

**Information content of insider trades:
before and after the Sarbanes-Oxley Act**

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Abstract:

This paper examines the information content of insider trade Form 4 filings under the more timely disclosure regime introduced by Section 403 of the Sarbanes-Oxley Act of 2002 (SOX). Abnormal returns and trading volumes around filings of insider purchases are significantly greater after than before SOX. The increase in returns around post-SOX filings of insider purchases is comparable to the amount of news that used to leak prior to pre-SOX filings. In the case of insider sales, abnormal trading volumes around their filings are also greater post-SOX, but stock returns are not more negative. Further analysis identifies two factors contributing to the difference between pre- and post-SOX sale returns: a decrease in insiders' propensity to time their sales shortly ahead of bad news after SOX and the greater dispersion of filings over time compared to before SOX.

JEL Classifications: G14, K22, M41

Keywords: insider trading; Sarbanes-Oxley Act; information content

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1. Introduction

The Sarbanes-Oxley Act of 2002 (thereafter SOX) constitutes a far-reaching federal law aimed at improving the reliability of corporate governance and the financial reporting process. SOX addresses the issue of insider trading in Section 403, which amends Section 16(b) of the Exchange Act of 1934 by requiring insiders¹ to report their trades on a Form 4 to the Securities and Exchange Commission (thereafter SEC) within two business days. Until August 2002, the reporting requirements consisted of filing a Form 4 with the SEC within ten days after the close of the calendar month in which the transaction occurred, which could result in a delay of up to 40 days.

Prior research reports mixed evidence in terms of the information content of insider trade filings before SOX (Lakonishok and Lee, 2001; Aboody and Lev, 2000).² By contrast, Fidrmuc et al. (2006) find significantly positive (negative) abnormal returns over the two-day window starting on filing dates of director stock purchases (sales) in the U.K., where reporting requirements are such that there is a maximum delay of six business days from the transaction to its public release.³ My study extends this strand of literature by documenting how a change in insider trade disclosure regulation in the U.S. has resulted in the provision of more timely and relevant information to market participants.⁴

¹ In most empirical studies, the term “insiders” is employed to designate directors, officers and beneficial owners of more than 10% subject to the filing requirements of Section 16 of the Exchange Act of 1934 prior to August 29, 2002, and of Section 403 of SOX subsequently. I further restrict my analysis to top management team members, whose trades are most likely to be informed (Gombola et al., 1983; Lin and Howe, 1990; Seyhun, 1998).

² This is despite evidence in the prior literature that corporate insider trades are associated with subsequent stock returns, which indicates that insiders trade upon private information not reflected in stock price (e.g. Givoly and Palmon, 1985; Seyhun, 1986; Rozeff and Zaman, 1988; Lakonishok and Lee, 2001).

³ However, Fidrmuc et al. (2006) report that in 85% of their sample, the delay is only zero or one day.

⁴ Another particularity of the accelerated filing requirements of Section 403 is that stock option grants are subject to the same regime, whereas they were previously reported on Form 5, not due until 45 days after

Since Section 403 of SOX requires insider trades to be filed on a much more timely basis (as of August 29, 2002) and mandates electronic filing (as of June 30, 2003), I expect Form 4 filings of insider trades to exhibit significantly greater information content in the post-SOX period, *ceteris paribus*. Prior theoretical and empirical studies emphasize the role of stock returns and trading volumes in measuring the information content (e.g. Beaver, 1968; Kim and Verrechia, 1991) of a public announcement. Stock returns capture changes in consensus belief about stock price, while trading volume arises when traders have heterogeneous beliefs about firm value before the announcement and/or interpret the signal differently. Using stock returns adjusted for book-to-market and size⁵ and abnormal trading volumes as proxies for information content, I find evidence that insider purchase filings are significantly more informative after SOX. Over a three-day window starting on the receipt of the form by the SEC, the mean cumulative abnormal returns are 0.63% and 1.89% pre- and post-SOX, while the average daily trading volumes are 1.22% and 9.09% higher than normal respectively; each of these differences are statistically significant. In the case of insider sales, daily trading volumes around post-SOX filings are significantly higher than normal (about 1.5%) and greater than pre-SOX. By contrast, mean abnormal returns are more negative around pre- than post-SOX filings (-0.27% and -0.11% respectively, over a three-day window).

The results in terms of returns around filings of insider sales do not appear to be consistent with my contention that Section 403 of SOX increases their information

the end of the fiscal year. Heron and Lie (2006) use this institutional change to test the backdating hypothesis for option grant date choice. Concurrent working papers by Collins et al. (2005) and Narayanan and Seyhun (2006a,b) also look at the effect of Section 403 of SOX on the patterns of stock returns around option grants (negative before, positive after) documented before SOX (Yermack, 1997; Aboody and Kasznik, 2000).

⁵ The expected returns are daily returns on the Fama-French 5x5 portfolios based on market capitalization and book-to-market ratio and obtained from Professor Kenneth French's website. Returns based on size- and momentum-portfolios as well as market-adjusted returns yield similar results.

content. I argue that the impact of the increased timeliness of Form 4 filings on contemporaneous short-window returns is potentially confounded by two factors.

First, the change in institutional environment and market conditions around the passage of SOX may have reduced the incidence of insider sales driven by private information. Indeed, SOX was enacted two months prior to the end of the correction period of the stock market bubble of the late 1990s, a period during which informed insider stock sales were believed to be rampant by academics and practitioners alike (see Fuller and Jensen, 2002; Greenspan, 2002). When I compare abnormal returns cumulated from the day following an insider transaction to the filing date of the corresponding Form 4 or a few days afterward, I find that pre-SOX returns after insider sales are significantly more negative than post-SOX. This is consistent with a decrease in insiders' propensity to time their sales shortly ahead of bad news after SOX. This finding does not extend to purchase transactions, as I find no significant difference between pre- and post-SOX mean or median returns starting from transaction dates and ending two days after purchase filings. Hence the increase in stock returns around Form 4 filings of purchases from pre- to post-SOX is comparable to the amount of positive news that used to be impounded into stock price before pre-SOX filings.

Another reason for the lower informativeness of sale filings post-SOX could be that Section 403 resulted in a larger frequency of filings that may convey little information on an individual basis. I assume that the observed tendency of insiders to trade over consecutive days reflects a breakdown of a total pre-decided amount, in order to limit the price impact of their trades (Kyle, 1985). If insiders keep breaking down their trades into several transactions over a period of several days after SOX, the new reporting

rule will result in multiple Form 4s being filed within a few days of each other. This is expected to affect insider sales more than purchases because sales tend to be larger than purchases (Seyhun, 1998). The data indicates that before and after SOX, about 40% of insider monthly stock sales observations are spread over several trading dates. To estimate the extent to which the dispersion of filings affects short-window returns around post-SOX Form 4 filings of sales, I aggregate them at the firm-month level. In that case, I find that average three-day returns around pre-SOX filings are no longer more negative than post-SOX, which suggests that the lack of clustering of post-SOX filings partly explains the less negative returns observed around Form 4 filings of sales after SOX.

Finally, I investigate cross-sectional determinants of stock returns and trading volumes around Form 4 filings. I find that the association between trading volumes and pre-filing analyst forecast dispersion increases (decreases) after SOX for purchases (sales). This suggests that the precision of purchase (sale) filings increased (decreased) after SOX (Karpoff, 1986; Dontoh and Ronen, 1993). I also find that the information content of purchase filings decreases in the trade reporting lag, a result likely attributable to leakage occurring prior to Form 4 filings. For sales, the significantly negative association between reporting lag and returns around pre- and post-SOX filings suggests that trades reported most diligently are less likely to signal bad news.

The remainder of the paper is organized as follows: Section 2 develops the hypotheses. Section 3 delineates the research design. Section 4 describes the sample and presents the results. Finally, Section 5 concludes.

2. Hypothesis development

The SEC regulates insider trading in the United States. Directors, officers and principal stockholders (with a stake of 10% or more) have to report most changes in their beneficial ownership to the SEC. Until August 2002, the reporting requirements were defined under Section 16 of the Securities Exchange Act of 1934, and consisted of filing a Form 4 with the SEC within ten days after the close of the calendar month during which the transaction occurred. Section 403 of SOX amends this provision of Section 16 of the Exchange Act as of August 29, 2002 by requiring insiders to file their Form 4s with the SEC within two business days of the transaction date. Furthermore, effective June 30, 2003, Form 4s must be filed electronically, and companies with websites are required to post information online about the trades the day after they are filed with the SEC.

Analytically, Huddart et al. (2001) show that public disclosure of insider trades accelerates price discovery compared to the no-disclosure benchmark model of Kyle (1985). Empirically, the association between insider trades and future returns documented throughout decades of observed corporate insider trading suggests that the average insider trade is a potential signal to investors about firm value. Insofar as the disclosure does not occur after the news that insiders were trading upon, a Form 4 may have information content, i.e. affect demand and supply for a stock and its equilibrium price. The existing literature has found no conclusive evidence in terms of the information content of Form 4 filings prior to SOX. Among all insider transactions by corporate managers in 1975-1995, Lakonishok and Lee (2001) find statistically but not economically significant mean market-adjusted returns over a five-day window starting on insider trade filing dates, irrespective of book-to-market ratio and size (about 0.13%

for purchases and -0.23% for sales). Aboody and Lev (2000) find more positive (negative) raw returns and higher trading volumes following filings of insider purchases (sales) in firms with R&D activity versus others, but the returns remain low on average. I attribute the small returns around pre-SOX Form 4 filings documented by prior research to the lack of timeliness of pre-SOX filing requirements. I expect the shorter delay between insider trades and their disclosure that came about as a result of Section 403 of SOX to endow Form 4 filings with greater information content, because it allows the market to react to the filings rather than other sources of news that reveal insiders' private information.

