

What do insiders know?

Evidence from insider trading around share repurchases and SEOs*

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Abstract

We examine the nature of information contained in insider trades prior to corporate events. Insiders' net buying increases before open market share repurchase announcements and decreases before SEOs. Higher insider net buying is associated with better post-event operating performance, a reduction in undervaluation, and, for repurchases, lower post-event cost of capital. Insider trading predicts announcement returns and, for repurchases, the long-term drift following events. Overall, our results suggest that insider trades before corporate events contain information about changes both in fundamentals and in investor sentiment. Information about fundamentals is incorporated slowly into prices, while information about mispricing is incorporated faster.

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Both corporate events and personal investment decisions of corporate insiders — insider trading — contain value-relevant information.¹ In this paper, we study the interaction between firms’ decisions and insiders’ actions in the context of open market share repurchases and seasoned equity offers (SEOs). We analyze patterns in insider trading around these events, the nature of information contained in pre-event insider trading, and potential complementarities in insider trades and event announcements. Our unique empirical design, which examines both repurchases and SEOs, allows us to draw conclusions that go beyond the results of prior studies. The key finding is that insider trading prior to repurchases and SEOs is associated with future changes in (i) fundamentals, such as operating performance and the cost of capital, and (ii) firm-specific misvaluation. Using a matched-sample approach, we also find that insider trading predicts changes in the cost of capital after repurchases, but not for matched firms with similar characteristics. In addition, insider trading predicts changes in firm-specific misvaluation after SEOs, but not for matched firms. Examining abnormal returns following these events, we show that the value implications of corporate events are larger when insiders “put their money where their mouth is”, i.e. when insider trading is in the direction of a corporate announcement. This is consistent with the existence of complementarities between the information contained in event announcements and that in insider trading. Finally, our findings suggest that prices adjust faster to information related to misvaluation that stems from investor sentiment than to information about fundamentals.

We examine share repurchases and seasoned equity offerings (SEOs) together, as these events are mirror image of each other. Indeed, recent theoretical work by Bond and Zhong (2016)

¹ Examples of value-relevant corporate events include equity issues (e.g., Heron and Lie (2004) and Billett, Flannery, and Garfinkel (2011)); share repurchases (e.g., Ben-Rephael, Oded, and Wohl (2014) Dittmar and Field (2015), and Busch and Obernberger (2017)); dividend changes (e.g., Farre-Mensa, Michaely, and Schmalz (2014)); and mergers and acquisitions (e.g., Netter, Stegemoller, and Wintoki (2011)). For analyses of value-relevant insider trading, see Jenter (2005) and Cohen, Malloy, and Pomorski (2012).

highlights the importance of analyzing repurchases and SEOs in a unified framework. Further, both events have a high ex-ante potential to exhibit complementarities with insider trading. First, there is a consensus that announcements of SEOs and repurchases provide the market with significant amounts of new information, as evident from market reactions to these event announcements (e.g., Grullon and Michaely (2004), Bonaimé (2012), Manconi, Peyer, and Vermaelen (2014) for the case of repurchases, and Ritter (2003), Carlson, Fisher, and Giammarino (2006), and Billett, Flannery, and Garfinkel (2011) for the case of SEOs).² Second, insiders are likely to possess superior information relative to other market participants in the months prior to these events (e.g., Myers and Majluf (1984), Korajczyk, Lucas, and McDonald (1991)). This is consistent with surveys of CEOs, according to which misvaluation is an important reason for issuing and repurchasing equity (e.g., Graham and Harvey (2001) and Brav, Graham, Harvey, and Michaely (2005)).

Our analysis starts by constructing a measure of insider net buying activity, defined as the number (or dollar value) of insider purchases less the number (or dollar value) of insider sales, normalized by the total number (total dollar value) of insider trades.³ This measure, the net purchase ratio (NPR), ranges between 1 (if all insider transactions are purchases) and -1 (if all insider transactions are sales). We show that on average, insiders trade in the direction of the event. NPR increases from -0.3 six months prior to a repurchase to -0.2 one month prior to the announcement, indicating more insider net buying prior to repurchases, a change that is statistically significant at the 1% level. This increase corresponds to 12% of one standard deviation of the NPR.

² The evidence on the informational content of other corporate events is less clear. For example, while dividend changes may also signal information, Grullon et al. (2005) show that dividend changes are not correlated with future changes in earnings, and are negatively (not positively) correlated with future changes in profitability. Similarly, Netter et al. (2011) report that the market reaction to mergers and acquisitions depends largely on how the sample of mergers is selected.

³ Throughout the paper, we follow the literature on insider trading and use the term “net buying” to refer to the number (or volume) of purchases less the number (or volume) of sales.

We also find a mirroring pattern that is larger in magnitude for SEOs. In particular, NPR moves from -0.35 six months prior to an SEO to -0.65 one month before the announcement, a decrease that equals 40% of the standard deviation of the NPR.

What do insiders know before these events? To answer this, we examine whether heterogeneity in pre-event insider net buying predicts changes in fundamentals, such as return on assets (ROA) and the cost of capital, and/or changes in firm-specific misvaluation, measured using the method of Rhodes-Kropf, Robinson, and Viswanathan (2005). We then use a propensity score matching approach to obtain a sample of matched firms for both the repurchasing and SEO firms, and examine whether insider trades predict similar future changes in fundamentals for event firms and for matched firms. We find that insider trading predicts changes in the cost of capital of repurchasing firms, but not of matched peers. A one-standard-deviation increase in insider net buying is associated with a 0.59 percentage point larger decline in the cost of capital, which equals one-third of the average decline in the cost of capital. We also find that insider trading predicts changes in firm-specific misvaluation of SEO firms, but not of matched peers. Finally, insider trading predicts changes in operating performance similarly across both event firms and matched peers. A one-standard-deviation increase in pre-event insider net buying is associated with a 0.62 (0.50) percentage point smaller decrease in ROA three years after repurchases (SEOs), which is economically sizable given that the average change in ROA is -2.2 (-2.8) percentage points.

Our final set of tests examines the predictive power of insider trades for announcement returns and long-term abnormal returns following repurchase and SEO announcements. We show that the extent of insiders' net buying prior to repurchases and SEOs strongly predicts the repurchase and SEO announcement returns. More insider net buying prior to share repurchases (SEOs) is associated with larger positive (smaller negative) announcement returns. For example,

a one-standard-deviation increase in pre-event insider net buying is associated with an increase of around 80 basis points in abnormal returns measured over the three-day period around repurchase announcements. A one-standard-deviation increase in insider net buying is associated with a reduction of around 41 basis points in the magnitude of the negative abnormal returns around SEO announcements. These numbers are substantial relative to the mean announcement returns of 2.1% in the case of repurchases and -2.6% in the case of SEOs.

We also show that the market does not immediately absorb all the information in insider trading prior to event announcements. A one-standard-deviation increase in insider net buying before repurchases is associated with an increase of 9 percentage points in one-year abnormal returns after the event. This is significantly higher than the increase of 4 percentage points for matched non-event firms. A one-standard-deviation increase in insider net buying before SEOs is associated with an increase of around 5 percentage points in one-year abnormal returns after SEO announcements, similar to the difference for matched non-event firms. Taken together, these findings suggest that information about investor sentiment (in the case of SEOs) is incorporated into prices faster than information about fundamentals (in the case of repurchases).

Our paper makes several contributions to the existing literature. Perhaps most importantly, ours is the first paper to examine the nature of information contained in insider trades around corporate events and the underlying reasons for the complementarity between the information in event announcements and that in pre-event insider trading. Previous studies show that misvaluation drives both insiders' personal portfolio choices, and their decision to issue new shares. This conclusion is shared by studies that use yearly aggregate data (e.g. Jenter (2005)), and those examining insider trading before equity issues (e.g., Kahle (2000)). Our results suggest that while the direction of insider trading is correlated with fluctuations in misvaluation over time, insider

trading prior to repurchases and SEOs is associated not only with changes in misvaluation, but also with future changes in fundamentals – (i) operating performance and (ii) risk and the resulting cost of capital. To the best of our knowledge, our paper is the first to document the link between insider trading and future fundamentals around repurchases and SEOs.

Second, our paper contributes to the literature examining how insider trading patterns change around corporate events. Our paper is the first to document this relation for the case of repurchases.⁴ As to SEOs, our large-sample evidence extends the findings in Clarke, Dunbar, and Kahle (2001), who show that insider selling increases before SEO announcements, and focus on differences between insider selling patterns in completed versus cancelled SEOs, and in Kahle (2000) and Karpoff and Lee (1991), who show that insider sales increase and purchases decrease before equity issuances.

Our third contribution is generalizing existing studies that examine the relation between insider trading prior to corporate event announcements and short-term and longer-term market reaction to these events. Existing studies tend to concentrate on one of the two sides of insider trading activity (e.g., Babenko, Tserlukevich, and Vedrashko (2012) and Karpoff and Lee (1991)). A notable exception is Kahle (2000), who examines insider sales and purchases prior to equity and debt issues, but finds no evidence that insider trading is related to announcement returns.

Our empirical setting extends this literature in several ways. Past studies of insider trading around repurchases and insider trading around SEOs typically study these events separately, vary in their use of empirical methodology, and examine smaller samples. We use a unified approach to study insider trading around repurchases and SEOs in a large, comprehensive sample of over 25

⁴ Bonaimé and Ryngaert (2013) report that insider trading *in* quarters that coincide with actual repurchases (as opposed to insider trading *prior* to repurchase announcements) is positively associated with future returns. They find that repurchases are most common in quarters when insiders are net sellers.

years. Doing so enables us to document patterns that are consistent across repurchases and SEOs over an extended time period, and to readily compare and contrast results across the two events. The joint analysis of repurchases and SEOs is also motivated by the recent theoretical work of Bond and Zhong (2016). They highlight that in a dynamic setting, firms may repurchase shares in one period to improve the terms of a future SEO, and argue that empirical work should analyze repurchases and SEOs in a unified framework.

We also examine the time it takes the market to incorporate the information contained in pre-event insider trading. Importantly, in examining long-term returns, we must ensure that the relation between post-event returns and pre-event insider trading can be attributed to the complementarity between information in insider trading and information in event announcements. To this end, we compare the relation between insider trading and returns of event firms to the relation between insider trading and returns of non-event firms with similar characteristics. Our results indicate that the market underreacts to the information in insider trading prior to repurchase announcements, while there is no such underreaction for SEOs. These patterns suggest that the speed of investor reaction is related to the nature of the information conveyed by insider trading.

