

## **What do insiders know?**

### **Evidence from insider trading around share repurchases and SEOs**

#### **Abstract**

We examine the information contained in insider trades prior to open market share repurchases and seasoned equity offerings using a comprehensive sample of over 4,300 repurchase and nearly 1,800 SEO announcements. We show that insiders tend to purchase stock prior to repurchase announcements and sell prior to SEO announcements. More purchasing before both types of events is associated with higher announcement returns. In addition, in the case of repurchases, information gets incorporated into stock prices slowly, leading to a positive relation between pre-event insider trading and post-event long-term returns. We also examine the nature of information contained in pre-event insider trading. We find that more insider purchasing before both types of events predicts better post-event operating performance. In addition, in the case of repurchases, more insider buying is associated with a larger reduction in post-event cost of capital. Taken together, our results suggest that insiders' trades prior to repurchases and SEOs contain information regarding firms' future fundamentals, and that such information is incorporated into prices over time.

## 1. Introduction

The evidence that corporate events contain value-relevant information is extensive in the corporate finance literature (e.g., Farre-Mensa, Michaely and Schmalz (2014) for dividend changes, Eckbo, Masulis and Norli (2007) for equity issues, Betton, Eckbo and Thorburn (2008) for mergers and acquisitions, and Ben-Rephael, Oded and Wohl (2014), and Dittmar and Fields (2015) for share repurchases, among many other events). In addition, there is evidence that personal investment decisions of firms' insiders – insider trading – contain value-relevant information (e.g., Jenter (2005) and Cohen, Malloy and Pomorski (2012)). What is less clear is how trading by firms' insiders prior to corporate events interacts with firms' actions and whether this interaction contains additional value-relevant information beyond the separate information in event announcements and in insider trading. If there are complementarities between the information contained in corporate event announcements and that in pre-event insider trading, then the effects of event announcements should be larger when insiders “put their money where their mouth is”, i.e. when insider trading is consistent with corporate announcement.

In this paper we examine patterns of insider trading prior to two types of corporate events – open market share repurchases and seasoned equity offerings (SEOs) –, and the effects of pre-event insider trading on the market reaction to these events over various horizons and on changes in operating performance and risk following these events. We focus on equity issues and share repurchases because there seems to be a consensus that these event announcements convey to the market insiders' superior information. Specifically, the market tends to react negatively to equity issue announcements (e.g., Ritter (2003), Carlson, Fisher and Giammarino (2006), and Eckbo, Masulis and Norli (2007)) and positively to open market repurchase announcements (e.g.,

Comment and Jarrell (1991), Grullon and Michaely (2004), and Farre-Mensa et al (2014)). Consistently, Graham and Harvey (2001) report that two-thirds of CEOs list perceived overvaluation of their firm's stock as an important consideration in the decision to issue equity. Similarly, Brav, Graham, Harvey and Michaely (2005) report that 80% of managers list "stock price is too low" as a reason for repurchasing company stock. The evidence on the information content of other corporate events, such as stock splits, is less clear. For example, while theoretically stock splits may be used to signal information (e.g., Grinblatt, Masulis and Titman (1984) and Brennan and Copeland (1988)), empirically stocks splits do not seem to affect future performance and firm values (e.g., Lakonishok and Lev (1987) and Byun and Rozeff (2003)).<sup>1</sup>

Our goal is to provide comprehensive evidence on 1) whether there is abnormal insider trading prior to SEOs and open market repurchases and whether the direction of pre-event abnormal insider trading is consistent with the direction of firm's trading implied by the event, 2) whether there is complementarity (or a multiplicative effect) between the information in the event announcement and that in pre-event insider trading, i.e. whether insider trades prior to SEOs and share repurchases contain more information about event firm valuation and future performance than insider trades during other times, and 3) what types of information do pre-event insider trades contain – for example information on future changes in cash flows and/or on future changes in the cost of capital.

In our analysis of the effects of insider trading prior to repurchases and SEOs on subsequent stock returns we focus on the "joint signal" theory of John and Mishra (1990) and

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<sup>1</sup> Similarly, while dividend changes may also signal information, we find no evidence of shifts in insider trading prior to changes in dividends. This result is consistent with Grullon, Michaely, Benartzi, and Thaler (2005), who show that dividend changes are not correlated with future earnings changes, and are negatively (not positively) correlated with future changes in profitability. Given our sample period, it may also reflect the recent trend of firms' increasing reliance on repurchases as opposed to dividends as the main form of payout (Farre-Mensa, Michaely, and Schmalz (2014)).

Babenko, Tserlukevich and Vedrashko (2012). According to this theory, pre-event insider trading provides an additional signal to the market, which affects the credibility of the signal contained in the event announcement: this signal is expected to be stronger if insiders' pre-announcement actions are consistent with the announced corporate action.

If the information in insider trading amplifies or mitigates the information contained in the event announcement, then we should expect to find a relation between pre-event insider trading and the market reaction to event announcements. Importantly, John and Mishra's (1990) joint signal theory implies complementarity between the information contained in the event announcement and that contained in pre-event insider trading. Without such complementarity between the two pieces of information, the market would be expected to react to insider trading when the information about insider trades is disclosed,<sup>2</sup> and not necessarily following corporate event announcements.

As we explain in detail below, the answers to our first two questions are positive: net insider purchasing is abnormally high prior to repurchases and abnormally low prior to SEOs, and pre-event insider trading affects event announcement returns.<sup>3</sup> The answer to the third question is more nuanced: insider trading prior to repurchases contains superior information regarding both future operating performance and future cost of capital, whereas insider trading prior to SEOs seems to contain information mainly regarding future operating performance.

The contribution of our paper is threefold. First, we provide comprehensive evidence on abnormal patterns in insider trading prior to SEOs and open market repurchases. Specifically, for both open market repurchases and SEOs we find that insiders tend to "put their money where

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<sup>2</sup> 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.

<sup>3</sup> 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.

their mouth is". In particular, the net purchase ratio (NPR), a measure that equals 1 if all insider transactions in a given firm-month are purchases, and -1 if all insider transactions are sales, increases from -0.3 six months prior to a repurchase to -0.2 one month prior to the announcement, indicating that insider purchasing activity intensifies significantly prior to repurchases. The change in NPR in the months prior to repurchases equals 13% of its standard deviation. We find a mirroring pattern for SEOs, but the magnitude of the change is larger. In particular, the 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 NPR.

Second, we show that insiders' actions prior to announcements of repurchases and SEOs influence the market's perception of these events. While open market repurchase and SEO announcements tend to lead to average returns of opposite signs, pre-event insider trading has similar effect on both: large abnormal net insider 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 abnormal net purchases is associated with an increase of around 77 basis points in abnormal returns measured over the three-day period around repurchase announcements. A one-standard-deviation increase in abnormal net insider purchases is associated with a reduction of around 45 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.

Importantly, to ensure that these results can be attributed to the joint signal in insider trading and event announcements, we examine announcement returns relative to returns of non-event firms that have similar characteristics and exhibit comparable insider trading patterns prior

to the time of the event. This matched-firm evidence demonstrates that there are complementarities between value-relevant information contained in insider trading prior to SEOs and repurchases on one hand and the information in these event announcements on the other hand.

