):	-1.4904	(4)-(3):	-2.5201**	(6)-(5):	-1.5818	(8)-(7):	-2.5295**

Table 5

Firm characteristics and the relation between share repurchases and vesting equity

This table examines whether firm characteristics are relevant for the relation between the CEO's vesting equity and share repurchases. The sample is split into two halves based on whether the CEO acts as the board chair, whether the independence of the board is below the median within the same year, whether the number of analysts is smaller than the median in the same year, whether firm size (as measured by assets) is below the median in the same year, and whether the firm's average delay in their earnings announcements is above the median, respectively. The delay in earnings announcements is equal to the gap between the current announcement date and the announcement date for the same fiscal quarter in the previous year, and is set to zero if there are no delays in earnings announcements. In Panel A, we re-run model (3) of Table 4 and in Panel B, we re-run model (4) of Table 4. In both panels, we include year-month fixed effects, firm fixed effects, and the standard controls 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.

Panel A: Regression of Repurchase Intensity on CEO vesting equity without corporate calendar controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable:	Repurchase intensity									
	CEO Duality		Board Ind.		Analysts		Size		EA Delay	
	Yes	No	Low	High	Small	Large	Small	Large	High	Low
CEO vesting equity (ln)	0.0058	0.0164***	0.0076*	0.0112***	0.0022	0.0131***	-0.0014	0.0142***	0.0089*	0.0123***
	(1.30)	(3.69)	(1.69)	(2.68)	(0.37)	(3.57)	(-0.24)	(4.00)	(1.67)	(3.26)
Observations	107,754	125,900	113,483	115,367	113,779	113,841	125,824	125,805	116,790	118,573

Panel B: Regression of Repurchase Intensity on CEO vesting equity with corporate calendar controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable:	Repurchase intensity									
	CEO Duality		Board Ind.		Analysts		Size		EA Delay	
	Yes	No	Low	High	Small	Large	Small	Large	High	Low
CEO vesting equity (ln)	-0.0064	0.0062	-0.0016	-0.0008	-0.0042	0.0019	-0.0084	0.0029	-0.0013	0.0007
	(-1.40)	(1.41)	(-0.34)	(-0.19)	(-0.71)	(0.50)	(-1.46)	(0.81)	(-0.25)	(0.18)
Observations	107,754	125,900	113,483	115,367	113,779	113,841	125,824	125,805	116,790	118,573

Table 6
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. The controls for the corporate calendar are *Blackout ratio*, which is the fraction of blackout days within a month, and dummies for the month in fiscal year. 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)	(5)
Dependent variable:			Repurchase intensity		
Insider trading (ln)	-0.0082***	-0.0012			
	(-5.43)	(-0.75)			
Insider buying (ln)			0.1006***		
			(5.03)		
Insider selling (ln)			0.0024		
			(1.57)		
CEO buying (ln)				0.1568	0.2126
				(0.85)	(1.15)
CEO selling (ln)				-0.0117***	-0.0101***
				(-4.98)	(-4.30)
CxO buying (ln)				1.1174	1.6863
				(0.51)	(0.77)
CxO selling (ln)				-0.0034	0.0004
				(-0.62)	(0.08)
Officers buying (ln)				0.9949**	1.1649**
				(2.01)	(2.35)
Officers selling (ln)				0.0018	0.0082***
				(0.82)	(3.75)
Directors buying (ln)				0.1196***	0.1428***
				(5.16)	(6.15)
Directors selling (ln)				0.0027	0.0077***
				(1.02)	(2.91)
Owners buying (ln)				0.0116	0.0107
				(0.29)	(0.26)
Owners selling (ln)				0.0604***	0.0610***
				(4.02)	(4.05)
Affiliates selling (ln)				0.0090	0.0230
				(0.52)	(1.33)
Blackout ratio		-0.2055***	-0.2028***	-0.2040***	
		(-24.05)	(-23.70)	(-23.90)	
Observations	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.1292	0.1340	0.1342	0.1346	0.1300
Standard controls	Yes	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Fiscal month FE	No	Yes	Yes	Yes	No

