

The Effects of Insider Trading Regulation on Trade Timing, Litigation Risk, and Profitability

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Abstract

This study examines the effects of changes in insider trade regulation on insiders' trade patterns around earnings announcements, firm litigation risk, and insiders' trade profits. Prior research documents that insiders trade less before firm news events in response to new insider trade regulation that increases legal damages for unlawful trade. This research, however, does not find that insiders' trade returns are reduced by the new regulation, leaving open the question of whether the response to the new regulations is, in general, perfunctory. We show that the passage of new insider trading regulation is associated with a lower frequency of insiders' trades before news events (earnings announcements), consistent with prior research. However, much of the shift in trade patterns is unexplained by new regulation. We also show that the passage of new insider trading regulation is associated with an increase in firms' general litigation risk, that the average level of firms' general litigation risk is associated with greater shifts in insiders' trades to after, relative to before, earnings announcements, and that the distributional shifts in insiders' trade patterns are, in turn, associated with reduction in firms' general litigation risk. Finally, we provide some evidence that insider trade returns are lower at firms that shifted more trade frequency to after earnings announcements in response to the new regulation. This suggests that the new insider trade regulation had more impact on firms with greater general litigation risk.

Keywords: Insider Trading; earnings announcements; regulation; litigation risk

Data Availability: Data is available from public sources with the exception of the Woodruff Sawyer Co. data on securities class-action lawsuits

1. Introduction

This study examines the effects of changes in insider-trade regulation on the timing of insiders' trades, firm-level litigation risk, and insider-trading profitability. Prior literature documents that insiders avoid trading during times of high litigation risk and that regulation is associated with increased avoidance of trading ahead of earnings announcements. We extend the prior literature by investigating how regulatory changes interact with firm and insider responses to determine firm-level litigation risk and insider-trading profitability.

There is still uncertainty regarding the degree to which insider trade regulation has an effect on insider trade behavior. For example, Seyhun (1992) finds no decrease in abnormal insider trade profits or volume associated with increased insider-trading regulation while Garfinkel (1997) finds that strategic timing of insiders' trades decreased following new insider-trading regulation. We find evidence that increased insider trade regulation is associated with shifts in insider trade activity from periods that precede earnings announcements to periods that follow earnings announcements. This is consistent with prior evidence that insiders appear to avoid trade before pending news events because of heightened litigation risk surrounding these events. However, we do not find a similar shift when we examine significant news events that are not associated with earnings announcements. This raises the question of whether firms' response to new insider trade regulation is, in general, perfunctory.

To provide more insight regarding the impact of new regulation, we examine the endogenous association between new regulation, firm-level litigation risk, and the distribution of insiders' trades around earnings announcements. We find that firm litigation risk is positively associated with the passage of new insider trading regulation. We also find some evidence that insiders at firms with higher litigation risk are more likely to trade after earnings announcements, relative to before earnings announcements. Finally, we find that firms' general level of litigation risk is

decreasing at firms whose insiders are more likely to trade after, rather than before, earnings announcements. Collectively, this suggests that the passage of new regulation increases firm litigation risk, on average, but that firms and insiders respond with changes in insider trade patterns to alleviate this increased risk.

Finally, we analyze whether insiders' trading profits are affected by changes in regulation. Consistent with prior research, we do not find evidence of a reduction in returns to insiders' trades after the passage of new insider trade regulation when we examine the entire pool of transactions. In fact, we find an increase in returns to both insider purchases and insider sales except at firms whose insiders respond more to regulation by shifting trading after earnings announcements. This suggests that new insider trade regulation had more impact on firms with greater litigation risk. These results also suggest that firm-level enforcement may be necessary for economy-wide regulation to be effective.

Collectively, this study provides evidence regarding the net effect of insider trade regulation on insiders' trade patterns and firms' overall litigation risk. By explicitly modeling the endogenous relation between litigation risk and insider trade patterns, it enhances our understanding, relative to prior research, of how insiders respond to changes in regulation that governs their trade activity. The study also updates prior research (e.g., Seyhun, 1992) on the effect of economy-wide regulation on insiders' ability to trade and profit from private information.

Section 2 of the paper outlines prior research regarding the relationship between insider trade regulation and insider trade patterns and also delineates a brief history of the development of insider trade regulation within the U.S. Section 3 outlines our hypotheses. Section 4 discusses the data selection procedures for the analyses. Section 5 presents the empirical analyses and

results. Finally, Section 6 summarizes the findings, discusses the study's limitations, and presents suggestions for future analysis.

2. Background

Prior studies that examine the association between insider trade patterns and insiders' regulatory-imposed trade risk typically fall into one of three categories: (1) examining whether insiders trade in anticipation of price-relevant firm events such as management forecasts (Penman, 1982; Noe, 1999), firm-specific news releases (Givoly and Palmon, 1985), takeover announcements (Seyhun, 1992), and bankruptcy (Gosnell et al., 1992; Seyhun and Bradley, 1997); (2) examining whether there are cross-sectional differences in insiders' trade across economies with different levels of regulatory risk (e.g., Beny, 2005; Wisniewski and Bohl, 2005); and (3) examining whether shifts in regulation affect insiders' trade patterns and profits (e.g., Seyhun, 1992; Garfinkel, 1997; Brochet, 2009). Although there is some conflicting evidence, generally, studies show that increased regulatory risk lowers the incidence of insiders' trades preceding price-relevant firm events; however, increased regulatory risk does not appear to reduce insiders' overall trade volume or profits.

This study most closely resembles Jaffe (1974), Seyhun (1992), and Garfinkel (1997) who assess the impact of specific trade enforcement acts on insiders' trade patterns, and Lee et al., (2008) who examine the effect of firm-level insider-trading restrictions on insider-trading profits. Specifically, Jaffe (1974) examines whether major court decisions in the 1960's (decisions that solidified restrictions on the use of private information by insiders) affected the profitability of insider trades. The paper finds no change in profitability following these court decisions. Similarly, Seyhun (1992) examines whether there are shifts in insider trading patterns and profits associated with the enactment of the Insider Trading Sanctions Act (ITSA) of 1984 and the

Insider Trading and Securities Fraud Enforcement Act (ITSFEA) of 1988 which both increase penalties for illegal insider trade. Congress passed ITSA in 1984 to strengthen enforcement of insider trading laws in response to increasing frequency of and profitability from illegal insider trade (Bainbridge, 1985). ITSA increased civil penalties by 300% and increased criminal penalties by 1,000% relative to existing penalties. ITSFEA, among other things, increased criminal penalties to a maximum of \$1 million and increased the maximum jail sentence to 10 years. Seyhun (1992) documents that there is no discernable decrease in insider trade volume or insider trade profitability associated with the passage of these laws.¹ However, Seyhun (1992) documents lower “timely” trade (i.e., purchases ahead of positive earnings surprises and sales ahead of negative earnings surprises) after the passage of ITSA and attributes this change to court decisions restricting trading on private information. Garfinkel (1997) finds a similar decrease in timely trade after the passage of ITSFEA.

Recent research finds that firms often restrict insiders to trading in the time period following a quarterly earnings announcement (Bettis, et al., 2000). One impetus for the adoption of such trading-window restrictions on insider trading was the passage of ITSFEA. In addition to the increased penalties mentioned above, this law amended the Securities Exchange Act of 1934 to impose civil penalties on “controlling person[s]” who “failed to establish, maintain, or enforce any policy or procedure” intended to limit violations of insider trading laws. Thus, firms could now be punished for insider-trading violations by their executives. This Act gave firms an incentive to adopt policies, such as the use of trading windows and blackout periods, that restrict trading by insiders. The idea that confining insider trading to specific windows may reduce exploitation of private information may have originated with the SEC: Huddart et al., (2006)

¹ Seyhun (1992) examines trades through the end of 1989; thus, less weight can be given to the effect of ITSFEA (which passed in late 1988) in driving the paper’s results, relative to the passage of ITSA.

points out that the (since revised) Rule 16b-3(e) once required insiders to exercise Stock Appreciation Rights between the third and twelfth days following quarterly and annual earnings announcements; presumably, the SEC viewed this time period as one where information asymmetry between insiders and the market is low. Consistent with ITSFEA increasing the use of trading windows, Bettis et al., (2000) and Jeng (1999) document the use of trading-window restrictions on insiders and provide evidence that these restrictions arose in the early 1990's. These restrictions have the effect of reducing the ability of insiders to profit from private information (Bettis et al., 2000; Roulstone, 2003) and affect the incorporation of information into market prices (Jeng, 1999).²

Another factor affecting the timing of insider trades is the introduction of SEC Rule 10b5-1 in October 2000 (Jagolinzer, 2009). These plans allow insiders to set up program trades that, when executed faithfully, afford insiders an affirmative defense against trade-related legal liability. Thus, insiders using 10b5-1 plans face less risk from trading ahead of disclosure events relative to insiders not using these plans.

In a related study, Lee et al. (2008) examine whether firm-level restrictions on the timing of insider trades reduce the profits to insider trading. Using the empirical proxy for restrictions developed in Roulstone (2003), Lee et al. (2008) observe that firm-level restrictions are rising over time (1986-2004) but that returns to insider trading have not decreased as a result of these restrictions. This study differs from Lee et al. (2008) by focusing on the interaction between

² Prior to Garfinkel (1997) researchers found little evidence of firm-level restrictions on insider trading. For example, Seyhun (1992) states: "To date, however, shareholders have not generally restricted insider trading in corporate charters or employment contracts." Similarly, Ausubel (1990) observes that one argument against insider-trading restrictions enhancing shareholder value is that "[insider trading] is typically not banned by explicit provisions of the corporate charter..." See also Carlton and Fischel (1983), and, for an explanation of why firms may have tolerated insider trading, Manne (2005).

firm-level litigation risk and economy-wide regulatory changes, and how this interaction affects trade timing and the returns to trades.

3. Hypothesis development

We begin by examining the degree to which litigation risk affects insider trade patterns and the degree to which insiders' trade patterns affect litigation risk. Prior research has generally focused only on the former question, thereby leaving open the question of how the endogenous nature of insider trade regulation impacts firms.

Our first hypothesis draws on the prior literature which shows that insiders avoid trading ahead of value-relevant disclosures. We hypothesize that this pattern will hold for trading around earnings announcements because these announcements are the most common source of price-relevant news for most firms:

H1A: Insiders trade more volume after earnings announcements relative to volume before earnings announcements.