Our evidence on the relation between pre-event insider trading and announcement returns extends the results of existing studies on abnormal insider trading prior to corporate events, which tend to concentrate on one of the two sides of insider trading activity. For example, Babenko, Tserlukevich and Vedrashko (2012) examine insiders' abnormal purchases in the year prior to repurchase announcements, while generally abstracting from insider sales; Karpoff and Lee (1991), whose sample is small due to data availability, analyze insider sales prior to SEOs, while abstracting from insider purchases.<sup>4</sup> Our evidence complements Bonaime and Ryngaert (2013), who report that insider trading in quarters that coincide with actual repurchases (as opposed to insider trading prior to repurchase announcements) are positively associated with future returns. Our evidence stands in contrast with earlier studies of the effects of pre-event insider trading around equity issues, which tend to not find a significant relation between pre-SEO insider trading activity and SEO announcement returns, using smaller samples of issues and shorter sample periods (e.g., Lee (1997), Kahle (2000), and Clarke, Dunbar and Kahle (2001)). In this context, our paper utilizes a large and comprehensive dataset, and uses the same empirical framework to assess insider trading both around repurchases and SEOs. This enables us to more effectively compare the interaction between firms buying and selling their own shares (repurchases and SEOs) and insiders buying and selling their firm's shares.

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<sup>4</sup> One notable exception is Kahle (2000), who examines both insider sales and buys prior to equity and debt issues. Kahle (2000) focuses on the number of insider transactions (as opposed to their size) and finds that there are significantly more instances of insider sales and fewer instances of purchases prior to SEO announcements.

Our paper also contributes to the literature that examines the time it takes the market to incorporate the information contained in pre-event insider trading. Our results indicate that the market does not immediately absorb all the information in insider trading prior to repurchase announcements – the difference between mean one-year abnormal return following repurchase announcements of the tercile of firms with highest insider net purchases and that of firms with the lowest insider net purchases is around six percentage points. On the other hand, the market seems to incorporate the information contained in pre-SEO insider trading fast – there is no evidence of a positive association between pre-SEO insider trading and post-SEO long-term returns.

Our third contribution is the analysis of potential reasons why insider trading around repurchases and SEOs is informative for future returns; or what do insiders know that outside investors do not know? We investigate the types of information that insiders seem to possess and convey to the market. Insiders buy more (sell less) prior to repurchases (SEOs) when expected future operating performance is better. For example, the average change in the return on assets in the three years following repurchase announcements is 1.5-1.6 percentage points higher for repurchases belonging to the top tercile of insider net buying than for those belonging to the bottom tercile. The respective figures are 1.0-1.4 percentage points for the case of pre-SEO insider net buying.

We also find highly statistically and economically significant differences in changes in risk and cost of capital following repurchases between firms characterized by relatively high net insider purchases and those with low net insider purchases. Using the Fama-French (1997) model as the benchmark, the reduction in post-repurchase cost of capital is 1.1-1.2 percentage points larger within the tercile of repurchases with the most insider net buying than within the tercile

with the least insider net buying. This is not the case for SEOs: pre-SEO insider trading does not seem to be negatively associated with post-SEO risk and cost of capital. In addition, our results suggest that large part of the information contained in insider trading is not about investor sentiment and insiders' desire to trade against it. In most cases, the information contained in pre-event insider trading does not differ significantly between subsamples of firms sorted by measure of relative misvaluation.

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. Investors seem to incorporate the information in insider trading prior to corporate events when forming reactions to event announcements, although the speed with which the market incorporates the information in pre-event insider trading varies across events. The information that insiders trade on prior to corporate events seems to be about future changes in operating performance and, in the case of repurchases, about future changes in the cost of capital.

## **2. Sample and descriptive statistics**

We obtain information on open market repurchases and SEOs from SDC Platinum for the period 1986-2011. 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 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. Our final sample contains 4,360 repurchases and 1,789 SEOs. Table 1 shows selected summary statistics of repurchases and SEOs and firms performing them.

- Table 1 here -

The average repurchasing firm has \$2,372 million (\$2,777 million) in book assets (equity market capitalization),<sup>5</sup> while SEO firms are smaller, with mean total assets (market capitalization) of \$759 million (\$720 million). The mean equity M/B ratio of repurchasing firms, computed as in Davis, Fama and French (2000), is 2.89, considerably lower than that of the average SEO firm, 3.76.<sup>6</sup> The median values are lower for both repurchasing firms and SEO firms (2.26 and 2.76, respectively). Repurchasing firms have somewhat higher return on assets (ROA)<sup>7</sup> than SEO firms: 0.155 and 0.132, respectively. The stock returns of repurchasing firms are close to zero in the 12 months preceding their repurchase announcement, while firms issuing seasoned equity experience considerable stock price appreciation in the year preceding their SEO announcement. This is consistent with the literature on repurchases (e.g., Comment and Jarrell (1991) and Ikenberry, Lakonishok and Vermaelen (1995)) and on SEOs (Masulis and Korwar (1986) and Eckbo and Masulis (1992)). The average (median) proportion of shares sought in a repurchase is 7.47% (5.86%), comparable to the figures reported by Grullon and Michaely (2004). The size of the average (median) SEO is 35.16% (26.98%) of the firm's existing shares. The market value of the average (median) repurchase program is \$18 million (\$3.6 million), while the mean (median) value of shares issued in an SEO is \$145 million (\$77 million).

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<sup>5</sup> Equity market capitalization is computed as the product of Compustat items *csho* and *prcc\_f*.

<sup>6</sup> Equity M/B ratio is computed as  $(csho \times prcc\_f) / (itcb + txdb + seq - pstk)$ .

<sup>7</sup> ROA is computed as the ratio of operating income, *oibdp* and the average of book assets in the beginning and the end of the year.

Throughout the paper, 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. The first measure, *net buy count*, is based on Lakonishok and Lee (2001) and is defined as the ratio of net insider purchase transactions in the six months prior to repurchase/SEO announcement to number of insider transactions during such period,  $\frac{\text{number of purchases} - \text{number of sales}}{\text{number of purchases} + \text{number of sales}}$ . This measure equals 1 if all insider trades are purchases in the six months prior to the event announcement, and -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 repurchase/SEO announcement, to the total number of shares purchased and sold during such 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 6-month period prior to repurchases (ending the month before the event) equals -0.41 (-0.47) , and prior to SEOs the respective averages are -0.53 and -0.58, implying that SEOs are preceded by heavier insider net selling than repurchases.<sup>8</sup>

### 3. Trading around repurchases and SEOs

We begin by examining whether there is abnormal insider trading prior to repurchase and SEO announcements. 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, which would be numbered month 0, into two parts: before and after the event. We

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<sup>8</sup> In a recent paper, Cohen, Malloy and Pomorski (2012) decompose insider trading into “routine” and “opportunistic”. Unfortunately, we cannot use their algorithm, since it requires three years of continuous insider trading, which reduces our samples of repurchases and especially SEOs dramatically.

denote these two parts by “0 before” and “0 after”. The length of these parts is not constant across observations, because firms may announce repurchases or SEOs any day of the month.

- Insert Figure 1 here -

Prior to both repurchases and SEOs, we find that insiders, on average, 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) stock prior to repurchases, and they tend to sell more (purchase less) stock 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 of the examined events, the changes in insider trading begin at roughly six months prior to the event.

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 net insider buying (in terms of number of trades or number of shares traded) around event announcements.

- Insert Figure 2 here -

Figure 2 shows that not only the average, but the entire distribution of insider trading shifts toward more purchasing prior to repurchases, and toward more selling prior to SEOs.

The main goal of our analysis is to examine whether insider trades prior to corporate events contain additional information beyond that conveyed by the event announcement. However, several studies suggest that absence of insider trading may also contain information. The underlying reasons are twofold. 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 (Marin and Olivier (2008)). Second, insiders who possess negative information may refrain from selling because of litigation risk (Gao and Ma (2012)). To investigate whether insiders are likely to abstain from trading in anticipation of event announcements, we examine the likelihood that insiders place no trades at all around corporate events. Figure 3 plots the percentage of firms whose insiders place at least one open market transaction during the months before and after repurchases and SEOs.