Table 7
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 is included in this portfolio if it repurchases shares in the current month (month 0). For other windows, a firm is included if it repurchases shares within the specified range of preceding months. For instance, a firm is included in the [1, 1] portfolio if it repurchased shares in the prior month (month -1), and in the [1, 12] portfolio if it repurchased shares anytime from the prior month (month -1) up to 12 months ago (month -12). 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 *CEO 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	0.0032***	0.0032***	0.0025***	0.0021**	0.0025***
	(0.73)	(3.76)	(3.87)	(3.05)	(2.35)	(2.86)
MktRF	0.9718***	0.9936***	0.9923***	1.0066***	1.0119***	1.0226***
	(50.91)	(46.63)	(48.06)	(49.73)	(45.11)	(46.73)
SMB	0.5460***	0.5105***	0.5345***	0.5564***	0.5814***	0.6049***
	(15.38)	(12.88)	(13.92)	(14.78)	(13.94)	(14.86)
HML	0.0560*	0.0798**	0.0967***	0.1230***	0.1894***	0.1673***
	(1.92)	(2.45)	(3.06)	(3.97)	(5.52)	(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	0.0022*	0.0020	0.0039***	0.0022**	0.0027***	0.0030***
(N=9,486)	(1.68)	(1.59)	(3.55)	(2.16)	(3.03)	(3.58)
CEO vesting equity low	0.0052	0.0025	0.0037	0.0032	0.0025	0.0029**
(N=2,140)	(1.54)	(0.70)	(1.56)	(1.39)	(1.45)	(2.15)
CEO vesting equity medium	-0.0012	0.0002	0.0045***	0.0011	0.0018	0.0023**
(N=3,055)	(-0.59)	(0.11)	(2.69)	(0.83)	(1.49)	(2.21)
CEO vesting equity high	0.0015	0.0011	0.0037***	0.0016	0.0023**	0.0026***
(N=4,291)	(0.90)	(0.78)	(2.76)	(1.60)	(2.19)	(2.94)

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	0.0092***	0.0029	0.0018	0.0017	0.0015	0.0020**
(N=5,869)	(3.72)	(0.72)	(1.42)	(1.57)	(1.40)	(2.58)
CEO equity sales low	-0.0014	0.0029	0.0020	0.0013	0.0039***	0.0031***
(N=1,656)	(-0.31)	(0.60)	(0.99)	(0.68)	(2.97)	(2.92)
CEO equity sales medium	0.0146***	-0.0010	0.0013	0.0022	0.0015	0.0018**
(N=2,157)	(6.16)	(-0.43)	(0.79)	(1.54)	(1.30)	(2.27)
CEO equity sales high	0.0176***	-0.0009	0.0015	0.0009	-0.0001	0.0007
(N=2,056)	(7.19)	(-0.40)	(0.76)	(0.53)	(-0.10)	(0.65)

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

Continued on next page

Table 7 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	0.0140***	-0.0011	-0.0009	-0.0009	0.0006	0.0002
(N=20,321)	(10.50)	(-0.92)	(-0.87)	(-0.92)	(0.73)	(0.34)
CEO equity sales low	0.0064***	0.0014	0.0001	-0.0022	0.0026	0.0008
(N=6,777)	(2.75)	(0.64)	(0.06)	(-1.51)	(1.33)	(0.89)
CEO equity sales medium	0.0177***	-0.0033**	-0.0011	-0.0011	0.0002	-0.0001
(N=7,351)	(10.93)	(-2.28)	(-0.89)	(-0.94)	(0.27)	(-0.12)
CEO equity sales high	0.0199***	-0.0004	-0.0022	-0.0015	-0.0001	-0.0005
(N=6,193)	(10.50)	(-0.23)	(-1.62)	(-1.30)	(-0.06)	(-0.47)

Table 8

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]	43,052	0.0080***	8,136	0.0070***	0.0010**	2.35
[+1, +1]	43,052	0.0055***	8,136	0.0105***	-0.0050***	-4.15
[+1, +3]	43,052	0.0070***	8,136	0.0160***	-0.0090***	-5.50
[+1, +6]	43,052	0.0075***	8,136	0.0175***	-0.0100***	-4.65