Because insider trade regulation generally increases insiders' trade-related litigation costs, prior research hypothesizes that insiders' trade volume during periods where insiders are likely privately informed are negatively associated with increased regulation or enforcement.

Similarly, we hypothesize that:

H1B: The proportion of insiders' trade volume after earnings announcements relative to before earnings announcements is positively associated with the passage of regulatory acts that increase illegal insider trade-related penalties.

Hypotheses 1A and 1B will not hold if trading around earnings announcements is driven more by insiders' private information than by consideration of legal concerns. We include the earnings announcement return and earnings surprise in tests of Hypotheses 1A and 1B to allow us to distinguish regulatory pressure from private information incentives.

Firms at risk of shareholder lawsuits are especially sensitive to revelations of insiders trading on price-relevant information as insider trading can be used as evidence that managers knew of subsequent, value-relevant events. Johnson et al. (2006) show that abnormal insider selling is associated with the initiation and outcomes of shareholder lawsuits. Similarly, Griffin and Grundfest (2002) show that firms sued by shareholders exhibit higher insider selling than control firms. It is possible that firms that face higher litigation risk will enforce more stringent restrictions on insiders' trade activity before material news events like earnings announcements. It is also possible that insiders at firms that face higher litigation risk infer higher trade-related litigation costs associated with trades executed before material news events like earnings announcements. In either case, we hypothesize that:

H2A: The proportion of insiders' trade volume after earnings announcements relative to before earnings announcements is positively associated with a firm's expected level of litigation risk.

Since insider trade activity is a component of firm level litigation risk (Johnson et al., 2006), presumably less timely trade should be associated with lower overall firm-level litigation risk. If firms restrict insiders' trades or if insiders simply choose to trade less before material news events like earnings announcements, this should, in turn, reduce the likelihood that the firm will face litigation costs. Specifically, we hypothesize that:

H2B: Firm-level litigation risk is negatively associated with the proportion of insiders' trade volume after earnings announcements relative to before earnings announcements.

Similar to Seyhun (1992), our final hypothesis investigates whether insider trade returns have declined after increases in regulation. Seyhun (1992) does not find evidence of a reduction in insiders' trade profitability associated with the increased penalties from ITSA.³ We explore this further by examining trades in the decade following the passage of ITSFEA and by partitioning

³ As mentioned earlier, the sample period in Seyhun (1992) ends in December, 1989, fourteen months after the passage of ITSFEA. The statistical tests in Seyhun (1992) do not distinguish the effects of ITSA and ITSFEA.

insider transactions into samples based on the degree to which there are shifts in insider trade patterns after earnings announcements. This allows us to better isolate the effects, if any, on insiders' trade returns at firms that face greater ex ante litigation risk. Consistent with prior research, we hypothesize that:

*H3: Returns to insiders' trades are negatively associated with the passage of regulatory acts that increase illegal insider trade-related penalties.*⁴

4. Data

We gather data from various sources. From Compustat, we collect data on firms' quarterly earnings announcement dates and earnings surprises. From CRSP we collect data on trading volume, stock returns around earnings announcements and market value. From I/B/E/S we collect data on analyst following and analyst earnings forecasts. From CDA/Spectrum we collect data on institutional holdings. From the National Archives and Thomson Financial we collect all trades made by top executives and directors of the sample firms.⁵ We merge the trading data with the earnings announcement dates to measure the distribution of insider trades around earnings announcements. Data regarding shareholder litigation is provided by Woodruff-Sawyer & Co. who maintain a proprietary securities class-action dataset.⁶ Our data span the years 1980-2003.⁷

Table 1 provides descriptive statistics on the main variables used in the study. The median firm in the study is small with limited analyst following and institutional ownership. Slightly

⁴ Insiders will only trade when the benefits to trading outweigh the costs. Thus, *H3* may not hold if regulatory acts raise the costs of trading enough to deter small-profit trades but not enough to deter high-profit trades, resulting in observed trading profits after new regulations being higher than observed trading profits prior to the regulatory acts.

⁵ We use the National Archives for insider-trading data from 1980 to 1985; we use Thomson Financial for data from 1986-2003.

⁶ Woodruff Sawyer & Co. is a San Francisco-based insurance broker that deals in Directors' and Officers' Liability insurance. We thank them for providing this data.

⁷ The Sarbanes-Oxley Act coincides with the end of our examination period, so we do not assess the impact of this specific regulation. See Brochet (2009) for insider trade implications associated with this Act.

over two percent of quarterly observations overlap with a shareholder litigation damage period. Our main measure of insider trade timing is *TradePostEarnings*, a variable measuring the volume of insider trading that occurs in the one-month window following a quarterly earnings announcement relative to the total trading occurring in the two-month window that precedes the announcement and the one-month period following the announcement.⁸ If increased regulatory penalties prompt insiders and firms to confine trading to windows after earnings announcements, *TradePostEarnings* should become larger over time. We define *TradePostEarnings* using the share volume from all observed insider purchases and sales; we also define separate measures for observed insider purchases (*TradePostEarnings_{Buyys}*) and observed insider sales (*TradePostEarnings_{Sales}*).

As can be seen in Table 1, insider trading over the whole sample period is distributed such that slightly over half of all shares traded by insiders are traded in the one-month period following an earnings announcement. This number is higher for sales than for purchases, (especially for the median firm) consistent with insiders facing greater legal risk from selling shares before price declines than from purchasing shares before price increases.

Table 2 reports the distribution of insider trading volume around earnings announcements for each year of the sample period; Figure 1 graphically presents the distributions for insider sales and insider purchases. The first column of Table 2 reports *TradePostEarnings* (calculated using both insider purchases and insider sales). For all insider trades, the percentage of shares traded falling in the post-announcement window rises from 37.8% in 1980 to 61.0% in 2003. Columns 2 and 3 of Table 2 present results for insider sales (*TradePostEarnings_{Sales}*) and insider buys (*TradePostEarnings_{Buyys}*). For insider sales (buys) the change is from 38.5% (34.8%) to 62.0%

⁸ For example, if 100 shares are traded in the two months before the announcement and 50 shares are traded in the month after the announcement, *TradePostEarnings* will equal 0.333 (50/150).

(58.4%). Thus, over our sample period, the distribution of insider trade around earnings announcements has gone from an evenly distributed pattern (i.e., roughly 33% of trades occurring in the month after an earnings announcement) to one in which insider trades are strongly concentrated in the period following an earnings announcement. The next section examines this change in more detail by controlling for the effects of firm factors and litigation risk on insider-trade timing.

5. Empirical Estimation

5.1.1 Insider Trade-Timing around Earnings Announcements

We evaluate the relation between the timing of insider trades, earnings announcement news and trends in insider-trading restrictions with the following multivariate estimation (firm and time subscripts have been omitted):

$$TradePostEarns = \alpha_0 + \alpha_1 PostITSA + \alpha_2 PostITSFEA + \alpha_3 Post10b5-1 + \alpha_4 Trend + \alpha_5 LN(MVE) + \alpha_6 LN(AnalystFoll) + \alpha_7 InstOwn + \alpha_8 PriorReturn + \alpha_9 SubseqReturn + \alpha_{10} EarnsReaction + \alpha_{11} EarnsSurprise + FirmFixedEffects_j + \varepsilon. \quad (1)$$

PostITSA is a dichotomous variable equal to one if the firm-quarter falls within the years 1984 and 1989 (i.e., after the passage of ITSA and before passage of ITSFEA in late 1988) and is zero otherwise; *PostITSFEA* is a dichotomous variable equal to one if the firm-quarter falls within the years 1990 and 2000 (i.e., after the passage of ITSFEA and before the introduction of 10b5-1 trading plans in late 2000) and is zero otherwise; *Post10b5-1* is a dichotomous variable equal to one if the firm-quarter falls after the year 2000 and is zero otherwise; *Trend* is an iterative count variable that increases by one for each year of the sample period (1980-2003); *EarnsReaction* is the cumulative, market-adjusted return over days -1, 0, and +2 relative to the earnings

announcement day; and *EarnsSurprise* is the firm-quarter's unexpected earnings, defined as analyst forecast error (where available) or the firm-quarter's seasonal difference in quarterly earnings (where analyst forecasts are not available), scaled by the firm's standard deviation of seasonally-differenced earnings.

We control for the association between *TradePostEarns* and firm size as the size of the firm is associated with the amount of information available regarding an earnings announcement and with the market's reaction to these announcements. For large firms, the news in the earnings announcement has been preempted more than for small firms (Atiase, 1985), suggesting that insiders at large firms have fewer profitable trading opportunities than insiders at small firms.⁹ In addition, larger firms face greater political costs (Watts and Zimmerman, 1986) and greater litigation risk (Rogers and Stocken, 2005) and thus, are more likely to regulate their executives' wealth-expropriating actions than are small firms. We proxy for firm size (*MVE*) with the market value of equity defined as shares outstanding multiplied by price at the beginning of each firm-quarter.

We control for the association between *TradePostEarns* and the number of analysts that follow the firm because analyst following is associated with the market's response to earnings news (Lobo and Mahmoud, 1989) and the quality of the firm's information environment. Firms with more analysts have more complete information environments and more efficient prices, leading to fewer opportunities for insiders to exploit private information. Analyst coverage also enhances a firm's visibility and attracts investor scrutiny. We proxy for analyst following (*Analystfoll*) with the number of analysts issuing a one-quarter ahead earnings forecast in the month prior to the earnings announcement as reported on the I/B/E/S summary tape. Where I/B/E/S reports no analyst forecasts, we code *Analystfoll* as zero.

⁹ Seyhun (1998) documents that insider trades are more profitable at small firms than at large firms.

We control for the potential association between *TradePostEarnings* and the level of institutional ownership as institutional ownership is associated with the information content of earnings (El-Gazzar, 1998). Further, the level of institutional ownership is often used to proxy for corporate governance since institutional owners have resources, incentives and leverage to monitor corporations. We measure institutional ownership (*InstOwn*) as the number of shares owned by institutions, scaled by shares outstanding.

Finally we control for the potential association between *TradePostEarnings* and firm performance prior to the announcement (*PriorReturn*) and subsequent to the announcement (*SubseqReturn*) as insiders sell after prices have risen and buy after prices have fallen (Rozeff and Zaman, 1998) and insider trades precede abnormal returns (Lee et al., 2007).