More broadly, these results contribute to the literature that examines complementarities in information in corporate finance (John and Mishra (1990) and John and Lang (1991)). The “joint signal” theory of John and Mishra (1990) argues that pre-event insider trading can provide an additional signal to the market, which can affect the credibility of the signal contained in event announcements. This signal is expected to be stronger if insiders’ pre-announcement actions are consistent with the announced corporate action. In other words, if there are complementarities between the information in insider trades and that in corporate actions then we would expect the market reaction to event announcements to depend on pre-announcement insider trading. On the

other hand, in the absence of complementarities between the information contained in event announcements and that in pre-event insider trading, we would expect the market to react to insider trading when the information about insider trades is disclosed,⁵ and we would not expect an association between insider trading and event announcement returns. Our results show that insider buying before repurchases and SEOs leads to higher event announcement returns, consistent with the complementarity between the two pieces of information. This particular evidence extends the results in Babenko, Tserlukevich, and Vedrashko (2012), who show this complementarity for repurchases only.

Overall, our findings suggest that corporate insiders' personal investment decisions tend to be consistent with their firms' actions: Insiders sell more on average prior to SEOs and they sell less on average prior to open market repurchases. The information that insiders trade on prior to corporate events seems to be about future changes in operating performance, changes in firm-specific misvaluation, and, in the case of repurchases, about future changes in the cost of capital. Investors seem to incorporate the information in insider trading prior to corporate events when forming reactions to event announcements. The market incorporates the information in pre-event insider trading more rapidly for SEOs than it does in the case of repurchases.

1. Sample and descriptive statistics

We obtain information on open market repurchases and SEOs from SDC Platinum for the period 1986-2011. Our sample ends in 2011 as we use data for three years following repurchases and SEOs in some of our tests. Regulated utilities (SIC codes 4900–4949) and financial institutions (SIC codes in the 6000 range) are excluded from the sample, as firms in these industries are subject

⁵ See Lakonishok and Lee (2001), Jenter (2005), Ravina and Sapienza (2010), and Cohen, Malloy, and Pomorski (2012) for evidence on the informativeness of insider trading.

to regulation that can impact their financial policies. We collect accounting and stock price information from the WRDS merged CRSP/Compustat database, and insider trading data from Thomson Reuters. We include events where we have two years of stock return data available in CRSP prior to the event – we require two years of return data for our tests of changes in the cost of capital. Our final sample contains 3,991 repurchases and 1,688 SEOs. We lose some observations due to missing data in some of our tests. We retain observations in the sample as long as they are included in at least one of our regressions in Tables 2-7. Table 1 shows selected summary statistics of repurchases and SEOs and of the firms performing them. We provide detailed variable definitions in the Appendix.

The average repurchasing firm has \$2,731 million (\$3,183 million) in book assets (equity market capitalization), while SEO firms are smaller, with mean book assets (market capitalization) of \$1,070 million (\$966 million). The mean equity M/B ratio of repurchasing firms, computed as in Davis, Fama, and French (2000), is 2.83, considerably lower than that of the average SEO firm, 3.29. The median values are lower for both repurchasing firms and SEO firms (2.24 and 2.49, respectively). Repurchasing firms have somewhat higher return on assets (ROA) than SEO firms: 0.158 and 0.142, respectively. The average stock returns of repurchasing firms are negative in the 6 months preceding the repurchase announcement, while firms issuing seasoned equity experience considerable stock price appreciation in the six months preceding their SEO announcement. This is consistent with the literature on repurchases (e.g., Kahle (2002), Ben-Rephael, Oded, and Wohl (2014)) and on SEOs (e.g., Billett, Flannery, Garfinkel (2011), Kim and Purnanandam (2014)). The average (median) proportion of shares sought in a repurchase is 7.49% (5.93%), comparable to the figures reported by Grullon and Michaely (2004). The size of the average (median) SEO is 31.47% (23.28%) of the firm's existing shares. The market value of the average (median)

repurchase program is \$20.7 million (\$4.3 million), while the mean (median) value of shares issued in an SEO is \$166 million (\$87 million).

We use two measures of insider trading prior to repurchase/SEO announcements. Both are based on insider trading in the six months preceding the event.⁶ The first measure, net buy count, is based on Lakonishok and Lee (2001) and is defined as the ratio of the net number of insider purchase transactions in the six months prior to a repurchase/SEO announcement to the total number of insider transactions during that period, $\frac{\text{number of purchases} - \text{number of sales}}{\text{number of purchases} + \text{number of sales}}$. This measure ranges between 1, if all insider trades are purchases in the six months prior to the event announcement, to -1, if all insider trades are sales. The second measure, net buy volume, is defined as the ratio of the net number of shares bought by insiders in the six months prior to a repurchase/SEO announcement, to the total number of shares purchased and sold during that period, $\frac{\text{number of shares purchased} - \text{number of shares sold}}{\text{number of shares purchased} + \text{number of shares sold}}$. The average net buy count (net buy volume) measured during the six-month period prior to repurchases (ending the month before the event) equals -0.45 (-0.51); and prior to SEOs, the respective averages are -0.59 and -0.65, implying that SEOs are preceded by heavier insider net selling than repurchases.⁷

2. Insider trading around repurchases and SEOs

We begin the analysis by examining whether there is abnormal insider trading prior to repurchase and SEO announcements. While Kahle (2000) examines insider trading in the quarters around

⁶ Firms may disallow insider trading during certain periods (blackout periods), but this is not required by law. Bettis, Coles, and Lemmon (2000) conduct a survey among firms in 1996, and report that the majority of respondents, 78%, place some restriction on insider trading. The most common policy is to allow insiders to trade only in the 12 trading days following earnings announcements. We measure insider trading over a six-month period to ensure that it is not affected by differences in insider-trading restrictions across firms.

⁷ Cohen, Malloy, and Pomorski (2012) decompose insider trading into “routine” and “opportunistic.” Unfortunately, we cannot use their algorithm as it requires three years of continuous insider trading, which considerably reduces our samples of repurchases and SEOs.

SEOs during 1982-1991, we are unaware of any evidence on insider trading patterns around repurchases. Figure 1 depicts event-time monthly averages of our two measures of insider trading, net buy count and net buy volume, in the months around SEO and repurchase announcements. Months are numbered relative to the month of the event. We split the month of the event into two parts: before and after the event. We denote these two parts by “0 before” and “0 after.” The length of these two parts is not constant across observations, because firms can announce repurchases or SEOs any day of the month.

Prior to both repurchases and SEOs, we find that, on average, insiders trade the firm’s stock in the direction that is consistent with the corporate action. That is, we find that insiders tend to purchase more (sell less) shares prior to repurchases, while they tend to sell more (purchase less) shares prior to SEOs. These results are consistent with the view that both insider trading and the corporate event (repurchase or SEO) are driven by managers’ views on the overvaluation or undervaluation of their firm’s stock. As we discuss below, these views may represent insiders’ superior projections of firms’ future operating performance and risk, and/or insiders’ recognition of pricing errors made by the market. For both examined events, the changes in insider trading begin at roughly six months prior to the event.

Note that Figures 1 and 2 show these insider trading measures at the monthly level, while the insider trading measures presented in Table 1 and used in our regressions are for the six-month period before events. The six-month net buy count and net buy volume measures need not equal the simple average of the monthly measures.

To ensure that our results on abnormal insider trading prior to corporate event announcements are not driven by extreme observations, in Figure 2 we examine the percentage of firms that have positive insider net buying (in terms of the number of trades or number of shares

traded) around event announcements. Figure 2 shows that not only the average, but the entire distribution of insider trading shifts towards more purchasing prior to repurchases, and towards more selling prior to SEOs.

Our main goal is to examine whether insider trades prior to corporate events contain additional information beyond that conveyed in the event announcement. However, several studies suggest that absence of insider trading may also contain information. There are two underlying reasons. First, insiders may have mandatory ownership requirements, so once the minimum requirement binds, they cannot sell more shares, although they would do so in an unconstrained setting (e.g., Marin and Olivier (2008)). Second, insiders who possess negative information about the firm may refrain from selling due to litigation risk (e.g., Gao and Ma (2012)). To investigate whether insiders abstain from trading in anticipation of event announcements, we examine the likelihood that insiders place no trades at all around corporate events. In Figure 3, we plot the percentage of firms whose insiders place at least one open market transaction during the months before and after repurchases or SEOs.

For both events, we find that the percentage of firms whose insiders trade increases or stays constant in the months preceding repurchase or SEO announcements. In the case of repurchases, there is no visible difference in the percentage of firms whose insiders place at least one trade in the months immediately preceding repurchase announcements, and other months. For SEOs, 25%-40% of the firms have some insider trading in any given month outside of the months prior to event announcements; this figure rises to 40%-45% in the six months prior to the SEO announcement. Our results also indicate that it is very rare that insiders do not trade in any of the six months preceding our corporate events: only 3.09% (3.11%) of firms in the repurchase (SEO) subsample have no insider trading in any of the six months prior to the event (not reported in the figure). We

conclude that insider trading activity does not decline prior to repurchases and it actually intensifies prior to SEOs. These findings are consistent with the view that insiders capitalize on their private information both through corporate actions and through their trading activities prior to corporate event announcements. Our results complement the evidence in Marin and Olivier (2008) and Gao and Ma (2012) by showing that while the incidence of insider trading declines before stock price crashes or acquisition announcements, this is not the case for other events, such as repurchases or SEOs.

3. What types of information does insider trading convey to the market?

Our main objective is to examine the information content of insider trading prior to repurchases and SEOs. Insiders may have superior information about firms' fundamentals, such as future operating performance and/or the cost of capital (e.g., Grullon and Michaely (2004), Ke, Huddart, and Petroni (2003), Core et al., (2006)). Insiders may also have information about investor sentiment, i.e. the misvaluation of the firm relative to fundamentals (e.g. Piotroski and Roulstone (2006)). In what follows, we examine whether insider trading before corporate events predicts changes in operating performance (Subsection 3.1.), cost of capital (Subsection 3.2.), and investor sentiment (Subsection 3.3.)

In addition to examining whether insider trading around corporate events predicts future fundamentals and sentiment, we also seek to understand whether any relation we find is particular to insider trading before corporate events. Therefore, we also compare the relation between insider trading and post-event changes in fundamentals and sentiment at repurchasing and SEO firms to that of comparable firms that do not conduct a repurchase or an SEO.

Using a propensity score (PS) matching procedure, we match firms announcing events

(repurchases and SEOs) to a control sample of firms that do not experience a repurchase or SEO during a given time period, but have the same level of insider trading. We match each event firm-month observation to a non-event firm-month along four dimensions: size (market capitalization), book-to-market ratio (B/M), past stock returns, and past insider trading. We measure past stock returns over the six-month period before the event (e.g., Jegadeesh and Titman (1993)). B/M is measured during the fiscal year preceding the event. Past insider trading is measured using either the net buy count calculated for the six-month period prior to the event announcement (matching on net buy volume yields similar results). Firms that announce a repurchase or SEO cannot be a part of the control sample for three years: the year before, the year of, and the year after the event.