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

Table 9
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 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 is included in this portfolio if it repurchases shares in the current month (month 0). For other windows, a firm is included if it repurchases shares within the specified range of preceding months. For instance, a firm is included in the [1, 12] portfolio if it repurchased shares between the prior month (month -1) and 12 months ago (month -12), and in the [1, 48] portfolio if it repurchased shares anytime from the prior month (month -1) up to 48 months ago (month -48). Panel B examines a subsample of 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 *CEO selling* in the first 12 program months of buyback programs initiated 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***	0.0029***	0.0025***	0.0016*	0.0019	0.0022**
	(5.49)	(2.99)	(2.66)	(1.78)	(1.63)	(2.36)
MktRF	0.9344***	1.0213***	1.0399***	1.0381***	1.0521***	1.0602***
	(19.69)	(42.82)	(44.76)	(46.00)	(36.89)	(45.73)
SMB	0.7064***	0.6082***	0.6050***	0.6377***	0.6169***	0.6637***
	(8.00)	(13.71)	(14.00)	(15.19)	(11.64)	(15.39)
HML	-0.0287	0.0973***	0.1814***	0.1783***	0.2520***	0.2084***
	(-0.40)	(2.67)	(5.10)	(5.17)	(5.79)	(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 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	0.0166***	0.0064***	0.0018**	0.0024**	0.0020	0.0033***
(N=2,343)	(7.66)	(6.27)	(2.09)	(2.36)	(1.50)	(3.69)
12-month equity sales low	0.0175***	0.0040***	0.0014	0.0027	0.0036*	0.0029***
(N=631)	(3.02)	(2.72)	(1.07)	(1.59)	(1.82)	(2.77)
12-month equity sales medium	0.0157***	0.0060***	0.0015	0.0009	0.0001	0.0026***
(N=845)	(3.94)	(4.20)	(1.37)	(0.65)	(0.08)	(2.73)
12-month equity sales high	0.0134***	0.0090***	0.0025*	0.0037***	0.0024	0.0040***
(N=867)	(4.00)	(7.97)	(1.92)	(2.89)	(1.54)	(4.04)

Table 10
Buy-and-hold abnormal returns

This table reports the results of replication and robustness tests of Table 3, Panel A, in Edmans et al. (2022). We calculate buy-and-hold abnormal returns (BHAR) as compounded monthly returns over various time periods (from two months before to four years after the current month), subtracting the compounded monthly value-weighted market returns. Panel A replicates Edmans et al. (2022), where the sample is repurchasing months and the regressor, *CEO 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 *CEO vesting equity in billions*, but the sample is non-repurchasing months. In Panel C, the sample is repurchasing months, and the regressor is *CEO vesting dummy*. *CEO 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 *CEO vesting shares*. *CEO vesting shares* 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 Panel E, we display the averages of BHARs. First, we test whether the BHARs differ from zero for the full sample of repurchasing months when the CEO's equity vests simultaneously. Then, we split the sample into terciles based on the value of *CEO vesting equity* (relative to other observations in the same year) and test whether the BHARs of each tercile differ from zero. 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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1,12]	[13, 24]	[25, 36]	[37, 48]
CEO vesting equity in billions	0.3788	0.5385**	0.1306	-2.5859***	-2.0838**	-2.7786***	-2.5150**
	(1.59)	(2.01)	(0.51)	(-2.62)	(-2.11)	(-2.82)	(-2.50)
Observations	58,506	58,773	58,975	50,335	49,633	48,929	48,369
Adjusted R^2	0.0471	0.0475	0.0419	0.2466	0.2636	0.2671	0.2708

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1,12]	[13, 24]	[25, 36]	[37, 48]
CEO vesting equity in billions	1.0575***	0.7086***	-0.1736	-9.7920***	-9.4207***	-9.1148***	-9.2824***
	(4.32)	(2.81)	(-0.69)	(-8.51)	(-8.13)	(-7.89)	(-8.01)
Observations	189,297	190,895	192,560	163,223	161,166	159,125	156,961
Adjusted R^2	0.0368	0.0370	0.0371	0.1373	0.1389	0.1402	0.1422