We measure the effect of regulatory changes and general trends in legal enforcement with our three indicator and one trend variables. The intercept measures the average value of the dependent variable during the pre-ITSA period (i.e., 1980-1984). The trend variable controls for a general trend in *TradePostEarnings* over our sample period. Note that the three indicator variables are each measured *relative* to the pre-ITSA period, thus, the coefficient on *Post10b5-1* gives the amount by which *TradePostEarnings* in the post-10b5-1 period differs from the pre-ITSA value and not how it differs from the Post-ITSFEA value. Finally, we include firm-fixed effects to control for heterogeneity across firms in insider-trading policies.

Because an insider's actions may depend on the sign of the news release, we estimate equation (1) with purchases and sales evaluated separately (i.e., utilizing *TradePostEarnings_{Buy}* and *TradePostEarnings_{Sales}* as our dependent variables). Separately examining purchases and sales also recognizes that insider sells often reflect diversification needs rather than a desire to trade on information.

One issue with using $TradePostEarnings_{Buys}$ and $TradePostEarnings_{Sales}$ as dependent variables is that they are constrained to lie between zero and 100 inclusive. To address this issue, we transform these variables into standard normal z -scores using the *Invnorm* function in STATA. Inferences using these transformed dependent variables are identical to those reported with the exception that statistical significance is slightly higher than in the tables [results not tabulated]. We have also estimated equation (1) using a Tobit specification with upper and lower-censoring; results with Tobit estimation are similar to those presented [results not tabulated].

The specification in equation (1) assumes that $TradePostEarnings$ has three components: a firm-specific component representing corporate governance and institutional factors affecting the firm's policies on insider trading (modeled by including firm fixed effects and firm characteristics); a time-varying component that reflects changes in the costs and benefits over time of restricting insiders and changes in the litigation risk from trading on private information; and a quarterly-specific component that reflects the effect of earnings announcement news on insider incentives to trade before or after the earnings announcement. For the last component, the $EarningsSurprise$ variable indicates whether the timing of purchases and sales is affected by the sign and magnitude of the earnings news. For example, a positive coefficient on $EarningsSurprise$ in the $TradePostEarnings_{Sales}$ regression would indicate that insiders concentrate sales in the month following the release of good news. This would reflect a "passive" trading strategy that exploits information after its release.¹⁰ Similarly, the $EarningsReaction$ variable investigates whether insiders time their trades to take advantage of price movements at the announcement that are unrelated to earnings.

¹⁰ Seyhun (1998) describes "...two types of insider transactions that are designed to exploit information." "Active" transactions "...anticipate future stock price movements and take advantage of them." "Passive" transactions react to past disclosures and price movements, such as selling after a price rise.

Table 3 contains the results for estimation of equation (1). The table reports OLS coefficients with *t*-statistics (in parentheses) based on standard errors robust to heteroscedasticity and cross-sectional and serial correlation within industry clusters (defined by two-digit SIC). The first column reports estimation of the distribution of insider sales around earnings announcements and the second column reports estimation of the distribution of insider purchases around earnings announcements.

In support of H1A, Table 3 shows that, in the pre-ITSA period, insider sales are concentrated after earnings announcements as opposed to before earnings announcements (intercept > 0.333; two-tailed *p*-value < 0.10). Although there is no evidence of a greater shift in the distribution of sales trade after earnings announcements in response to the passage of ITSA, Table 3 reports a positive shift relating to *PostITSFEA*, providing some support for H1B. After controlling for the sign and magnitude of the announcement news and the potential for a time trend, Table 3 indicates that insiders shift 3.3% more relative sales after an earnings announcement in the post-ITSFEA period relative to the pre-ITSA period. The coefficient on *Post10b5-1* indicates that, subsequent to the passage of Rule 105-1, insider sales are generally more likely to follow earnings announcements than they were in the pre-ITSA period. However, the coefficient on *Post10b5-1* is significantly less than the coefficient on *PostITSFEA*, suggesting that Rule 10b5-1 plans have allowed insiders more relative flexibility to sell in windows that precede earnings announcements (Jagolinzer, 2009).

Table 3 also indicates that insiders are more apt to delay sales until after earnings when there is positive news in earnings, consistent with the afore-mentioned “passive” trading strategy. Specifically, the coefficients on *EarnsReaction* (0.511) and *EarnsSurprise* (0.047) are both

significantly positive. There is also evidence of more relative post-earnings sales at firms with higher institutional ownership perhaps because of greater governance pressure.

Column 2 of Table 3 reports results for insider purchases. Contrary to H1A, there is no evidence that in the pre-ITSA period insider purchases are more likely to occur after an earnings announcement relative to before the announcement. This may be due to purchases being less likely than sales to attract regulatory and shareholder scrutiny. Results regarding shifts relating to ITSA, ITSFEA, and Rule 10b5-1 (i.e., H1B) are similar to those for sales transactions. Specifically, there is no evidence of a shift in trade patterns around earnings associated with ITSA, however, there is evidence of a shift in trade after earnings associated with the passage of ITSFEA. Specifically, ceteris paribus, $TradePostEarnings_{Buys}$ is 4% higher after the passage of ITSFEA. The coefficient on $Post10b5-1$ is not significantly different from the coefficient on $PostITSFEA$, therefore there is no evidence that Rule 10b5-1 affected the timing of insider purchases beyond any effect from ITSFEA.

Column 2 of Table 3 also indicates that purchase patterns are associated with passive trade strategies. Specifically, the negative coefficient for $EarnsReaction$ (-0.466) indicates that insiders are more apt to delay purchases until after negative earnings announcements have been disclosed. Consistent with results regarding insiders' sales, there is also evidence of more relative purchase transactions after earnings announcements at firms with greater institutional ownership.

Collectively, the evidence in Table 3 indicates a trend in the shift of insiders' trades until after earnings announcements. It also indicates that this shift is associated with increased institutional ownership, which may proxy for increased governance monitoring, and with at least one regulatory act that increased penalties for illegal insider trading. These results are consistent

with evidence presented by Huddart et al. (2007), who report that insiders (in the post-1996 period) exploit private information about future 10-K filings by trading ahead of the filing but after the recently issued earnings announcement. Huddart et al., (2007) show that the insider trades most related to the 10-K information are those made closest to the past earnings announcement, when, presumably, legal jeopardy is at its lowest.

While Table 3 reports some evidence of shifts in trade patterns being associated with regulation passage and informed trade opportunities, the greatest effect on the timing of insider trades is simply the passage of time. Specifically, the time trend estimated in Equation (1) is 0.6% a year for both insider sales and insider purchases. Over the 1980-2003 period this time trend explains an increase in $TradePostEarns_{Sales}$ and $TradePostEarns_{Buys}$ of almost 14% (relative to the average increase of roughly 23%). This suggests that there was a general trend in firm-specific governance or a heightened sensitivity to insider trade related litigation risk through this period.

5.1.2 Sensitivity Analyses

We include lead and lagged values of the earnings announcement return and the earnings surprise to assess whether our inferences regarding the association between the distribution of insiders' trade and the passage of ITSFEA are confounded by changes in earnings announcement news. Results [not tabulated] indicate that our inferences are not affected.

$TradePostEarns$ is not defined in the absence of trade around a quarterly earnings announcement. This could lead to selection bias if an unknown factor is positively associated with both the presence of trading and with the timing of these trades, and is also associated with the passage of ITSA and ITSFEA and the introduction of 10b5-1 plans. To investigate this possibility, we estimate a selection model for the presence of insider buying or selling around a

given earnings announcement. The selection model is identified by including quarterly trading volume and the absolute value of the lagged earnings surprise and the lagged announcement return as determinants of trading. We then use the Heckman (1979) technique to control for this selection in the second-round estimation of equation (1). Results with this specification [not tabulated] are similar to those reported in Table 3, although for insider sales the coefficient on *PostITSFEA* is smaller in magnitude (0.024) and only marginally significant (two-tailed p-value < 0.10).¹¹

5.1.3 Insider Trade Volume

Given that insiders are increasingly trading after earnings announcements a related question is whether insiders are reducing their volume of trading over time. Such a reduction in trading would be expected if restrictions on the timing of trades reduce insiders' opportunities to trade profitably. Figure 2 presents annual means of insider share turnover (shares purchased and sold by insiders, scaled by shares outstanding) over the 1980-2003 period. To control for determinants of insider trading, we regress insider share turnover on the same variables as those included in equation (1) (results untabulated). We find that insider trading volume is higher following the passage of ITSA and ITSFEA than before ITSA. We also find that insider purchase and insider sales volume decrease after 2000. Overall, these results indicate that insiders are not reducing the volume of their trading (both purchases and sales) at least over the 1980-2000 period, even as their discretion in timing is apparently being reduced.

5.1.4 Insider Trade-Timing around Extreme Return Events

While restricting insider trading around earnings announcements may prevent some exploitation of private information, numerous information events occur throughout the year at

¹¹ A formal test of correlation between the first-stage (selection) equation and the second-stage (trade-timing) equation rejects the null of no correlation for the timing of both insider purchases and insider sales.

times other than earnings announcements (Ball and Shivakumar, 2008). For completeness, we examine insider trading around “extreme” return events. Specifically, for each trading day in a firm-year, we calculate the three-day cumulative, market-adjusted return around the trading day (i.e., the sum of the market-adjusted returns from the prior day to the day after the trading day). We then take the two highest and two lowest three-day returns from each firm-year and examine insider trading around these “extreme” return events.¹² Similar to the definitions of *TradePostEarns*, we define *TradePostEvents* as the percentage of shares traded in the one-month period following the event, scaled by total shares traded in the two months before and one month after the event. Figure Three presents the average (across firms within each year) value of *TradePostEvents_{Sales}* and *TradePostEvents_{Buys}* over the sample period. The figure suggests two inferences. First, in the Pre-ITSA period, the value of *TradePostEvents_{Sales}* (*TradePostEvents_{Buys}*) is roughly 35% (34%), which does not appear to be substantively larger than the proportion expected if insiders trade randomly around information events. Second, in contrast to *TradePostEarns*, there is no evidence to suggest these values have risen over the sample period. Thus, while evidence suggests that insiders are increasingly trading after earnings announcements, there is no evidence to suggest they are not avoiding trading before information events other than earnings announcements.¹³ This suggests that while insiders and firms may be avoiding trading before closely watched events such as earnings announcements, they might not be changing their tendency to trade before other, perhaps less visible, information events. Thus, it is an open question whether changes in legislation over time have reduced the

¹² We impose two filters on extreme return events. First, if two events are within 10 days of each other, we only use the first event. Second, if the three-day window around a return event overlaps the three-day window around an earnings announcement we omit the event.

