

New evidence on the effects of federal regulations on insider trading: The *Insider Trading and Securities Fraud Enforcement Act* (ITSFEA)

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Abstract

This paper finds new evidence that the threat of legal sanctions significantly affects the trading behavior of insiders. Specifically, I examine the effects of the *Insider Trading and Securities Fraud Enforcement Act* (ITSFEA) on insider trading around earnings announcements. Given ITSFEA's stated concern with trading on private information prior to its release, I argue that insiders may respond to the Act by altering the timing of their trades. I find that, following ITSFEA, insiders are more likely to postpone liquidity sales until after negative earnings surprises. I also find that insiders increase their *relative* emphasis on post-event as opposed to pre-event information based trading. Finally, earnings announcements appear to be more informative in the post-ITSFEA period, consistent with *less* information based trading in front of earnings announcements, after the Act.

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1. Introduction

On November 19, 1988 the Congress passed the *Insider Trading and Securities Fraud Enforcement Act* (ITSFEA). This act, hitherto considered to be the most stringent set of regulations pertaining to insider trading, culminated a series of attempts by the Congress and the courts to curb illegal insider trading. (See Seyhun, 1992; Meulbroek, 1992). In particular, ITSFEA increased maximum penalties to \$1 million and 10 years in prison. It also created a bounty program enabling informants to collect 10% of the insider's trading profits. Finally, it contains language that holds top management liable for any employee's illegal insider trading. The quoted purpose of this act is to "enhance deterrence against insider trading, and where that deterrence fails, to augment the current methods of detection and punishment of this behavior" (House Report No. 100-910). The Report also provides an example of the type of behavior the Act was designed to address. "... Possession of *advance* (emphasis added) knowledge that a company is about to... issue a surprising earnings report can give the possessor of that knowledge tremendous advantages in the market for the equities being traded."

Previous research by Seyhun (1992) and others examines the effectiveness of federal insider trading sanctions by describing insider trading volume and profits over periods with differing levels of sanctions. Specifically, Seyhun compares insider trading from three separate periods differentiated by (perceived) levels of sanctions and finds that increased federal sanctions had little effect on either the profitability or volume of this trading. This finding is puzzling in light of the increased attention that regulators have placed on insider trading.

In this paper I provide additional evidence on the impact of federal regulations on insider behavior. Specifically, I focus on the effects of ITSFEA on insider trading around corporate earnings announcements. While previous work has examined insider trading in periods that include the passage of ITSFEA, this is the first paper to explicitly compare insider behavior before and after the Act. Moreover, this is the first paper to examine how changes in regulations might affect the *timing* of insiders' transactions around clear information events. This approach emphasizes the *possibility* that information (as well as liquidity) trades can occur *after* as well as before news events, and is specifically important in light of the fact that ITSFEA proscribes trading in advance of an information event.

I examine a sample of nearly 14,000 quarterly earnings announcements during the period January 1984 through March 1991 for evidence of changes in insiders' trading behavior around earnings events. I focus on changes in the timing of insider trades around earnings announcements, from before to after the ITSFEA. My results are generally consistent with the Act having a significant impact on insiders' behavior. In particular, insiders increased their relative emphasis on both liquidity and information based trades executed *after* (as opposed to before) earnings events, subsequent to the Act.

The evidence that ITSFEA affected the timing of insiders' liquidity trade is

based on the assumption that liquidity trades must be executed (to obtain funds for a purpose) and that profits are of little concern on such trades (relative to concerns with sanctions). I find that conditional on the need to sell shares around a negative earnings surprise, insiders postpone their sales until after the earnings announcement more often in the post-ITSFEA period. In other words, after the Act, insiders that ‘need’ to sell (sell either before or after an earnings event), choose to ‘lose’ more often (than before the Act) by selling after rather than before negative surprises. In addition, insiders appear to postpone selling until after positive surprises more often after the Act. This evidence is inconsistent with the Act’s expected effect on liquidity sales around positive earnings surprises, but is consistent with the notion that insiders perceived the Act to address pre-event trading abuses relatively more than post-event trading abuses.