- Insert Figure 3 here -

For both events, we find that the fraction of firms whose insiders trade increases or stays constant in the months preceding repurchase or SEO announcement. In the case of repurchases, there is no visible difference between insider trading during the months immediately preceding repurchase announcements and during other months. For SEOs, the percentage of firms with some insider trading in any given month outside of the months prior to event announcements ranges between 25-40%. This percentage 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. We conclude that

insider trading activity does not decline prior to repurchases and intensifies prior to SEOs, consistent with the idea that insiders express their views on firm overvaluation or undervaluation both through corporate actions and through their trading prior to corporate event announcements.

#### **4. Complementarity of event announcement and insider trading signals**

Having established that insider trading patterns shift toward higher net purchasing prior to repurchases, and lower net purchasing (higher net selling) prior to SEOs, we now ask whether differences in insider trading patterns across events are correlated with the short-term and long-term market reaction to the events. We are interested in testing the joint signal hypothesis of John and Mishra (1990) and Babenko, Tserlukevich and Vedrashko (2012), which suggests that signals contained in announcements of repurchases and SEOs on the one hand and pre-event insider trading on the other hand are complementary. To test this hypothesis, we ask whether returns around and following repurchase and SEO announcements are more sensitive to insider trading information than returns at other times.

To answer this question, we match events to non-events using a propensity score (PS) matching procedure. We match each event firm-month observation to a non-event firm-month along four dimensions: size, book-to-market (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 or net buy volume, calculated over six months prior to the event announcement. When performing the matching procedure for each of the event samples, firm-months that are in the year of a repurchase or SEO, the year before, or the year

after are dropped from the pool of potential matches. Because matching is done with replacement, there are some non-event firm-months that appear in the sample as duplicates.<sup>9</sup>

We estimate regressions on the pooled sample of events and non-events to examine whether insider trading prior to repurchases and SEOs contains more information for future returns than insider trading during other periods. To ensure that our results are comparable to those found in prior literature, we extend the empirical model of Lakonishok and Lee (2001), who regress portfolio returns on past insider trading and past returns to disentangle trading on insider information from contrarian trading. Our innovation is that we allow all of the coefficients to differ across event and non-event firms, by estimating the following model:

$$BHAR(t_1, t_2) = \beta_0 + \beta_1 Event + \beta_2 Itr + \beta_3 Ret + \beta_4 Event \times Itr + \beta_5 Event \times Ret + \varepsilon. \quad (1)$$

The dependent variable in (1) is the buy-and-hold abnormal return measured over the three days surrounding the event announcement, or over one year following the event. 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 matches closely the distribution of both repurchase and SEO announcements, as both appear to be uniformly distributed within months.  $BHAR(t_1, t_2)$  is calculated as the buy-and-hold return on the firm's stock less the buy-and-hold return on the market portfolio.<sup>10</sup> We regress these abnormal returns on an indicator variable equal to 1 for events and 0 for matched non-events ( $Event$ ), our two measures of insider trading ( $ITR$ ), and past returns ( $Ret$ ). We allow the

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<sup>9</sup> There are three repurchases (but no SEOs) that are matched to a non-event firm-month of the same firm. Such matches should lessen any endogeneity issues that might arise if event firms were systematically different from non-event firms. If there were some unobserved factor that led investors to react differently to insider trading information of event firms and non-event firms, the existence of such pairs in which the two firms are one and the same would work against us finding significant results. Notwithstanding, we confirm that dropping these event—non-event pairs from the data does not affect our results

<sup>10</sup> To ensure that our results are not driven by outliers, we winsorize BHARs for both events and non-events at the 5th and the 95th percentile.

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.

We are primarily interested in the coefficient  $\beta_4$ , which captures whether insider trading prior to repurchases and SEOs conveys a stronger signal for future returns than it does at other times. For short horizons, we expect “reaction” to non-events to be economically insignificant, by definition. However, even if the short-term abnormal return is zero on average, it may still be higher for firms with heavy insider buying in the past 6 months relative to firms with heavy insider selling in the past 6 months, so that  $\beta_2$  is different from zero. For long horizons, the comparison to non-events becomes much more important, as previous work finds evidence that past insider trading is related to future returns in the long term (Lakonishok and Lee (2001)). Hence, we expect that both  $\beta_2$  and  $\beta_4$  may be positive and statistically significant.

Table 2 presents the results of estimating (1) over the three-day window around events.

- Insert Table 2 here -

The first two columns present the results for repurchases. The coefficient on the event dummy is positive and significant, both statistically and economically. The average announcement return of repurchasing firms that had no insider purchases in the past six months is around 2.6%, the sum of the coefficient of the event dummy and the constant. 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.

Importantly, our estimates of  $\beta_4$ , the coefficient on the interaction between the repurchase dummy and an insider trading measure, are significant for both insider trading measures. A one-standard-deviation increase in net insider purchases (0.81 from Table 1) is associated with an increase of over 0.77 percentage points in abnormal returns measured over the three-day period (-1,1) around the repurchase announcement. This effect is quite large, as the average announcement return across our sample of repurchases is 2.1%.

Columns 3 and 4 present the results of estimating (1) within the SEO sample. Consistent with past studies (e.g., Asquith and Mullins (1986) and Denis (1994)), the average market reaction to SEOs is negative and significant, around -2.6%, in our sample. 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 of the interaction term between the event dummy and pre-SEO insider trading are positive and significant for both insider trading measures. In addition, the impact of a one-standard-deviation increase in insider trading (0.76 and 0.75 for net buy count and net buy volume, respectively, from Table 1) is an economically sizeable increase of around 45 basis points in SEO announcement returns.

Taken together, the results in Table 2 imply that insider trading is positively related to short-term abnormal returns, but only around announcements of open market repurchases and SEOs, and not during other times (i.e., not for matched firm-months that are similar to repurchase or SEO firm-months in terms of their size, B/M, past stock returns, and past insider trading).

The information in pre-event insider trading may not be fully impounded 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 return measured two days after the event up to 254 days (i.e., 12 months) after the event. The results are shown in Table 3.

- Insert Table 3 here -

Columns 1 and 2 present long-term return regressions for the repurchases sample. The coefficients on the event dummy show that, on average, repurchases enjoy 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. Unlike the case of the three-day return window, insider trading is positively related to long-term returns for 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 pre-repurchase six-month insider trading is associated with almost 4 percentage point higher post-event 12-month return.

Importantly, we find evidence consistent with the joint signal hypothesis: more insider purchasing (less insider selling) 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 repurchase dummy show that a one-standard-deviation increase in insider purchasing during the six months before the event is associated with an increase of around 5 percentage points in abnormal returns during the year after the event over and above the abnormal returns for non-event firms.

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

In sum, the results in this section indicate that insider trading prior to repurchases and SEOs is positively related to post-event returns, more so than for matched firms that did not issue or repurchase equity. In the case of repurchases, pre-event insider trading is 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 the SEO announcement.

## **5. What types of information does insider trading convey to the market?**

Insider trading prior to open market repurchases and SEOs provides information that is reflected in post-announcement stock prices, which is complementary to the information contained in event announcements. In principle, insiders may trade in their firm's stock for two non-

mutually-exclusive reasons. First, they may have superior knowledge to that of outsiders regarding their firm's future operating performance or risk and the resulting cost of capital (e.g., Core, Guay, Richardson and Verdi (2006)). Second, insiders may recognize pricing errors made by outsiders and trade against current investor sentiment. In both cases, insider trading prior to corporate events may reflect and convey to the market information regarding firms' valuation that is complementary to the information conveyed by corporate events.