Information content is measured not only in terms of stock returns, but also trading volumes, in conjunction with the information environment around the disclosure, as demonstrated theoretically by Karpoff (1986), Kim and Verrechia (1991), and Dontoh and Ronen (1993). Trading volumes can result from differential interpretations of a disclosure among traders, or convergence of their previously dispersed beliefs. The announcement of an insider trade is expected to generate both abnormal stock returns (positive for purchases, negative for sales) and abnormal trading volumes. Hypothetically, if the same exact insider trade were subject to a more timely disclosure requirement, I would expect its disclosure to trigger a larger price reaction, because some of the private information that insiders trade upon can be revealed before an untimely Form 4 filing. Indeed, before SOX, several studies such as Givoly and Palmon (1985) and Aboody and Lev (2000) document positive (negative) abnormal returns in the days following insider purchases (sales), but before their public filing. Under heterogeneous beliefs, accelerated filing and prompt online public dissemination of Form 4s by firms

and the SEC are also expected to affect trading volumes positively because more market participants will trade on the insider signal at the same time.

However, this assumes that insiders trade on their private information to the same extent before and after SOX. I argue that this may not be the case for insider sales. In the wake of corporate scandals contemporaneous to the enactment of SOX, I expect insiders to be less prone to engage into opportunistic trading because of increased scrutiny from investors, medias and regulators (what Huddart, Ke and Shi, 2007, label as “jeopardy”). Since insider sales are more exposed to litigation and prosecution than purchases, I expect them to be more affected by this change.⁶ Recent research provides evidence suggesting that managers’ incentives and flexibility to engage into opportunistic behavior have decreased after SOX. For example, stock return patterns around option grants are less favorable to managers after SOX (Heron and Lie, 2007; Narayanan and Seyhun, 2006a). Li and Zhang (2006) find a decrease in opportunistic insider selling ahead of accounting restatement announcements after SOX. Cohen, Dey and Lys (2005) find a decrease in accrual-based earnings management after SOX, and document that pre-SOX earnings management was associated with the proportion of option holdings in total compensation.⁷ This suggests that insiders have less opportunities to ‘pump and dump’

⁶ This is assumed to be the by-product of an asymmetry in expected legal costs associated with good and bad news. In the case of good news, one suffers an opportunity loss rather than an out-of-pocket cost, and is it more difficult to prevail in front of juries with the former (see Skinner, 1994). The connection with insider trading comes from the fact that insider selling is recognized by courts as a mechanism to establish that the defendants acted with scienter in securities fraud allegations, which plaintiffs ought to prove for their lawsuit to prevail under Rule 10b-5. Hence, plaintiffs resort to insider selling allegations to substantiate many cases.

⁷ See also Carter, Lynch and Zechman (2006), who document that after SOX, income-decreasing accruals are associated with a larger penalty, and non-discretionary earnings with greater rewards in terms of bonus compensation.

their stock as they did prior to SOX.⁸ More generally, I hypothesize that the average insider sale will be driven by private information to a lesser extent after SOX. In that case, the more negative returns that would have been induced by the more timely disclosure of insider sales can be mitigated by the concurrent decrease in opportunistic selling after SOX.

Second, I expect the new disclosure rule to result in the provision of information about insider trades in a more disaggregated fashion after SOX. Insiders tend to trade several times over a period of several days. I assume that this reflects concerns with the influence on stock price of large trades, which is consistent with Kyle's (1985) strategic model of trading. Hence, large transactions are expected to be divided into multiple transactions over a period of several days. Under the old reporting regime, insiders could wait until the deadline to file a single Form 4, whereas under Section 403 of SOX, the same insider may report several Form 4s within days to meet the two-business-day deadline. I expect sales to be more affected than purchases because they tend to be larger than purchases (Seyhun, 1998). The probability that an open market insider purchase may be driven by private information is expected to be high, even for small purchases. In addition, assuming that waiting for the deadline was the norm, pre-SOX trades could be reported around the same date for all insiders across all firms. Market participants who use insider trades in their investment decisions are more likely to do so at a certain level of aggregation in the case of sales, which are very noisy when considered individually, among others because of liquidity trades. Before SOX, they could simultaneously receive

⁸ Several studies show that in the years before SOX, corporate insiders sold large amounts of stock when prices were presumably inflated through income-increasing earnings management (Bartov and Mohanram, 2004; Bergstresser and Philippon, 2006; Huddart and Louis, 2006).

information about insider trade disclosures at the firm-, industry- and market-level. This is unlikely to occur after SOX, unless all insiders trade at the same time.

Overall, the tension between increased timeliness and 1) the decrease in informed trading, 2) the greater disaggregation of filings is expected to be more severe for sales than purchases. Accordingly, I formulate a directional hypothesis with respect to the effect of Section 403 of SOX on Form 4 filings of insider purchases, but leave sales as an empirical question:

H1: Abnormal stock returns and trading volumes are significantly more positive in the days following Form 4 filings of insider purchases for transactions executed after versus before August 29, 2002, when Section 403 of SOX came into effect.

3. Research design

3.1. Variable definitions: trade size, abnormal returns, abnormal trading volumes

I measure the size of insider trades as the number of shares traded, deflated by the number of shares outstanding⁹ on the same day, as in Beneish and Vargus (2002), which is equivalent to dividing the market value of the trade by the contemporaneous market capitalization, as used by Elliot et al. (1984), provided there is consistency between the numerator and denominator in terms of share price. Since I conduct my tests separately for purchases and sales, there is no need to create a signed variable. I label the ratio *Trade Size*. Several transactions may be reported on the same Form 4, and several forms may be

⁹ Theoretically, deflating trades by insiders' equity holdings is more appealing than using shares outstanding, because it better reflects the impact of trades on insiders' portfolios. However, when selling "conventional" stock, insiders report their holdings exclusive of options. By contrast, when selling options, they report only option holdings for a specific series, so total (option) holdings are generally not observable in Thomson Financial.

reported on the same date. In this case, I add up *Trade Size* for all transactions reported on the same filing date, but separately for purchases and sales.

To measure abnormal returns, I assign stocks to one of 25 Fama-French portfolios resulting from the intersection of five portfolios based on market values of equity (size) and five portfolios based on book-to-market value of equity ratios. I subtract portfolio returns from individual stock returns to obtain daily abnormal returns CAR_t . If the window of interest exceeds one day, daily abnormal returns are summed.¹⁰

I calculate abnormal trading volumes using a log market model based on Ajinkya and Jain (1989), extended by Meulbroek (1992) in the context of illegal insider trading, Yermack (1997) and Heron and Lie (2007) for stock option awards. The regression is the following:

$$\begin{aligned} \log(V_{it}) = & \alpha_i + \beta_i \log(V_{i,mt}) + \lambda_1 \log(V_{it-1}) + \lambda_2 \log(V_{it-2}) + \eta_1 Mon + \eta_2 Tue \\ & + \eta_3 Wed + \eta_4 Thu + \phi_1 Holiday_{it} + \phi_2 Holiday_{it-1} + \rho_i Earnings_{it} \\ & + \delta_i Dividend_{it} + \gamma_i Filing_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

V_{it} is trading volume as a percentage of total shares outstanding for firm i on day t , net of *Trade Size*. $V_{i,mt}$ is equal to total trading volume as a percentage of total shares outstanding for all firms listed on the same exchange as firm i on day t . Lagged values of V_{it} are included to reduce serial correlation of the residuals. *Mon*, *Tue*, *Wed* and *Thu* are day-of-the-week indicator variables. *Holiday* is an indicator variable set to one for days preceding three-day holiday weekends and the Friday following Thanksgiving. *Earnings* (*Dividend*) is an indicator variable equal to one for all days in $[-3,+3]$ window around earnings (dividend) announcements. The variable of interest is *Filing*: it is an indicator

¹⁰ In robustness checks, I use portfolios based on size and momentum. I also compute market-adjusted returns, as in Lakonishok and Lee (2001).

variable equal to one on insider sale filing dates and/or the following one to four trading days depending on the window of interest. The coefficients are estimated separately for each firm-SEC filing date, using a time-series regression based on 50 days before and after the event day. Each regression produces a γ_i specific to a Form 4 filing, and I use it as a measure of abnormal trading volume (subsequently labeled *Volume*). It can be interpreted as the daily percentage deviation over the window of interest from normal trading volumes as modeled in (1).

My primary tests of H1 consist of comparing mean *CAR* and *Volume* around filings of insider purchases and sales before versus after August 29, 2002. The subsequent multivariate analyses investigate potential determinants of the information content of Form 4 filings.

3.2. Information content of insider trade filings: multivariate analysis

3.2.1. Trading volumes

To test the association between volume reactions to Form 4 filings and analyst forecast dispersion as well as other control variables, I run the following regression, where individual observations are filing dates of Form 4s:

$$\begin{aligned}
 Volume_{0,4} = & \alpha_0 + \alpha_1 PostSOX + \alpha_2 Reporting\ Lag + \alpha_3 Reporting\ Lag \times PostSOX \\
 & + \beta_1 Dispersion + \beta_2 Dispersion \times PostSOX + \beta_3 Trade\ Size \\
 & + \beta_4 Trade\ Size \times PostSOX + \beta_5 Book\ To\ Market + \beta_6 Size + \beta_7 R\ \&\ D \\
 & + \beta_8 Loss + \beta_9 Restrict + \varepsilon
 \end{aligned} \tag{2}$$

PostSOX is an indicator variable equal to one for post-SOX filings, zero otherwise. *Reporting Lag* is the number of trading days between an insider transaction and its filing. If several trades are filed on the same day in a given firm, the reporting lag of the earliest trade prevails. The variable is censored at three days (i.e. late filings) for post-SOX

filings. *Dispersion* is the standard deviation of individual analyst end-of-the-year EPS forecasts released between the latest earnings announcement and the Form 4 filing date, as a percentage of the absolute value of the mean of those forecasts. If an analyst issues several forecasts, only the latest is kept. *Trade Size* is total number of shares purchased or sold as reported on all Form 4s filed on day 0, deflated by shares outstanding. *Book-to-Market* is the ratio of book value to market value of equity, calculated as of the beginning of the fiscal quarter. *Size* is the natural logarithm of market capitalization as of the beginning of the fiscal quarter. *R&D* is an indicator variable equal to one for firms that report a non-zero R&D expense in the previous fiscal year, zero otherwise. *Loss* is an indicator variable equal to one for firms that report negative net income in the previous fiscal year, zero otherwise. *Restrict* is an indicator variable aimed at capturing the existence of a firm-level policy restricting the timing of insider trades (Bettis, Coles and Lemmon, 2000). Following Roulstone (2003), I infer the presence of such policy from the degree of clustering of insider transactions after earnings announcements. *Restrict* is equal to one for all quarters in a firm-fiscal year if 75% or more of insider trades executed during the year occur in a 30-day window following an earnings announcement.¹¹ I address the sensitivity of this proxy by changing the parameters such as the 75% and 30-day cutoffs, but report results based on the aforementioned definition.