The evidence that the Act affected the timing of insiders’ information based trades is based on two sets of results. First, I assume that certain trades are more likely to be information based – selling before and buying after negative earnings surprises, and buying before and selling after positive earnings surprises. While I document significant declines in the frequency of each of these ‘versions’ of informed trading, the declines in informed pre-event trading are significantly larger than the declines in informed post-event trading. Moreover, the increase in relative emphasis on post-event informed selling persists when volume based measures of insider trading are used.

As an alternative test of the Act’s effects on information based trading, I examine the correlations between insider trading indices and proxies for earnings information before and after the Act. I find that the Act is associated with a decline in the correlation between insider trading and the forthcoming earnings surprise; the correlation between pre-event trading and earnings surprise proxies is significantly more negative after the Act. I also find that insiders increased their tendency to trade against just announced earnings information after the Act. The correlation between proxies for earnings information such as earnings surprise, the runup in stock price prior to earnings announcements and the two-day announcement return is significantly more negative after the Act in several specifications. These results also suggest that insiders increased their relative emphasis on post-event versus pre-event informed trading, after ITSFEA.

Finally, I examine the informativeness of earnings announcements before and after ITSFEA as an alternative test of the Act’s effects on information based trading. I find that after ITSFEA, the average earnings response coefficient is larger, consistent with less informed trading prior to earnings announcements during the post-Act period and the notion that informed trading encourages price discovery.

The remainder of this paper is organized as follows. Section 2 discusses insiders’ incentives to trade around earnings announcements and the expected effects of ITSFEA on these incentives. Section 3 discusses my data and methodology. Section 4 presents my results. Section 5 concludes.

2. The effect of statutes on insider trading

2.1. Previous research

Seyhun (1992) argues that increases in statutory sanctions over the 1980s produced little effect on insider trading. He points to an increase in the total volume of insider trading per month and an increase in the average profitability of these trades over time as evidence. Seyhun treats all insider trades after August 1984 (post-Insider Trading Sanctions Act (ITSA)) the same, and thus focuses primarily on the effects of the ITSA on insider trading. Since my data begin in 1984, my focus is largely upon the incremental effects of ITSFEA on insider behavior. I also extend Seyhun's work by examining ITSFEA's impact on the relative importance insiders place on post-event versus pre-event trading. My analysis of trade timing is designed to highlight alternative insider responses to changes in federal statutes.

2.2. Effects of ITSFEA on liquidity trade timing by insiders

The language of the House Report on ITSFEA explicitly mentions pre-earnings announcement trading as a potential insider abuse. Since, by definition, the primary motive for liquidity trades is not profit, then after the Act insiders should be relatively less concerned with the wealth consequences of the timing on liquidity trades than with the effects of trade timing on the likelihood of sanctions. For example, an insider who plans to sell shares in order to pay for a child's pending tuition bill may postpone the sale until after an earnings announcement that the insider knows will be surprisingly negative, due to fears of potential sanctions. In other words, the insider will want to preclude the possibility that regulators will falsely prosecute him or her over a *liquidity* motivated trade. Thus, I expect ITSFEA to be associated with a general increase in the postponement of liquidity sales until after negative earnings surprises.

Similarly, if insiders interpret the Act to address post-event trading the same as pre-event trading, they can accelerate liquidity sales in front of positive earnings surprises in an effort to preclude false prosecutions of liquidity motivated sales. In particular, sales after positive earnings surprises may be interpreted by regulators as information based, which is something insiders will want to avoid when selling for liquidity reasons. Thus the Act is expected to be associated with an acceleration of *liquidity* selling in advance of positive earnings surprises.