In this section, we examine the information content of insider trading prior to repurchases and SEOs. We begin by examining whether insider trading prior to corporate events is associated with changes in firms' operating performance and/or risk. We proceed by examining whether the association between pre-event insider trading and post-event changes in operating performance and cost of capital is stronger at times when firms' stock may be misvalued and, therefore, insiders may have increased incentives to trade against misvaluation even if they do not have private information about changes in future operating performance or risk.

### *5.1 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 documented in the literature, we adopt the framework of Grullon and Michaely (2004). Specifically, we examine the change in ROA one to three years following corporate events. We employ two sets of tests to examine whether insider trading prior to repurchases and SEOs predicts future operating performance. First, we estimate a linear regression of the change in ROA on each of our two measures of pre-event insider trading:

$$\Delta ROA(t_1, t_2) = \alpha + \beta \times ITR + \varepsilon, \tag{2}$$

where  $t_1$  is the year of repurchase/SEO and  $t_2$  equals either one or three years after the event. Second, we test whether ROA of firms with the highest insider net buying prior to repurchases and SEOs is different from ROA of firms with the least insider net buying prior to corporate events. The results of these two tests are presented in Table 4. The upper part of the table presents coefficient estimates of the regression in (2), whereas the lower part of the table presents the differences in the change in ROA between the top and bottom terciles of each of the two insider trading measures.

- Insert Table 4 here -

The results for repurchases are shown in the first two columns of Table 4. Column 1 describes the relation between pre-repurchase insider trading and a one-year change in ROA, while column 2 focuses on three-year change in ROA following repurchases. The operating performance of the average repurchasing firm declines in the years following the event, consistent with the findings of Grullon and Michaely (2004): the mean one-year change in ROA is -1.2 percentage points, while the mean three-year change is -2.2 percentage points. Importantly, however, more insider purchasing (less insider selling) prior to stock repurchases is associated with a smaller decline in ROA. This effect is present at both the one-year and the three-year horizon, and can be seen both in the regressions, and in the differences between the top and the bottom terciles. For example, a one-standard-deviation increase in pre-repurchase

insider net purchasing is associated with an increase of 0.73 to 0.78 percentage points in three-year ROA. Differences in the changes in post-repurchase operating performance between firms in the top and bottom terciles of insider trading are sizeable: the reduction in one-year ROA is smaller by around 0.45 percentage points for firms in the top tercile of pre-repurchase insider net purchasing than for those in the bottom tercile. The difference of around 1.6 percentage points in the three-year change in ROA between firms in the extreme terciles is even larger.

The results for SEOs, presented in columns 3 and 4 are similar. The mean one-year change in ROA is -1.8 percentage points, while the mean three-year change is -3.6 percentage points. The coefficients on insider trading in the post-SEO operating performance regressions are statistically significant for both measures of insider trading and for both one-year and three-year horizons. The differences are also economically sizable: a one-standard-deviation increase in pre-SEO insider trading is associated with around 0.55 (0.9) percentage point increase in one-year (three-year) ROA. The difference in the change in ROA between the top and the bottom terciles of pre-SEO insider trading is also statistically significant in most cases. In addition, it is economically large: the difference is almost a full percentage point in the case of one-year change in ROA and it ranges between 1.0 and 1.4 percentage points in the case of three-year change in ROA depending on the measure of insider trading.

Overall, the conclusion from the analysis in Table 4 seems quite robust. More insider buying and less insider selling prior to repurchases and SEOs is associated with smaller reductions in operating performance, measured by ROA, in years following repurchase and SEO announcements. This implies that insider trading prior to repurchases and SEOs seems to be driven, at least partially, by information that insiders possess regarding the future operating performance of firms repurchasing or issuing seasoned equity.

## 5.2. Changes in risk characteristics and cost of capital

Next, we examine whether insider trading before repurchases and SEOs is driven by their information regarding changes in their firms' risk and the resulting cost of capital. We use the framework of Grullon and Michaely (2004) to estimate changes in firms' risk characteristics. In particular, we estimate a Fama-French 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 framework we use indicator variables to allow for different factor exposures before versus after the event. We estimate the following model for the repurchases and SEO samples separately:

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

where  $r_{it}$  is the return on stock  $i$ ,  $r_{ft}$  is the return on 1-month U.S. Treasury bills, and  $r_{mt}$  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.  $D_t$  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, and subscript  $\Delta i$  refers to changes in coefficient estimates following the event.

After estimating the regression in (3) for firms repurchasing and issuing equity, we estimate changes in the cost of capital using the changes in factor exposures in (3) and the average factor premia over our estimation period, 1983–2008.<sup>11</sup>

After estimating changes in each firm’s factor loadings and overall changes in the cost of capital following repurchases and SEOs, we perform two tests, similar to those in Table 4. First, we regress the change in each risk factor exposure and of the total estimated change in the cost of capital on each of our two measures of pre-event insider trading. Second, we compare changes in factor loadings and in the estimated cost of capital between top and bottom terciles of pre-event insider trading.

Table 5 summarizes the results. The top panel of Table 5 presents results for repurchases, while the bottom panel presents the results for SEOs.

- Insert Table 5 here -

The top panel of Table 5 shows that, on average, repurchasing firms’ market beta, small firm beta, and B/M beta decline in the three years following repurchase announcement, as evident from the “average change” row. Importantly, more insider buying (less insider selling) prior to repurchase announcements is associated with significantly larger reduction in all three factor loadings. A one-standard-deviation increase in pre-repurchase insider trading is associated with 0.031 reduction in market beta, a 0.067 reduction in SMB beta, and a 0.047 reduction in HML beta. The results for the overall change in cost of capital, reported in the last column of Table 5, are quite striking. The difference between the reduction in the estimated cost of capital of firms

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<sup>11</sup> In particular, for each event, the estimated post-event change in the cost of capital equals  $\Delta r_{it} = 0.049936 + b_{\Delta i} \times 0.069425 + s_{\Delta i} \times 0.031107 + h_{\Delta i} \times 0.036976$ .

in the top tercile of pre-event insider trading and those in the bottom tercile is 1.1-1.3 percentage points, which constitutes roughly 40% of the average overall reduction in the cost of capital following repurchases.

The lower panel of Table 5 summarizes the results for SEOs. We do not find a significant association between pre-SEO insider trading and the change in issuing firms' market beta and SMB beta; however, there is a significantly positive relation between insider trading and post-SEO change in HML beta. The relation between pre-event insider trading and the estimated change in the cost of capital is insignificant. Moreover, this relation is positive in both tests, which is inconsistent with insiders trading because of the information regarding the reduction in risk following SEOs.

To summarize, the results in Table 5 suggest that insider trading prior to repurchases contains information regarding changes in repurchasing firms' cost of capital, while insider trading prior to SEOs does not seem to contain such information.

### *5.3. Exploiting mispricing*

The results in the previous two subsections suggest that insider trading prior to repurchases and SEOs contains information regarding changes in future operating performance and, in the case of repurchases, in the cost of capital. However, in addition to trading on superior information regarding future operating performance and risk, insiders may also trade to exploit mispricing due to investor sentiment (e.g., Seyhun (1992), Rozeff and Zaman (1998), Graham and Harvey (2001), Jenter (2005), and Piotroski and Roulstone (2005)).



Jenter (2005) and Piotroski and Roulstone (2005) among others show that insiders tend to be contrarian traders – they tend to sell when their firm’s stock has high valuation and to buy when the stock’s valuation is low. Thus, it is possible that 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 private information about future cash flows and cost of capital.