Because of the fundamental differences between purchases and sales, Model (2) is run separately for these two types of transactions. I choose to measure the dependent variable over a five-day window as in Lakonishok and Lee (2001) to allow for delayed reactions to Form 4 filings to be included, especially before SOX when electronic filing was not common practice (Bryan-Low, 2002). The coefficient on *PostSOX* is expected to

¹¹ I use trades from all directors and officers to construct this variable.

be significantly positive, especially for purchases, following the hypothesis development. If leakage¹² affects negatively the information content of pre-SOX Form 4 filings, and leakage increases with filing delays, then the coefficient on *Reporting Lag* should be negative. Since reporting lags are much shorter after SOX, I interact *Reporting Lag* with *PostSOX* to capture the pre- and post-SOX effect of leakage on *Volume* separately. Prior analytical work shows that disclosure can trigger trading volume when traders interpret a signal differently or when they interpret it identically but have different priors (Karpoff, 1986; Kim and Verrechia, 1991; Dontoh and Ronen, 1993). Disclosure that induces convergence is considered to have more information content, whereas noisy signals tend to generate different interpretations. The precision of an insider trade signal is unobservable, but can be inferred from the association between *Volume* and *Dispersion* as a proxy for pre-filing belief heterogeneity.¹³ In Model (2), β_1 captures the pre-SOX association and β_2 the incremental post-SOX association. A positive β_1 would indicate that pre-SOX Form 4 filings tend to trigger larger volume reactions as a result of convergence of beliefs. If Section 403 increases the information content of Form 4 filings in terms of precision, then β_2 should be positive. I also include *Trade Size* to test whether larger insider trades trigger more trading volume upon filing, in which case β_3 and/or β_4 will be positive. Finally, the other variables have been shown to be determinants of stock returns following insider transactions. I include them to test whether they are associated

¹² I use the term “leakage” to describe the incorporation of insiders’ private information into stock price in the period between an insider trade and its public filing. Such leakage can occur through informed traders’ activity or public announcements, but is not necessarily driven by knowledge about the insider trade per se.

¹³ Bildersee et al. (1996) use a proxy based on accounting earnings to measure the precision of earnings announcements and find that it is positively related to volume reactions around those announcements. Their findings complement those of Ziebart (1990) who documents a positive association between pre-announcement analyst forecast dispersion and trading volume around the announcement. Ajinkya et al. (1991) document a similar association on average, i.e. not solely around earnings announcements.

with the trading volume component of the information content of Form 4 filings, but leave the sign of their coefficients as an empirical question.

3.2.2. Stock returns

I test the association between returns around filing dates of insider trades and potential determinants of the information content of Form 4 filings using the following cross-sectional regression:

$$CAR_{0,4} = \alpha_0 + \alpha_1 Reporting\ Lag + \beta_1 Trade\ Size + \beta_2 Book\ To\ Market + \beta_3 Size + \beta_4 R\ \&\ D + \beta_5 Loss + \beta_6 Restrict + \varepsilon \quad (3)$$

$CAR_{0,4}$ is the five-day size- and book-to-market-adjusted stock return starting on the filing date of a Form 4. *Reporting Lag*, *Trade Size*, *Book-to-Market*, *Size*, *R&D*, *Loss* and *Restrict* are the same as in Equation (2).

As in (2), I run the model separately for purchases and sales, but also pre- and post-SOX. The latter distinction is equivalent to interacting the *PostSOX* indicator from Model (2) with all other variables. As in Model (2), *Reporting Lag* is included to capture the potential effect of leakage on the information content of Form 4 filings as a function of the delay between the transaction and its public disclosure. If leakage increases in reporting lag, then the association will be negative (positive) for purchase (sale) filings. I include *Trade Size* to assess if the market reacts more strongly to insider trade filings, the greater those trades are as a percentage of shares outstanding. The other independent variables are also expected to be determinants of returns around insider trade filings, as they proxy for other dimensions of information asymmetry, risk and past performance. Prior research shows that insiders tend to buy (sell) shares in value (growth) stocks (Rozeff and Zaman, 1998; Lakonishok and Lee, 2001; Piotroski and Roulstone, 2005). If

insider purchases (sales) in high (low) book-to-market firms signal under-(over-) valuation, the coefficient on *Book-to-Market* should be positive in Model (4). Net insider purchases predict more positive abnormal returns in smaller firms (Lakonishok and Lee, 2001), hence the coefficient on *Size* should be negative (positive) for purchases (sales). Following Aboody and Lev (2000), I expect *R&D* to exhibit a positive (negative) association with *CAR* for purchases (sales). I also test whether poor financial performance, captured by the *Loss* indicator, is associated with more positive (negative) reactions to purchase (sale) filings, as Fidrmuc et al. (2006) document for insider transactions in the U.K. As for *Restrict*, Roulstone (2003) shows it is negatively associated with insider trading profitability, so I expect Form 4 filings of purchases (sales) to be associated with less positive (negative) returns when *Restrict* equals one.

4. Results

4.1. Sample and descriptive statistics

The data employed for the main tests in this study is gathered from the following sources: 1) CRSP for stock price¹⁴ and trading volume variables, 2) Compustat for financial information, 3) Thomson Financial insider trading database, 4) I/B/E/S for analyst forecasts and 5) The Stanford Securities Class Action Clearinghouse for Rule 10b-5 lawsuit data. Sample size varies by test depending on data requirements.

Thomson Financial Insiders Data Feed contains trade information from directors, officers and principal stockholders with holdings over 10% of a firm's stock, all subject to disclosure requirements as defined in Section 16 of the Exchange Act of 1934 until August 2002, and Section 403 of the Sarbanes-Oxley Act subsequently. I select all open

¹⁴ Except for returns on the Fama-French portfolios, which are obtained from Professor French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

market purchases and sales (including those of shares acquired through option exercises) executed by CEOs, CFOs, COOs, Chairmen of the Board and Presidents between 1997 and 2005.

Table 1 reports descriptive statistics for the variables used in the subsequent tests. The sample consists of 12,734 reporting dates of insider purchases (of which 4,317 after SOX) and 33,871 reporting dates of sales (including 24,054 after SOX) for which shares outstanding data is available.¹⁵ Using reported transaction prices, the mean (median) dollar value of insider purchases as reported in my sample is \$217,010 (\$29,060) before SOX and \$152,076 (\$24,450) after SOX, while for sales it is \$2,803,864 (\$476,738) before SOX and \$1,559,057 (\$278,052) after SOX. The increased number of insider sales reporting dates and decrease in average trade value (almost 50% for sales) after SOX illustrates a mechanical effect of Section 403 of SOX, which results in a multiplicity of Form 4s being filed on different dates while they would have been clustered under the prior rule. Also, there are more insider monthly sales (about 40%) than purchases (20-25%) spread over several transaction dates, before and after SOX. These summary results suggest that the potential impact of Section 403 of SOX on the dispersion of Form 4 filings is not negligible.

Figure 1 plots the daily distribution of pre- and post-SOX filing dates for a given calendar month. It clearly shows that there is a flat distribution of filing dates after SOX, as opposed to before SOX, when filings were clustered around the 10th day of the month. This provides additional support to the interpretation from the results in Table 1 in terms of greater dispersion of post-SOX filings.

¹⁵ This is after a cleansing process that eliminates transactions with reported prices outside of the interval between the lowest bid and highest ask available on CRSP, with a number of shares exceeding total common shares outstanding, or with a transaction price lower than \$2 per share.

4.2. Information content of Form 4 filings

4.2.1. Insider purchase filings before versus after SOX

Table 2 reports mean and median abnormal returns *CAR* (Panel A) and trading volumes *Volume* (Panel B) around Form 4 filing dates of insider purchases. Mean and median daily abnormal returns over the five days starting on the filing date of Form 4s of insider purchases are significantly positive post-SOX. They are also significantly greater than pre-SOX returns on the filing date and the following day. Mean (median) three-day *CAR* is 1.89% (0.95%) after SOX versus 0.63% (0.01%) before SOX, the difference being significant at the 0.01 level. Hence in terms of returns, post-SOX filings of Forms 4 for insider purchases have more information content than pre-SOX. Also, mean daily returns are significantly positive from the filing date onwards after SOX, but only as of day $t+2$ before SOX, which suggests that before SOX, information about Form 4 filings of purchases was not available until two trading days after the receipt of the filing by the SEC. The quicker market reaction after SOX is likely driven by electronic filings (mandated as of June 30, 2003). The results in terms of abnormal trading volumes are similar. Daily *Volume* averages 9.09% over the three-day window starting on the filing date after SOX, versus 1.22% before SOX.¹⁶ Post-SOX abnormal trading volumes are also significantly positive on average the day before the receipt of Form 4s by the SEC, a result potentially driven by abnormal trading activity associated with the trades themselves (as opposed to their disclosure), despite the fact that I deduct the shares traded by insiders from my measure of daily turnover. Overall, the evidence in Table 2 leads to

¹⁶ To provide a benchmark for the magnitude of this trading activity, the mean abnormal trading volume around earnings announcement according to Model (1) (using all earnings announcements that fall within 50 days of a Form 4 filing) is about 25%, which shows that post-SOX filings of top managers' open market purchases generate a large amount of trading volume.

the conclusion that the market reacts more quickly and strongly to insider purchase filings after SOX, which supports H1.