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1,12]	[13, 24]	[25, 36]	[37, 48]
CEO vesting dummy	0.0011	-0.0002	0.0027**	0.0021	0.0047	0.0030	0.0034
	(1.05)	(-0.16)	(2.46)	(0.49)	(1.06)	(0.66)	(0.71)
Observations	58,506	58,773	58,975	50,335	49,633	48,929	48,369
Adjusted R^2	0.0471	0.0474	0.0420	0.2466	0.2636	0.2670	0.2708

Panel D: CEO equity vesting number and abnormal returns in repurchasing months

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1,12]	[13, 24]	[25, 36]	[37, 48]
CEO vesting shares	-0.0012	0.0104	0.0233***	0.0502*	0.0660**	0.0508*	0.0737**
	(-0.17)	(1.36)	(2.93)	(1.80)	(2.38)	(1.84)	(2.52)
Observations	57,718	57,978	58,170	49,663	48,970	48,272	47,715
Adjusted R^2	0.0480	0.0482	0.0386	0.2437	0.2606	0.2631	0.2665

Panel E: Buy-and-hold abnormal returns in repurchasing months

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: BHAR over	[-2, -2]	[-1, -1]	[0, 0]	[1,12]	[13, 24]	[25, 36]	[37, 48]
Full sample	-0.0006	-0.0041***	0.0036***	0.0323***	0.0335***	0.0308***	0.0300***
(N=9,487)	(-0.70)	(-4.37)	(3.79)	(7.60)	(7.42)	(6.66)	(6.24)
CEO vesting equity low	-0.0030*	-0.0098***	0.0060***	0.0503***	0.0531***	0.0492***	0.0495***
(N=3,267)	(-1.68)	(-5.29)	(3.03)	(5.20)	(4.95)	(4.47)	(4.27)
CEO vesting equity medium	-0.0019	-0.0043***	-0.0003	0.0219***	0.0214***	0.0195***	0.0172**

Continued on next page

Table 10 continued

(N=3,111)	(-1.25)	(-2.62)	(-0.22)	(3.41)	(3.40)	(2.98)	(2.56)
CEO vesting equity high	0.0032***	0.0020	0.0050***	0.0243***	0.0255***	0.0232***	0.0228***
(N=3,109)	(2.60)	(1.50)	(3.89)	(4.72)	(4.95)	(4.53)	(4.44)

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 Sakinç, 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 dataset

No commercial database provides detailed repurchase activity on a monthly basis or includes details on the nature of the repurchases. Hence, we obtain 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 1, 2004, and December 31, 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 obtain the CIKs for the respective firms. There are 8,459 firms in CRSP. Out of these, 16 are unavailable in Compustat, and 458 firms have missing CIK data. Furthermore, we use WRDS' SEC Suite to download a list of CIKs that 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 EDGAR. In the next step, we comb through the downloaded filings in search of repurchase information under Item 2(e) of Form 10–Q or under Item 5(c) of Form 10–K. For the filings that contain this 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 details of 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 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, its date of announcement, approved dollar amount, and, if applicable, expiration date. We also record whether the 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, manual work follows to check and supplement the automatic output. This work has three aims. First, some firms did not adhere to the standard format of reporting repurchases, so for 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 whether 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. Any discrepancies between the original filings and the automated output are manually corrected. The manual correction ensures that we drop very few observations (less than 100).

Firms sometimes announce additional buyback programs while an older program continues. Furthermore, some firms announce modifications to their ongoing programs. We treat both events as the start of a new buyback program.