2.3. Effects of ITSFEA on information based trade timing of insiders

Certainly, ITSFEA was written to address trading based on private information. Thus, to the extent that insiders were willing to execute information based trades

prior to ITSFEA's enactment, such trading should be less likely after the Act. One example of information based selling that is expected to decline after the Act is selling prior to negative earnings surprises. In addition, information based selling subsequent to positive earnings surprises should be less prevalent following the Act as long as insiders perceive the Act to address post-event trading. However, given insiders' periodic needs to sell for liquidity reasons, they may claim that sales after positive surprises are liquidity motivated and argue that they must be allowed to trade at some point.¹ Thus, empirically, it may be difficult to discern whether information based post-event selling declines after the Act.²

Another clear example of information based trading is insider buying in front of positive earnings surprises. To the extent that insiders were previously willing to purchase shares of their firm's stock in front of positive earnings surprises, the Act is expected to be associated with a decline in this sort of activity. Moreover, buying after surprisingly negative earnings announcements should decline after the Act, as long as insiders perceive the Act to address post-event trading. Given insiders' typically undiversified portfolios, it should be more difficult for them to argue that they were trading for liquidity reasons in defense of buying activities.

In addition to testing for declines in information based trading, I examine whether the Act affected insiders' *relative* emphasis on post-event versus pre-event information based trading. In particular, if insiders perceive the Act to address post-event trading less than pre-event trading, information based trades executed after earnings events will appear relatively safer after the Act and therefore will be used relatively more. While such a shift in relative emphasis is not a testable implication of the Act per se (the Act does not explicitly differentiate between the legality of post-event and pre-event trading – it is only suggestive), it represents one way of analyzing insiders' interpretation of the Act's intent.

2.4. *Changes in the information that insiders trade upon*

Insiders can also respond to ITSFEA by altering the sensitivity of their trading to different information proxies. For example, if the Act increased the expected cost of sanctions on trading for information reasons (or appearing to) in front of an earnings announcement, insiders may reduce their tendency to trade in the direction of the forthcoming earnings surprise. More negative earnings surprises will be preceded by relatively less selling (compared to buying), while more positive earnings surprises will be preceded by relatively less buying. If the Act

¹ Why not just after earnings announcements when their information advantage is theoretically lowest.

² Increases in selling after positive earnings surprises may be due to increased liquidity selling after earnings announcements in general, perhaps due to firm specific restrictions on pre-event trading, when the earnings announcement just happened to be surprisingly positive.

increased the expected cost of sanctions on trading for information reasons (or appearing to) after an earnings announcement, insiders may increase their tendency to trade in the direction of the (just passed) earnings surprise. More positive earnings surprises will be followed by relatively less selling (compared to buying) while more negative surprises will be followed by relatively less buying (compared to selling).

2.5. An implication of ITSFEA's effect on information based trade timing

I also examine the informativeness of earnings announcements before and after ITSFEA. If ITSFEA lowered the incidence of information based trading, then there should be less information conveyed to the market through informed trading, both before and after earnings announcements. If less information is conveyed to the market through trading prior to earnings announcements, then earnings announcements themselves should convey more information. I examine earnings response coefficients before and after the enactment of ITSFEA as an alternative test of the Act's effects on information based trading in front of earnings announcements.

3. Data and methodology

My sample consists of 13,862 quarterly earnings announcements by 644 firms over the period January 1984 through March 1991. This sample meets the following criteria: (1) the quarterly earnings announcement date is available from PC-Compustat Plus; (2) there is IBES consensus forecast information for that quarterly earnings figure; (3) there are no contemporaneous dividend change announcements associated with the earnings announcement; and (4) the firm is in existence during the entire sample period.

Earnings forecast data and actual earnings per share figures come from the IBES tapes. The median consensus forecast from the month before the earnings announcement proxies for earnings expectations. O'Brien (1988) finds that this measure dominates time series based forecasts of earnings. Earnings surprise is defined as

$$\text{Surprise} = (A_t - F_t) / \text{Price}_{t-2 \text{ days}}, \quad (1)$$

where A_t is the actual earnings figure for quarter t , and F_t is the median IBES forecast for quarter t earnings. I scale the forecast error by the price 2 days prior to the announcement date reported in the *Wall Street Journal*.^{3,4} All returns and price data come from the CRSP and NASDAQ tapes.

³ Since my cross sectional tests control for the net of market return over the period $[t-31, t-2]$, I scale my earnings surprise and growth measure by $\text{Price}_{t-2 \text{ days}}$.