4.2.2. *Insider sale filings before versus after SOX*

Table 3 reports mean and median *CAR* and *Volume* around Form 4 filing dates of insider sales. The results in Panel A indicate that abnormal returns around post-SOX filings are less negative than pre-SOX. Mean (median) five-day returns starting on filing dates are -0.56% (-0.31%) before SOX and -0.19% (-0.27%) after. If one looks at stock returns only, this result contradicts the contention that insider sale filings have greater information content under Section 403 of SOX versus Section 16 of the Exchange Act. However, this is not the case in terms of trading volumes, as Panel B shows. Indeed, mean *Volume* is significantly positive around post-SOX filings, but not pre-SOX. For example, on the filing date, the difference between post- and pre-SOX is significant at the 0.05 level. Mean three-day daily *Volume* is 1.49% post SOX, -0.43% before, the difference being significant at the 0.01 level. Hence post-SOX filings of insider sales generate positive trading volumes on average as opposed to pre-SOX filings.

As posited in Section 2, there are several factors that can explain the less negative returns around post-SOX filings of insider sales compared to pre-SOX. One of them is the lack of clustering of post-SOX filings. To investigate the effect of this difference between pre- and post-SOX filings, I sum returns and volumes around Form 4 filings at the firm-month level, without double counting trading days when windows overlap. The results are presented in Table 4. The number of observations drops by almost 50% for post-SOX filings, whereas it is only marginally affected by the aggregation for pre-SOX filings, which are already clustered. In Panel A, mean and median pre-SOX returns are

also unaffected, while post-SOX returns are more negative at the firm-month level than at the individual form level. The difference between mean $CAR_{0,2}$ before and after SOX is no longer statistically significant. Panel B reports mean and median *Volume* at the firm-month level. Compared to Table 3, the gap between pre- and post-SOX mean and median *Volume* widens. Hence, the results in Table 4 suggest that the more diffuse release of insider sale filings under Section 403 of SOX partly explains why they are not contemporaneous to abnormal returns more negative than pre-SOX when observed at the individual filing level.

4.3. Abnormal returns as of transaction dates

The analysis so far ignores stock price patterns between insider transactions and their filings, especially in the pre-SOX period. The next set of results addresses this issue. Figure 2 plots mean cumulative abnormal returns starting from the day after insider transactions, separately for 1) pre- and post-SOX 2) purchases and sales, which results in four return patterns.¹⁷ Since pre-SOX trades may be filed 10 to 40 calendar days after their execution, I only plot returns over the first five days following pre-SOX trades and then the last five days before their filings. This explains the discontinuity in the pre-SOX lines. Pre-transaction returns are not plotted, so the returns before day 0 for post-SOX trades are based only on trades filed with a two-business day delay. Late post-SOX filings are excluded. The graph shows that within a few days after the filing date, the mean return following post-SOX purchases is almost as high as the pre-SOX mean, despite the fact that the pre-SOX mean as of the filing date is over 1.5%. Stock return patterns following insider purchases suggest that the incremental returns that follow post-

¹⁷ The means in Figure 2 are based on all transactions being treated as individual observations with equal weight. This is in contrast to all tables, where Form 4 filing dates constitute unique observations.

SOX filings are comparable to the amount of news that used to be reflected into stock price before the filings under the previous reporting regime. By contrast, returns following post-SOX sales are less negative than pre-SOX irrespective of the end of the measurement window.

Table 5 presents the results for mean abnormal returns computed as of the day following transaction dates. Since several transactions may be reported on the same filing date, I take the mean of the transaction-specific returns weighted by the value of the corresponding trades (transaction price multiplied by the number of shares purchased or sold). Panel A reports the results for purchases. Mean (1.58%) and median (0.56%) *CAR* over the period during which, presumably, the insider transaction is unknown to the public, i.e. ending day -1, is significantly more positive pre- than post-SOX (post-SOX mean is 0.12%, median 0.14%): there is a greater amount of leakage following pre-SOX purchases. However, if the window is extended until day +2 to +4, i.e. when one accounts for the potential market reaction to the public disclosure of the purchase, the difference in mean and median *CAR* between pre- and post-SOX is insignificant. This result is consistent with the returns around post-SOX filings of insider purchases incorporating what would have leaked prior to the filing date under a less timely filing requirement. Panel B reports the results for insider sales. Whether the window ends one day before or up to four days after the Form 4 filing date, mean (median) *CAR* computed as of the transaction date is significantly more negative for pre- than post-SOX sales. The mean *CAR* measured prior to the filing of pre-SOX sales is -1.54%, versus -0.13% for post-SOX sales, the difference being significant at the 0.01 two-tailed level. This suggests that after SOX, insiders are more likely to avoid timing their sales shortly ahead of bad

news¹⁸, which contributes to the limited impact that their Form 4 filings have on stock price. Hence, results in Table 5 are consistent with the argument that there is less opportunistic insider selling after SOX, as measured by the association between insider sales and subsequent short-term returns.

4.4. Determinants of Form 4 filing information content

4.4.1. Trading volumes

Table 6 reports OLS results for the analysis of abnormal trading volumes around Form 4 filings. Since some observations exhibit very high levels of *Dispersion* that are driven by a denominator close to zero, I report results based on decile rankings instead of the continuous variable. The decile assignments are based on the distributions of *Dispersion* before and after SOX. Also, *Trade Size* is multiplied by ten, so the order of magnitude is more in line with *Volume* and the tabulated coefficients not too large. The first (last) two sets of coefficients are those estimated from Model (2) for purchases (sales), respectively without and with *Dispersion* and its interaction term with *PostSOX*. The significantly positive coefficients on *PostSOX* (except for purchases when *Dispersion* is included in the model) are consistent with the univariate findings, i.e. returns around Form 4 filings are greater, on average, after SOX. There is a significantly negative association between *Volume* and *Reporting Lag* around purchase filings: the longer the delay between a purchase and its disclosure, the lower the volume reaction to the disclosure. Judging from the significantly positive coefficient on *Trade Size*PostSOX* in all models, larger insider transactions tend to trigger larger volume reactions from the market when filed. Trading volumes around post-SOX purchases are positively and

¹⁸ Alternatively, I compare abnormal returns following pre- and post-SOX insider sales over the same window length, e.g. five days. In that case, I still find that mean (and median) *CAR* is significantly more negative before compared to after SOX. These results are not tabulated.

significantly associated with pre-filing analyst forecast dispersion: the coefficient on *Dispersion*PostSOX* (0.0202) is significant at the 0.05 two-tailed level, and so is the sum of the coefficients on *Dispersion* and *Dispersion*PostSOX* (not tabulated). There is also a significantly positive coefficient on *Dispersion* (0.0087) for sale filings, while the coefficient on the interaction term with *PostSOX* is negative. These results are consistent with Section 403 of SOX increasing the precision of purchase filings and decreasing that of sales, at least in firms with analyst following.¹⁹ Other results show that *Volume* is decreasing in firm size, significantly so for sale filings. Purchase (sale) filings are associated with greater *Volume* in firms with negative (positive) earnings. The coefficient on *Restrict* is positive, which means that insider trades in firms that appear to impose a restriction on their timing trigger larger trading volumes on average around their filing compared to those in firms with no restriction. This result may be due to the greater degree of clustering of Form 4 filings in such firms.

4.4.2. Abnormal returns

Table 7 reports regression results where the dependent variable is five-day *CAR* starting on Form 4 filing dates. Coefficients are estimated separately for purchase and sale filings, before and after SOX. Returns around post-SOX Form 4 filings of purchases exhibit a significantly positive association with the size of the reported trade: investors react as though larger insider purchases signal more positive news. The significantly negative coefficient on *Reporting Lag* for purchase filings (pre- and post-SOX), together with the results in the volume regressions, shows that the information content of those

¹⁹ If I winsorize *Dispersion* at 1% each tail and use the continuous variable instead of deciles, this conclusion is qualitatively unaffected.

filings increases with their timeliness.²⁰ By contrast, the more promptly sales are reported, the less negative the returns following their disclosure, as illustrated by the negative coefficient on *Reporting Lag*. Pre- (Post-) SOX purchase filings trigger, on average, five-day returns greater by 0.94% (1.35%) in R&D firms compared to other firms. The coefficient on *Loss* is significantly positive for post-SOX purchases (1.45%). This suggests that, after SOX, disclosures of insider purchases in financially distressed firms signal good news. Overall, for purchases, the multivariate results suggest that the increase in returns around post-SOX filings is due to their greater association with trade and firm characteristics. Finally, in terms of R^2 , there is a large increase from pre- to post-SOX for purchases, but not sales, which provides additional support to the conclusion that Section 403 of SOX increases the information content of insider purchases more than sales.

4.5. Additional tests

4.5.1. Returns following sales and litigation risk

To complement the previous tests, I look at the association between short-term returns following insider sales and an estimate of the firm-level ex-ante litigation risk. The purpose of this test is to shed additional light on the change in opportunistic insider selling behavior around the passage of SOX. In particular, I expect managers in firms with high ex-ante litigation risk to be more cautious in timing their stock sales after SOX.

I run the following regression for insider sales:

$$CAR_{t+1,t+10} = \alpha_0 + \alpha_1 PostSOX + \gamma_1 High\ Risk + \gamma_2 High\ Risk \times PostSOX + \beta_1 Trade\ Size + \beta_2 Book\ To\ Market + \beta_3 Size + \beta_4 R\ \&\ D + \beta_5 Loss + \beta_6 Restrict + \varepsilon \quad (4)$$

²⁰ For post-SOX purchases, a non-tabulated univariate analysis suggests that this is likely driven by the lower returns and volumes around late filings.