Our final repurchase dataset, which spans from 2004 to 2019, covers 3,803 repurchasing firms, 11,529 repurchase programs, and 110,887 repurchase months between 2004 and 2019. Our final dataset is matched to data from Equilar. For this project, the sample begins in 2006 because vesting equity can be estimated with much more precision using the 2006 disclosure requirement for executive compensation. Therefore, we restrict the dataset to the period between 2006 and 2019, reducing the dataset to 3,556 repurchasing firms, 10,107

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

Table OA1

The impact of the corporate calendar on share repurchases (dummy) or equity-based compensation (dummy)

The dependent variable is *Repurchase dummy* in Panel A, *CEO granted dummy* in Panel B, *CEO vesting 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 dummy and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			Repurchase dummy		
Blackout ratio	-0.1017***			-0.1342***	-0.1728***
	(-32.95)			(-29.86)	(-31.48)
Month in fiscal quarter=2		0.0594***		-0.0314***	
		(21.60)		(-7.89)	
Month in fiscal quarter=3		0.0445***		0.0153***	
		(16.14)		(5.21)	
Month in fiscal year=2			0.0593***		-0.0126**
			(12.80)		(-2.55)
Month in fiscal year=3			0.0688***		0.0311***
			(14.51)		(6.39)
Month in fiscal year=4			0.0265***		0.0183***
			(6.18)		(4.28)
Month in fiscal year=5			0.0807***		-0.0593***
			(17.00)		(-9.22)
Month in fiscal year=6			0.0563***		0.0101**
			(11.99)		(2.04)
Month in fiscal year=7			0.0107**		0.0023
			(2.54)		(0.55)
Month in fiscal year=8			0.0721***		-0.0685***
			(15.30)		(-10.64)
Month in fiscal year=9			0.0464***		0.0006
			(9.88)		(0.11)
Month in fiscal year=10			0.0016		-0.0076*
			(0.38)		(-1.77)
Month in fiscal year=11			0.0642***		-0.0766***
			(13.44)		(-11.81)
Month in fiscal year=12			0.0458***		-0.0007
			(9.77)		(-0.14)
Observations	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.2752	0.2733	0.2736	0.2757	0.2765
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel B: CEO granted dummy and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			CEO granted dummy		
Blackout ratio	-0.0295***			0.0720***	-0.1373***
	(-12.72)			(16.71)	(-26.40)
Month in fiscal quarter=2		0.0653***		0.1141***	
		(33.00)		(30.84)	
Month in fiscal quarter=3		0.0106***		0.0262***	
		(5.81)		(12.90)	
Month in fiscal year=2			0.1988***		0.1417***
			(45.53)		(30.95)
Month in fiscal year=3			0.0471***		0.0171***
			(12.22)		(4.29)
Month in fiscal year=4			-0.0439***		-0.0504***
			(-14.54)		(-16.65)
Month in fiscal year=5			-0.0151***		-0.1263***
			(-4.41)		(-23.23)

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Table OA1 continued

Month in fiscal year=6			-0.0619***		-0.0987***
			(-19.67)		(-28.86)
Month in fiscal year=7			-0.0671***		-0.0738***
			(-23.47)		(-25.72)
Month in fiscal year=8			-0.0512***		-0.1629***
			(-15.93)		(-30.60)
Month in fiscal year=9			-0.0791***		-0.1155***
			(-26.56)		(-35.43)
Month in fiscal year=10			-0.0801***		-0.0875***
			(-28.19)		(-30.66)
Month in fiscal year=11			-0.0607***		-0.1726***
			(-19.05)		(-32.44)
Month in fiscal year=12			-0.0542***		-0.0911***
			(-16.80)		(-25.89)
Observations	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.0538	0.0580	0.1006	0.0598	0.1052
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel C: CEO vesting dummy and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			CEO vesting dummy		
Blackout ratio	-0.0300***			0.1095***	-0.1539***
	(-10.06)			(21.51)	(-26.32)
Month in fiscal quarter=2		0.0835***		0.1575***	
		(32.07)		(35.72)	
Month in fiscal quarter=3		0.0165***		0.0403***	
		(6.68)		(15.10)	
Month in fiscal year=2			0.2346***		0.1706***
			(46.16)		(31.14)
Month in fiscal year=3			0.0818***		0.0482***
			(16.76)		(9.63)
Month in fiscal year=4			-0.0631***		-0.0704***
			(-15.19)		(-16.90)
Month in fiscal year=5			-0.0174***		-0.1420***
			(-3.79)		(-21.65)
Month in fiscal year=6			-0.1002***		-0.1413***
			(-23.46)		(-31.33)
Month in fiscal year=7			-0.1039***		-0.1114***
			(-26.31)		(-28.10)
Month in fiscal year=8			-0.0781***		-0.2032***
			(-17.93)		(-31.66)
Month in fiscal year=9			-0.1322***		-0.1730***
			(-32.37)		(-39.92)
Month in fiscal year=10			-0.1407***		-0.1489***
			(-35.80)		(-37.79)
Month in fiscal year=11			-0.1112***		-0.2365***
			(-25.95)		(-37.13)
Month in fiscal year=12			-0.0900***		-0.1313***
			(-20.95)		(-28.81)
Observations	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.1104	0.1143	0.1592	0.1165	0.1624
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Panel D: CEO selling dummy and the corporate calendar