⁴ I also construct two additional measures of earnings surprise for use in my cross-sectional tests as a check on the robustness of my results. These measures are discussed in the applicable results section.

3.1. Insider trading measures

Insider trading data come from *The Ownership Reporting System* compiled by the Securities and Exchange Commission. I use all open market trades by Officers and Directors of the firm.

The discussion in Section 2 suggests that insider trading should be measured over equal sized pre-announcement and post-announcement windows. Empirically however, we would like to assess trading over windows that are differentiated by the level of the insider's information advantage.⁵ I define the pre-announcement window to be the month before the earnings announcement ($[t - 31, t - 2]$, where t = earnings announcement date),⁶ since IBES forecasts generally precede the earnings announcement by one month. I argue that the insider's information advantage is larger after the forecast is made through the earnings announcement.

To facilitate comparability of insider trading measures between the pre and post-announcement windows, I measure post-announcement trading over an equal sized window of the month following the earnings announcement ($[t + 1, t + 30]$). Finally, the one month in between the pre-announcement period and the prior quarter's post-announcement period is deemed the benchmark period. Recent studies of insider trading have noted that some level of trading by insiders occurs normally and might therefore be considered 'benchmark' trading. (See Lee et al., 1992).

For use in my cross-sectional tests, I construct an Insider Sale and Purchase Index (ISPI).⁷ The index is designed to capture the preponderance of buying or selling behavior in insiders' transactions. The index is constructed by subtracting the number of shares sold by insiders from the number of shares purchased by insiders in the month of interest, and then dividing by the total number of shares transacted in by insiders:

$$\text{Index} = \frac{(\text{Number of shares purchased} - \text{Number of shares sold})}{(\text{Number of shares purchased} + \text{Number of shares sold})}. \quad (2)$$

The advantage of this measure of insider trading is that it does not suffer from large firm biases that would skew unscaled measures of net trading behavior. I construct my indices of insider trading using both the number of shares traded and the number of trades executed by insiders.

⁵ This is especially true in light of the Act's stated concern with trading on private earnings information. By defining windows based on different levels of information advantage, we enhance the possibility of finding differences in trading behavior within (and across) windows following the Act.

⁶ I do not include trading during the days $[t - 1, t]$ since this is the announcement window and I cannot determine whether trades in this window occur before or after the earnings announcement.

⁷ The ISPI has been used in many previous studies of insider trading. (See for example John and Lang (1991), Damodaran and Liu (1993) and Seyhun (1990)).

The final sample consists of 13,862 earnings announcements of which 6,028 were accompanied by at least one episode of either pre-announcement or post-announcement insider trading (or both).

4. Results

4.1. Univariate evidence on insider trading around all earnings events

Table 1 provides descriptive statistics concerning pre-announcement, post-announcement and benchmark insider trading around two samples; earnings announcements before ITSFEA's enactment and those after ITSFEA. The table also

Table 1

Pre-announcement, post-announcement and benchmark period insider trading measures classified by whether the earnings announcement was before or after ITSFEA

	Pre-announcement		Post-announcement		Benchmark	
	Before ITSFEA	After ITSFEA	Before ITSFEA	After ITSFEA	Before ITSFEA	After ITSFEA
Frequency ^a	0.2855	0.1645 *	0.4311	0.2909 *	0.7530	0.6439 *
Mean volume of shares traded ^b	10,397	8,206	15,150	13,480	15,425.5	9,106 *
Mean volume of shares bought ^c	7,531.5	2,262 *	3,803	3,478	7,378.5	2,796.5
Mean volume of shares sold ^d	10,694	13,664	18,660	20,098	16,431.5	13,245
Mean number of trades ^e	2.084	1.761 *	2.768	2.221 *	2.705	1.656 *
Mean number of 'buy' trades ^f	1.676	1.444 *	1.708	1.647	1.686	1.085 *
Mean number of 'sell' trades ^g	2.055	1.904	2.887	2.438 *	2.740	1.885 *
Mean volume per transaction ^h	4,771	3,866	4,477	6,066.5 *	5,178	5,973

* Significantly different from corresponding pre-ITSFEA mean (5% level).