To examine whether insider trades contain more information in periods when insiders are less likely to trade against investor sentiment, we split the samples of repurchases and SEOs into subsamples of firms with relatively high and low valuation. In particular, we define firms having high valuations as those with relatively high P/E ratios and firms having low valuations as those with relatively low P/E ratios. The abnormally low and high P/E ratios are calculated relative to peers and across time. Specifically, to compute relative P/E ratios we first calculate the difference between a firm’s P/E ratio and the average P/E ratio of firms in its four-digit SIC industry in the year prior to the year of repurchase or SEO. Then, we compute the same difference three years prior to the event. The differences between these two differences reflect relative (mis)valuation. We then designate firms belonging to the top tercile of relative P/E ratios as more likely to be “overvalued”, and firms belonging to the bottom tercile of relative P/E ratios as more likely to be “undervalued”.

Table 6 presents estimates of the relation between post-event changes in operating performance on measures of insider trading, as in (3), for subsamples of firms with relatively high and low valuations (in columns 1-2 and 4-5, respectively). Columns 3 and 6 present the differences in the relation between pre-event insider trading and change in ROA between the two subsamples.

- Insert Table 6 here -

The upper part of Table 6 examines the repurchase subsample. We find no support for the hypothesis that insider trades provide more information about future operating performance in repurchases that are less likely to be undertaken to exploit negative investor sentiment (i.e., in cases in which overvalued firms announce repurchases). The coefficients on pre-event insider trading in the relatively high valuation subsample are similar to those in the relatively low valuation subsample, and the differences are not statistically significant.

In the lower panel, in which we examine the relation between pre-SEO insider trading and post-SEO changes in ROA for firms with relatively high and low valuations, the results are somewhat different. For firms with relatively low valuations, for which it is less likely that SEOs are undertaken to exploit overvaluation, insider trading is significantly positively associated with post-SEO operating performance. In particular, for SEO firms with relatively low valuations the coefficients on our measures of insider trading – net buy volume and net buy count – in the post-SEO change in ROA regressions are always statistically significant. In addition, the difference in the post-SEO change in operating performance between firms with high insider buying and low insider buying for relatively undervalued firms ranges between 0.7 and 1.7 percentage points, albeit statistically significant in only one out of four cases. On the contrary, for firms with relatively high pre-SEO valuation, for which it is more likely that SEO is performed to exploit investor sentiment, there is no statistically and economically significant relation between insider trading and post-SEO changes in operating performance.

In Table 7 we examine whether relative valuation is related to the amount of information contained in insider trading regarding post-repurchase/SEO changes in firms' cost of capital.

Similarly to Table 6, we divide the repurchases and SEO samples into subsamples of firms with relatively high and low pre-event valuations and examine the association between pre-event insider trading and post-event change in the cost of capital, computed in the same way as in Table 5.

- Insert Table 7 here -

The top panel, which describes the result for repurchases, demonstrates that insider trading is more informative regarding future changes in the cost of capital for the subsample of firms with relatively low valuation. For such firms the difference in the change in estimated cost of capital between high and low insider trading terciles ranges between 1.7 and 2.1 percentage points for the two measures of insider trading. On the other hand, the relation between insider trading and post-repurchase changes in the cost of capital is much weaker and statistically insignificant for firms with relatively high pre-repurchase valuation. The finding that there is more information regarding the change in the cost of capital in the subsample of relatively undervalued firms is inconsistent with the hypothesis that insider trading should contain more information about future performance for repurchases announced by relatively overvalued firms, for which exploiting investor sentiment is less likely to be one of the reasons for the repurchase.

The lower panel, which describes the results for SEOs, shows that neither in the high valuation nor in the low valuation subsample, there is a statistically significant relation between pre-SEO insider trading and post-SEO change in the estimated cost of capital. Thus, similar to repurchases, we do not find support for the hypothesis that insiders have more information about

future cost of capital in cases in which SEOs are more likely to be performed to exploit investor sentiment.

Overall, the results in this section suggest that investor sentiment does not play a defining role in the type of information contained in pre-repurchase/SEO insider trading. Relative valuation prior to repurchases is not related to post-repurchase change in risk and cost of capital. Relative valuation prior to SEOs is not related to post-SEO change in either operating performance or cost of capital. On the other hand, in firms that are less likely to be undervalued prior to repurchases, insider trading prior to repurchase announcement contains more information regarding changes in future operating performance than in firms that are more likely to be undervalued.

## **6. Conclusion**

This paper uses a comprehensive sample of over 4,300 open market repurchase and close to 1,800 seasoned equity offering announcements to examine whether insiders convey information to the market through their trades prior to repurchases and SEOs. While prior studies show that insiders refrain from trading before other corporate events such as M&As, 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 SEOs and repurchases than at other times. Moreover, insiders tend to trade in the direction of upcoming corporate event: there tends to be abnormally high net purchasing activity prior to repurchases and abnormally low net purchasing prior to SEOs.

Our paper sheds new light on the predictive power of insider trading for future returns and fundamentals around certain corporate events. We find that more insider net purchasing prior

to repurchases and SEOs is associated with higher announcement returns, and, for the case of repurchases, higher post-event long-term returns. The relation between insider trading and returns is stronger around these corporate events than in other times, suggesting that the signals in pre-event insider trading and in event announcements are complementary, consistent with the joint signalling theory of John and Mishra (1990).

We also analyze the nature of information that insider trading is likely to contain. Our evidence suggests that heavier insider net purchasing prior to repurchases and SEOs is associated with larger increases in operating performance. In addition, in the case of repurchases, pre-event insider trading also contains information regarding future changes in risk and cost of capital.