¹³ We have also regressed *TradePostEvents* on indicator variables for ITSFEA and ITSA and a trend variable along with control variables as in Equation (1). These regressions also indicate that *TradePostEvents* (for both insider purchases and insider sales) is not increasing over our sample period.

ability of insiders to exploit private information. We re-visit this issue in Section 5.3 where we address the returns earned by insiders over time. The next section investigates whether shifts in insider-trading volume (around earnings announcements) are associated with changes in the litigation risk faced by the firm.

5.2 Litigation Risk and Trade-Timing

Hypotheses 2A and 2B predict that the use of insider-trading window restrictions is endogenously associated with firm-level litigation risk. We test these predictions by estimating the following simultaneous system of equations:

$$\begin{aligned} TradePostEarns = & \alpha_0 + \alpha_1 LitRisk + \alpha_2 PostITSFEA + \alpha_3 Post10b5-1 + \alpha_4 Trend + \\ & \alpha_5 LN(MVE) + \alpha_6 LN(AnalystFoll) + \alpha_7 InstOwn + \alpha_8 PriorReturn + \alpha_9 SubseqReturn + \\ & \alpha_{10} EarnsReaction + \varepsilon \end{aligned} \quad (2a)$$

$$\begin{aligned} LitRisk = & \beta_0 + \beta_1 TradePostEarns + \beta_2 MinReturn + \beta_3 StdDevRet + \beta_4 Turnover + \\ & \beta_5 LN(MVE) + \beta_6 BuyHoldRet + \beta_7 Beta + \beta_8 BioTechIndDum + \beta_9 CompHWIndDum + \\ & \beta_{10} ElectrIndDum + \beta_{11} RetailIndDum + \beta_{12} CompSWIndDum + \beta_{13} PostITSFEA + \\ & \beta_{14} Post10b5-1 + \varepsilon \end{aligned} \quad (2b)$$

Equation (2a) is a condensed version of equation (1) while equation (2b) is adopted from the litigation-risk estimation in Rogers and Stocken (2005). *TradePostEarns* is as defined previously¹⁴; *LitRisk* is a dichotomous variable equal to one if the firm-quarter observation falls within a litigation damage period specified within a securities class action lawsuit filed against the firm, and is equal to zero otherwise. *MinReturn* is the minimum daily return over the firm-quarter; *StdDevRet* is the standard deviation of daily returns over the firm-quarter; *Turnover* is share turnover (shares traded during the quarter, scaled by shares outstanding); *BuyHoldRet* is

¹⁴ Note that *TradePostEarns* is measured using all insider trades (both purchases and sales).

the buy-and-hold return over the quarter; *Beta* is the firm's beta over the firm-quarter estimated using daily returns and the value-weighted market index; *BioTechIndDum* *CompHWIndDum*, *ElectrIndDum*, *RetailIndDum*, and *CompSWIndDum* are dichotomous variables equal to one if the firm is in the bio-technology, computer hardware, electrical, retail, and computer software industries, respectively and is equal to zero otherwise; and *PostITSFEA* and *Post10b5-1* are as defined previously. Note that due to the need for data on shareholder litigation we estimate this model over the years 1987-2003. Thus, we are not able to investigate the effects on litigation risk of the passage of ITSA in 1984.¹⁵

Table 4 reports results regarding the association between trade-timing and litigation risk. Column 1 presents two-stage least squares (2SLS) estimation of the determinants of *TradePostEarns*. We correct *t*-statistics for heteroscedasticity and correlation within industry clusters. The coefficient on predicted litigation risk (*LitRisk*) is negative but is not statistically or economically significant. Therefore it does not support the notion that insiders avoid more relative trade before earnings announcements in response to increased levels of firm litigation risk. *TradePostEarns* is positively associated with firm size, analyst following, institutional ownership, and the passage of ITSFEA, and is increasing over time. We also find evidence that the relative proportion of trade *before* earnings announcements increases after the adoption of SEC Rule 10b5-1. Specifically, we find that the estimated coefficient for *Post10b5-1* in the *TradePostEarns* regression is smaller than the coefficient on *PostITSFEA* (0.012 versus 0.035; *p*-value < 0.01) and is not significantly different from zero which is consistent with firms allowing

¹⁵ Including a dichotomous variable for firm-quarters after the passage of the Private Securities Litigation Reform Act of 1995 has no effect on the estimation of equation (3); the coefficient on this dichotomous variable is not significantly different from zero.

insiders' Rule 10b5-1 trades to execute within otherwise-restricted trade windows before earnings (Jagolinzer, 2009).¹⁶

Column 2 of Table 4 reports the marginal effects (evaluated at the mean) of the determinants of litigation risk as a function of factors documented in Rogers and Stocken (2005) and the distribution of insiders' trade activity surrounding earnings announcements (*TradePostEarnings*). The estimation utilizes *IVPROBIT*, a STATA procedure for probit estimation with an endogenous independent variable (in this case, *TradePostEarnings*). We correct *t*-statistics for heteroscedasticity and correlation within industry clusters. The main result is that, consistent with H2B, the coefficient on *TradePostEarnings* is negative and significant. This suggests that firms' overall litigation risk is decreasing in the degree to which insiders trade after, relative to before, earnings announcements. To get some sense of economic magnitude, a one-standard deviation increase in *TradePostEarnings* results in a 0.88 standard deviation decrease in the probability of litigation, assuming correct model specification. Consistent with Rogers and Stocken (2005), litigation risk is increasing in firm size and share turnover and decreasing in quarterly stock return, the minimum daily return during the quarter, and the standard deviation of daily stock returns during the quarter. We also find that the passage of ITSFEA is associated with an increase in litigation risk: the coefficient on *PostITSFEA* is positive and significant.

The estimation in Table 4 uses a measure of trade-timing (*TradePostEarnings*) that is recalculated every quarter. This introduces noise in the estimation process as firm policies on insider trading are probably more evident when trades are examined over a longer period.

Columns 3 and 4 of Table 4 reproduce the estimation with a new measure of insider trade-

¹⁶ Table 3 reports similar results for insider sales: the shift to post-earnings announcement selling following ITSFEA is partially reversed following the implementation of Rule 10b5-1. The larger reversal observed in Table 4 is likely due to the omission of pre-1987 years in the Table 4 regressions.

timing: ($TradePostEarnings_{AVG}$). $TradePostEarnings_{AVG}$ is the average value of $TradePostEarnings$ over the current quarter and the prior three quarters.¹⁷ We estimate the $TradePostEarnings_{AVG}$ regression without $EarningsReaction$ as we would not expect the current quarter announcement return to be associated with the average value of $TradePostEarnings$ over a one year time period.

Results for $TradePostEarnings_{AVG}$ are similar to the results for $TradePostEarnings$ with one notable exception: in column 3, the coefficient on $LitRisk$ (0.357) is statistically positive (t -stat = 2.36). This provides evidence that a firm's overall litigation risk is associated with the distribution of insiders' trades around earnings and also provides some evidence of the endogenous relation between regulation, firm-level litigation risk and insiders' trade patterns. In the fourth column of Table 4 we see that, just as for $TradePostEarnings$, $TradePostEarnings_{AVG}$ is negatively associated with litigation risk; however, the economic magnitude of the relation is lower: a one-standard deviation increase in the average percentage of trading occurring after an earnings announcement disclosure is associated with a 0.36 standard deviations decrease in litigation risk.¹⁸

Overall, the results in Tables 3 and 4 suggest that the passage of ITSFEA had two offsetting effects on litigation risk. First, unconditional litigation risk increased following the passage of ITSFEA. Second, insiders moved more trading volume to periods after earnings announcements following ITSFEA's passage. However, trading after (rather than before) an earnings announcement is associated with lower litigation risk. Thus, the effect of ITSFEA on litigation risk depends on the interaction between an overall increase in litigation risk and insiders' trading pattern responses to the passage of ITSFEA.¹⁹

¹⁷ The averaging procedure provides larger sample size for column 3 and 4 estimations relative to column 1 and 2 estimations. If at least 2 quarter observations are observed, the average is computed and applied to otherwise missing data quarters.

¹⁸ As with the Table 3 results, the Table 4 results are robust to controlling for selection bias by including the inverse Mill's ratio as an independent variable in equation (2) and as an instrument for $TradePostEarnings$ in equation (3).

¹⁹ For sensitivity, we also investigate the direct effect of lawsuits on insider trade timing by creating an indicator variable which, for a given firm-quarter, equals one if any of the prior 8 firm-quarters was part of a lawsuit damages

5.3 Insider-Trading Returns

Our final set of results concern changes in the returns generated by insiders' trades over time. If changes in regulation and litigation risk have prompted insiders to trade during times of low litigation risk (or prompted firms to better monitor insiders' trade activity), we would expect to see reductions in the ability of insiders to exploit their private information. We test this proposition by examining changes (post-ITSA and post-ITSFEA) in abnormal returns to insider-trading events. The null hypothesis is that the profitability of insider trading has stayed the same or increased over time. For example, stronger penalties for trading on private information may discourage trading on information with low value, while leaving intact incentives to trade on highly profitable information. As discussed in Section 5.1.3, insider trading volume did not decline after the passage of ITSFEA. However, the increase in volume was higher for insider sales than for insider purchases perhaps due to the increased use of stock compensation in the 1990's. Thus, an increase in liquidity trades may mask any decrease in marginally profitable trades. Whether the resulting mix of trades leads to a decrease or increase in trading profits is an empirical issue.