3.1. Changes in operating performance

We first examine whether insider trading prior to repurchases and SEOs is informative about firms' subsequent operating performance, measured by post-event changes in ROA. To ensure that our results are comparable with those in the literature, we adopt the framework of Grullon and Michaely (2004). Specifically, we examine the change in ROA one to three years following repurchases and SEOs. We employ two tests to examine whether insider trading prior to these events is associated with changes in future operating performance. First, using the sample of repurchases, and separately, SEOs, we estimate equation (1), a linear regression of the change in ROA on each of our two measures of pre-event insider trading. Second, using the pooled sample of event (repurchase/SEO) and matched firms, we also estimate equation (2), allowing a separate coefficient of insider trading for events and matched firms:

$$\Delta ROA(t_1, t_2) = \alpha + \beta \times Itr + \varepsilon \quad (1)$$

$$\Delta ROA(t_1, t_2) = \alpha + \gamma_1 \times Itr + \gamma_2 \times Event + \gamma_3 \times Event \times Itr + \eta \quad (2)$$

We use t_1 to denote the year of repurchase/SEO, and t_2 equals either one or three years after the event. The results of these regressions are in Table 2.

The results in the first column of Panel A of Table 2 describe the relation between pre-repurchase insider trading and the one-year change in ROA, while the results in the second column show the three-year change in ROA following repurchases. We show the average change in operating performance at the bottom of each column. The operating performance of the average repurchasing firm declines in the years following a repurchase, consistent with Grullon and Michaely (2004). More insider buying (less insider selling) prior to a share repurchase is associated with a smaller decline in ROA. The coefficient is not statistically significant at the one-year horizon (columns 1 and 2). However, it is strongly statistically significant at the three-year horizon (columns 5 and 6), with t-statistics exceeding 3.5. A one-standard-deviation increase in pre-event insider net buying (0.80 from Table 1) is associated with a 0.62 percentage point smaller decrease in ROA three years after repurchases, while the average decrease is 2.2 percentage points. In columns 3, 4, 7, and 8, we show the results from the interaction specification (equation (2)). These results indicate that insider trading also predicts future changes in operating performance at matched non-event firms that have similar characteristics to repurchasing firms.

Panel B shows the results for SEOs. The operating performance of the average firm declines in the years after SEOs. These results are consistent with Loughran and Ritter (1997), who find that operating performance deteriorates following SEOs, and with the corresponding prediction of Carlson, Fisher, and Giammarino's (2006) theoretical model. Columns 1, 2, 5, and 5 show that insider net buying is significantly positively related to changes in ROA after SEOs both at the one-year and at the three-year horizon. A one-standard-deviation increase in pre-event insider net buying (0.71 and 0.70 for net buy count and net buy volume, respectively, from Table

1) is associated with a 0.50 percentage point smaller decrease in ROA three years after SEOs, while the average change is -2.8 percentage points. In columns 3, 4, 7, and 8, we show the results from the interaction specification. As in the case of repurchases, we find that insider trading also predicts future changes in operating performance at matched non-event firms with similar characteristics to SEO firms.

Overall, more insider net buying prior to repurchases and SEOs is associated with a smaller deterioration in operating performance, as measured by ROA, in the years following repurchase and SEO announcements. Insider trading is associated with changes in future operating performance at matched non-event firms. These patterns are consistent with insider trading prior to repurchases and SEOs being driven, at least in part, by information that insiders possess regarding the future operating performance of firms repurchasing or issuing equity.

3.2. *Changes in the cost of capital*

Insiders may also have knowledge about expected changes in their firms' risk profiles. Hence, we examine whether insider trading prior to repurchases and SEOs is driven by information regarding changes in event firms' risk and the resulting cost of capital. We estimate a Fama-French (1992) three-factor model using monthly data for a window starting 36 months before and ending 36 months after the event (73 months in total). In our estimation, we use indicator variables to allow for different factor exposures before and after the event. We estimate the following model for the repurchase and SEO samples separately:

$$\begin{aligned}
 r_{it} - r_{ft} = & a_{-i} + a_{\Delta i} D_t + b_{-i}(r_{mt} - r_{ft}) + b_{\Delta i} D_t(r_{mt} - r_{ft}) \\
 & + s_{-i} SMB_t + s_{\Delta i} D_t SMB_t + h_{-i} HML_t + h_{\Delta i} D_t HML_t + e_t,
 \end{aligned} \tag{3}$$

where r_{it} is the return on stock i , r_{ft} is the return on one-month U.S. Treasury bills, r_{mt} is the return on the value-weighted market index, SMB_t and HML_t are the returns on Fama-French size and book-to-market factor portfolios, and D_t is a dummy variable that equals one if $t \geq t^*$, where t^* is the month of the event. Subscript $-i$ refers to coefficient estimates prior the event, while subscript Δi refers to changes in coefficient estimates following the event. After estimating the regression in (3) for firms repurchasing and issuing equity, as well as their matched peers, we estimate changes in the cost of capital using changes in factor exposures in (3) and the average factor premia over our estimation period, 1983–2008.⁸

After estimating changes in each firm’s cost of capital following repurchases and SEOs, we perform two tests, similar to those in Table 2. First, we regress the change in the total estimated cost of capital on each of our two measures of pre-event insider net buying for event firms. Second, using the pooled sample of event (repurchase/SEO) and matched firms, we also estimate equation (2), using the change in the cost of capital as the dependent variable.

We summarize the results in Table 3. Columns 1-2 of Table 3 show that repurchasing firms’ cost of capital declines by 1.62 percentage points following the repurchase. We find that more insider net buying is associated with a larger decline in the cost of capital. The coefficients are highly statically significant, and the implied economic effects are large. Based on the results of column 1, a one-standard-deviation increase in insider net buying is associated with a 0.59 percentage point larger decline in the cost of capital, which equates to one-third of the average decline. Columns 3 and 4 show that insider trading does not predict similar changes in the cost of capital at matched firms that are similar to repurchasing firms. The level coefficients on the insider

⁸In particular, for each event and matched non-event, the estimated change in the cost of capital is $\Delta r_{it} = 0.049936 + b_{\Delta i} \times 0.069425 + s_{\Delta i} \times 0.031107 + h_{\Delta i} \times 0.036976$.

trading measures are small and not statistically significant. In contrast, the interaction terms of the event dummy and the insider trading measure have similar sizes compared to columns 1 and 2, and remain statistically significant – albeit with lower t-statistics. We conclude that insider trading before repurchases predicts changes in the cost of capital, and that this predictive power of insider trading is particular to event firms.

Columns 5-8 of Table 3 summarize the results for SEOs. We find no significant association between pre-SEO insider trading and the change in issuing firms' cost of capital. We also find no significant relation between insider trading and future changes in the cost of capital for matched firms whose characteristics are similar to those of SEO firms.

To summarize, the results in Table 3 show that insider net buying prior to repurchases is associated with changes in the cost of capital for firms conducting repurchases, but not for matched firms. This evidence suggests that prior to repurchases insiders may possess private information about upcoming changes in their firms' risk and cost of capital, and that repurchases are particular in this regard. We do not find such evidence for SEOs: There is no relation between insider trading prior to SEOs and subsequent changes in issuing firms' cost of capital.

3.3. Changes in investor sentiment

In this section, we examine whether insider trading before corporate events predicts changes in investor sentiment. The reason for the potential importance of investor sentiment is that even if insiders do not have private information about future changes in fundamentals, they may recognize market mispricing and exploit it at both the personal level (insider trading, e.g., Seyhun (1992), Rozeff and Zaman (1998), Jenter (2005), and Piotroski and Roulstone (2005)) and at the firm level (repurchases and SEOs). We refer to such mispricing, driven, for example, by a misspecified

valuation model or behavioral biases (e.g., Hirshleifer (2001)), as sentiment-driven misvaluation.

Jenter (2005) and Piotroski and Roulstone (2005), among others, show that insiders tend to sell when the valuation of their firm's stock is high and to buy when the valuation is low. Thus, there are periods in which insider trades are more likely to be driven by insiders' desire to exploit mispricing due to investor sentiment, rather than their private information about future cash flows and cost of capital.

To examine whether this is the case, we first calculate a measure of firm-specific sentiment. We follow the market-to-book decomposition of Rhodes-Kropf, Robinson, and Vishwanathan (2005) to obtain the firm-specific error component of the market-to-book ratio. In particular, the firm-specific error component is defined as the residual from the following regression (equation (15) of Rhodes-Kropf et al. (2005, p. 577)):

$$m_{it} = \alpha_{0jt} + \alpha_{1jt}b_{it} + \alpha_{2jt} \ln(NI)_{it}^+ + \alpha_{3jt}I_{(<0)} \ln(NI)_{it}^+ + \alpha_{4jt}LEV_{it} + \varepsilon_{it}, \quad (4)$$

where m is log market value, b is log book value, NI is net income, $I_{(<0)}$ is an indicator variable for loss-making firms, and LEV is the leverage ratio. Subscript j indexes industries (based on the Fama-French 12 industry classification), i indexes firms, and t refers to time. We estimate this regression for each industry-year.

An advantage of applying the Rhodes-Kropf et al. (2005) decomposition method to measure misvaluation in our setting is that it can be used to separate firm-specific errors in valuation (i.e., firm-specific sentiment) from industry-specific time series errors (i.e., industry-level sentiment). This is important because insiders are more likely to have accurate information on the former than on the latter.

Table 4 presents results from regressions of the change in investor sentiment from the year before the event (t-1) to the year after (t+1) on measures of insider net buying. The layout of the table is similar to that of Tables 2 and 3. We first examine the repurchase subsample. Columns 1-2 show that more insider net buying before repurchases is associated with an increase in investor sentiment one year after the repurchase relative to one year before. A one-standard-deviation increase in insider net buying is associated with a 3% increase in sentiment around the repurchase. Because the sentiment measure of Rhodes-Kropf et al. (2005) is the residual from a regression of log market values, this can be interpreted as an additional 3% increase in the market value of the firm that is not explained by fundamentals or by changes in market valuation common across firms in the same industry. The average change in the sentiment measure around repurchases is -0.065, so a one-standard-deviation increase in insider net buying corresponds to a change that is 46% of the average. Because our dependent variable is a regression residual, this quantitative interpretation is likely imprecise. Our focus here is, therefore, on the statistical significance of the association between insider trading and the change in the sentiment measure. Columns 3-4 show that the predictive power of insider trading for changes in sentiment is similar across repurchasing firms and their matched firms in both size and significance.