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			CEO selling dummy		
Blackout ratio	-0.0668***			-0.0772***	-0.1123***
	(-30.77)			(-24.49)	(-28.13)

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Table OA1 continued

Month in fiscal quarter=2		0.0396***		-0.0126***	
		(21.18)		(-4.67)	
Month in fiscal quarter=3		0.0096***		-0.0072***	
		(5.45)		(-3.80)	
Month in fiscal year=2			0.0473***		0.0006
			(14.61)		(0.18)
Month in fiscal year=3			0.0250***		0.0005
			(7.90)		(0.15)
Month in fiscal year=4			0.0045		-0.0008
			(1.63)		(-0.29)
Month in fiscal year=5			0.0425***		-0.0484***
			(13.12)		(-10.73)
Month in fiscal year=6			0.0084***		-0.0217***
			(2.82)		(-6.86)
Month in fiscal year=7			0.0042		-0.0013
			(1.55)		(-0.48)
Month in fiscal year=8			0.0402***		-0.0511***
			(12.53)		(-11.35)
Month in fiscal year=9			0.0074**		-0.0224***
			(2.49)		(-7.13)
Month in fiscal year=10			0.0041		-0.0019
			(1.49)		(-0.70)
Month in fiscal year=11			0.0413***		-0.0502***
			(12.78)		(-11.06)
Month in fiscal year=12			0.0106***		-0.0196***
			(3.60)		(-6.26)
Observations	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.1636	0.1618	0.1619	0.1637	0.1649
Year-month FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Table OA2

The corporate calendar and the correlation between share repurchases (ln) and equity-based compensation

This table presents OLS regressions of the logarithmic values of *Repurchase intensity* on the granting, vesting, and selling of equity, and controls for the corporate calendar. The columns with odd numbers show the regressions without controls for the corporate calendar and the columns with even numbers with controls for the corporate calendar. The controls for the corporate calendar are *Blackout ratio*, which is the fraction of blackout days within a month, and dummies for the month in fiscal year. 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 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.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			Repurchase intensity (ln)			
CEO granted equity (ln)	0.0086***	0.0022				
	(5.80)	(1.45)				
CEO vesting equity (ln)			0.0088***	0.0019		
			(6.15)	(1.31)		
CEO selling (ln)					0.0002	-0.0030***
					(0.15)	(-2.95)
Blackout ratio		-0.1179***		-0.1179***		-0.1189***
		(-33.73)		(-33.73)		(-34.14)
Observations	251,642	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.2562	0.2645	0.2562	0.2645	0.2561	0.2645
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)	-4.2663***	(4)-(3):	-4.7894***	(6)-(5):	-2.6987**

Table OA3

Correlation between share repurchases and equity-based compensation using only one of the corporate calendar controls

This table presents OLS regressions of *Repurchase intensity* on the granting, vesting, and selling of equity, and controls for the corporate calendar. The columns with odd numbers show the regressions with only the control variable *Blackout ratio* included. The columns with even numbers show the regressions only dummies for the month in fiscal year. 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					
CEO granted equity (ln)	0.0061*	0.0080**				
	(1.92)	(2.46)				
CEO vesting equity (ln)			0.0066**	0.0082***		
			(2.15)	(2.67)		
CEO selling (ln)					-0.0095***	-0.0071***
					(-4.33)	(-3.25)
Blackout ratio	-0.1573***		-0.1573***		-0.1587***	
	(-30.03)		(-30.03)		(-30.23)	
Observations	251,642	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.1335	0.1318	0.1335	0.1318	0.1335	0.1318
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 OA4