^a Fraction of earnings announcements accompanied by insider trading.

^b Mean (across earnings announcements) number of shares traded by insiders during appropriate period (measured *conditional* on trading).

^c Mean (across earnings announcements) number of shares bought by insiders during appropriate period (measured *conditional* on trading).

^d Mean (across earnings announcements) number of shares sold by insiders during appropriate period (measured *conditional* on trading).

^e Mean (across earnings announcements) number of trades by insiders during appropriate period (measured *conditional* on trading).

^f Mean (across earnings announcements) number of purchase transactions by insiders during appropriate period (measured *conditional* on trading).

^g Mean (across earnings announcements) number of sale transactions by insiders during appropriate period (measured *conditional* on trading).

^h Mean (across earnings announcements) number of shares per insider transaction during appropriate period (measured *conditional* on trading).

provides information on whether there are differences in the mean values of the various insider trading measures between the two samples.

The first line of Table 1 indicates that there is a significant decline in the proportion of earnings announcements accompanied by insider trading, subsequent to the Act. Specifically, there is a 12% decline in the number of earnings announcements accompanied by pre-announcement trading, as well as similar declines in the proportion of earnings announcements accompanied by post-announcement and benchmark period trading (14% and 11 respectively). Each of these declines is significant at the 5% level. The evidence suggests that insiders responded to the Act by reducing their overall incidence of trading.

Also consistent with this interpretation is the marked decline in the average number of pre-announcement, post-announcement and benchmark insider trades *per* earnings announcement. In particular, conditional on at least one pre-announcement (post, benchmark) insider trading episode, there is a 15.5% (19.76%, 38.78%) decline in the number of pre-announcement (post, bench) trades *per* earnings announcement.

My data do not indicate any real change in the mean volume of insider trading around earnings announcements subsequent to the Act. None of the post-ITSFEA average values of insider trading volume are significantly different from their pre-Act values. Finally, there is little change in the average volume *per* insider transaction in response to the Act.⁸ While the general evidence of no real change in the average insider's volume *per* transaction is inconsistent with the notion that federal sanctions affect insider behavior by causing them to curtail their average volume of trading, it does not address the possibility that the Act may affect insider behavior by causing them to shift their trading volume to the post-announcement period. I discuss this possibility in more detail below.

To summarize, the evidence presented in Table 1 is consistent with the notion that ITSFEA caused insiders to reduce their *incidence* of trading. However, the similar declines in both the frequency of pre-announcement and post-announcement trading as well as the average number of trades *per* period suggest that the Act may have affected insiders' pre and post-announcement trading equally. Moreover, the aggregated data in Table 1 is not designed to highlight changes in the frequency or timing of liquidity versus information based trades.

4.2. Tests of the Act's effects on 'liquidity' trading

While it is impossible to know which trades by insiders are truly liquidity motivated, sales transactions seem much more likely candidates of this classifica-

⁸ While the average volume *per* post-announcement trade is higher after the Act, there is no difference between the volumes *per* transaction on pre-announcement and benchmark trades across regulatory regimes. The increase in volume *per* post-announcement trade is inconsistent with the Act curtailing insider trading. It is consistent with insiders interpreting the Act to address pre-event trading abuses more than post-event; they increase their emphasis on post-event trading.

tion. I therefore test whether insiders alter their sale timing behavior in a manner consistent with the Act's expected effects on liquidity trading. My tests are based on the intuition described in Section 2.2 above. Briefly, conditional on the 'need' to sell, the Act is expected to be associated with a general postponement of sales until after negative earnings surprises and an acceleration of sales in front of positive earnings surprises.

Table 2 examines the timing of insider sales (around negative and positive earnings surprises separately) as a function of whether ITSFEA had been enacted. If insiders perceive the Act as raising the expected costs of liquidity sales in front of negative earnings surprises more than the expected costs of selling after such events then they will execute more post-announcement sales and fewer pre-announcement sales (around negative earnings surprises) after the Act, than we would *expect* under the 'no effect' assumption.