Columns 5-8 summarize the regression results for SEOs. Columns 5-6 show that insider trading before SEOs is strongly and significantly correlated with the change in investor sentiment from before the SEO to after it. A one-standard-deviation increase in insider net buying before SEOs is associated with a 7% increase in sentiment. Taking the interpretation of the Rhodes-Kropf et al. (2005) measure of sentiment, this implies a 7% increase in the market value of the firm that is not explained by fundamentals or by changes in market valuation common across firms in the same industry. The average change in firm-specific sentiment around SEOs is -0.155, so a one

standard deviation increase in insider net buying corresponds to a change that is 45% of the average.

Columns 7-8 compare the predictive power of insider trading for changes in sentiment at SEO firms and their matched peers. First, the coefficient on the event dummy shows that sentiment declines by 5% for SEO firms relative to their matched counterparts. Second, we see that insider trading predicts changes in sentiment only for SEO firms, but not for matched firms that do not conduct an SEO. To summarize, on average, sentiment declines around SEOs, both on average, and when we compare SEO firms to similar firms that do not issue shares. However, insider trading prior to the SEO is able to predict a large percentage of the change in investor sentiment, and this predictive power is not present at matched firms that do not conduct an SEO.

Overall, our results indicate that insider trading prior to repurchases predicts changes in operating performance, in the cost of capital, and in investor sentiment. The predictive power of insider trading for changes in the cost of capital is particular to repurchases and not present at matched firms with similar characteristics. For SEOs, we find that insider trading predicts changes in operating performance, and in investor sentiment. The second result is particular to SEOs: we find no evidence that insider trading predicts changes in sentiment for matched non-SEO firms. These results are consistent with the idea that insiders possess information on future fundamentals as well as sentiment, and also that they are more likely to trade on some of this information around corporate events.

4. Abnormal returns and the complementarity of event announcement and insider trading signals

Given our evidence on the information content of insider trading prior to corporate events, we now examine whether insider trading predicts short-term and long-term market reaction to the events.

In doing so, we focus on whether the information contained in insider trading activity prior to corporate events interacts with the information contained in these events. In other words, we are interested in testing whether the signal contained in announcements of repurchases and SEOs and that contained in pre-event insider trading are complementary. We perform two types of empirical analyses. First, we focus on the event-time buy-and-hold abnormal returns surrounding repurchase and SEO announcements. Second, we use the calendar-time portfolio approach in which we examine risk-adjusted long-term returns of portfolios of firms announcing repurchases and SEOs.

4.1. Event announcements and insider trading

Insider trading has been shown to be positively related to future returns (e.g., Jenter (2005), Cohen, Malloy and Pomorski (2012)), a finding we confirm in our data for both repurchases and SEOs. However, what we are primarily interested in is whether insider trading has a stronger relation with returns following corporate event announcements than at other times, i.e. whether there are complementarities between information contained in pre-event insider trading and information in event announcements. To examine these complementarities, we compare the relation between insider trading and post-event-announcement returns to that between insider trading and returns of comparable firms that do not repurchase or issue shares. This analysis of differences is crucial in the case of long-term returns, while it is arguably less important in the case of short-term announcement returns.

We thus rely on our sample of matched non-event firms introduced in the previous section in the analysis of announcement and long-term abnormal returns.⁹ Using the sample that includes both event firms and matched control firms, we estimate the following regression:

⁹ To focus the scope of our analysis, we omit the simple regressions of abnormal returns on insider net buying. We find that more insider net buying is associated with higher announcement returns, and higher long-term returns after

$$BHAR(t_1, t_2) = \beta_0 + \beta_1 Event + \beta_2 Itr + \beta_3 Ret + \beta_4 Event \times Itr + \beta_5 Event \times Ret + \varepsilon. \quad (5)$$

The dependent variable in (5) is the buy-and-hold abnormal return measured over the three days surrounding the event announcement. Because non-events do not effectively have an event date, we assign a random day of the month as the event date. We verify that this closely matches the distribution of both repurchase and SEO announcements, as both appear to be uniformly distributed within months. $BHAR(t_1, t_2)$ is calculated by cumulating daily abnormal returns of either the event or a matched firm. We estimate abnormal returns relative to Carhart's (1997) four-factor model. To ensure that our results are not driven by outliers, we winsorize buy-and-hold abnormal returns (BHARs) for both events and non-events at the 5th and the 95th percentiles. Following Lakonishok and Lee (2001), we also include past returns (Ret) over the prior six months to disentangle trading on insider information from contrarian trading. We regress abnormal returns on an indicator variable equaling 1 for events and 0 for matched non-events ($Event$), our two measures of insider trading (Itr), and past returns (Ret). We allow the coefficients on insider trading and past returns to vary across events and non-events by including interaction terms between the event dummy and these two variables. Standard errors are clustered at the firm level.

The use of the control sample allows us to isolate the differential effect of the interaction between insiders' trading and corporate events. Thus, we are primarily interested in the coefficient β_4 , which captures whether insider trading prior to repurchases and SEOs is related to the informational content of the announcements of these events and whether such announcements convey a stronger signal for future returns than they do at other times. It is likely that the use of a control sample will be inconsequential in the analysis of short-term market reactions. For long

both repurchases and SEOs. These results are in line with those of prior studies that look separately at insider trading around repurchases, and insider trading around SEOs.

horizons, the comparison to non-events is crucial, as previous work finds evidence that past insider trading is related to future returns in the long term even outside of the context of corporate event announcements (e.g., Lakonishok and Lee (2001)). Hence, we expect that both β_2 and β_4 will be positive and statistically significant.

Table 5 presents the results of estimating (5) over the three-day window surrounding event announcements. Columns 1 and 2 present the results for repurchases. In line with the literature (e.g., Kahle (2002), Babenko, Tserlukevich, and Vedrashko (2012), and Dittmar and Field (2015)), we find a positive and significant announcement return for repurchases, equaling 2.12%. The coefficient on the event dummy, β_1 , is positive and significant, both statistically and economically. Not surprisingly, our measures of insider trading are not significantly related to returns of matched firms, as is evident from the coefficients on the levels of net buy count and net buy volume, β_2 .

Importantly, our estimates of β_4 , the coefficients on the interaction between the repurchase dummy and each of the insider trading measures, are significant for both measures. A one-standard-deviation increase in insider net purchases is associated with an increase of over 0.8 percentage points in the difference in abnormal returns measured over the three-day period (-1,1) surrounding the repurchase announcement between event firms and control firms. This effect is quite large, as the average announcement return across our sample of repurchases is 2.12%, as shown at the bottom of Table 5.

Columns 3 and 4 of Table 5 present the results of estimating (5) using the SEO sample. Consistent with past studies (e.g., Denis (1994), Kim and Purnanandam (2014)), the average market reaction to SEOs is negative and significant, around -2.6%, in our sample. We find that insider trading does not have a significant impact on matched firms' returns, as evident from the coefficients on net buy count and net buy volume. Importantly, however, the coefficients on the

interaction between the event dummy and pre-SEO insider trading are positive and significant for both insider trading measures. The impact of a one-standard-deviation increase in insider trading is associated with an economically sizeable increase of around 41 bps in the difference between the mean announcement returns of SEO firms and that of matched firms.

Taken together, the results in Table 5 imply that abnormal insider trading before the announcement of corporate events conveys information that is complementary to that in event announcements. Events with more insider net buying in the six months prior to the event exhibit significantly more positive market reaction to event announcements than events with less insider net buying.

The information in pre-event insider trading may not be fully incorporated into stock prices by the end of the first trading day following the repurchase or SEO announcement. Therefore, we examine whether the predictive power of insider trading for long-term stock returns is higher following repurchases and SEOs than in the absence of these events. We use the same matched sample approach as before, but now look at the buy-and-hold abnormal returns measured from 2 to 254 trading days (i.e., 12 calendar months) after the event. The results are shown in Table 6.

Columns 1 and 2 in Table 6 present the long-term return regression results for the repurchases sample. The coefficients on the event dummy show that, on average, repurchases exhibit a buy-and-hold abnormal return that is around 8.5% higher than the abnormal return of otherwise similar firms that do not conduct a repurchase. Insider trading is positively related to long-term returns for the matched sample (non-repurchasing firms), as evident from the statistically significant coefficients on insider trading measures, which are also economically large: A one standard deviation increase in six-month insider net buying is associated with an almost 4 percentage point higher post-event 12-month return.

Importantly, we find evidence consistent with complementarity between insider trading and event announcements: more insider net buying before an open market repurchase announcement is associated with significantly higher abnormal returns in the year following the event, over and above the relation between insider trading and long-term returns at other times. The estimates of the interaction between measures of insider trading and the repurchase dummy show that a one-standard-deviation increase in insider net buying during the six months before the event is associated with an increase of around 5 percentage points in abnormal returns during the year following the event over and above the abnormal returns for non-event firms. In other words, the effect of pre-repurchase insider trading on long-term buy-and-hold returns is more than twice as strong for repurchasing firms as for control firms.¹⁰

Columns 3 and 4 describe the relation between insider trading and long-term abnormal returns following SEOs. Insider net buying is positively related to long-term returns for both SEO firms and control firms. The coefficients on both insider trading measures are significant statistically and economically. A one standard deviation decrease in pre-SEO six-month insider net buying is associated with a 5 percentage point reduction in post-SEO 12-month returns. However, unlike in the case of repurchases, we find that the coefficients of the interaction term between insider trading and the event dummy are insignificant. We conclude that the relation between insider trading over a six-month period prior to an SEO announcement and subsequent 12-month returns is similar for firms conducting SEOs and for matched firms.

¹⁰ Barger, Bonaimé, and Thomas (2016) suggest that long-run returns following share buyback announcements are driven by takeover activity or takeover risk. Only 1.97% of our repurchasing firms (and 2.35% of their matched peer firms) become acquisition targets within the one-year period after the announcement day. Controlling for whether the firm is acquired during this period, or discarding observations of firms that are acquired does not change our results in Table 6.

In sum, the results in Tables 5 and 6 indicate that insider net buying prior to repurchases and SEOs is positively related to post-event returns, and this relation is significantly stronger compared to matched firms that do not issue or repurchase equity. In the case of repurchases, pre-event insider trading is positively and significantly related to both announcement returns and to long-term post-announcement returns, indicating that the market does not immediately incorporate the information in pre-repurchase insider trading into repurchasing firms' stock prices. In the case of SEOs, insider trading contains information that seems to be incorporated into issuing firms' stock prices within two days of an SEO announcement.¹¹

The difference in the time it takes the market to incorporate the information for repurchases versus SEOs highlights the importance of our approach of both using the same framework to assess insider trading around these two events, and examining what information insider trades may contain. Our results for repurchases suggest that it takes time for the market to fully incorporate information about the cost of capital into prices. Our results for SEOs, on the other hand, show that when insider trades convey information about changes in misvaluation, the market responds once the SEO announcement is made, and the information is incorporated into prices more rapidly.