The dependent variable is the average of the returns compounded as of one day following each transaction reported on the same date and ending ten days after the transactions, weighted by the transaction dollar value. The variable of interest is the interaction term between *PostSOX* and *High Risk*, which is equal to one for abnormally large sales in firms subject to high litigation risk, zero otherwise. I predict that the coefficient on *High Risk* \times *PostSOX* is positive, i.e. that after SOX, insiders are (even) less inclined to sell large amounts of stock shortly before bad news when facing high ex-ante litigation risk.

To calculate *High Risk*, I first estimate litigation risk at the firm-year level by using a methodology similar to that developed by Rogers and Stocken (2005)²¹, and use lagged values to obtain an ex-ante measure. Observations across all sample firms are then ranked within each calendar year based on their estimated ex-ante litigation risk, and those in the top quartile of a given year are considered to be high litigation risk firms. In order to identify abnormally large sales, for a given Form 4, I aggregate *Trade Size* at the insider- and firm-level over the 365-day window ending on the Form 4 filing date. I then compute the mean and standard deviation of annual insider- and firm-level *Trade Size* over five preceding 365-day windows, ending one year before the filing. If total insider- and firm-level sales over the most recent year exceed the past insider- and firm-level mean by more than five standard deviations (or 100% if standard deviation is not

²¹ Rogers and Stocken (2005) run a probit regression where the dependent variable is one if a Rule 10b-5 lawsuit is filed against a firm in a given quarter, zero otherwise. The independent variables include firm size, beta, daily turnover, cumulative quarterly return, standard deviation, minimum and skewness of daily returns, as well as indicator variables for high-risk industries. I run the same model using firm-year observations, and add indicator variables for calendar years. The results are very similar to those reported by Rogers and Stocken. A table with coefficient estimates is available upon request.

available), the sale(s) reported on the Form 4 is (are) considered to be abnormally large.²² This variable construct is inspired by the notion of suspiciously/abnormally large insider sales developed in legal practice²³, and the existing literature (Bartov and Mohanram, 2004; Beneish et al., 2005).

The results are presented in Table 8. The significantly negative coefficient on *High Risk* indicates that abnormally large pre-SOX sales in firms exposed to high litigation risk precede abnormal returns which are, on average, more negative than other pre-SOX sales by 1.19%.²⁴ By contrast, the coefficient on *High Risk* interacted with *PostSOX* is significantly positive (+1.45%). This suggests that after SOX, insiders are more cautious in timing their large sales when ex-ante litigation risk is high. This result lends additional support to the argument that there is less opportunistic insider selling after SOX.

4.5.2. Robustness checks

I perform a variety of tests to supplement the results from the main analysis. First, I test whether abnormal returns and trading volumes around Form 4 filings increased prior to August 29, 2002 by separating the pre-SOX period into two sub-periods. I choose December 2, 2001 as the cutoff date, i.e. when Enron filed for bankruptcy in the U.S., because market participants may have increased their focus on insider trade disclosures in the months following the Enron fallout but preceding the enactment of SOX.

²² I perform a sensitivity analysis by changing the parameters from 4 to 8 standard deviations and 50% to 200% of past mean.

²³ See Sale (2002) for more details on court criteria to determine if insider sales are indicative of opportunistic behavior.

²⁴ This result may seem counterintuitive, since one may expect insiders in high-litigation risk firms to be most cautious, even before SOX. However, sales from insiders in companies such as Enron and Qwest are classified as *High Risk* in my sample in 1999-2000. This suggests that insiders did little to conceal their opportunistic sales in the years prior to SOX.

The results, presented in Table 9, indicate that there is no significant difference between mean abnormal returns and trading volumes measured over a short-window following Form 4 filings of insider trades before and after December 2, 2001 within the pre-SOX era. Post-SOX filings of purchases remain more informative than pre- and post-Enron bankruptcy filings. Likewise, three- and five-day mean daily abnormal trading volumes are significantly greater after SOX compared to either pre-SOX period. Hence, there is no evidence that the increase in information content of (volume reactions to) Form 4 filings of insider purchases (sales) around SOX is attributable to the events that led to the enactment of SOX.

I also check whether the results hold if I require the same firms to be in the sample before and after SOX. When I keep post-SOX observations for firms that had at least one insider trade before SOX, I find virtually the same results as with the main sample, although there are about 30% fewer post-SOX purchases and sales.

5. Conclusion

This study analyzes the information content of Form 4 filings in the years around the passage of the Sarbanes-Oxley Act of 2002 (SOX). Effective August 29, 2002, SOX amends Section 16 of the Securities Exchange Act of 1934 by requiring corporate insiders to file their stock transactions with the SEC within two business days, whereas they could wait until the 10th day of the following calendar month under the prior regime. I argue that, *ceteris paribus*, the greater timeliness of Section 403 filing requirements increases and accelerates the information content of Forms 4, especially for purchases, which are more likely to be motivated by private information than sales. Using all open

market purchases and sales by top managers from 1997 to 2005, I find that mean and median size- and book-to-market adjusted stock returns and abnormal trading volumes around filing dates of insider purchases are significantly greater post-SOX than pre-SOX. When returns are accumulated as of the transaction date, the results suggest that the increase in returns around post-SOX filings of purchases corresponds to the amount of good news that used to be incorporated into stock price prior to pre-SOX filings. Also, I find that volume reactions to post-SOX purchase filings are positively associated with pre-filing analyst forecast dispersion, which is consistent with those filings inducing convergence of beliefs on average (Karpoff, 1986; Dontoh and Ronen, 1993).

In the case of sales, abnormal trading volumes around Form 4 filings are significantly positive after SOX and greater than pre-SOX. By contrast, stock returns are less negative around post-SOX filings. I identify two factors that potentially explain this result. First, I find that abnormal returns in the days following insider sales are less negative after SOX, especially for firms with high estimated ex-ante litigation risk. I argue that this reflects a lower propensity of managers to engage into opportunistic insider sales under the heightened scrutiny from investors and regulators on managerial behavior around the passage of SOX. Second, the lack of clustering of post-SOX sale filings reduces their impact on stock price, as investors need to observe sales at a certain level of aggregation to assess the extent to which they are driven by private information. Instead, they generate more disagreement among traders about the implications of their signal, hence the greater trading volumes and their lower association with prior belief heterogeneity compared to before SOX.

Overall, I document that the information content of Form 4 filings of insider purchases, as manifested in the price and volume reactions to their disclosure, increased and accelerated after the passage of SOX. In the case of sales, the results hold only in terms of greater trading volume reactions. While I attempt to control for the impact of changes in market conditions around the passage of SOX, I am aware that the enactment of SOX was brought about endogenously along with the unraveling of the stock market bubble and the revelation of large-scale corporate fraud scandals. At the very least, the analysis strongly suggests that the results are attributable to the joint occurrence of fraud scandals and the consequent SOX regulation. Moreover, Section 403 of SOX, by itself, is shown to affect the timeliness of the information content of insider trades. Hence, my study highlights potential benefits of this specific change in regulation which provides investors with a more timely source of information about managers' equity transactions.

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Variable definitions

<i>Trade Size</i>	Number of shares purchased/sold by a senior executive (CEO, CFO, COO, Chairman of the Board, President) as reported on a Form 4, divided by common shares outstanding.
$CAR_{t,t+n}$	Abnormal stock returns around Form 4 SEC filing date ($t=0$), adjusted for size and book-to-market using the Fama-French 5x5 portfolios based on market capitalization and book-to-market ratio.
$Volume_{t,t+n}$	Daily abnormal trading volume around a Form 4 SEC filing date ($t=0$). It is measured by the coefficient on an indicator variable equal to one for days t to $t+n$ in a firm-specific regression of daily trading volumes on lagged daily trading volumes and market-level trading volumes, as in Meulbroek (1992), Yermack (1997), Heron and Lie (2006).
<i>PostSOX</i>	Indicator variable equal to one for transactions filed under Section 403 of SOX, i.e. which occurred on or after August 29, 2002, zero otherwise.
<i>Reporting Lag</i>	Number of trading days between the first insider trade filed on a Form 4 and the receipt of the Form by the SEC. The variable is censored at three days for post-SOX trades.
<i>High Risk</i>	Indicator variable equal to one if an abnormally large sale* occurs in a firm whose ex-ante litigation risk is in the top quartile of the distribution across all sample firms in the same calendar year, zero otherwise. Litigation risk is calculated using the Rogers and Stocken (2005) model with firm-year observations and calendar year indicator variables. Lagged values are used to obtain an ex-ante measure.
	*Sales reported on a given date are considered abnormally large if total sales by the reporting insider and by all insiders in the firm over the last 365 days exceed respectively the insider- and firm-level past annual mean (calculated over a maximum of five years) by more than five standard deviations, or by 100% if standard deviation is not available, zero otherwise.
<i>Option Exercise</i>	Indicator variable equal to one for insider sales filed on the same Form 4 as an option exercise, zero otherwise.
<i>Dispersion</i>	Standard deviation of analyst annual EPS forecasts issued between the latest earnings announcement and a Form 4 filing, scaled by the absolute value of the mean forecast. If an analyst issues multiple forecasts, only the most recent one is taken into account. Analysts forecasts are obtained from I/B/E/S.
<i>Size</i>	Natural logarithm of the market capitalization of the firm (Compustat Data61×Data14), as of the end of the most recent fiscal quarter.
<i>Book-to-Market</i>	Book value of common stockholder equity (Compustat Data59) divided by market value of equity (Compustat Data61×Data14), as of the end of the most recent fiscal quarter.
<i>R&D</i>	Indicator variable equal to one if the firm reported a non-zero R&D expense (Compustat Data46) in the most recent fiscal year, zero otherwise.
<i>Loss</i>	Indicator variable equal to one if net income before extraordinary items (Compustat Data18) for the most recent fiscal year is strictly negative, zero otherwise.
<i>Restrict</i>	Indicator variable equal to one for all filings in a firm-fiscal year if 75% or more of insider trades executed during the year occur in a 30-day window following an earnings announcement.