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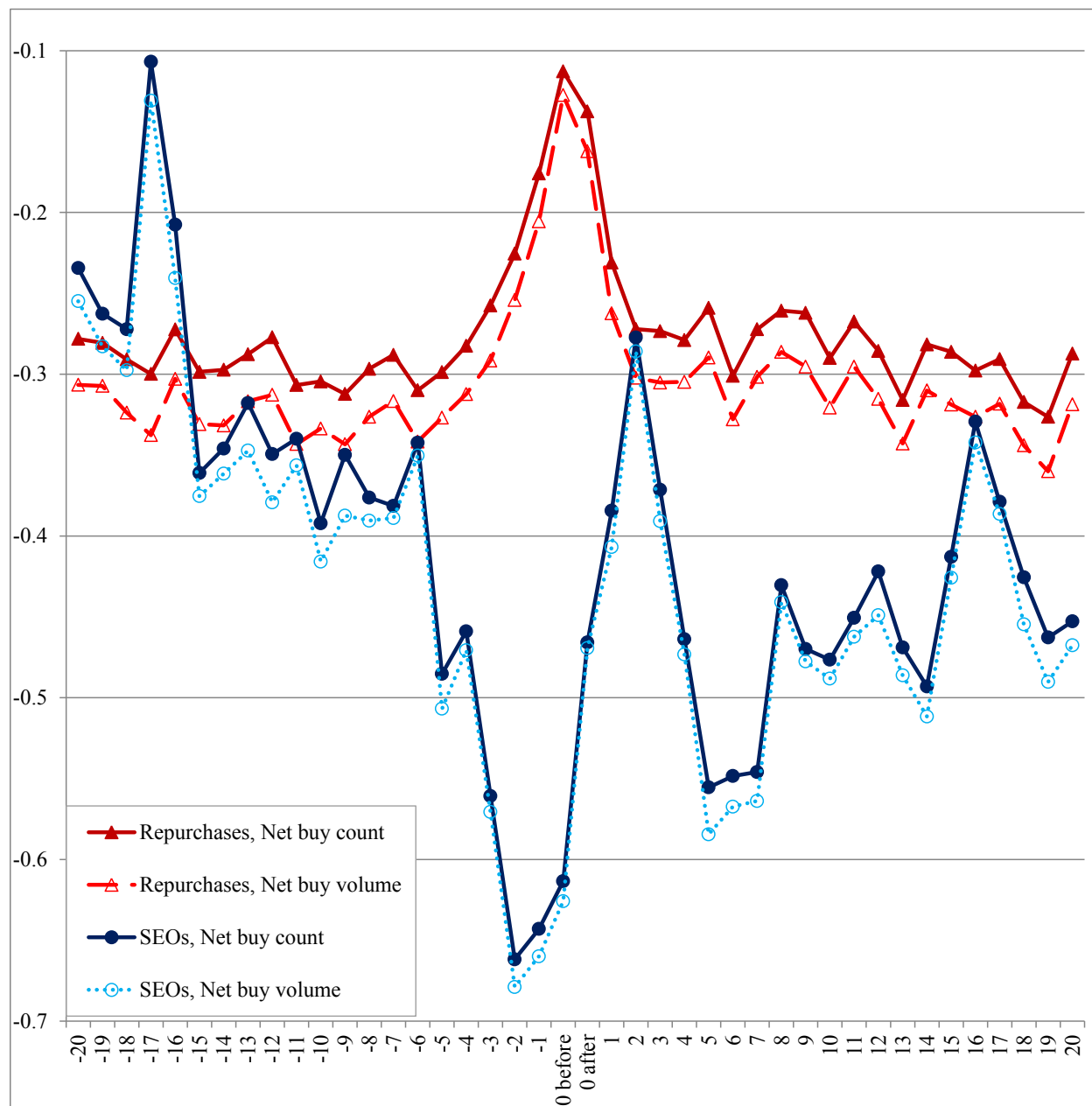
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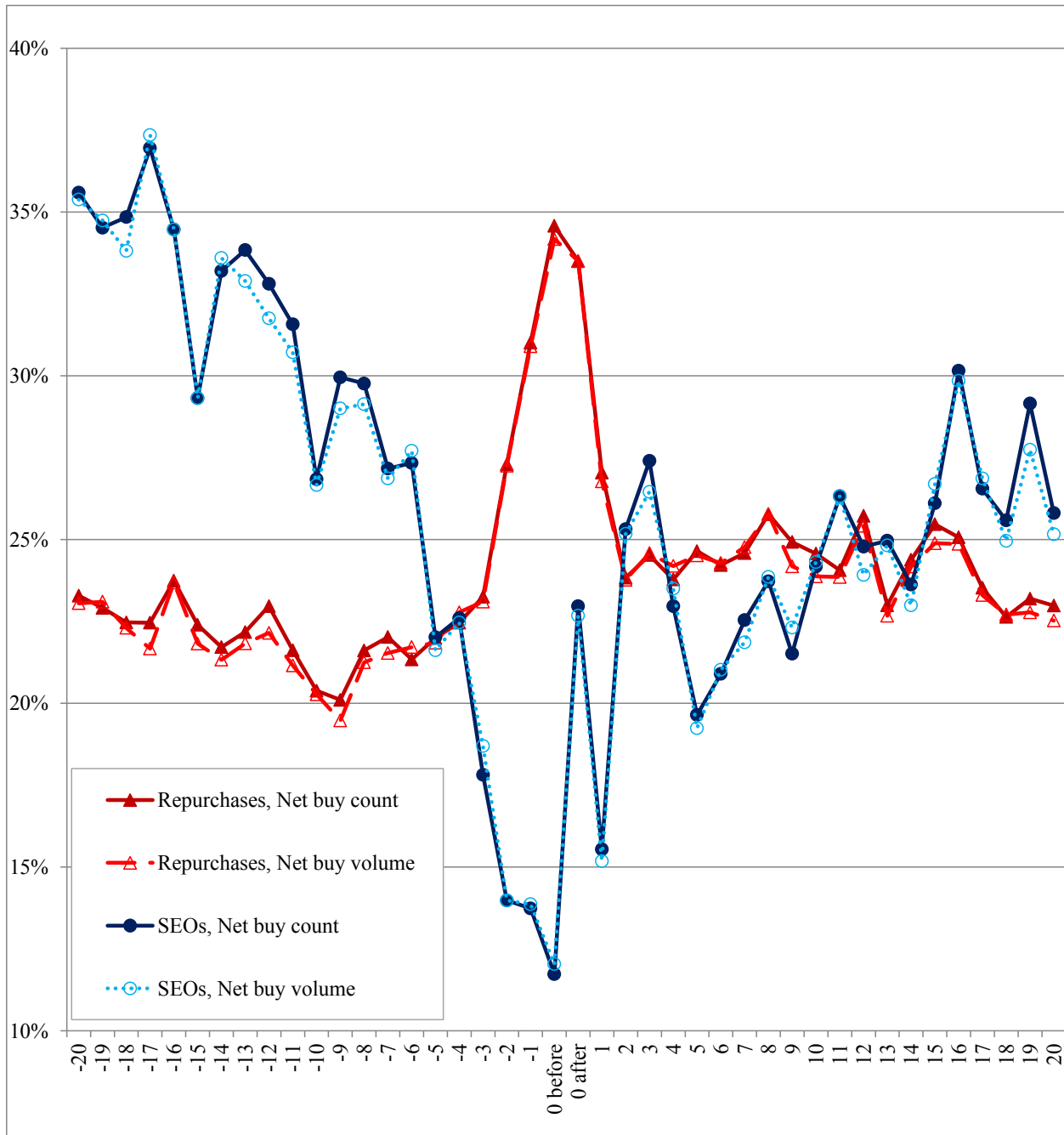
**Figure 1. Net insider buying around repurchases and SEOs**

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 red lines marked with triangles show insider trading measures around repurchases, and the blue 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.



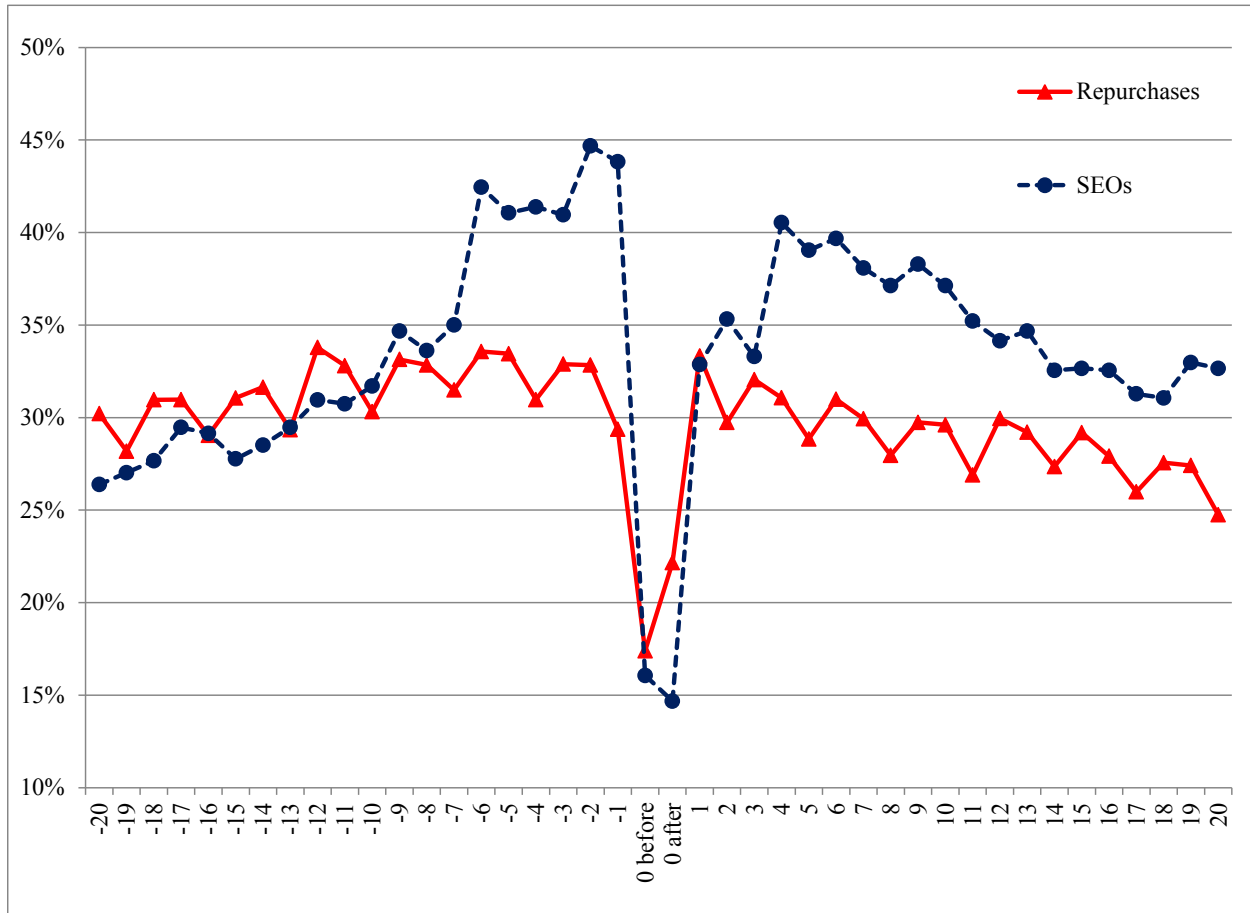
**Figure 2. Percentage of firms with positive net insider buying around repurchases and SEOs**