Table 2 presents a contingency table analysis that tests for independence between the timing of insiders' sales and the current regulatory regime (whether ITSFEA had been enacted), separately for positive and negative earnings surprises. Conditional on either pre-announcement or post-announcement selling being ob-

Table 2

Effects of ITSFEA on the timing of insider 'liquidity' trades around earnings announcements: Contingency tables relating the timing of insider sales to current regulatory regime (before or after the ITSFEA) ^b

	There exists post selling and no pre selling	There exists pre selling	Totals
Panel A: Negative earnings surprise ^a			
Earnings announcement before ITSFEA	639 – Actual cases (678) – Expected cases	593 – Actual cases (554) – Expected cases	1232
Earnings announcement after ITSFEA	315 – Actual cases (276) – Expected cases	186 – Actual cases (225) – Expected cases	501
Totals	954	779	1733
$\chi^2(1) = 17.26$ * * (significant at 1% level)			
Panel B: Positive earnings surprise ^a			
Earnings announcement before ITSFEA	743 – Actual cases (789) – Expected cases	699 – Actual cases (653) – Expected cases	1442
Earnings announcement after ITSFEA	405 – Actual cases (359) – Expected cases	250 – Actual cases (296) – Expected cases	655
Totals	1148	949	2097
$\chi^2(1) = 18.96$ * * (significant at 1% level)			

^a Earnings surprise = [Actual Earnings minus Median Analyst's Forecast] all divided by stock price two days prior to the earnings announcement.

^b ITSFEA was passed in November of 1988. Expected cases are based on the assumption of independence between the insider's choice of when to trade and the current regulatory regime.

served, I classify the earnings announcement as a pre selling announcement if there was at least one episode of pre-announcement selling, else the event is classified as a post selling only event. This classification is then related to the indicator variable for whether ITSFEA had been passed.

The results are consistent with ITSFEA curtailing insiders' pre-announcement selling in favor of post-announcement selling around negative earnings surprises. For the negative surprise sample there are more cases of post-announcement selling after ITSFEA than would be expected if ITSFEA had no effect. Under the null hypothesis (that ITSFEA had no impact) there are 276 expected cases of post-announcement selling after ITSFEA; 315 cases are observed. Furthermore, there are 639 observed cases of pre-announcement selling after ITSFEA; 678 cases were expected under the null. The Chi-square statistic on the test of independence between sale timing choice and the current regulatory regime is 17.26, which is significant at the 1% level. The null hypothesis of independence is rejected, suggesting that ITSFEA raised the expected cost of sanctions on insider selling before negative earnings surprises more than on insider selling after negative surprises.⁹

For the sample of positive earnings surprises the null hypothesis of independence between trade timing and regulatory regime is also rejected (Chi-square = 18.96), indicating that insiders postponed their sales around positive earnings surprises more often after the Act was passed. These results suggest that conditional on the decision to sell around positive earnings surprises, insiders are relatively less concerned with the cost of potential sanctions on post-event trading than with the cost of lost profits on pre-event trading. This evidence is consistent with the notion that the Act was interpreted by insiders to address pre-event trading abuses more than post-event trading abuses. The above evidence is robust to using volume based measures of relative emphasis on post-event versus pre-event trading measures.

4.3. Tests of the Act's effects on 'informed' trading

Given the Act's stated purpose of curtailing 'insider trading abuses' I examine the effect of ITSFEA on trades by insiders that are likely to be viewed as information based. Specifically, I look for changes in the patterns of insider selling before negative earnings surprises and after positive earnings surprises, as well as changes in the patterns of insider buying before (after) positive (negative) earnings

⁹ However, results not shown indicate no significant change in volume based measures of the relative emphasis on post-event versus pre-event trading around negative earnings surprises, in response to the Act.

surprises. I also test whether insiders alter their relative emphasis on pre-event versus post-event informed trading.

Table 3 examines changes in the frequency of insider buying and selling around positive and negative earnings surprises. Panel A focuses on changes in insider selling from before to after the Act. In general, I find that insiders lowered their incidence of selling both before and after earnings announcements after the Act. For example, selling before negative earnings surprises occurred 19.17% of the time prior to ITSFEA's enactment, but was observed only 7.18% of the time following the Act. This decline is significant at better than the 5% level. Other selling behavior also declines by significant amounts (see table for details).