Table 1: Descriptive statistics

Variable	Mean		<i>p-value for difference</i>	Median		<i>p-value for difference</i>	N	
	Pre-SOX	Post-SOX		Pre-SOX	Post-SOX		Pre-SOX	Post-SOX
Trade Size sales (%)	0.20	0.09	<.01	0.07	0.03	<.01	9,817	24,054
Trade Size purchases (%)	0.09	0.04	<.01	0.02	0.01	<.01	8,417	4,317
Value sales (\$)	2,803,864	1,559,057	<.01	476,738	278,052	<.01	9,817	24,054
Value purchases (\$)	217,010	152,076	<.01	29,060	24,450	<.01	8,417	4,317
% of transactions executed over several days ¹ - sales	40.2	36.7	<.01	-	-	-	12,144	16,571
% of transactions executed over several days ¹ - purchases	25.9	20.8	<.01	-	-	-	9,493	3,644
CAR _{0,4} (%)	0.17	0.16	0.95	-0.05	-0.09	0.48	16,111	26,540
Volume _{0,4} (%)	0.35 [†]	2.65	<.01	0.00 [†]	0.50	<.01	15,496	25,077
Dispersion (%)	8.56	6.02	<.01	2.38	1.98	<.01	8,084	10,936
Option Exercise	0.38	0.54	<.01	-	-	-	9,817	24,054
Reporting Lag	19.35	1.67	<.01	13.00	1.00	<.01	18,234	28,371
High Risk	0.09	0.07	<.01	-	-	-	9,602	23,767
Size	6.00	6.61	<.01	5.93	6.49	<.01	16,350	26,527
Book-to-Market	0.53	0.43	<.01	0.41	0.37	<.01	16,322	26,507
R&D	0.45	0.48	<.01	-	-	-	16,413	26,542
Loss	0.31	0.19	<.01	-	-	-	16,412	26,536
Restrict	0.35	0.26	<.01	-	-	-	16,816	26,306

[†] indicates that a mean or median is insignificantly different from zero at the 0.10 level.

¹ Trades are aggregated at the insider-month level. This represents the proportion of insider-month observations that contain more than one transaction date.

Table 2: abnormal returns and trading volumes around SEC filing dates of insider purchases, pre- vs. post-SOX

Panel A: mean and median abnormal stock returns around Form 4 filing dates of insider purchases, reported separately for purchases executed before August 29, 2002 (pre-SOX) and after (post-SOX). The sample includes all open market purchases filed by senior executives from 1997 to 2005. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market. T-statistics (Z-statistics) are reported for the differences in means (medians).

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1	-0.03% [†]	-0.00% [†]	0.46	-0.11%	-0.07%	0.79
0	0.11%	0.65%	6.38***	-0.10%	0.25%	6.73***
+1	0.16%	0.82%	7.68***	-0.10%	0.38%	8.93***
+2	0.36%	0.42%	0.70	0.03% [†]	0.16%	2.67***
+3	0.29%	0.27%	-0.26	0.01% [†]	0.11%	1.69*
+4	0.19%	0.24%	0.59	-0.04%	0.02%	1.31
[0,+2]	0.63%	1.89%	8.97***	0.01%	0.95%	9.27***
[0,+4]	1.11%	2.40%	7.33***	0.27%	1.45%	9.06***
N	7,012	3,665		7,012	3,665	

Panel B: mean and median abnormal trading volumes around Form 4 filing dates of insider purchases, reported separately for purchases executed before August 29, 2002 (pre-SOX) and after (post-SOX). The sample includes all open market purchases filed by senior executives from 1997 to 2005. T-statistics (Z-statistics) are reported for the differences in means (medians).

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1	0.95% [†]	10.39%	5.87***	0.00% [†]	5.94%	4.44***
0	0.27% [†]	14.86%	3.31***	0.00% [†]	10.72%	8.59***
+1	0.81% [†]	12.72%	4.95***	-0.49% [†]	9.46%	7.74***
+2	3.05%	5.42%	1.54	0.03% [†]	3.72%	2.36**
+3	3.16%	5.89%	1.78*	0.48% [†]	2.07%	1.10
+4	4.64%	5.32%	0.45	0.93%	3.83%	2.19**
[0,+2]	1.22%	9.09%	10.77***	-0.10% [†]	10.69%	10.72***
[0,+4]	2.19%	7.60%	9.63***	0.71% [†]	7.81%	8.55***
N	6,463	3,351		6,463	3,351	

In both panels, ***, **, * indicate significance at the 0.01, 0.05 and 0.10 levels.

[†] Indicates that a mean or median is insignificantly different from zero at the 0.10 level.

Table 3: abnormal returns and trading volumes around SEC filing dates of insider sales, pre- vs. post-SOX

Panel A: mean and median abnormal returns around Form 4 filing dates of insider sales, reported separately for sales executed before August 29, 2002 (pre-SOX) and after (post-SOX). The sample includes all open market sales filed by senior executives from 1997 to 2005. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market. T-statistics (Z-statistics) are reported for the differences in means (medians).

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1	-0.08%	0.08%	3.33***	-0.15%	-0.05%	3.18***
0	-0.04% [†]	0.02% [†]	1.27	-0.14%	-0.06%	2.37**
+1	-0.06% [†]	-0.08%	-0.41	-0.15%	-0.12%	0.87
+2	-0.16%	-0.05%	2.34**	-0.16%	-0.09%	2.06**
+3	-0.15%	-0.06%	1.99*	-0.14%	-0.09%	1.86*
+4	-0.14%	-0.03% [†]	2.45**	-0.15%	-0.07%	2.62***
[0,+2]	-0.27%	-0.11%	1.85*	-0.23%	-0.18%	0.98
[0,+4]	-0.56%	-0.19%	3.48***	-0.31%	-0.27%	0.45
N	9,099	22,875		9,099	22,875	

Panel B: mean and median abnormal trading volumes around Form 4 filing dates of insider sales, reported separately for sales executed before August 29, 2002 (pre-SOX) and after (post-SOX). The sample includes all open market sales filed by senior executives from 1997 to 2005. T-statistics (Z-statistics) are reported for the differences in means (medians).

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1	-0.19% [†]	4.45%	5.71***	-1.80%	0.66%	4.09***
0	0.10% [†]	1.82%	2.22**	-0.60%	-0.63% [†]	-0.01
+1	-0.09% [†]	0.90%	1.03	-1.04%	-1.27%	-0.23
+2	-1.32%	0.88%	2.75***	-3.28%	-1.53%	2.39**
+3	0.09% [†]	1.54%	1.87*	-1.02% [†]	-1.04%	-0.04
+4	0.54% [†]	0.72%	0.24	0.00% [†]	-1.40%	-1.61
[0,+2]	-0.43%	1.49%	3.99***	-1.85%	-0.24%	3.12***
[0,+4]	-0.15% [†]	1.65%	4.64***	-1.30%	0.12% [†]	3.69***
N	9,033	21,726		9,033	21,726	

In both panels, ***, **, * indicate significance at the 0.01, 0.05 and 0.10 levels.
[†] indicates that a mean is insignificantly different from zero at the 0.10 level.

Table 4: abnormal returns and trading volumes around SEC filing dates of insider sales, pre- vs. post-SOX – aggregated by firm-month

Panel A: mean and median abnormal returns around Form 4 filing dates of insider sales, reported separately for sales executed before August 29, 2002 (pre-SOX) and after (post-SOX). The sample includes all open market sales filed by senior executives from 1997 to 2005. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market. T-statistics (Z-statistics) are reported for the differences in means (medians). The returns are summed at the firm-month level.

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1	-0.09%	0.15%	4.06***	-0.15%	-0.04% [†]	2.88***
0	-0.05% [†]	0.03% [†]	1.37	-0.13%	-0.07%	1.91*
+1	-0.06%	-0.15%	-1.69*	-0.15%	-0.16%	-0.36
+2	-0.17%	-0.09%	1.46	-0.17%	-0.11%	1.44
+3	-0.16%	-0.11%	0.89	-0.15%	-0.12%	0.58
+4	-0.14%	-0.05% [†]	1.75*	-0.14%	-0.10%	1.28
[0,+2]	-0.26%	-0.15%	1.13	-0.24%	-0.27%	-0.67
[0,+4]	-0.54%	-0.28%	2.17**	-0.29%	-0.39%	-1.04
N	8,748	12,209		8,748	12,209	

Panel B: mean and median abnormal trading volumes around Form 4 filing dates of insider sales, reported separately for sales executed before August 29, 2002 (pre-SOX) and after (post-SOX). The sample includes all open market sales filed by senior executives from 1997 to 2005. T-statistics (Z-statistics) are reported for the differences in means (medians). The volumes are summed at the firm-month level.

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1	-0.13% [†]	7.95%	7.80***	-2.37%	2.71%	6.51***
0	0.12% [†]	3.50%	3.42***	-0.65%	0.57% [†]	1.79*
+1	-0.03% [†]	1.57%	1.61	-1.24%	-0.61% [†]	0.69
+2	-1.67%	1.60%	3.19***	-3.49%	-1.04%	2.82***
+3	0.07% [†]	2.86%	2.82***	-1.29%	-0.61% [†]	0.76
+4	0.36% [†]	1.29%	0.93	-0.34% [†]	-1.92%	-1.55
[0,+2]	-1.56%	5.47%	4.23***	-5.02%	0.71% [†]	3.72***
[0,+4]	-1.07%	7.87%	4.29***	-5.55%	1.80% [†]	3.25***
N	8,733	11,294		8,733	11,294	

***,**, * indicate significance at the 0.01, 0.05 and 0.10 levels.

[†] indicates that a mean is insignificantly different from zero at the 0.10 level.

Table 5: abnormal returns following insider transactions until their SEC filing dates, pre- vs. post-SOX

This table reports mean and median abnormal returns from the first day after insider transactions until their Form 4 filing dates or up to four trading days after the filing date, reported separately for trades executed before August 29, 2002 (pre-SOX) and after (post-SOX). The sample includes all open market purchases and sales filed by senior executives from 1997 to 2005. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market. T-statistics (Z-statistics) are reported for the differences in means (medians). Individual observations are Form 4 filing dates. In case several transactions are reported on the same date, the return is the average return following each transaction weighted by the dollar value of the transaction.