Since tests of abnormal performance using buy-and-hold abnormal returns may over-reject the null hypothesis due to skewness of the distribution of test statistics (e.g., Barber and Lyon (1997), Kothari and Warner (1997)), or due to the correlation between abnormal return observations of the same firm (e.g., Mitchell and Stafford (2000)), we also measure abnormal returns using calendar-time portfolios (Fama (1998) and Mitchell and Stafford (2000)). In our

¹¹ To verify that our measure indeed reflects the trading of insiders who can influence corporate decisions, we recalculate our net buy volume measure based only on trades placed by the top tier of corporate insiders, including the CEO, CFO, COO, chairman of the board, and president. We find that the correlation between the measure based only on the trades of these top insiders and our original measure is 0.85 for repurchases and 0.83 for SEOs, both significant at the 1% level. As expected, our results in Tables 5 and 6 remain similar if we include a dummy variable in the regression indicating whether any of these top-level insiders trade in the six months leading up to the event, and interact this dummy with our slope coefficients.

setting, the calendar-time portfolio approach is expected to yield a conservative estimate of returns to trading on insider trading information.

To form portfolios, we use the following rule: the high insider buying portfolio for repurchases (SEOs) contains the shares of firms that announced a repurchase (SEO) in the past k months and have a net purchase ratio of 1 (i.e., all insider trading in the past k months has been buying). Similarly, the low insider buying portfolio for repurchases (SEOs) contains the shares of firms that announced a repurchase (SEO) in the past k months and have a net purchase ratio of -1 (i.e., whose insiders only sold shares during the last k months).¹² Finally, we construct a self-financing portfolio that is long in high insider buying stocks and short in low insider buying stocks for repurchases (SEOs). Using the same rule, we construct similar high insider buying, low insider buying, and long-short portfolios for the matched control samples. We examine returns for holding periods of $k = 3, 6,$ and 12 months, for both equally-weighted and value-weighted portfolios. We estimate portfolio alphas using Carhart's (1997) four-factor model. We summarize the results in Table 7.

Our calendar-time portfolios that use insider trading information to invest in firms that announce repurchases in the past three months generate alphas of 0.93% (low insider net buying) and 2.27% (high insider net buying) per month. The long-short portfolio earns an alpha of 1.34% per month, significant at the 1% level. In contrast, using the same investment strategy within our control sample leads to alphas that are insignificant both statistically and economically: The alpha of the long-short portfolio for the control sample is -4 bps. Finally, the difference between the two

¹² The 20th percentile of net buy count is -1 , while the 80th percentile is 0.89 over our entire sample period. Hence, ex post, our portfolio rule can be thought of as one that is close to forming quintile portfolios. However, ex ante, investors do not know the exact percentiles of the distribution during the entire sample period. Also, using the values of 1 and -1 is intuitive as it implies that investors trade only in instances when all insider trades are made in the same direction (buy or sell). This criterion has been used in the context of insider trading by Jenter (2005).

long-short portfolio alphas (repurchases vs. control) is a statistically significant 1.38% per month. We find similar results for equally-weighted portfolios with a holding period of six months. The long-short portfolio for repurchases generates a statistically significant alpha of 1.18% per month, while the same strategy for the control sample generates a statistically insignificant alpha of 0.22%; the difference between the alphas of the long-short portfolios for repurchases versus control firms is a statistically significant 0.96% per month. At the 12-month horizon, we find a statistically significant alpha of 1.08% for the long-short portfolio for repurchases, and a statistically insignificant alpha of 0.51% for the control sample.

The patterns are similar for value-weighted portfolios. At the 6-month and 12-month horizons, we find large and statistically significant alphas for the long-short portfolios in the repurchase sample, 1% and 0.88%. In contrast, alphas for the long-short portfolios in the control sample are small and statistically insignificant. At the 6-month horizon, the alpha even turns negative, at -0.37%. For all three horizons, the absolute value of t-statistics in the control sample is below 0.55, suggesting that the estimated alphas are small and statistically insignificant.

Overall, the results show that a portfolio strategy that uses pre-event insider trading information tends to earn both statistically and economically significant returns around repurchases, but not in a matched sample of placebo firms that have similar characteristics to repurchasing firms. These results, coupled with our earlier analysis of abnormal returns, suggest that insider trading predicts future returns around repurchases more than it does at other times. This finding is consistent with the interpretation that the information contained in the repurchase announcement and the information conveyed in pre-event insider trades are complementary.

For SEOs, we do not find significant alphas for the long-short portfolios based on insider trading information. In the equally-weighted case, the alphas are larger in the SEO sample than in

the control sample. However, for value-weighted portfolios, the relation reverses. For example, for the 6-month horizon, the long-short portfolio for the control sample earns a significant alpha of 1.73%, and an insignificant 0.85% for the SEO sample. Given this mixed evidence, we cannot conclude that insider trading around SEOs predicts future long-term returns more than insider trading than it does at other times. Hence, the calendar-time portfolio approach yields a similar conclusion to our event study analysis within the SEO sample.

5. Conclusion

In this paper, we use a comprehensive sample of over 3,900 share repurchase and over 1,600 SEO announcements made between 1986-2011 to examine the information contained in insider trades prior to repurchases and SEOs. While prior studies show that insiders refrain from trading before other corporate events, such as mergers and acquisitions or releases of adverse news, we show that this is not the case for repurchases and SEOs. If anything, insiders are more likely to trade before repurchases and SEOs than at other times. Moreover, insiders tend to trade in the direction of the upcoming corporate event: There is an abnormally high insider net buying activity prior to repurchases and abnormally low insider net buying activity prior to SEOs.

Previous studies show that both firms' decisions to repurchase and issue shares, and insider trading are driven by misvaluation, on aggregate. Our paper is the first to analyze the nature of information that insider trading is likely to contain around these events. We find that heavier insider net buying prior to repurchases and SEOs is associated with better post-event operating performance. In addition, pre-event insider trading also contains information regarding future changes in the cost of capital for repurchasing firms, while there is no such relation for otherwise similar firms that do not conduct a repurchase. We also find that insider trading predicts changes

in investor sentiment around both repurchases and SEOs. For SEOs, this pattern is specific to event firms: we find no evidence of changes in sentiment for matched non-event firms.

Our paper sheds new light on the relation between insider trading around corporate events and firms' future returns and fundamentals. We find that more insider net buying prior to repurchases and SEOs is associated with higher announcement returns, and, in the case of repurchases, higher post-event long-term returns. The relation between insider trading and returns is stronger around these corporate events than during other periods, suggesting that the information contained in pre-event insider trading and that in event announcements are complementary. Taken together, these findings suggest that information about changes in investor sentiment is incorporated into stock prices faster than information about post-event changes in firms' cost of capital.

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Appendix: Variable definitions

Variable	Definition
<i>Total assets</i>	Total assets. Source: Compustat
<i>Market capitalization</i>	Number of shares outstanding multiplied by the end-of-year stock price. Source: Compustat
<i>M/B</i>	Market-to-book ratio calculated as market capitalization divided by book equity. Book equity is calculated as in Davis, Fama, and French (2000): the book value of stockholders' equity, plus balance sheet deferred taxes and investment tax credit (if available), minus the book value of preferred stock. Source: Compustat
<i>ROA</i>	Return on assets calculated as operating income before depreciation (EBITDA) scaled by the average of beginning- and ending-period book value of assets. Source: Compustat
<i>Ret6</i>	Stock return over the six months prior to the month of the event (months $(t-6)$ to $(t-1)$, where t is the month of the event). Source: CRSP
<i>Ret12</i>	Stock return over the 12 months prior to the month of the event (months $(t-12)$ to $(t-1)$, where t is the month of the event). Source: CRSP
<i>% sought</i>	The number of shares authorized for repurchase divided by the number of shares outstanding at the time of the announcement. Sources: SDC and Compustat
<i>Offer size (%)</i>	The number of shares offered in the SEO divided by the number of shares outstanding at the time of the announcement. Sources: SDC and Compustat
<i>Value</i>	For repurchases, it is the total market value of the repurchase program. For SEOs, it is the total market value of the shares sold in the equity offer. Source: SDC
<i>Net buy count</i>	The net number of purchases scaled by the total number of open market insider transactions: $(\text{number of purchases} - \text{number of sales}) / (\text{number of purchases} + \text{number of sales})$. The variable is measured over the six months prior to the month of the event (months $(t-6)$ to $(t-1)$, where t is the month of the event) in Table 1 and all of the regressions, and in each month in Figures 1 and 2. Source: Thomson Reuters
<i>Net buy volume</i>	The net volume of shares purchased scaled by the total number of shares purchased or sold in open market insider transactions: $(\text{number of shares purchased} - \text{number of shares sold}) / (\text{number of shares purchased} + \text{number of shares sold})$. The variable is measured over the six months prior to the month of the event (months $(t-6)$ to $(t-1)$, where t is the month of the event) in Table 1 and all of the regressions, and in each month in Figures 1 and 2. Source: Thomson Reuters
<i>Event</i>	Binary variable equal to 1 for event (repurchase or SEO) observations and equal to 0 for placebo observations. Source: SDC
<i>Sentiment</i>	Investor sentiment is measured as the firm-specific component from the market-to-book decomposition of Rhodes-Kropf, Robinson, and Vishwanathan (2005).. Source: Compustat

Figure 1. Net insider buying around repurchases and SEOs

Data on insider trading are from Thomson Reuters. The figure shows monthly averages of two measures of insider trading. *Net buy count*, defined as the (number of purchases – number of sales)/(number of purchases + number of sales) is shown in the graph with solid lines and filled markers. *Net buy volume*, defined as (number of shares purchased – number of shares sold)/(number of shares purchased + number of shares sold), is shown in the graph with dashed lines and empty markers. The lines marked with triangles show insider trading measures around repurchases, and the lines marked with circles show insider trading measures around SEOs. The data are shown in event time. “0 before” refers to the part of the month of the event prior to the event, and “0 after” refers to the part of the month of the event after the event.