We estimate changes in returns by regressing firms' monthly excess returns on risk factors and indicator variables for proximity to insider-trading events. For each firm-month observation, we create an excess return by subtracting the risk free rate from the firm-month return. These excess returns are regressed on the Fama-French (1993) factors and the Carhart (1997) momentum factor and on indicator variables for whether the firm-month is in proximity to an

period (zero otherwise). We include this variable in estimation of equation (1). For both insider sales and insider purchases, the coefficient on this variable is positive and marginally significant (two-tailed p-value of 0.05 and 0.09 for purchases and sales respectively) indicating that insiders move trading after earnings announcements in the wake of a lawsuit.

insider-trading event.²⁰ For example, we include an indicator variable for whether the firm-month is within 3 months prior to an insiders' trade month; the coefficient on this indicator variable gives the average abnormal monthly return (i.e., excess return controlling for the Fama-French and momentum factors) in the three month period prior to the insider-trading event. We include indicator variables ($MonthDum_i$ in the regression equation below) for five time periods around insider-trading events: months -6 to -4 before the event-month, months -3 to -1 before the event-month, the event month, months $+1$ to $+3$ following the event-month, and months $+4$ to $+6$ following the event-month. We use indicator variables ($PeriodDum_j$) to estimate the regression separately for time periods before and after the passage of ITSA in 1984 and ITSFEA in 1988 and test for changes across the regressions by fully interacting the variables. This enables us to test whether abnormal returns around insider-trading events change after the passage of ITSA and ITSFEA. To avoid the confounding effect of 10b5-1 plans, we limit the data to years 1980-2000. Because we pool together the firms' individual time-series of monthly data we control for cross-sectional correlation by clustering the standard errors of the coefficient estimates by calendar month. Specifically, we estimate:

$$R_{it} - R_{ft} = \gamma_0 + \gamma_1(R_{Mkt} - R_f) + \gamma_2SMB + \gamma_3HML + \gamma_4UMD + \gamma_5MonthDum_i + \gamma_6PeriodDum_j + \psi \quad (4)$$

where R_{it} is the raw monthly return for firm i in month t ; R_{ft} is the monthly risk-free rate; R_{Mkt} is the value-weighted, monthly, market return; SMB is the difference in monthly return between a portfolio of small stocks and a portfolio of large stocks; HML is the difference in monthly returns between a portfolio of value (high book-to-market) stocks and a portfolio of glamour (low book-

²⁰ The factors are available through WRDS and from Ken French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

to-market) stocks; *UMD* is the difference in monthly returns between a portfolio of winner (high past returns) stocks and a portfolio of loser (low past returns) stocks; *MonthDum_i* is a set of five indicator variables specifying whether the firm-month occurs in months -6 to -4 , -3 to -1 , month zero, month $+1$ to $+3$, or month $+4$ to $+6$, relative to the month of the insider purchase or sale; and *PeriodDum_j* is a set of two indicator variables indicating whether the firm-month is between the passage of ITSA and ITSFEA (1985-1989) or after the passage of ITSFEA (post-1989). The intercept captures firm-months before the passage of ITSA that are not in the seven month window around an insider purchase or sale. The full regression includes the interactions between *PeriodDum* and the risk factors and the interactions between *PeriodDum* and *MonthDum*.²¹

Table 5 reports the regression output.²² Panel A of Table 5 focuses on all firms with required data, while panels B and C focus on subsets of the data partitioned on observed trade pattern changes associated with the passage of ITSA and ITSFEA. The first column presents results for trades that occur in the pre-ITSA period (prior to 1985); the second column presents results for trades that occur between ITSA and ITSFEA (1985-1989); and the third column presents results for trades that occur after ITSFEA and before the introduction of 10b5-1 plans (1990-2000). Shifts in returns, and their statistical significance are presented in column four (the shift from Pre-ITSA to Post-ITSA) and column 5 (the shift from Post-ITSA to Post-ITSFEA). For example, column one of Table 5 panel A shows that in the pre-ITSA period, in the three months ahead of an insider sale, firms experience a positive monthly return of 1.46% suggesting insiders

²¹ Results in Tables 5 and 6 are not affected by: 1) using only the Fama-French factors (i.e., omitting the momentum factor) or only the market factor. We have also included a factor based on idiosyncratic risk to control for changes in volatility over time. Reported results are similar to results with this factor included in equation (4).

²² Note that we are regressing individual firm-month returns on risk factors and allowing indicator variables to tell us the mean returns to firm-months with characteristics of interest (e.g., firm-months that follow a month with insider purchases). Traditional event studies usually form portfolios of firm-months with a characteristic of interest and regress the portfolio-month return on risk factors. Relative to the latter regression setup, the R-squared for our regression will be low as firm-month returns display greater variation than portfolio-month returns.

are contrarian sellers who sell shares after price increases. The third column shows that this contrarian behavior appears to become stronger after the passage of ITSFEA, suggesting that this Act is associated with a greater use of passive trading strategies when insiders are selling.

Examining returns after insider sales shows that insiders, on average, avoid negative returns when they sell, i.e., they employ active trade strategies. For example, sales in the pre-ITSA period avoid post-trade three month returns of -0.52% . Consistent with prior research, there is no evidence to indicate that the passage of ITSA mitigates insiders' ability to generate active trade returns for their sales. Further, Table 5 shows no evidence that ITSFEA resulted in a general lowering of insiders' ability to avoid losses following sales. For example, after the passage of ITSFEA, insiders' sales are associated with *lower* subsequent returns over the post-trade three-month period of 0.59% (0.60%) relative to returns in the post- (pre-) ITSA period.

Table 5 panel A also reports returns results for insider purchases. Similar to results reported for insiders' sales, there is evidence that insiders purchase patterns are contrarian (insiders buy after price declines) and that insiders can generate positive, active (forward-looking) trade strategy returns. There is also no evidence that the passage of ITSA or ITSFEA mitigate insiders' ability to earn active trade strategy returns; rather, column 5 indicates that in the three months following an insider-purchase, returns are significantly higher post-ITSFEA relative to pre-ITSA.

Thus, inconsistent with H3A but consistent with prior research (e.g., Seyhun, 1992), the evidence from Table 5 panel A does not suggest that the passage of regulation that increases penalties for illegal insider trading is associated with a reduction in returns to insiders' active trade strategies. It is possible, then, that the observed shifts in insider trade patterns associated with new regulation reflect more form over substance, where the response generally mitigates

overall litigation risk yet preserves insiders' ability to generate active trade returns. Such a scenario would be consistent with Figure 3 which indicates that insiders have not changed the timing of trades around non-earnings announcement, high price-movement days. To explore this issue further, we examine trade returns in samples partitioned on the degree to which earnings-related trade pattern shifts are observed.

For Panels B and C of Table 5, we isolate firms and insiders that respond to ITSFEA by taking all firms with data in the pre-ITSA period (1980-1984) and calculating their average value of *TradePostEarns* in the first year they appear in the sample. We then quintile rank firms (within years) based on initial values of *TradePostEarns*. We similarly rank firms in the post-ITSFEA period by calculating their average value of *TradePostEarns* in the final year they appear in the sample (or in 2000 if they appear in the sample after 2000). Our sample of firms that respond to the passage of ITSFEA consists of firms that first appear in the sample in the bottom quintile of firms ranked on *TradePostEarns* and last appear in the sample in the top quintile of firms ranked on *TradePostEarns*. In other words, these are firms that in the pre-ITSA period tend to have trades occurring ahead of earnings announcements but in the post-ITSFEA period tend to have trades appearing after earnings announcements. For comparison purposes, we also examine firms that begin in the bottom quintile and end in the bottom quintile; these firms appear to have room for insiders to respond to ITSFEA but they choose not to do so.²³

Table 5 panel B reports results for firms with low distributional shifts in insiders' trades around earnings announcements. Consistent with results in Panel A (for the aggregate sample), panel B does not provide evidence that regulation that increases penalties for illegal insider

²³ Firms in the lowest (highest) quintile of *TradePostEarns* in their first year have an average value of *TradePostEarns* of 9.0% (99%). In their final year in the sample, firms in the lowest (highest) quintile of *TradePostEarns* have an average value of *TradePostEarns* of 2.0% (88%). Relative to non-responders, responding firms are larger and have slightly higher market-to-book ratios.

trading is associated with lower active trade strategy returns. Rather, insider purchases exhibit higher post-trade returns and insider sales exhibit lower power-trade returns following the passage of ITSFEA. Table 5 panel C reports results for firms with high distributional shifts in insiders' trades around earnings announcements. These firms are likely to face greater litigation risk and have, over time, shifted more insider trading after earnings announcements. In contrast to panels A and B, panel C provides some evidence of lower insider trade returns to sales and purchases after the passage of insider-trading regulation (specifically, the passage of ITSA). During the three month period following insiders' sales, insiders' loss avoidance returns are 1.04% lower after the passage of ITSA. Similarly, during the three month period following insiders' purchases, insiders' hold returns are 0.95% lower after the passage of ITSA. This reduction in active trade strategy returns is not reversed following the passage of ITSFEA. Collectively, this evidence suggests that the effects of new insider trade regulation are strongest at firms with greater general litigation risk. Additionally, the evidence suggests that firm actions responding to ITSFEA (e.g., insider blackout periods) were necessary for ITSFEA to effectively constrain insiders' from exploiting private information.

6. Conclusion

This study examines the effects of changes in insider-trade regulation on the timing of insiders' trades, firm-level litigation risk, and insider-trading profitability. We present evidence that the passage of insider trading regulation (specifically, the passage of ITSFEA in 1988) is associated with the tendency of insiders to trade after, relative to before, earnings announcements. We also present evidence of a general trend in the tendency to trade after, relative to before, earnings announcements associated with a multiple-year period of increased

insider trading scrutiny. These shifts in insider trade patterns appear to mitigate a general increase in firm-level litigation risk associated with regulation passage. Therefore, these trade pattern shifts are consistent with firms or insiders adopting, during periods of increased sensitivity to insider trade related litigation risk, self-imposed limits on trading during times when insiders may be privately informed.

There is no evidence, however, that insiders shift trade to avoid trading before other substantive information events, which we identify by searching for trade days that exhibit extreme returns. Consistent with prior research, there is also no general evidence that the passage of regulation decreases the returns to insiders' trades. Therefore, one might infer that the average firm and insider response to regulation passage is perfunctory. We do present some evidence of a reduction in returns to insiders' trades, however, at firms whose insiders respond to more regulation by shifting trading after earnings announcements. This suggests that new insider trade regulation had more impact on firms with greater general litigation risk. These results also suggest that firm-level enforcement may be necessary for economy-wide regulation to be effective.

There are still unresolved questions regarding the effects of new insider regulation on insiders' trade patterns and returns. Future research might explore in more detail the fundamental information underlying insiders' trade returns. As discussed previously, an increase in insider-trading profits after increased regulation may reflect insiders trading only on private information when the benefits exceed the (now higher) costs. Alternatively, increased regulation may give insiders incentives to trade on different information that is less subject to regulatory attention. For example, Huddart et al., (2007) present evidence that insiders avoid regulatory scrutiny by trading after earnings announcements, but still exploit information in upcoming 10-K

filings. Distinguishing between these two explanations for insiders' continued ability to earn abnormal returns would provide valuable evidence on the consequences of regulatory actions.

Future research might also explore whether the documented shifts in insiders' trade patterns result from decisions by risk-averse insiders who face increased litigation risk or result from decisions by firms who constrain trade opportunities to mitigate overall firm litigation risk.