Panel A: Purchases

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1 [#]	1.58%	0.12%	-5.52***	0.56%	0.14%	-3.35***
0 [#]	1.66%	0.77%	-3.81***	0.64%	0.40%	-2.28**
+1	1.82%	1.42%	-1.68*	0.77%	0.79%	0.19
+2	2.18%	1.84%	-1.39	1.09%	1.00%	-0.42
+3	2.47%	2.11%	-1.41	1.22%	1.27%	0.27
+4	2.67%	2.35%	-1.20	1.44%	1.43%	0.05
N	7,014	3,671		7,014	3,671	

Panel B: Sales

Days relative to Form 4 filing date	Means			Medians		
	Pre-SOX	Post-SOX	(<i>t-stat</i>)	Pre-SOX	Post-SOX	(<i>z-stat</i>)
-1 [#]	-1.54%	-0.13%	7.28***	-0.76%	-0.13%	6.71***
0 [#]	-1.58%	-0.09%	7.57***	-0.77%	-0.11%	6.09***
+1	-1.63%	-0.17%	7.34***	-0.78%	-0.18%	5.35***
+2	-1.80%	-0.22%	7.85***	-0.87%	-0.23%	5.62***
+3	-1.95%	-0.28%	8.11***	-0.90%	-0.26%	5.08***
+4	-2.09%	-0.30%	8.43***	-1.05%	-0.32%	5.65***
N	9,099	22,875		9,099	22,875	

***, **, * indicate significance at the 0.01, 0.05 and 0.10 levels.

[†] indicates that a mean is insignificantly different from zero at the 0.10 level.

[#] The observations on day -1 (0) include only trades filed with a delay of at least two (one) day(s).

Table 6: abnormal trading volumes around insider trade Form 4 filings, regression results

This table reports regression results where the five-day daily abnormal trading volume ($Volume_{0,4}$) around the filing date of a Form 4 is the dependent variable. The sample includes all open market purchases and sales filed by senior executives from 1997 to 2005.

	Purchases				Sales			
	Coefficients	<i>t-stats</i>	Coefficients	<i>t-stats</i>	Coefficients	<i>t-stats</i>	Coefficients	<i>t-stats</i>
Intercept	0.0347	1.60	0.1029 **	2.54	0.0301 **	1.98	-0.0126	-0.69
PostSOX	0.0608 ***	5.72	0.0239	0.86	0.0234 **	2.19	0.0334 ***	2.50
Reporting Lag	-0.0016 **	-2.38	-0.0021 **	-2.15	0.0001	0.20	0.0008	1.44
Reporting Lag*PostSOX	-0.0240 ***	-2.96	-0.0121	-1.20	-0.0053 *	-1.68	-0.0045	-1.34
Dispersion			-0.0051	-0.66			0.0087 **	2.18
Dispersion*PostSOX			0.0202 **	1.98			-0.0031	-0.68
Trade Size	0.4782 *	1.73	0.3995	0.82	0.0063	0.08	0.1480	1.26
Trade Size*PostSOX	1.4592 **	1.98	2.4406 **	2.10	0.5261 ***	3.10	0.4470 **	2.37
Book-to-market	-0.0114	-1.50	-0.0277 **	-2.08	0.0029	0.40	0.0056	0.74
Size	-0.0024	-0.85	-0.0050	-1.21	-0.0063 ***	-4.91	-0.0033 **	-2.16
R&D	-0.0040	-0.42	-0.0298 **	-2.28	0.0028	0.66	0.0013	0.28
Loss	0.0164	1.64	0.0226	1.50	-0.0131 **	-2.25	-0.0137 **	-1.98
Restrict	0.0069	0.76	0.0211 *	1.72	0.0189 ***	4.54	0.0165 ***	3.30
N	8,568		3,137		27,962		17,489	
Adjusted R ²	1.40%		2.71%		0.46%		0.43%	

***, **, * indicate significance at the 0.01, 0.05 and 0.10 two-tailed levels. The t-statistics are based on standard errors clustered by firm-month.

PostSOX: indicator variable equal to one for filings of trades executed on or after August 29, 2002, zero otherwise.

Reporting Lag: number of trading days (set to three for late post-SOX filings) between the first insider transaction reported on a Form 4 and the receipt of the Form by the SEC.

Dispersion: standard deviation of analyst annual EPS forecasts released between the most recent earnings announcement and the filing, scaled by the absolute value of the mean forecast. In this table, the variable is replaced by its decile rank based on its distribution computed separately before and after SOX.

Trade Size: number of shares purchased/sold (multiplied by 10 in this table) as reported on the Form 4, scaled by shares outstanding.

Book-to-market: Quarterly Compustat Data59 / (Data61×Data14), as of the end of the previous fiscal quarter.

Size: log (Quarterly Compustat Data61×Data14), as of the end of the previous fiscal quarter.

R&D (Loss): indicator equal to one if Annual Compustat Data46 (Data18) at the end of the previous fiscal year is strictly positive (negative), zero otherwise.

Restrict: indicator variable equal to one for all filings in a firm-fiscal year if 75% or more of insider trades executed during the year occur in a 30-day window following an earnings announcement, zero otherwise.

Table 7: five-day abnormal returns around Form 4 filings, regression results

This table reports regression results where the five-day abnormal stock return ($CAR_{0,4}$) around the filing date of a Form 4 is the dependent variable. The sample includes all open market purchases and sales filed by senior executives from 1997 to 2005. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market. The coefficients are estimated separately for purchases and sales, each before and after SOX (i.e. for trades executed before and after August 29, 2002).

	Purchases				Sales			
	Pre-SOX	<i>t-stats</i>	Post-SOX	<i>t-stats</i>	Pre-SOX	<i>t-stats</i>	Post-SOX	<i>t-stats</i>
Intercept	0.0048	0.80	0.0043	0.69	0.0035	0.55	0.0011	0.36
Reporting Lag	-0.0003 *	-1.89	-0.0035 **	-2.15	-0.0004 **	-2.56	-0.0025 ***	-4.13
Trade Size	-0.0144	-0.24	0.7977 ***	3.76	-0.0158	-0.54	-0.0488	-1.56
Book-to-market	0.0020	0.96	0.0095 ***	3.55	0.0023	0.76	-0.0014	-0.74
Size	0.0010	1.28	0.0006	0.72	0.0002	0.27	0.0002	0.48
R&D	0.0094 ***	3.18	0.0135 ***	3.62	-0.0025	-1.13	-0.0000	-0.00
Loss	-0.0015	-0.50	0.0145 ***	3.93	-0.0039	-1.30	0.0014	0.88
Restrict	-0.0006	-0.22	0.0049	1.62	-0.0064 ***	-2.91	-0.0009	-0.92
N	6,264		3,398		8,301		20,553	
Adjusted R ²	0.25%		4.44%		0.30%		0.22%	

***, **, * indicate significance at the 0.01, 0.05 and 0.10 two-tailed levels. The t-statistics are based on standard errors clustered by firm-month.

Reporting lag: number of trading days (set to three for late post-SOX filings) between the first insider transaction reported on a Form 4 and the receipt of the Form by the SEC.

Trade Size: number of shares purchased/sold (multiplied by 10 in this table) as reported on the Form 4, scaled by shares outstanding.

Book-to-market: Quarterly Compustat Data59 / (Data61×Data14), as of the end of the previous fiscal quarter.

Size: log (Quarterly Compustat Data61×Data14), as of the end of the previous fiscal quarter.

R&D: indicator variable equal to one if Annual Compustat Data46 at the end of the previous fiscal year is strictly positive, zero otherwise.

Loss: indicator variable equal to one if Annual Compustat Data18 at the end of the previous fiscal year is strictly negative, zero otherwise.

Restrict: indicator variable equal to one for all filings in a firm-fiscal year if 75% or more of insider trades executed during the year occur in a 30-day window following an earnings announcement.

Table 8: abnormal returns following insider sales – before and after SOX

This table reports regression results where abnormal stock returns as of the day following insider sales until ten days after the transactions is the dependent variable. The sample includes all open market sales filed by senior executives from 1997 to 2005. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market.

	Coefficients	<i>t-statistics</i>
Intercept	-0.0030	-0.78
PostSOX	0.0011	0.72
High Risk	-0.0119 **	-2.56
High Risk × PostSOX	0.0145 ***	2.75
Trade Size	-0.0325	-1.14
Book-to-market	-0.0015	-0.62
Size	-0.0000	-0.06
R&D	-0.0031 **	-2.40
Loss	-0.0020	-0.93
Restrict	-0.0022	-1.63
N		29,147
Adjusted R ²		0.16%

***,**, * indicate significance at the 0.01, 0.05 and 0.10 two-tailed levels. The t-statistics are based on standard errors clustered by firm-month.

PostSOX: indicator variable equal to one for filings of trades executed on or after August 29, 2002, zero otherwise.

High Risk: indicator variable equal to one if an abnormally large sale^a occurs in a firm whose ex-ante litigation risk is in the top quartile of the distribution across all sample firms in the same calendar year, zero otherwise. Litigation risk is calculated using the Rogers and Stocken (2005) model, and lagged values are used to form an ex-ante measure.

^a An insider sale as reported on a Form 4 is considered abnormally large if total sales by the reporting insider and by all insiders in the firm over the last 365 days exceed respectively the insider- and firm-level past annual mean (calculated over a maximum of five years) by more than five standard deviations, or by 100% if standard deviation is not available.

Trade Size: number of shares sold (multiplied by 10 in this table) as reported on the Form 4, scaled by shares outstanding.

Book-to-market: Quarterly Compustat Data59 / (Data61×Data14), as of the end of the previous fiscal quarter.

Size: log (Quarterly Compustat Data61×Data14), as of the end of the previous fiscal quarter.

R&D: indicator variable equal to one if Annual Compustat Data46 at the end of the previous fiscal year is strictly positive, zero otherwise.