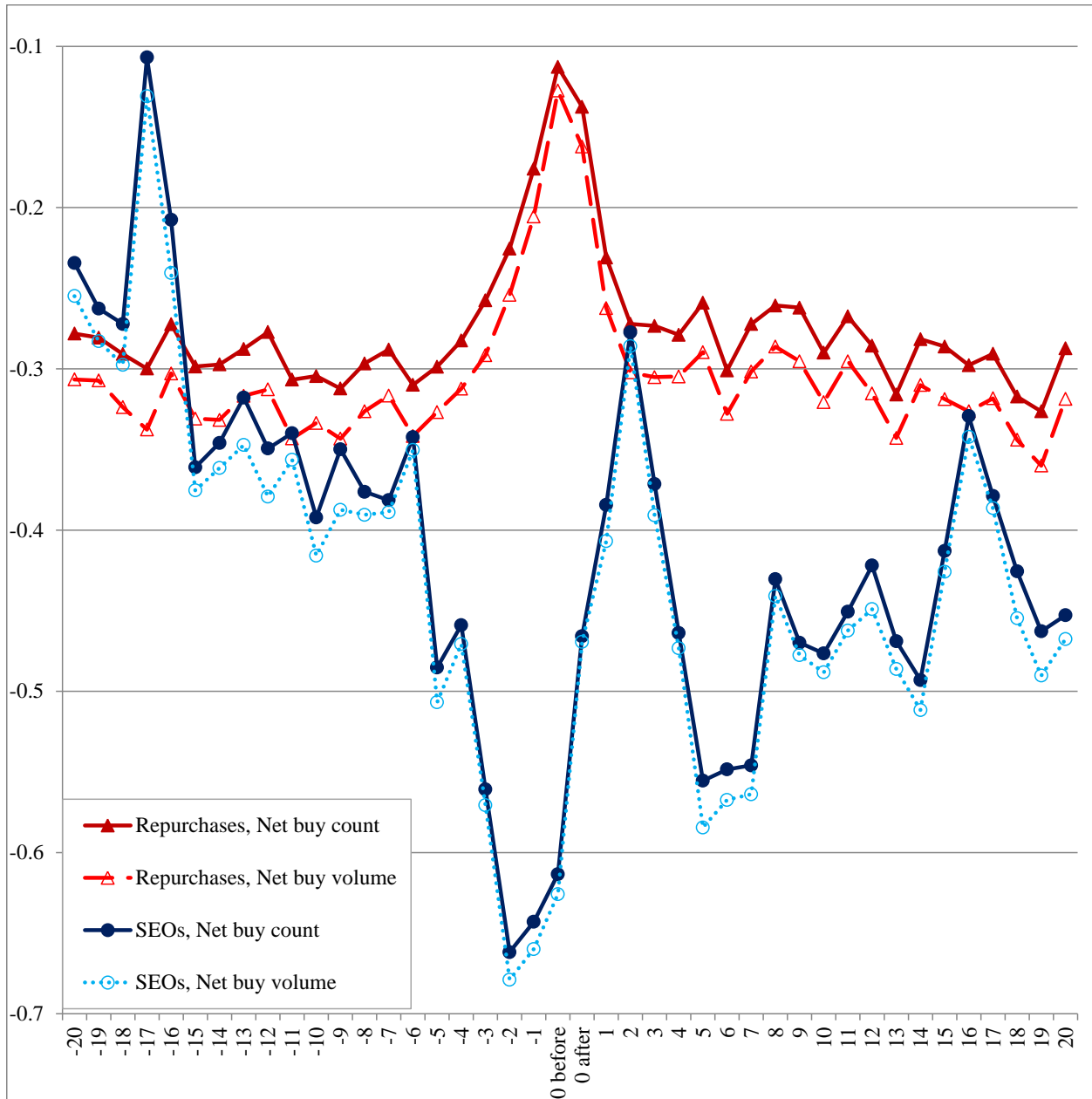


Figure 2. Percentage of firms with positive net insider buying around repurchases and SEOs

Data on insider trading are from Thomson Reuters. The figure shows the percentage of firms with positive net insider buying using two measures of insider trading. *Net buy count*, defined as $(\text{number of purchases} - \text{number of sales}) / (\text{number of purchases} + \text{number of sales})$ is shown in the graphs with solid lines and filled markers. *Net buy volume*, defined as $(\text{number of shares purchased} - \text{shares sold}) / (\text{number of shares purchased} + \text{shares sold})$, is shown in the graphs with dashed lines and empty markers. The lines marked with triangles show insider trading measures around repurchases, and the lines marked with circles show insider trading measures around SEOs. The data are shown in event time. “0 before” refers to the part of the month of the event prior to the event, and “0 after” refers to the part of the month of the event after the event.

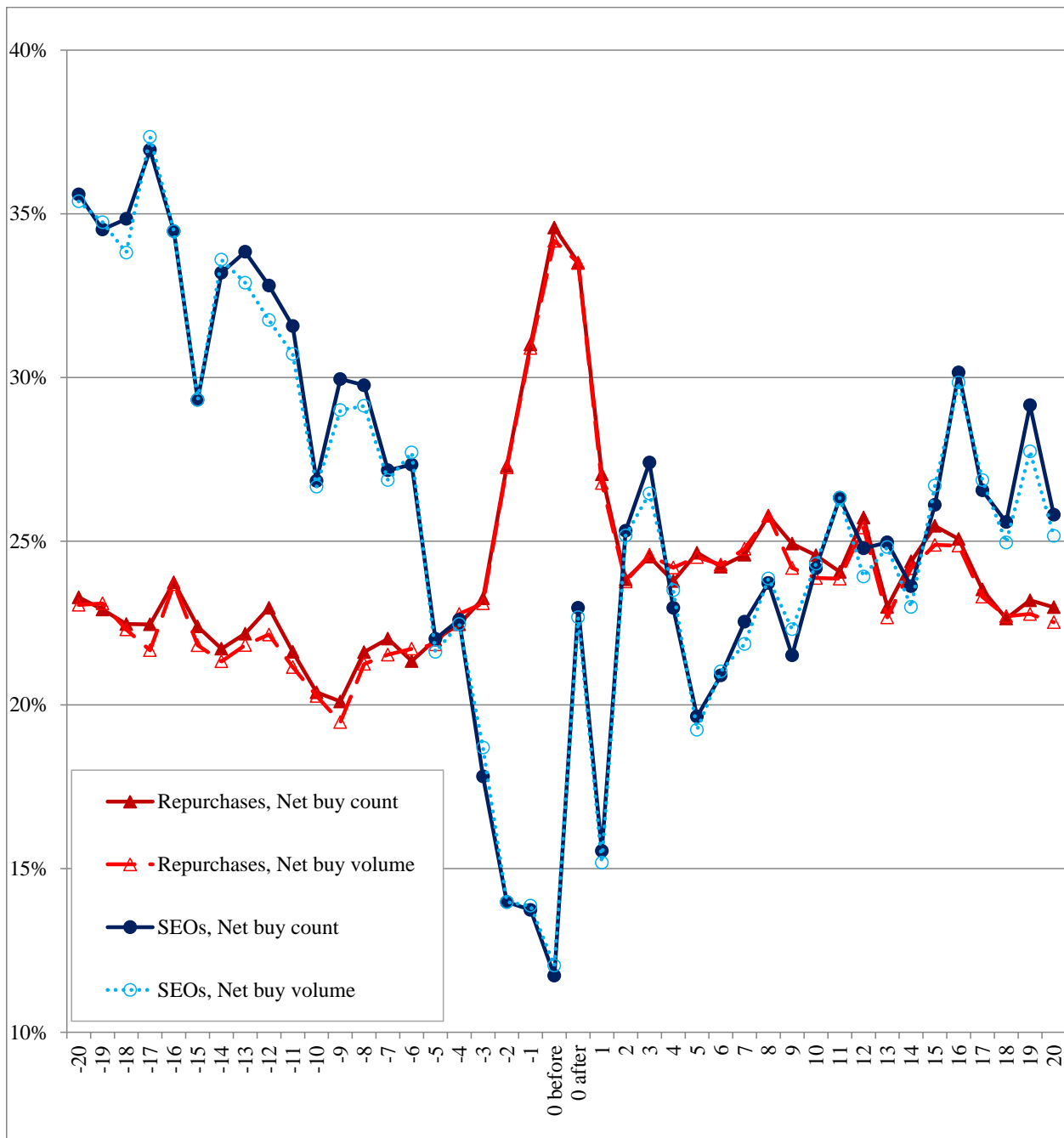


Figure 3. The frequency of insider trading in the months around corporate events

Data on insider trading are from Thomson Reuters. The graphs show the percentage of firms with insider trading around repurchases and SEOs. An event month is defined to have insider trading if at least one purchase or sale is made by insiders of the firm in that month. The solid line marked with triangles shows insider trading around repurchases, and the dashed line marked with circles shows insider trading around SEOs. The data are shown in event time. “0 before” refers to the part of the month of the event prior to the event, and “0 after” refers to the part of the month of the event after the event.