Finally, we document that much of the shift in insider trading patterns around earnings announcements is unexplained by regulatory and firm-level factors; identifying the forces that motivate these shifts is another task for future research.

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Appendix A. Variable Definitions

Variable	Definition
<i>TradePostEarns</i>	The number of shares traded by a firm's insiders during the one-month period following a quarterly earnings announcement scaled by the total number of shares traded by the firm's insiders during the two-month period that precedes the earnings announcement and the one-month period that follows the announcement
<i>TradePostEvents</i>	Similar to <i>TradePostEarns</i> with earnings announcements replaced by the two highest and two lowest abnormal return days during the firm-year
<i>Trend</i>	Iterative count variable that increases by one for each year during the sample period
<i>PostITSA</i>	Dichotomous variable equal to one if firm-quarter is between 1984 and 1990; zero otherwise
<i>PostITSFEA</i>	Dichotomous variable equal to one if firm-quarter is between 1990 and 2000; zero otherwise
<i>Post10b5-1</i>	Dichotomous variable equal to one if firm-quarter is after 2000; zero otherwise
<i>MVE</i>	Market value of equity (shares outstanding multiplied by beginning of quarter price)
<i>AnalystFoll</i>	Number of analysts issuing a earnings forecast in month prior to earnings announcement
<i>InstOwn</i>	Percentage of shares outstanding owned by institutional investors
<i>PriorReturn</i>	Cumulative, market-adjusted return over the two month period preceding a quarterly earnings announcement
<i>SubseqReturn</i>	Cumulative, market-adjusted return over the one month period subsequent to a quarterly earnings announcement
<i>EarnsReaction</i>	Three-day, cumulative, market-adjusted return centered on the release day of a quarterly earnings announcement
<i>EarnsSurprise</i>	Quarterly earnings analyst forecast error (when available) or seasonal change in quarterly earnings (when analyst forecast error is not available) scaled by price 10 days before earnings announcement
<i>LitRisk</i>	A dichotomous variable equal to one if the firm-quarter observation falls within a litigation damage period specified within a securities class action lawsuit filed against the firm, and equal to zero otherwise
<i>MinReturn</i>	The minimum daily return over the firm-quarter
<i>StdDevReturn</i>	The standard deviation of daily returns over the firm-quarter
<i>Turnover</i>	The share turnover over the firm-quarter (shares traded during the quarter, scaled by shares outstanding)
<i>BuyHoldRet</i>	The buy-and-hold return over the quarter
<i>Beta</i>	Coefficient on market return in a firm-specific market model regression of quarterly daily returns
<i>CompHWIndDum</i> , <i>ElectrIndDum</i> , <i>RetailIndDum</i> , and <i>CompSWIndDum</i>	Dichotomous variables equal to one if the firm is in the bio-technology, computer hardware, electrical, retail, and computer software industries, respectively; equal to zero otherwise
R_f	Risk-free rate
R_{Mkt}	Monthly Portfolio Return
<i>SMB</i>	Return on small firms minus return on big firms
<i>HML</i>	Return on value firms minus return on growth firms
<i>UMD</i>	Return on winners minus return on losers

Table 1. Descriptive statistics

Variable	Mean	Std. Dev.	Q1	Median	Q3
<i>TradePostEarnings</i>	0.504	0.446	0.000	0.502	1.000
<i>TradePostEarnings_{Sales}</i>	0.513	0.450	0.000	0.545	1.000
<i>TradePostEarnings_{Buys}</i>	0.481	0.466	0.000	0.400	1.000
<i>LitRisk</i>	0.021	0.144	0.000	0.000	0.000
<i>MVE (\$billion)</i>	1.137	7.672	0.024	0.092	0.415
<i>AnalystFoll</i>	1.399	3.349	0.000	0.000	1.000
<i>InstOwn</i>	0.147	0.230	0.000	0.000	0.240
<i>PriorReturn</i>	0.005	0.245	-0.109	-0.012	0.088
<i>SubseqReturn</i>	0.000	0.176	-0.079	-0.010	0.062
<i>EarningsReaction</i>	0.002	0.079	-0.034	-0.001	0.034
<i>EarningsSurprise</i>	-0.002	0.123	-0.009	0.001	0.009
<i>MinReturn</i>	-0.099	0.076	-0.125	-0.077	-0.048
<i>StdDevRet</i>	0.037	0.029	0.019	0.030	0.046
<i>Turnover</i>	0.204	0.190	0.071	0.142	0.270
<i>BuyHoldRet</i>	0.043	0.811	-0.143	0.000	0.145
<i>Beta</i>	1.100	2.325	0.332	0.938	1.731

See the Appendix for variable definitions.

Table 2. Distribution of insiders' trades around earnings announcements

Year	<i>TradePostEarnings</i>	<i>TradePostEarnings_{Sales}</i>	<i>TradePostEarnings_{Buys}</i>
1980	37.8%	38.5%	34.8%
1981	39.4%	39.6%	39.3%
1982	41.6%	43.5%	36.7%
1983	40.0%	39.5%	39.9%
1984	42.5%	44.0%	39.6%
1985	42.9%	44.9%	38.2%
1986	44.1%	44.5%	41.7%
1987	41.6%	39.2%	43.7%
1988	42.7%	44.3%	40.2%
1989	46.0%	46.9%	43.6%
1990	46.6%	46.3%	46.6%
1991	49.7%	51.7%	44.5%
1992	51.0%	53.0%	46.0%
1993	49.8%	49.2%	51.0%
1994	52.7%	53.0%	51.7%
1995	53.1%	55.5%	49.3%
1996	54.0%	55.0%	51.1%
1997	55.0%	54.7%	53.5%
1998	55.4%	57.9%	50.9%
1999	55.2%	56.7%	53.1%
2000	53.8%	54.8%	51.4%
2001	53.9%	57.8%	45.9%
2002	55.9%	55.8%	55.6%
2003	61.0%	62.0%	58.4%

The sample is drawn from all firms on Compustat with observations between 1980 and 2003 and necessary data from CRSP, Thomson Financial, the National Archives, CDA-Spectrum, and I/B/E/S. Percentages in Table 2 refer to the percentage of shares traded by insiders that are traded in the one-month period following an earnings announcement.

Table 3. Factors associated with distributional shifts in insiders' trades around earnings announcements

<i>TradePostEarnings</i> =	Sales	Buys
<i>Intercept</i>	0.415 (14.00)	0.217 (7.21)
<i>PostITSA</i>	-0.006 (-0.95)	-0.001 (-0.07)
<i>PostITSFEA</i>	0.035 (3.79)	0.039 (2.32)
<i>Post10b5-1</i>	0.022 (1.71)	0.032 (1.19)
<i>Trend</i>	0.006 (7.11)	0.006 (4.99)
<i>LN(MVE)</i>	-0.002 (-0.75)	0.012 (4.49)
<i>LN(AnalystFoll)</i>	0.003 (1.69)	-0.005 (-1.67)
<i>InstOwn</i>	0.028 (2.74)	0.052 (4.25)
<i>PriorReturn</i>	0.155 (12.96)	-0.199 (-18.80)
<i>SubseqReturn</i>	0.266 (25.33)	-0.109 (-8.01)
<i>EarnsReaction</i>	0.478 (18.99)	-0.457 (-22.66)
<i>EarnsSurprise</i>	0.026 (1.02)	-0.003 (-0.18)
<i>n</i>	129,594	99,308
Adj. R^2	0.112	0.085
<i>PostITSA=PostITSFEA</i>	<i>p</i> -value=0.00	<i>p</i> -value=0.00
<i>PostITSFEA=Post10b5-1</i>	<i>p</i> -value=0.05	<i>p</i> -value=0.62

OLS coefficients with robust t-statistics (in parentheses) based on standard errors clustered at the two-digit SIC level. See the Appendix for variable definitions. Firm fixed effects are included in each regression.

Table 4. Litigation risk and the distribution of insiders' trade around earnings announcements

Panel A: <i>TradePostEarns</i>				Panel B: <i>TradePostEarns_{AVG}</i>			
<i>TradePostEarns</i> =		<i>LitRisk</i> =		<i>TradePostEarns_{AVG}</i> =		<i>LitRisk</i> =	
<i>Intercept</i>	0.236 (10.22)	<i>Intercept</i>	-1.872 (-6.56)	<i>Intercept</i>	0.226 (11.57)	<i>Intercept</i>	-2.839 (-5.67)
<i>LitRisk</i>	0.008 (0.06)	<i>TradePostEarns</i>	-0.283 (-17.31)	<i>LitRisk</i>	0.357 (2.36)	<i>TradePostEarns_{AVG}</i>	-0.153 (-4.12)
<i>LN(MVE)</i>	0.010 (5.13)	<i>MinReturn</i>	-0.274 (-9.18)	<i>LN(MVE)</i>	0.010 (4.76)	<i>MinReturn</i>	-0.190 (-8.58)
<i>LN(AnalystFoll)</i>	0.015 (4.87)	<i>StdDevRet</i>	-0.523 (-5.22)	<i>LN(AnalystFoll)</i>	0.015 (5.81)	<i>StdDevRet</i>	-0.317 (-5.63)
<i>InstOwn</i>	0.062 (4.72)	<i>Turnover</i>	0.136 (11.07)	<i>InstOwn</i>	0.054 (4.82)	<i>Turnover</i>	0.099 (11.81)
<i>PriorReturn</i>	0.028 (2.87)	<i>LN(MVE)</i>	0.015 (12.46)	<i>PriorReturn</i>	0.016 (2.57)	<i>LN(MVE)</i>	0.010 (12.20)
<i>SubseqReturn</i>	0.113 (10.78)	<i>BuyHoldRet</i>	-0.011 (-4.86)	<i>SubseqReturn</i>	0.036 (5.55)	<i>BuyHoldRet</i>	-0.011 (-4.26)
<i>PostITSFEA</i>	0.035 (7.77)	<i>Beta</i>	0.002 (1.62)	<i>PostITSFEA</i>	0.033 (5.14)	<i>Beta</i>	0.001 (0.97)
<i>Post10b5-1</i>	0.012 (1.29)	<i>PostITSFEA</i>	0.017 (2.25)	<i>Post10b5-1</i>	0.014 (1.24)	<i>PostITSFEA</i>	0.007 (1.35)
<i>Trend</i>	0.006 (6.39)	<i>Post10b5-1</i>	0.027 (2.02)	<i>Trend</i>	0.007 (8.04)	<i>Post10b5-1</i>	0.013 (2.14)
<i>EarnsReaction</i>	0.108 (5.59)	<i>Industry Fixed Effects</i>	Included			<i>Industry Fixed Effects</i>	Included
<i>n</i>	159,272	<i>n</i>	159,272	<i>n</i>	248,518	<i>n</i>	248,518

Two-Stage Least Squares coefficients (Columns 1 and 3) and IV Probit marginal effects (Columns 2 and 4) with robust t-statistics (in parentheses) based on standard errors clustered at the two-digit SIC level. See the Appendix for variable definitions.