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 the (number of purchases – number of sales)/(number of purchases + number of sales) is shown in the graphs with solid lines and filled markers. *Net buy volume*, defined as (number of shares purchased – shares sold)/(number of shares purchased + shares sold), is shown in the graphs with dashed lines and empty markers. The red lines marked with triangles show insider trading measures around repurchases, and the blue 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 red line marked with triangles shows insider trading around repurchases, and the dashed blue 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. *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 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. *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	2,372	484	4,485		759	264	1,161
Market capitalization	2,777	634	4,922		720	306	1,011
M/B	2.8931	2.2567	2.0231		3.7611	2.7581	2.8683
ROA	0.1545	0.1499	0.0920		0.1320	0.1514	0.1390
<i>Past returns</i>							
Ret6	-0.0718	-0.0732	0.2706		0.5241	0.3946	0.5132
Ret12	0.0068	-0.0252	0.3896		0.9027	0.6346	0.9169
<i>Size of repurchases/SEOs</i>							
% sought	7.47	5.86	5.67	Offer size (%)	35.16	26.98	30.50
Value	18.12	3.59	39.45	Value	145.10	77	256.08
<i>Insider trading during 6 months prior to the event</i>							
Net buy count	-0.4126	-1	0.8142		-0.5305	-1	0.7572
Net buy volume	-0.4743	-1	0.8141		-0.5811	-1	0.7530
Observations	4,360				1,789		

**Table 2: Insider trading and announcement returns around repurchases and SEOs**

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 (-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, and 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 heteroskedascity-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 that the coefficient is statistically significant at the 10%, 5%, and 1% level, respectively.

	Dependent variable: BHAR(-1,1) around announcement			
	Repurchases		SEOs	
	(1)	(2)	(3)	(4)
Event	0.0263*** (15.716)	0.0265*** (15.343)	-0.0182*** (-6.083)	-0.0174*** (-5.464)
Net buy count	0.0006 (0.441)		-0.0033 (-1.307)	
Net buy volume		0.0005 (0.387)		-0.0034 (-1.318)
<b>Event × Net buy count</b>	<b>0.0096*** (5.160)</b>		<b>0.0058* (1.822)</b>	
<b>Event × Net buy volume</b>		<b>0.0094*** (5.050)</b>		<b>0.0065** (1.988)</b>
Ret6	0.0114*** (3.698)	0.0114*** (3.696)	-0.0092 (-1.483)	-0.0092 (-1.475)
Event × ret6	-0.0090** (-2.027)	-0.0077* (-1.706)	0.0061 (0.908)	0.0056 (0.839)
Constant	-0.0011 (-0.990)	-0.0011 (-0.959)	-0.0046** (-2.074)	-0.0048** (-2.051)
Observations	6,461	6,461	1,856	1,803
Adjusted R <sup>2</sup>	0.053	0.051	0.055	0.057
Mean of dependent variable	0.0114	0.0111	-0.0176	-0.0175
Mean for events	0.0213***	0.0211***	-0.0260***	-0.0262***
Mean for nonevents	-0.0017*	-0.0017*	-0.00332**	-0.00332**
t-stat difference	-16.33***	-16.12***	10.51***	10.51***

**Table 3: Insider trading and long-term returns following repurchases and SEOs**

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 2 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, and 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 heteroskedascity-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 that the coefficient is statistically significant at the 10%, 5%, and 1% level, 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)
<b>Event × Net buy count</b>	<b>0.0639*** (3.270)</b>		<b>0.0071 (0.227)</b>	
<b>Event × Net buy volume</b>		<b>0.0598*** (3.047)</b>		<b>0.0157 (0.495)</b>
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	1,856	1,803
Adjusted R <sup>2</sup>	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 4: Insider trading before corporate events and changes in operating performance**

This table shows regressions of changes in operating performance on insider trading, and t-tests of changes in operating performance across terciles of insider trading. *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 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. Regression coefficients are from a simple linear regression of the change in operating performance on insider trading,  $\Delta ROA(t_1, t_2) = \alpha + \beta \times ITR + \varepsilon$ , estimated using heteroskedasticity-robust standard errors, clustered at the firm level. We consider changes from year 0 to year 1, and changes from year 0 to year 3, where year 0 is the year of the event. The first two rows show coefficient estimates from such regression models. The second two rows show the difference in operating performance between the top and the bottom tercile of firms ranked by the insider trading variable shown in the row. The top panel shows results for repurchases, and the bottom panel shows results for SEOs. \*, \*\*, and \*\*\* indicate that the coefficient or difference in means is statistically significant at the 10%, 5%, and 1% level, respectively.

<i>Repurchases</i>		
	<b>Regression coefficients</b>	
<b>Event years</b>	<b>(0,1)</b>	<b>(0,3)</b>
NPR_count	0.0029*	0.0096***
NPR_volume	0.0025	0.0090***
	<b>Terciles: difference top-bottom</b>	
NPR_count	0.0043*	0.0155***
NPR_volume	0.0047*	0.0162***
Average change in ROA	-0.0124	-0.0223

<i>SEOs</i>		
	<b>Regression coefficients</b>	
<b>Event years</b>	<b>(0,1)</b>	<b>(0,3)</b>
NPR_count	0.0074***	0.0115**
NPR_volume	0.0072***	0.0120***
Average change in ROA	-0.0179	-0.0356
	<b>Terciles: t-test top-bottom</b>	
NPR_count	0.0097**	0.0104
NPR_volume	0.0092**	0.0144**
Average change in ROA	-0.0179	-0.0356

**Table 5: Insider trading before corporate events and changes in risk and the cost of capital**

This table shows regressions of changes in risk characteristics and the cost of capital on insider trading, and t-tests of changes in risk characteristics and the cost of capital across terciles of 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. Regression coefficients are from a simple linear regression of the change in a risk characteristic, or in the cost of capital on insider trading,

$\Delta b = \alpha + \beta \times ITR + \varepsilon$ , estimated using heteroskedasticity-robust standard errors, clustered at the firm level. The first two rows in each panel show coefficient estimates from such regression models. The second two rows in each panel show the difference in risk characteristics between the top and the bottom tercile of firms ranked by the insider trading variable shown in the row. We obtain estimates for changes in risk and in the cost of capital from the three-factor model

$$r_{it} - r_{ft} = \alpha_{-i} + \alpha_{Ai}D_t + b_{-i}(r_{mt} - r_{ft}) + b_{Ai}D_t(r_{mt} - r_{ft}) + s_{-i}SMB_t + s_{Ai}D_tSMB_t + h_{-i}HML_t + h_{Ai}D_tHML_t + e_{it}$$

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.  $b_{Ai}$ ,  $s_{Ai}$ , and  $h_{Ai}$  are the changes in the factor loadings after the event.  $\alpha_{-i}$  is the abnormal return of firm  $i$  before the event, and  $\alpha_{Ai}$  is the change in abnormal return 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 from the sample all observations in which the cost of capital before the event is negative. \*, \*\*, and \*\*\* indicate that the coefficient or difference in means is statistically significant at the 10%, 5%, and 1% level, respectively.