Loss: indicator variable equal to one if Annual Compustat Data18 at the end of the previous fiscal year is strictly negative, zero otherwise.

Restrict: indicator variable equal to one for all filings in a firm-fiscal year if 75% or more of insider trades executed during the year occur in a 30-day window following an earnings announcement.

Table 9: returns and volumes around SEC filing dates of insider trades, in three periods: pre- and post-Enron bankruptcy, post-SOX

This table reports mean abnormal stock returns and abnormal trading volumes around Form 4 filing dates of insider trades, reported separately for purchases and sales executed before December 2, 2001 (pre-Enron), between December 2, 2001 and August 29, 2002 (post-Enron) and after August 29, 2002 (post-SOX). The sample includes all open market purchases and sales filed by senior executives from 1997 to 2005. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market. T-statistics are reported for differences in means.

Purchases	Returns						Volumes					
	Pre-Enron (1)	<i>t-stat</i> (1) vs. (2)	Post-Enron (2)	<i>t-stat</i> (2) vs. (3)	Post-SOX (3)	<i>t-stat for</i> (1) vs. (3)	Pre-Enron (1)	<i>t-stat</i> (1) vs. (2)	Post-Enron (2)	<i>t-stat</i> (2) vs. (3)	Post-SOX (3)	<i>t-stat for</i> (1) vs. (3)
0	0.11%	<i>0.10</i>	0.12% [†]	3.47	0.65%	6.15	0.56% [†]	-2.15	-5.62%	6.82	14.86%	8.56
+1	0.21%	-2.38	-0.14% [†]	6.63	0.82%	6.75	0.36% [†]	<i>0.27</i>	1.16% [†]	3.82	12.72%	7.53
+2	0.32%	<i>1.62</i>	0.60%	<i>-1.08</i>	0.42%	<i>1.14</i>	3.11%	<i>0.21</i>	3.71% [†]	<i>0.39</i>	5.42%	<i>1.04</i>
+3	0.28%	<i>0.69</i>	0.38%	<i>-0.74</i>	0.27%	<i>0.06</i>	2.27%	1.85	7.46%	<i>-0.70</i>	5.89%	1.96
+4	0.18%	<i>0.33</i>	0.23%	<i>0.03</i>	0.24%	<i>0.64</i>	5.01%	<i>0.52</i>	6.60%	<i>-0.20</i>	5.32%	<i>0.62</i>
[0,+2]	0.64%	<i>-0.84</i>	0.59%	4.97	1.89%	8.57	1.14%	<i>-1.08</i>	-0.76% [†]	6.57	9.09%	9.88
[0,+4]	1.10%	<i>0.32</i>	1.21%	3.60	2.40%	7.13	2.05%	<i>0.03</i>	2.09% [†]	4.93	7.60%	9.14
N	6,026		986		3,665		5,726		737		3,351	

Sales	Returns						Volumes					
	Pre-Enron (1)	<i>t-stat</i> (1) vs. (2)	Post-Enron (2)	<i>t-stat</i> (2) vs. (3)	Post-SOX (3)	<i>t-stat for</i> (1) vs. (3)	Pre-Enron (1)	<i>t-stat</i> (1) vs. (2)	Post-Enron (2)	<i>t-stat</i> (2) vs. (3)	Post-SOX (3)	<i>t-stat for</i> (1) vs. (3)
0	-0.06% [†]	<i>0.57</i>	-0.00% [†]	<i>0.32</i>	0.02% [†]	<i>1.27</i>	1.03% [†]	-3.55	-4.42%	4.48	1.82%	<i>0.72</i>
+1	-0.06% [†]	<i>0.13</i>	-0.05% [†]	<i>-0.39</i>	-0.08%	<i>-0.29</i>	0.30% [†]	<i>0.89</i>	1.12% [†]	<i>-0.36</i>	0.90%	<i>0.31</i>
+2	-0.18%	<i>0.80</i>	-0.10% [†]	<i>0.70</i>	-0.05%	2.31	-1.51%	<i>-0.28</i>	-1.97% [†]	2.10	0.88%	2.81
+3	-0.17%	<i>0.95</i>	-0.09% [†]	<i>0.45</i>	-0.06%	2.01	0.29% [†]	<i>-0.20</i>	-0.02% [†]	<i>1.20</i>	1.54%	<i>1.48</i>
+4	-0.14%	<i>-0.22</i>	-0.16%	1.72	-0.03% [†]	1.98	0.23% [†]	<i>0.10</i>	0.38% [†]	<i>0.26</i>	0.72%	<i>0.58</i>
[0,+2]	-0.30%	<i>0.90</i>	-0.16% [†]	<i>0.40</i>	-0.11%	1.88	-0.41% [†]	<i>-1.20</i>	-1.56%	3.68	1.49%	3.21
[0,+4]	-0.61%	<i>1.05</i>	-0.41%	<i>1.40</i>	-0.19%	3.26	-0.21% [†]	<i>-0.70</i>	-0.75% [†]	3.42	1.65%	4.06
N	6,886		2,213		22,875		7,050		1,983		21,726	

T-statistics are in bold font if the corresponding two-tailed p-value is less than 0.10. [†] Indicates that a mean is insignificantly different from zero at the 0.10 level.

Figure 1: Distribution of Form 4 filing dates by calendar day of the month

This figure plots the distribution of Form 4 filing dates by calendar day of the month. The dates are determined by the receipt of the Forms by the SEC. The sample includes all open market purchases and sales filed by senior executives from 1997 to 2005. Pre- and post-SOX filings refer to trades executed before and after August 29, 2002 respectively.

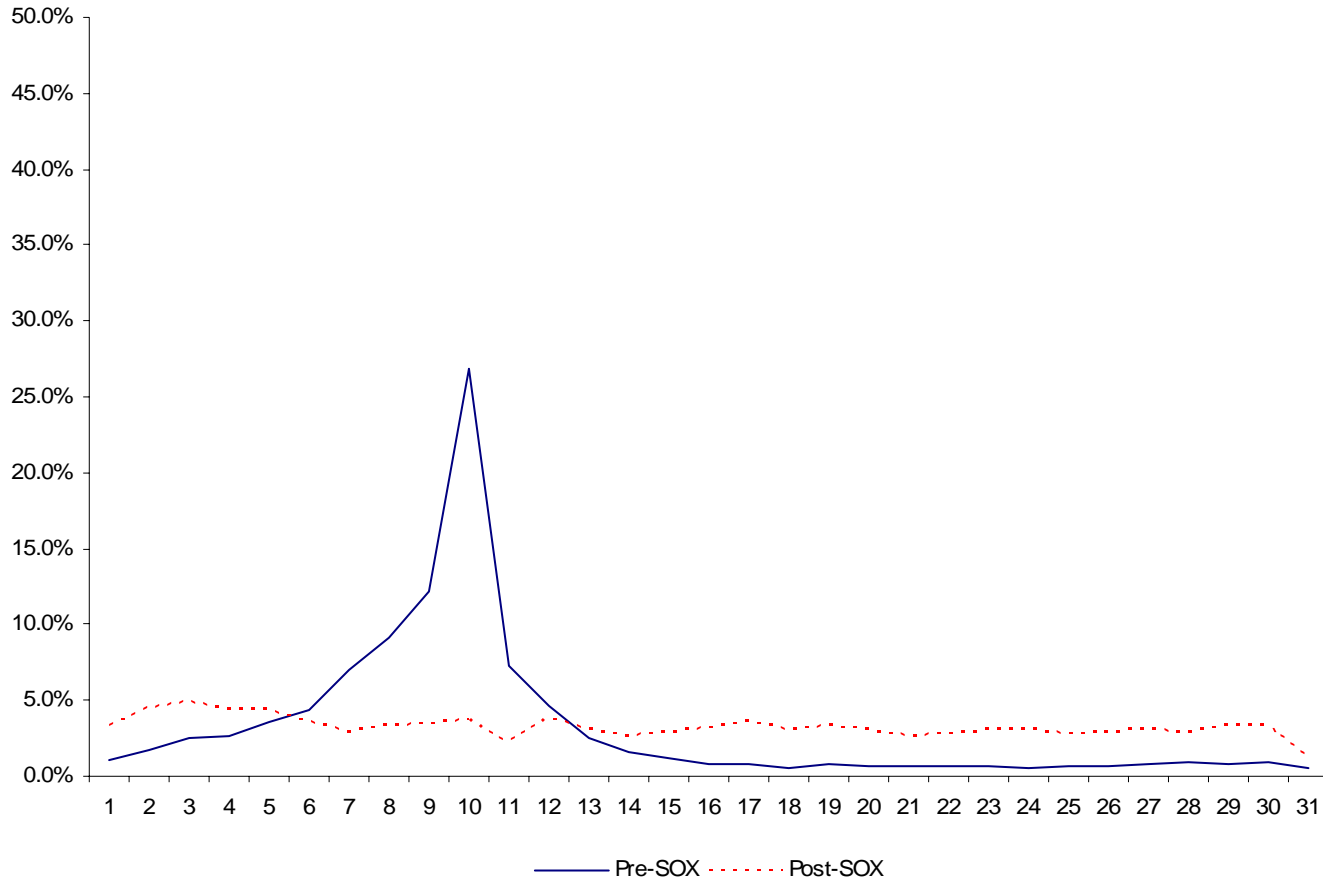


Figure 2: cumulative abnormal returns after insider trades – before and after SOX

This figure plots mean cumulative abnormal returns following open market insider transactions by senior executives separately for 1) pre- and post-SOX 2) purchases and sales. Pre- and post-SOX filings refer to trades executed before and after August 29, 2002 respectively. Returns are adjusted using Fama-French 5x5 portfolios based on size and book-to-market. Since the window between transactions and their SEC filings is subject to a large degree of variation before SOX, only the first five days after transaction dates and the last five days before filing dates are plotted, hence the discontinuity in the pre-SOX lines. Returns prior to insider transactions are not shown.