Table 5. Insiders' trade profitability

Panel A. Pooled ($n = 341,200$; Adj. $R^2 = 15.02\%$)

	<i>Sales</i>				
	<i>Pre-ITSA</i>	<i>Post-ITSA</i>	<i>Post-ITSFEA</i>	Δ <i>Post-ITSA</i>	Δ <i>Post-ITSFEA</i>
<i>Months - 6 to - 4</i>	0.0062 (4.88)	0.0098 (6.33)	0.0142 (5.69)	0.0036 (2.24)	0.0044 (2.76)
<i>Months - 3 to - 1</i>	0.0146 (10.03)	0.0151 (9.29)	0.0240 (9.36)	0.0005 (0.34)	0.0089 (5.26)
<i>Month 0</i>	0.0168 (9.07)	0.0172 (9.94)	0.0246 (9.42)	0.0004 (0.19)	0.0074 (3.91)
<i>Months + 1 to + 3</i>	-0.0052 (-3.56)	-0.0053 (-3.34)	-0.0112 (-4.94)	-0.0001 (-0.07)	-0.0059 (-3.98)
<i>Months + 4 to + 6</i>	-0.0011 (-0.78)	-0.0006 (-0.40)	-0.0019 (-0.69)	0.0005 (0.24)	-0.0013 (-0.69)

	<i>Buys</i>				
	<i>Pre-ITSA</i>	<i>Post-ITSA</i>	<i>Post-ITSFEA</i>	Δ <i>Post-ITSA</i>	Δ <i>Post-ITSFEA</i>
<i>Months - 6 to - 4</i>	0.0018 (1.17)	0.0018 (1.14)	0.0011 (0.49)	-0.0000 (-0.02)	-0.0007 (-0.41)
<i>Months - 3 to - 1</i>	-0.0088 (-5.44)	-0.0038 (-2.64)	-0.0071 (-2.98)	0.0050 (3.26)	-0.0034 (-1.87)
<i>Month 0</i>	-0.0035 (-1.77)	0.0031 (1.78)	0.0021 (0.71)	0.0066 (2.99)	-0.0010 (-0.42)
<i>Months + 1 to + 3</i>	0.0124 (9.07)	0.0127 (8.56)	0.0168 (7.08)	0.0003 (0.19)	0.0041 (2.57)
<i>Months + 4 to + 6</i>	0.0062 (3.17)	0.0050 (3.01)	0.0051 (2.42)	-0.0012 (-0.66)	0.0001 (0.10)

Table 5. Insiders' trade profitability

Panel B. Low distributional shifts in insiders' trades around earnings announcements ($n = 31,857$; $Adj R^2 = 11.30\%$)

	Sales				
	<u>Pre-ITSA</u>	<u>Post-ITSA</u>	<u>Post-ITSFEA</u>	<u>Δ Post-ITSA</u>	<u>Δ Post-ITSFEA</u>
<i>Months - 6 to - 4</i>	0.0049 (1.43)	0.0090 (2.66)	0.0104 (2.42)	0.0041 (0.92)	0.0055 (1.20)
<i>Months - 3 to - 1</i>	0.0194 (4.76)	0.0135 (3.62)	0.0275 (3.26)	-0.0059 (-1.14)	0.0081 (1.56)
<i>Month 0</i>	0.0090 (1.72)	0.0201 (4.92)	0.0191 (3.97)	0.0110 (1.81)	0.0101 (1.58)
<i>Months + 1 to + 3</i>	-0.0022 (-0.56)	-0.0089 (-2.65)	-0.0120 (-3.37)	-0.0066 (-1.50)	-0.0098 (-2.17)
<i>Months + 4 to + 6</i>	-0.0041 (-1.33)	-0.0004 (-0.10)	-0.0068 (-0.55)	0.0038 (0.92)	-0.0027 (-0.65)

	Buys				
	<u>Pre-ITSA</u>	<u>Post-ITSA</u>	<u>Post-ITSFEA</u>	<u>Δ Post-ITSA</u>	<u>Δ Post-ITSFEA</u>
<i>Months - 6 to - 4</i>	0.0029 (0.82)	0.0034 (0.99)	0.0007 (0.22)	0.0005 (0.12)	-0.0022 (-0.54)
<i>Months - 3 to - 1</i>	-0.0051 (-1.28)	-0.0136 (-4.13)	-0.0136 (-3.43)	-0.0084 (-1.69)	-0.0085 (-1.67)
<i>Month 0</i>	0.0004 (0.10)	0.0059 (1.02)	-0.0011 (-0.50)	0.0054 (0.74)	-0.0015 (-0.23)
<i>Months + 1 to + 3</i>	0.0046 (1.18)	0.0094 (3.13)	0.0183 (4.10)	0.0048 (1.10)	0.0137 (2.99)
<i>Months + 4 to + 6</i>	0.0063 (1.41)	0.0095 (2.92)	0.0011 (0.80)	0.0032 (0.69)	-0.0052 (-1.12)

Table 5. Insiders' trade profitability

Panel C. High distributional shifts in insiders' trades around earnings announcements ($n = 18,928$; $Adj R^2 = 11.97\%$)

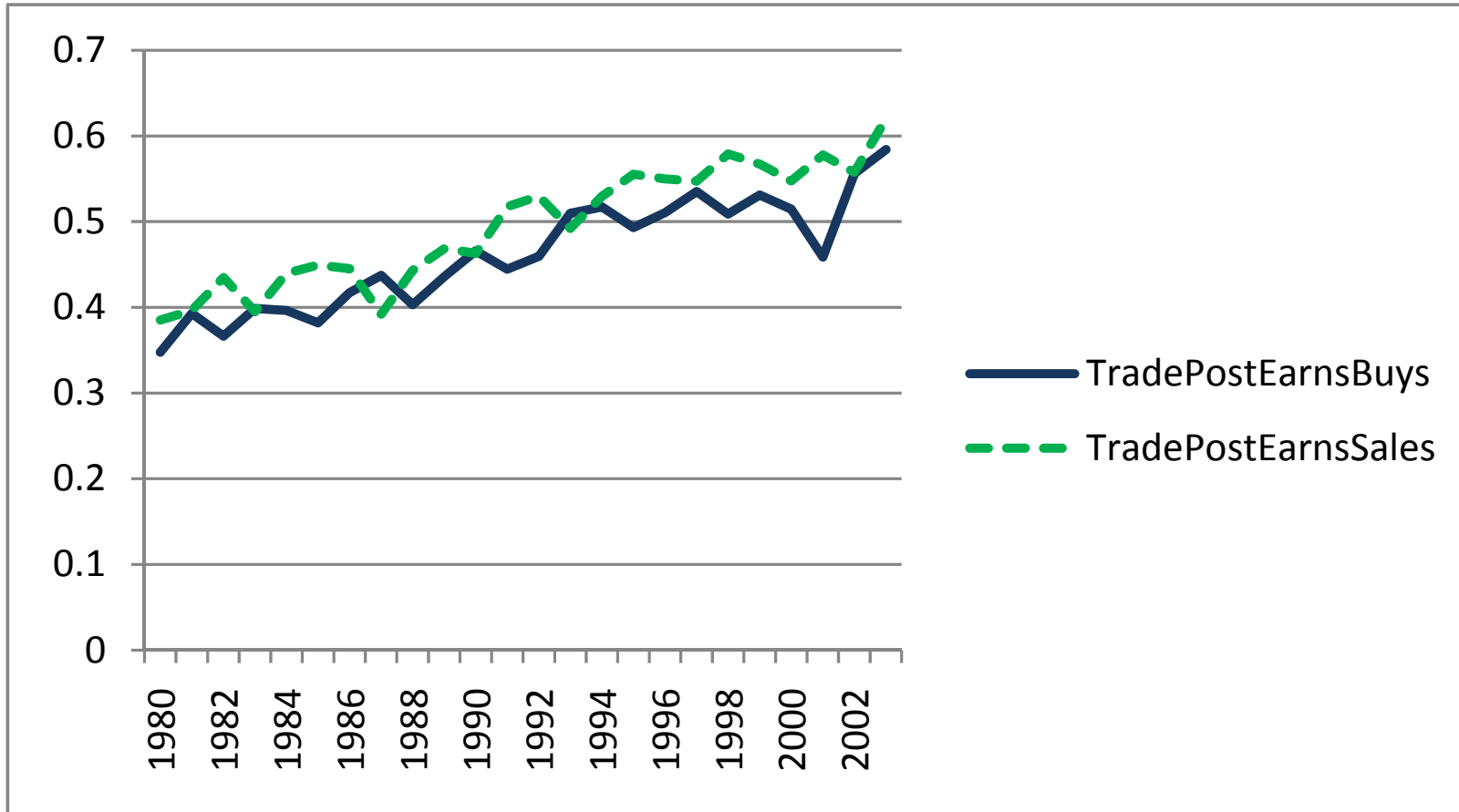
	<i>Sales</i>				
	<i>Pre-ITSA</i>	<i>Post-ITSA</i>	<i>Post-ITSFEA</i>	Δ <i>Post-ITSA</i>	Δ <i>Post-ITSFEA</i>
<i>Months - 6 to - 4</i>	0.0040 (1.03)	0.0119 (2.52)	0.0107 (2.39)	0.0079 (1.37)	0.0067 (1.28)
<i>Months - 3 to - 1</i>	0.0161 (4.15)	0.0143 (3.36)	0.0200 (2.73)	-0.0018 (-0.37)	0.0039 (0.82)
<i>Month 0</i>	0.0218 (3.78)	0.0149 (3.05)	0.0213 (1.68)	-0.0069 (-1.02)	-0.0005 (-0.07)
<i>Months + 1 to + 3</i>	-0.0095 (-2.12)	0.0009 (0.20)	-0.0099 (-0.10)	0.0104 (1.97)	-0.0004 (-0.07)
<i>Months + 4 to + 6</i>	-0.0042 (-1.03)	-0.0036 (-0.85)	0.0013 (0.32)	0.0006 (0.13)	0.0055 (1.26)

	<i>Buys</i>				
	<i>Pre-ITSA</i>	<i>Post-ITSA</i>	<i>Post-ITSFEA</i>	Δ <i>Post-ITSA</i>	Δ <i>Post-ITSFEA</i>
<i>Months - 6 to - 4</i>	0.0010 (0.24)	0.0005 (0.10)	-0.0011 (-0.22)	-0.0005 (-0.09)	-0.0021 (-0.41)
<i>Months - 3 to - 1</i>	-0.0115 (-2.56)	-0.0011 (-0.26)	-0.0146 (-0.64)	0.0104 (2.05)	-0.0031 (-0.65)
<i>Month 0</i>	0.0001 (0.17)	0.0042 (0.69)	-0.0006 (-0.26)	0.0032 (0.42)	-0.0016 (-0.19)
<i>Months + 1 to + 3</i>	0.0188 (3.81)	0.0093 (2.16)	0.0168 (0.97)	-0.0095 (-1.65)	-0.0020 (-0.35)
<i>Months + 4 to + 6</i>	0.0026 (0.54)	0.0063 (1.47)	0.0042 (1.26)	0.0037 (0.74)	0.0016 (0.33)

Mean abnormal returns with robust t -statistics (in parentheses) based on standard errors clustered at the calendar-month level. Coefficients on the Fama-French and Carhart factors and their interactions with the period dummies are omitted for brevity.