<i>Repurchases</i>	<b>Change in market beta</b>	<b>Change in small firm beta</b>	<b>Change in B/M beta</b>	<b>Change in the cost of capital</b>
	<b>Regression coefficients</b>			
Net buy count	-0.0376**	-0.0827***	-0.0575*	-0.8355***
Net buy volume	-0.0317*	-0.0782***	-0.0668**	-0.7265***
	<b>Terciles: difference top-bottom</b>			
Net buy count	-0.0529*	-0.1803***	-0.0861*	-1.261***
Net buy volume	-0.0453	-0.131***	-0.095**	-1.1059***
Average change	-0.276	-0.108	-0.162	-2.854
<hr/>				
<i>SEOs</i>	<b>Change in market beta</b>	<b>Change in small firm beta</b>	<b>Change in B/M beta</b>	<b>Change in the cost of capital</b>
	<b>Regression coefficients</b>			
Net buy count	0.0088	0.0320	0.1290**	0.5378
Net buy volume	0.0082	0.0753	0.1178*	0.6484
	<b>Terciles: difference top-bottom</b>			
Net buy count	0.007	0.0467	0.2472**	0.9538
Net buy volume	-0.0305	0.1326	0.1928*	0.8453
Average change	-0.232	-0.252	-0.264	-3.322

**Table 6: Valuation, insider trading, and changes in operating performance after repurchases and SEOs**

The relation between insider trading and changes in operating performance for events with high and low valuation. The dependent variable is the change in ROA from the year of the event (year 0) to after the event (year 1 or year 3), as defined in Table 4. *Net buy count* and *net buy volume* are defined in Table 1. Regression coefficients are from a simple linear regression of the change in operating performance on insider trading,  $\Delta ROA(t_1, t_2) = \alpha + \beta \times ITR + \varepsilon$ , estimated using heteroskedasticity-robust standard errors, clustered at the firm level. The first two rows show coefficient estimates from such regression models. The second two rows show the difference in operating performance between the top and the bottom tercile of firms ranked by the insider trading variable shown in the row. *Valuation* is measured as  $(P/E_{i,t-1} - P/E_{SIC4i,t-1}) - (P/E_{i,t-3} - P/E_{SIC4i,t-3})$ , where subscript  $i$  indicates the P/E measure of the firm conducting the SEO, subscript  $SIC4_i$  indicates the average P/E of the firm's 4-digit industry, and the  $t$  is the year of the SEO. *High valuation* means that the event is in the highest tercile according to our valuation measure, and *low valuation* means that the event is in the lowest tercile according to our valuation measure. *Difference* shows the difference in regression coefficients (first two rows in each panel), or the difference in differences between the highest and the lowest tercile for high versus low valuation events (second two rows in each panel). \*, \*\*, and \*\*\* indicate that the coefficient is statistically significant at the 10%, 5%, and 1% level, respectively.

<i>Repurchases</i>	<b>Low valuation</b>	<b>High valuation</b>	<b>Difference</b>	<b>Low valuation</b>	<b>High valuation</b>	<b>Difference</b>
	<b>Regression coefficients</b>					
<b>Event years</b>	<b>(0,1)</b>	<b>(0,1)</b>		<b>(0,3)</b>	<b>(0,3)</b>	
Net buy count	0.0033	0.0008	-0.0025	0.0089**	0.0093**	0.0004
Net buy volume	0.0027	0.0003	-0.0024	0.0079*	0.0078*	-0.0001
	<b>Terciles: difference top-bottom</b>					
Net buy count	0.0048	0.0027	-0.0022	0.0079*	0.0078*	-0.0001
Net buy volume	0.0036	0.0048	0.0012	0.0142**	0.0159**	0.0017
Average change in ROA	-0.00970	-0.0142		-0.0181	-0.0205	

<i>SEOs</i>	<b>Low valuation</b>	<b>High valuation</b>	<b>Difference</b>	<b>Low valuation</b>	<b>High valuation</b>	<b>Difference</b>
	<b>Regression coefficients</b>					
<b>Event years</b>	<b>(0,1)</b>	<b>(0,1)</b>		<b>(0,3)</b>	<b>(0,3)</b>	
Net buy count	0.0164***	0.0016	-0.0148*	0.0176*	0.0065	-0.0111
Net buy volume	0.0140**	0.0035	-0.0105	0.0176*	0.0090	-0.0086
	<b>Terciles: difference top-bottom</b>					
Net buy count	0.0170**	-0.0068	-0.0237*	0.0153	0.0023	-0.0130
Net buy volume	0.0069	-0.0053	-0.0121	0.0090	0.0162	0.0072
Average change in ROA	-0.0117	-0.0211		-0.0256	-0.0323	

**Table 7: Valuation, insider trading, and changes in the cost of capital after repurchases and SEOs**

The relation between insider trading and changes in the cost of capital for events with high and low valuation. The dependent variable is the change in the cost of capital in the 18 months after the event, estimated using the Fama-French model, as defined in Table 5. *Net buy count* and *net buy volume* are defined in Table 1. Regression coefficients are from a simple linear regression of the change in a risk characteristic, or in the cost of capital on insider trading,  $\Delta b = \alpha + \beta \times ITR + \varepsilon$ , estimated using heteroskedasticity-robust standard errors, clustered at the firm level. The first two rows in each panel show coefficient estimates from such regression models. The second two rows in each panel show the difference in risk characteristics between the top and the bottom tercile of firms ranked by the insider trading variable shown in the row. Our measure of valuation is defined in Table 6. *High valuation* means that the event is in the highest tercile according to our valuation measure, and *low valuation* means that the event is in the lowest tercile according to our valuation measure. *Difference* shows the difference in regression coefficients (first two rows in each panel), or the difference in differences between the highest and the lowest tercile for high versus low valuation events (second two rows in each panel). \*, \*\*, and \*\*\* indicate that the coefficient is statistically significant at the 10%, 5%, and 1% level, respectively.

<i>Repurchases</i>	Change in the cost of capital		
	<b>Low valuation</b>	<b>High valuation</b>	<b>Difference</b>
	<b>Regression coefficients</b>		
Net buy count	-1.3655***	-0.5741	0.7914
Net buy volume	-1.1158***	-0.6699*	0.4459
	<b>Terciles: difference top-bottom</b>		
Net buy count	-2.1468***	-0.9931	1.1537
Net buy volume	-1.7449***	-1.0054	0.6785
Average change	-3.568	-2.789	

<i>SEOs</i>	Change in the cost of capital		
	<b>Low valuation</b>	<b>High valuation</b>	<b>Difference</b>
	<b>Regression coefficients</b>		
Net buy count	-0.5424	0.3440	0.8864
Net buy volume	-0.1700	0.3244	0.4945
	<b>Terciles: difference top-bottom</b>		
Net buy count	-0.685	0.6299	1.2237
Net buy volume	0.1060	0.2434	0.1374
Average change	-4.200	-3.700	