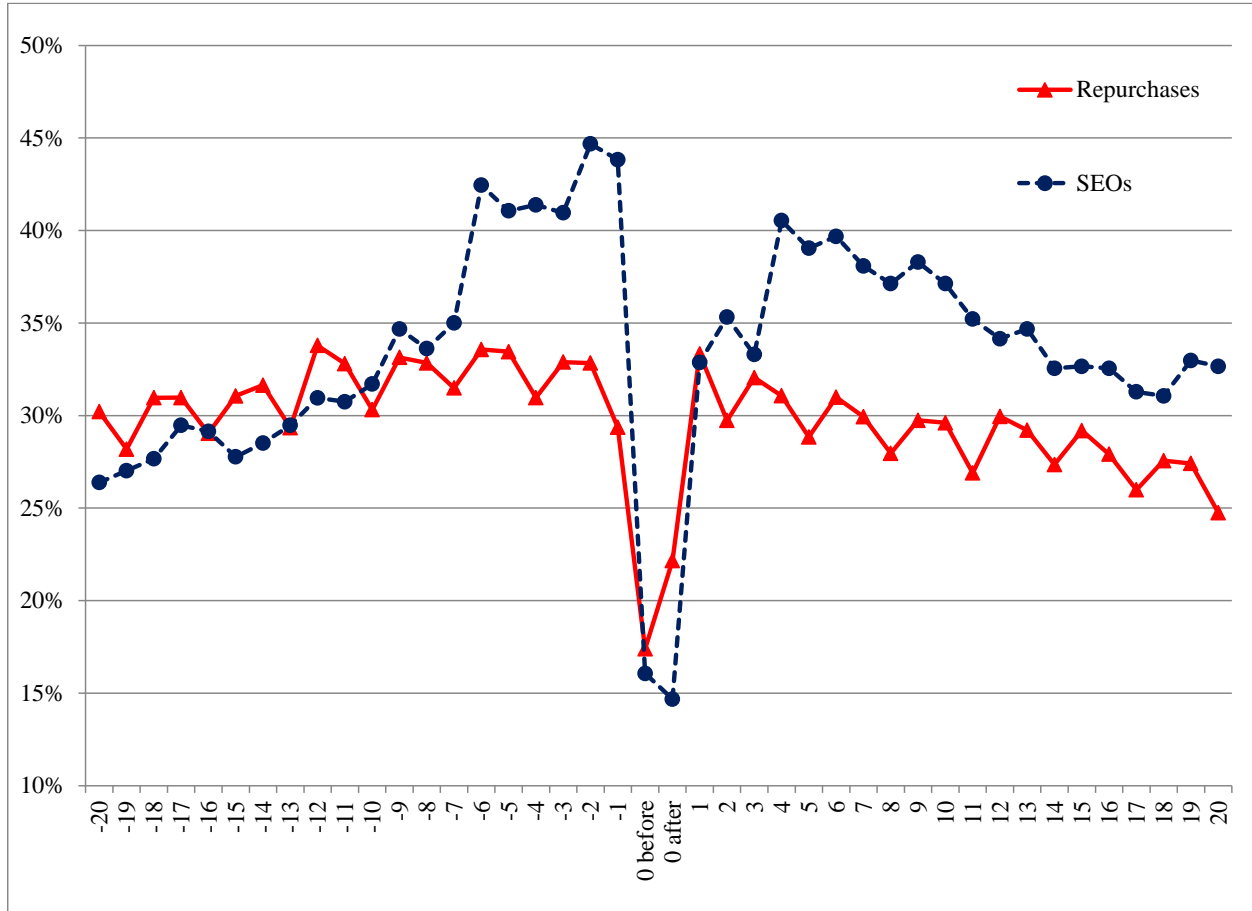


Table 1: Descriptive statistics

This table reports descriptive statistics of our sample of repurchases (left panel) and SEOs (right panel) collected from SDC Platinum for the period 1986-2011. We include events where we have two years of stock return data available in CRSP prior to the event. *Ret6* and *ret12* are the cumulative stock returns of the firm measured over a period starting six and 12 months before the event, and ending in the month before the event. *% sought* is the number of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement. *Value* is the market value of the repurchase programs or the SEO. *Offer size* is the number of shares offered divided by the total number of shares outstanding prior to the SEO. *Net buy count* is defined as the (number of purchases – number of sales)/(number of purchases + number of sales) over the six-month period ending one month before the event. *Net buy volume* is defined as (number of shares purchased – number of shares sold)/(number of shares purchased + number of shares sold) over the six-month period ending one month before the event. *Total assets*, *market capitalization*, and the *value* of shares repurchased (sold) are measured in million dollars.

	Repurchases			SEOs			
	Mean	Median	Standard deviation	Mean	Median	Standard deviation	
<i>Size, valuation, and profitability</i>							
Total assets	2,731	611	5,056	1,070	377	1,551	
Market capitalization	3,183	755	5,551	966	400	1,387	
M/B	2.8337	2.2392	1.9327	3.2919	2.4944	2.3995	
ROA	0.1580	0.1516	0.0864	0.1417	0.1505	0.1104	
<i>Past returns</i>							
Ret6	-0.0569	-0.0582	0.2629	0.5079	0.3735	0.5065	
Ret12	0.0284	-0.0064	0.3840	0.8566	0.5993	0.8805	
<i>Size of repurchases/SEOs</i>							
% sought	7.49	5.93	5.66	Offer size (%)	31.47	23.28	28.51
Value	20.66	4.26	44.24	Value	165.85	86	302.49
<i>Insider trading 6 months prior to the event</i>							
Net buy count	-0.4461	-1	0.7987	-0.5906	-1	0.7071	
Net buy volume	-0.5056	-1	0.7990	-0.6483	-1	0.6955	
Observations		3,991			1,688		

Table 2: Insider trading before corporate events and changes in operating performance

This table shows the results of regressions of changes in operating performance on insider trading for repurchases and SEOs, and matched non-events. *ROA* is return on assets. *Net buy count* is defined as the (number of purchases – number of sales)/(number of purchases + number of sales) over the six-month period ending one month before the event. *Net buy volume* is defined as (number of shares purchased – number of shares sold)/(number of shares purchased + number of shares sold) over the six-month period ending one month before the event. *Event* is a dummy variable that equals 1 if the observation is a repurchase (SEO) and 0 if the observation is a matched non-event. Non-events are matched to events based on size, B/M ratio, past six-month returns, and past six-month insider trading. Panel A shows results for repurchases, and Panel B shows results for SEOs. Underneath each coefficient we show t-statistics based on heteroscedasticity-robust standard errors, clustered at the firm level. *, **, and *** indicate that the coefficient or difference in means is statistically significant at the 10%, 5%, and 1% level, respectively.

Panel A: Repurchases								
	Change in ROA (0,1)				Change in ROA (0,3)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net buy count	0.0017 (1.513)		0.0054*** (2.647)		0.0077*** (3.939)		0.0123*** (3.967)	
Net buy volume		0.0015 (1.333)		0.0051** (2.507)		0.0075*** (3.894)		0.0120*** (3.893)
Event			-0.0045** (-2.152)	-0.0047** (-2.180)			-0.0154*** (-4.648)	-0.0156*** (-4.553)
Event × Net buy count			-0.0037 (-1.602)				-0.0046 (-1.259)	
Event × Net buy volume				-0.0036 (-1.571)				-0.0045 (-1.232)
Constant	-0.0101*** (-10.400)	-0.0102*** (-10.095)	-0.0057*** (-3.102)	-0.0055*** (-2.924)	-0.0185*** (-10.689)	-0.0182*** (-10.249)	-0.0031 (-1.122)	-0.0026 (-0.909)
Observations	3,991	3,991	6,784	6,784	3,372	3,372	5,654	5,654
Adjusted R-squared	0.000	0.000	0.002	0.002	0.005	0.005	0.011	0.011
Mean of dependent variable	-0.011	-0.011	-0.010	-0.010	-0.022	-0.022	-0.016	-0.016
Panel B: SEOs								
	Change in ROA (0,1)				Change in ROA (0,3)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net buy count	0.0040** (2.244)		0.0042 (1.630)		0.0071** (2.460)		0.0128*** (2.989)	
Net buy volume		0.0039** (2.190)		0.0042* (1.672)		0.0070** (2.402)		0.0137*** (3.163)
Event			0.0018 (0.632)	0.0018 (0.620)			-0.0057 (-1.200)	-0.0065 (-1.308)
Event × Net buy count			-0.0002 (-0.067)				-0.0057 (-1.091)	
Event × Net buy volume				-0.0004 (-0.120)				-0.0068 (-1.300)
Constant	-0.0102*** (-6.441)	-0.0100*** (-6.043)	-0.0120*** (-5.189)	-0.0118*** (-4.938)	-0.0249*** (-9.134)	-0.0244*** (-8.676)	-0.0191*** (-4.950)	-0.0179*** (-4.449)
Observations	1,688	1,688	3,376	3,376	1,688	1,688	3,376	3,376
Adjusted R-squared	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.005
Mean of dependent variable	-0.012	-0.012	-0.013	-0.013	-0.028	-0.028	-0.027	-0.027

Table 3: Insider trading before corporate events and changes in the cost of capital

This table shows the results of regressions of changes in the cost of capital on insider trading for repurchases and SEOs, and matched non-events. *Net buy count* is defined as the (number of purchases – number of sales)/(number of purchases + number of sales) over the 6-month period ending one month before the event. *Net buy volume* is defined as (number of shares purchased – number of shares sold)/(number of shares purchased + number of shares sold) over the 6-month period ending one month before the event. *Event* is a dummy variable that equals 1 if the observation is a repurchase (SEO) and 0 if the observation is a matched non-event. Non-events are matched to events based on size, B/M ratio, past six-month returns, and past six-month insider trading. We obtain estimates for changes in the cost of capital from the three-factor model:

$$r_{it} - r_{ft} = \alpha_{-i} + \alpha_{\Delta i} D_t + b_{-i}(r_{mt} - r_{ft}) + b_{\Delta i} D_t (r_{mt} - r_{ft}) + s_{-i} SMB_t + s_{\Delta i} D_t SMB_t + h_{-i} HML_t + h_{\Delta i} D_t HML_t + e_t,$$

where r_{it} is the monthly return on stock i , r_{ft} is the monthly return on one-month U.S. Treasury bills, r_{mt} is the monthly return on the NYSE/AMEX/Nasdaq value-weighted index, SMB_t is the difference between the monthly return on a portfolio of small firms and the monthly return on a portfolio of large firms, HML_t is the difference between the monthly return on a portfolio of high book-to-market stocks and the monthly return on a portfolio of low book-to-market stocks, and D_t is a dummy variable that is equal to one if $t \geq t^*$, where t^* is the month of the event (repurchase or SEO). We use a 73-month window (-36 to +36) to estimate the parameters of the regression model. b_{-i} , s_{-i} , and h_{-i} are the factor loadings (betas) of firm i during the three years prior to the event. $b_{\Delta i}$, $s_{\Delta i}$, and $h_{\Delta i}$ are the changes in the factor loadings after the event. We exclude from the sample all observations in which the absolute value of the change in cost of capital is greater than the cost of capital before the event. We also exclude all observations in which the cost of capital before the event is negative. Columns 1-4 show results for repurchases, and columns 5-8 show results for SEOs. *, **, and *** indicate that the coefficient or difference in means is statistically significant at the 10%, 5%, and 1% level, respectively.

		Dependent variable: Change in the cost of capital							
		Repurchases				SEOs			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net buy count		-0.7414*** (-3.806)		0.0135 (0.050)		0.4761 (1.404)		0.1655 (0.502)	
Net buy volume			-0.6882*** (-3.463)		-0.0744 (-0.277)		0.4928 (1.436)		0.1909 (0.578)
Event				-0.5346* (-1.793)	-0.5042 (-1.612)			-0.5424 (-1.266)	-0.5284 (-1.188)
Event × Net buy count				-0.7549** (-2.281)				0.3106 (0.653)	
Event × Net buy volume					-0.6138* (-1.851)				0.3020 (0.630)
Constant		-1.9362*** (-10.568)	-1.9542*** (-10.152)	-1.4017*** (-5.841)	-1.4501*** (-5.773)	-2.8494*** (-9.116)	-2.8130*** (-8.600)	-2.3070*** (-7.849)	-2.2846*** (-7.538)
Observations		1,431	1,431	2,862	2,862	908	908	1,816	1,816
Adjusted R-squared		0.008	0.007	0.005	0.004	0.001	0.001	0.002	0.002
Mean of dependent variable		-1.62	-1.62	-1.55	-1.55	-3.10	-3.10	-2.76	-2.76

Table 4: Insider trading before corporate events and changes in investor sentiment

This table shows the results of regressions of changes in the cost of capital on insider trading for repurchases and SEOs, and matched non-events. *Net buy count* is defined as the (number of purchases – number of sales)/(number of purchases + number of sales) over the 6-month period ending one month before the event. *Net buy volume* is defined as (number of shares purchased – number of shares sold)/(number of shares purchased + number of shares sold) over the 6-month period ending one month before the event. *Event* is a dummy variable that equals 1 if the observation is a repurchase (SEO) and 0 if the observation is a matched non-event. Non-events are matched to events based on size, B/M ratio, past six-month returns, and past six-month insider trading. *Sentiment* is measured as the firm-specific component from the market-to-book decomposition of Rhodes-Kropf et al. (2005, p. 577, equation (15)). The dependent variable in all regressions is the change in sentiment from the year before the event (t-1) to the year after the event (t+1). Columns 1-4 show results for repurchases, and columns 5-8 show results for SEOs. *, **, and *** indicate that the coefficient or difference in means is statistically significant at the 10%, 5%, and 1% level, respectively.