The corporate calendar and the correlation between share repurchases and equity-based compensation using lagged *Blackout ratio*

This table presents OLS regressions of the logarithmic values of *Repurchase intensity* on the granting, vesting, and selling of equity, and controls for the corporate calendar. The columns with odd numbers show the regressions without controls for the corporate calendar and the columns with even numbers with controls for the corporate calendar. The controls for the corporate calendar are *Blackout ratio* lagged by 36 months, and dummies for the month in fiscal year. 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 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.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Repurchase intensity					
CEO granted equity (ln)	0.0105***	0.0021				
	(3.27)	(0.57)				
CEO vesting equity (ln)			0.0112***	0.0026		
			(3.66)	(0.82)		
CEO selling (ln)					-0.0047**	-0.0097***
					(-2.16)	(-3.82)
Blackout ratio$_{t-36}$		-0.1440***		-0.1438***		-0.1457***
		(-15.97)		(-15.97)		(-16.20)
Observations	251,642	197,314	251,642	197,314	251,642	197,314
Adjusted R^2	0.1292	0.1463	0.1292	0.1463	0.1291	0.1463
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):	-2.4307**	(4)-(3):	-2.7600***	(6)-(5):	-2.1200**

Table OA5

The corporate calendar and the correlation between share repurchases and equity-based compensation on the annual level

This table presents OLS regressions of *Repurchase intensity* on the granting, vesting, and selling of equity, and controls for the corporate calendar on the fiscal-year level. The columns with odd numbers show the regressions without controlling for the corporate calendar and the columns with even numbers show the regressions with the control variable *Blackout ratio*. We include the standard controls which are described in Table A1 throughout all specifications. Year 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			
CEO granted equity (ln)	0.0020	0.0013				
	(0.51)	(0.33)				
CEO vesting equity (ln)			-0.0034	-0.0041		
			(-0.91)	(-1.08)		
CEO selling (ln)					-0.0029	-0.0031*
					(-1.53)	(-1.67)
Blackout ratio		-0.2798***		-0.2819***		-0.2823***
		(-5.39)		(-5.48)		(-5.47)
Observations	20,999	20,999	20,999	20,999	20,999	20,999
Adjusted R^2	0.2610	0.2625	0.2611	0.2625	0.2611	0.2626
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

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					
CEO granted equity (ln)	0.0158***			-0.0002		
	(3.16)			(-0.02)		
CEO vesting equity (ln)		0.0138***			0.0131	
		(3.10)			(1.31)	
CEO selling (ln)			-0.0052			-0.0200***
			(-1.42)			(-2.84)
Observations	112,064	112,064	112,064	25,159	25,159	25,159
Adjusted R^2	0.1456	0.1456	0.1456	0.1942	0.1943	0.1944
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. The columns with odd numbers show the regressions without controls for the corporate calendar and the columns with even numbers with controls for the corporate calendar. The controls for the corporate calendar are *Blackout ratio*, which is the fraction of blackout days within a month, and dummies for the month in fiscal year. 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					
CEO granted equity (ln)	0.0087***	0.0070***				
	(4.20)	(3.23)				
CEO vesting equity (ln)			0.0122***	0.0105***		
			(7.05)	(5.96)		
CEO selling (ln)					0.0006	0.0001
					(0.50)	(0.11)
Blackout ratio		-0.0219***		-0.0210***		-0.0235***
		(-4.04)		(-3.90)		(-4.29)
Observations	251,642	251,642	251,642	251,642	251,642	251,642
Adjusted R^2	0.0253	0.0254	0.0254	0.0255	0.0252	0.0253
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):	-0.8019	(4)-(3):	-0.9735	(6)-(5):	-0.4696