Figure 1

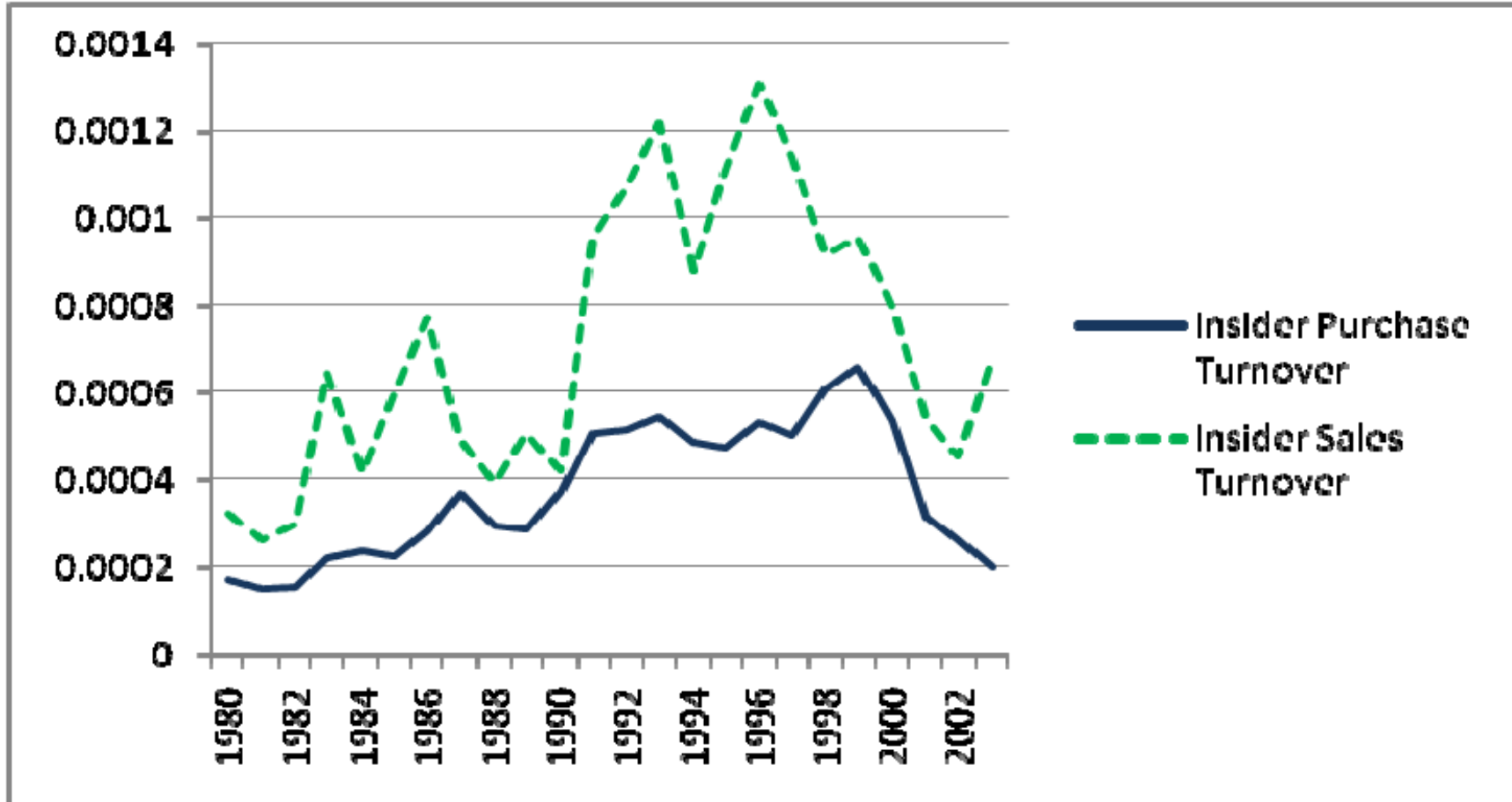
Insider Trade Timing: 1980-2003



TradePostEarnings_{Buys} and *TradePostEarnings_{Sales}* are the percentage of shares bought and sold by insiders that are traded in the one-month period following a quarterly earnings announcement, relative to total shares bought and sold by insiders in the two months before and one month after the earnings announcement. Firm-quarter values are averaged across all quarters in a year by firm; firm-year values are averaged across all firms each year.

Figure 2

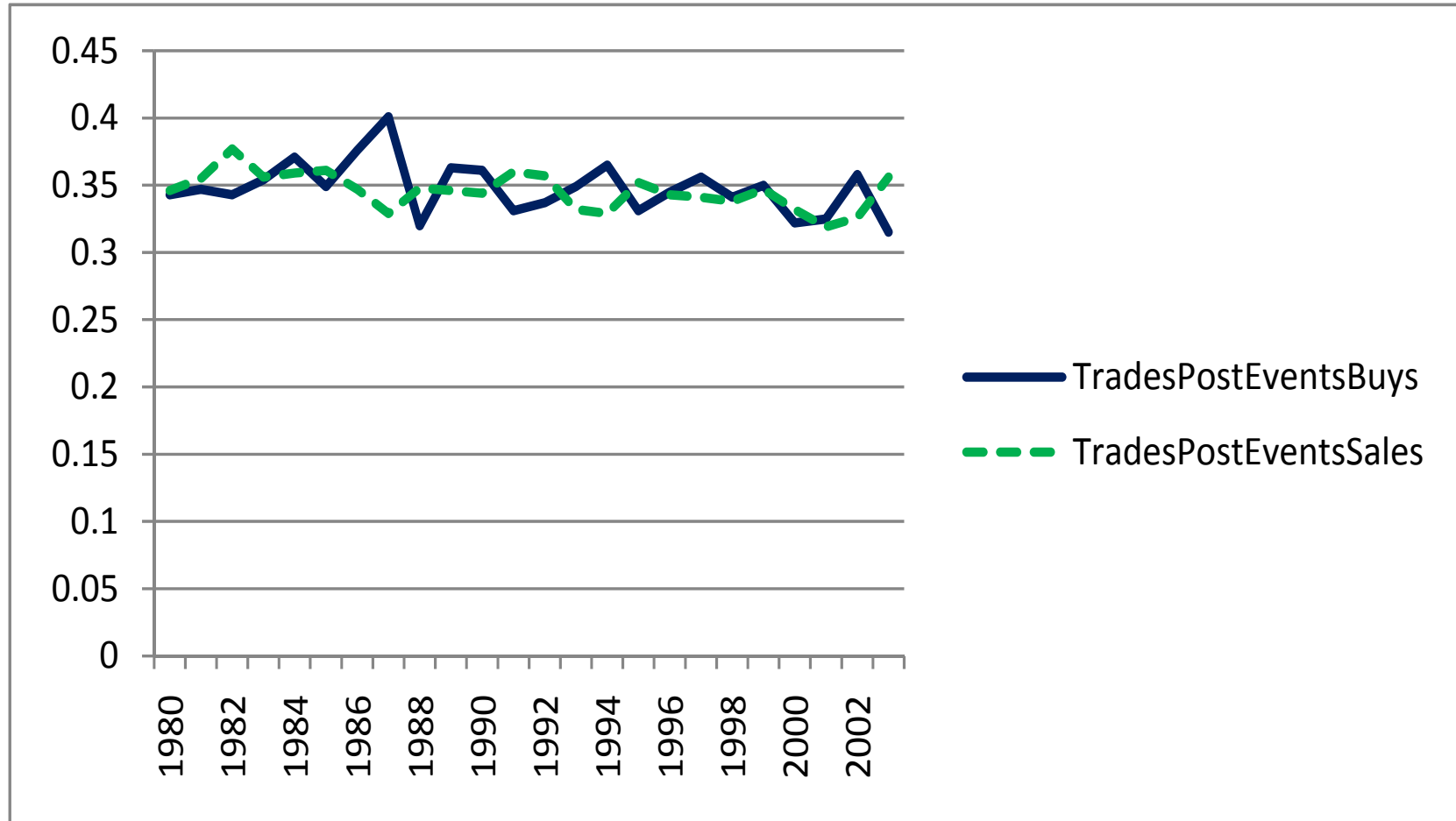
Insider Share Turnover: 1980-2003



Insider Purchase Turnover and Insider Sales Turnover are total shares purchased or sold by insiders during a given firm-year, scaled by shares outstanding. Firm-year values are averaged across all firms each year.

Figure 3

Insider Trade Timing around Extreme Return Events: 1980-2003



$TradePostEvents_{Buys}$ and $TradePostEvents_{Sales}$ are the percentage of shares bought and sold by insiders in the one-month period following an extreme return event, relative to total shares bought and sold by insiders during the two months before and one month after the extreme return event. Extreme return events are the two highest and two lowest trading days during each firm-year, ranked by the three-day market-adjusted return around each trading day. Firm-event values are averaged across all events in a firm-year; firm-year values are averaged across all firms each year.