	Dependent variable: Change in sentiment from year (t-1) to year (t+1)							
	Repurchases				SEOs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net buy count	0.0423*** (3.757)		0.0452** (3.083)		0.0991*** (3.559)		0.0216 (1.024)	
Net buy volume		0.0430*** (3.671)		0.0494** (3.055)		0.0958*** (3.666)		0.0231 (1.278)
Event			0.0403 (1.791)	0.0387 (1.640)			-0.0511** (-3.068)	-0.0497** (-2.769)
Event × Net buy count			-0.0029 (-0.175)				0.0775** (2.305)	
Event × Net buy volume				-0.0064 (-0.408)				0.0727** (2.256)
Constant	-0.0454*** (-4.452)	-0.0426*** (-4.328)	-0.0858*** (-5.731)	-0.0813*** (-4.992)	-0.1032*** (-7.824)	-0.1000*** (-7.473)	-0.0521*** (-3.927)	-0.0503*** (-3.762)
Observations	2,980	2,980	5,960	5,960	1,568	1,568	3,136	3,136
Adjusted R-squared	0.004	0.004	0.005	0.006	0.017	0.016	0.016	0.015
Mean of dependent variable	-0.065	-0.065	-0.083	-0.083	-0.155	-0.155	-0.109	-0.109

Table 5: Insider trading and announcement returns around repurchases and SEOs

This table provides the results of regressions of buy-and-hold abnormal returns around events and matched non-events on measures of insider trading. The dependent variable in all regressions is the buy-and-hold abnormal return (*BHAR*) for the event window (-1,1) around the announcement of the event. Buy-and-hold abnormal returns are calculated using the Fama-French three-factor model as the benchmark. Columns 1 and 2 show results for repurchases, while columns 3 and 4 show results for SEOs. *Event* is a dummy variable that equals 1 if the observation is a repurchase (SEO) and 0 if the observation is a matched non-event. Non-events are matched to events based on size, B/M ratio, past six-month returns, and past six-month insider trading. *Net buy count* is defined as the (number of purchases – number of sales)/(number of purchases + number of sales) over the six-month period ending one month before the event. *Net buy volume* is defined as (number of shares purchased – number of shares sold)/(number of shares purchased + number of shares sold) over the six-month period ending one month before the event. All other independent variables are defined in Table 1. Underneath each coefficient we show t-statistics that are based on heteroscedasticity-robust standard errors, clustered at the firm level. We also report the mean of the dependent variable separately for events and for the matched non-events. Asterisks next to the means indicate whether the means are significantly different from zero. Asterisks next to the t-test indicate whether the mean for events is significantly different from the mean for non-events. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: BHAR(-1,1) following the event			
	Repurchases		SEOs	
	(1)	(2)	(3)	(4)
Event	0.0270*** (16.501)	0.0267*** (15.652)	-0.0182*** (-6.083)	-0.0174*** (-5.464)
Net buy count	0.0002 (0.168)		-0.0033 (-1.307)	
Net buy volume		0.0010 (0.842)		-0.0034 (-1.318)
Event × Net buy count	0.0103*** (5.596)		0.0058* (1.822)	
Event × Net buy volume		0.0089*** (4.869)		0.0065** (1.988)
Ret6	-0.0068** (-2.494)	-0.0067** (-2.451)	-0.0092 (-1.483)	-0.0092 (-1.475)
Event × ret6	0.0019 (0.389)	0.0033 (0.677)	0.0061 (0.908)	0.0056 (0.839)
Constant	-0.0011 (-0.995)	-0.0007 (-0.602)	-0.0046** (-2.074)	-0.0048** (-2.051)
Observations	6,458	6,458	2,856	2,856
Adj. R ²	0.047	0.047	0.055	0.057
Mean of dependent variable	0.0116	0.0116	-0.0176	-0.0175
Mean for events	0.0212***	0.0212***	-0.0260***	-0.0262***
Mean for non-events	-0.001	-0.001	-0.00332**	-0.00332**
t-stat difference	-16.21***	-16.21***	10.51***	10.51***

Table 6: Insider trading and long-term returns following repurchases and SEOs

This table provides the results of regressions of buy-and-hold abnormal returns around events and matched non-events on measures of insider trading. The dependent variable in all columns is the buy-and-hold abnormal return (*BHAR*) for the event window of two days to 254 days following the announcement of the event. Buy-and-hold abnormal returns are calculated using the Fama-French three-factor model as the benchmark. Columns 1 and 2 show results for repurchases, while columns 3 and 4 show results for SEOs. *Event* is a dummy variable that equals 1 if the observation is a repurchase (SEO) and 0 if the observation is a matched non-event. Non-events are matched to events based on size, B/M ratio, past six-month returns, and past six-month insider trading. *Net buy count* is defined as the (number of purchases – number of sales)/(number of purchases + number of sales) over the 6-month period ending one month before the event. *Net buy volume* is defined as (number of shares purchased – number of shares sold)/(number of shares purchased + number of shares sold) over the 6-month period ending one month before the event. All other independent variables are defined in Table 1. Underneath each coefficient we show t-statistics that are based on heteroscedasticity-robust standard errors, clustered at the firm level. We also report the mean of the dependent variable separately for events and for the matched non-events. Asterisks next to the means indicate whether the means are significantly different from zero. Asterisks next to the t-test indicate whether the mean for events is significantly different from the mean for non-events. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: BHAR(2,254) following the event			
	Repurchases		SEOs	
	(1)	(2)	(3)	(4)
Event	0.0833*** (4.674)	0.0859*** (4.612)	-0.2256*** (-6.786)	-0.2228*** (-6.379)
Net buy count	0.0465*** (3.003)		0.0701** (2.577)	
Net buy volume		0.0468*** (3.019)		0.0693** (2.540)
Event × Net buy count	0.0639*** (3.270)		0.0071 (0.227)	
Event × Net buy volume		0.0598*** (3.047)		0.0157 (0.495)
Ret6	-0.3763*** (-9.999)	-0.3772*** (-10.039)	-0.4456*** (-7.553)	-0.4472*** (-7.615)
Event × ret6	0.0626 (1.471)	0.0669 (1.559)	0.2600*** (3.938)	0.2614*** (3.957)
Constant	-0.0036 (-0.256)	-0.0009 (-0.063)	0.0414 (1.591)	0.0447* (1.653)
Observations	6,458	6,458	2,856	2,856
Adjusted R ²	0.068	0.067	0.215	0.220
Mean of dependent variable	0.0229	0.023	-0.217	-0.217
Mean for events	0.0468***	0.0475***	-0.331***	-0.336***
Mean for non-events	-0.011	-0.011	-0.0234	-0.0234
t-stat difference	-3.97***	-4.005***	13.80***	13.94***

Table 7: Calendar-time portfolios using insider trading information around repurchases and SEOs versus a matched control sample

For each month, we form portfolios using information on the announcement of share repurchases and SEOs, and insider trading in the six months prior to the announcement. A firm is included in the low (high) net buy count event portfolio if it experienced an event (repurchase or SEO) in the past t months, and its net buy count over the six months prior to the event is -1 (+1). *Net buy count* and *net buy volume* are defined in Table 1. Similarly, a matched control firm is included in the low (high) net buy count control portfolio if it is matched to an actual event (repurchase or SEO) and its net buy count over the past six months is -1 (+1). The table shows monthly alphas from a Carhart four-factor model for each of these portfolio strategies for holding periods of $t = 3, 6,$ and 12 months. *High-low* in columns 4 and 7 shows the alpha for a portfolio that goes long in high net buy count firms and shorts low net buy count firms. Finally, *Difference high-low for event-control* in column 8 shows the difference between the alphas on the long-short portfolios in columns 4 and 7. *, **, and *** indicate that the coefficient is statistically significant at the 10%, 5%, and 1% level, respectively.

Holding period	Event			Control			Difference Difference high-low for event-control
	Low net buy count	High net buy count	Difference high - low	Low net buy count	High net buy count	Difference high - low	
<i>Repurchases - equally weighted</i>							
3	0.93*** (0.25)	2.27*** (0.41)	1.34*** (0.44)	-0.01 (0.40)	-0.05 (0.63)	-0.04 (0.70)	1.38*
6	0.66*** (0.21)	1.84*** (0.36)	1.18*** (0.41)	-0.03 (0.31)	0.19 (0.39)	0.22 (0.41)	0.96*
12	0.38* (0.20)	1.46* (0.32)	1.08*** (0.34)	0.03 (0.24)	0.54 (0.33)	0.51 (0.32)	0.57
<i>Repurchases - value weighted</i>							
3	0.97*** (0.29)	1.81*** (0.43)	0.84 (0.52)	0.65* (0.39)	1.07 (0.81)	0.42 (0.88)	0.42
6	0.50* (0.26)	1.50* (0.39)	1.00** (0.49)	0.49 (0.32)	0.12 (0.60)	-0.37 (0.68)	1.37
12	0.47** (0.22)	1.35** (0.32)	0.88** (0.36)	0.58** (0.29)	0.64 (0.41)	0.06 (0.49)	0.82
<i>SEOs - equally weighted</i>							
3	-0.08 (0.35)	0.93 (0.99)	1.01 (1.05)	-0.67 (0.47)	-0.81 (0.63)	-0.14 (0.82)	1.15
6	-0.30 (0.28)	1.03 (0.95)	1.33 (0.98)	-0.19 (0.31)	0.04 (0.77)	0.23 (0.83)	1.10
12	-0.58*** (0.21)	-0.19*** (0.43)	0.39 (0.47)	-0.08 (0.21)	-0.20 (0.47)	-0.12 (0.50)	0.51
<i>SEOs - value weighted</i>							
3	0.50 (0.44)	0.98 (1.33)	0.48 (0.78)	-0.65 (0.51)	-0.52 (0.84)	0.13 (1.01)	0.35
6	0.41 (0.35)	1.26 (1.09)	0.85 (0.58)	-0.49 (0.36)	1.24 (0.89)	1.73* (0.98)	-0.88**
12	-0.04 (0.29)	0.40 (0.46)	0.44 (0.53)	-0.47 (0.30)	0.54 (0.60)	1.01 (0.69)	-0.57