Table OA8
Vesting equity on the annual level using a restricted sample

This table presents regressions of *CEO vesting equity* on the annual level. Firm fixed effects are controlled for throughout all specifications and year fixed effects are controlled for in specifications (2) - (5). 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:			CEO vesting equity		
CEO duality			0.2310*	0.2070	0.2709**
			(1.74)	(1.56)	(2.06)
CEO tenure (ln)			0.6202***	0.5717***	0.5664***
			(8.57)	(7.87)	(7.88)
Return			3.9045***	5.7897***	6.1622***
			(4.14)	(6.19)	(6.63)
Return_{t-1}			12.4886***	13.5099***	13.4068***
			(11.65)	(12.56)	(12.58)
$\text{Assets}_{t-1}(ln)$			1.5372***	1.7008***	1.6057***
			(12.15)	(13.46)	(12.74)
$\text{Book-to-market}_{t-1}$			-1.0914***	-0.7693***	-0.7350***
			(-7.67)	(-5.24)	(-5.11)
EBITDA-to-assets			7.6958***	6.8799***	6.3747***
			(3.27)	(2.95)	(2.78)
$\text{EBITDA-to-assets}_{t-1}$			4.0844*	-0.3029	0.1353
			(1.80)	(-0.13)	(0.06)
Leverage_{t-1}				-3.8740***	-3.6962***
				(-8.84)	(-8.48)
CEO ownership				2.8064***	2.9437***
				(2.71)	(2.89)
CEO unvested shares				0.1592**	0.0953
				(2.17)	(1.30)
CEO vesting schedule					-0.2072***
					(-2.84)
CEO granted equity					0.1404***
					(6.88)
Observations	8,791	8,791	8,791	8,791	8,791
Adjusted R^2	0.4588	0.5954	0.6262	0.6310	0.6356
Year FE	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Table OA9

Further analyses on CEO vesting equity using a restricted sample

This table presents regressions of *CEO vesting equity* on thirteen explanatory variables, alongside the corporate calendar controls. The controls for the corporate calendar are *Blackout ratio*, which is the fraction of blackout days within a month, 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:				CEO vesting equity			
CEO duality		0.0506***	0.0245*			0.0145	0.0191
		(3.76)	(1.70)			(1.01)	(1.49)
CEO ownership			0.1183			0.2174**	0.2432***
			(1.23)			(2.26)	(2.76)
CEO unvested			0.0090			0.0149*	-0.0007
			(1.01)			(1.66)	(-0.08)
CEO tenure (ln)			0.0432***			0.0364***	0.0589***
			(5.91)			(4.98)	(8.70)
Stock price				0.0023***		0.0022***	0.0021***
				(8.64)		(8.41)	(8.95)
Return				-0.0351		-0.0348	0.0028
				(-1.60)		(-1.58)	(0.14)
Return_{t-1}				0.0579***		0.0585***	0.0588***
				(2.59)		(2.61)	(2.90)
Assets				0.0750***		0.0768***	0.0528***
				(6.45)		(6.60)	(4.99)
Book-to-market				-0.0512***		-0.0500***	-0.0392***
				(-6.06)		(-5.89)	(-5.02)
Dividends-to-assets				-0.3924***		-0.3751***	-0.4224***
				(-2.80)		(-2.67)	(-3.15)
Leverage				-0.1678***		-0.1826***	-0.1921***
				(-4.30)		(-4.61)	(-5.21)
CEO vesting schedule					-0.0174***		-0.0253***
					(-2.58)		(-3.73)
CEO granted equity					0.4267***		0.4266***
					(65.66)		(66.18)
Blackout ratio	-0.7263***	-0.7259***	-0.7238***	-0.7106***	-0.4156***	-0.7081***	-0.3974***
	(-19.57)	(-19.56)	(-19.50)	(-19.15)	(-13.51)	(-19.08)	(-12.93)
Observations	95,780	95,780	95,780	95,780	95,780	95,780	95,780
Adjusted R^2	0.1655	0.1656	0.1659	0.1692	0.3450	0.1695	0.3489
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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