Importantly, the evidence that selling before negative surprises and after positive surprises declines significantly after ITSFEA (see bolded numbers) is consistent with the Act having its intended effect; lowering the incidence of trading that is most likely to be informed. However, these numbers do not say much about the Act's effects on the *relative* importance placed by insiders on post-event versus pre-event informed trading. In particular, if insiders perceive the Act to address pre-event trading abuses relatively more than post-event trading abuses, they may increase their relative emphasis on post-event informed trading. I

Table 3

Changes in the frequency of insider buying and selling around earnings surprises in response to the ITSFEA

Panel A: Frequency of selling results:

Frequencies	Negative earnings surprises		Positive earnings surprises ^a	
	Pre-ITSFEA	Post-ITSFEA	Pre-ITSFEA	Post-ITSFEA
Pre-event selling	19.17%	7.18 % *	20.08%	9.99% *
Post-event selling	30.4%	13.91% *	32.76%	20.23% *

Z-statistic ^a for test that percentage drop in post-event informed selling is smaller (less of a drop) than the percentage drop in pre-event informed selling is 12.86 (significant at 1% level).

Panel B: Frequency of buying results:

Frequencies	Positive earnings surprises		Negative earnings surprises ^a	
	Pre-ITSFEA	Post-ITSFEA	Pre-ITSFEA	Post-ITSFEA
Pre-event buying	11.62%	9.08% *	10.465%	8.60% *
Post-event buying	15.86%	13.03% *	17.25%	15.37% *

Z-statistic ^a for test that percentage drop in post-event informed buying is smaller (less of a drop) than the percentage drop in pre-event informed buying is 5.62 (significant at 1% level).

* Post-ITSFEA frequency is significantly smaller (at 5% level) than pre-ITSFEA frequency.

^a $Z = [(x/y - 1)] / \sqrt{[\text{variance}(x/y)]}$ where: x = % drop in pre-event informed trading; y = % drop in post-event informed trading; $\text{variance}(x/y) = [\text{variance}(x)] / (y^2) + [x^2] * [\text{variance}(y)] / [y^4]$ (see Kendall et al. (1987, p. 325, vol. 1)).

test this notion by examining whether the percentage drop in post-event informed selling (selling after positive earnings surprises) is smaller (less of a drop) than the percentage drop in pre-event informed selling (selling before negative earnings surprises).

The decline in the frequency of pre-event informed selling from 19.17% of earnings announcements before ITSFEA to 7.18% of earnings announcements after ITSFEA represents a 62.55% decline in the frequency of informed pre-event selling ‘in response to the Act’. The corresponding decline in post-event informed selling (selling after positive earnings surprises) is 38.25%. These declines are significantly different from each other. The relevant z -statistic (see Eq. (3) below) carries a value of 12.86, significant at the 1% level.

$$Z = [(x/y) - 1] / [\sigma(x/y)] \quad (3)$$

where x is the percent drop in pre-event informed selling, y is the percent drop in post-event informed selling, and

$$\sigma(x/y) = \sqrt{\frac{\text{variance}(x)}{y^2} + \frac{\text{variance}(y)}{y^4}} \quad (4)$$

(see Kendall et al., 1987). The evidence is consistent with insiders perceiving the Act to address pre-event trading abuses relatively more than post-event trading abuses. Insiders lower their tendency to trade in ways that are likely to be viewed as information motivated prior to earnings announcements, more than they lower their post-event ‘informed’ trading activities.

Panel B of Table 3 focuses on changes in insider buying from before to after the Act. Here too, I find that insiders lowered their incidence of buying both before and after earnings announcements after the Act. For example, buying before positive earnings surprises occurred 11.62% of the time prior to ITSFEA’s enactment, but was observed only 9.08% of the time following the Act. This decline is significant at better than the 5% level. Other buying behavior also declines by significant amounts (again see table for details).

Importantly, the evidence that buying before positive surprises and after negative surprises declines significantly after ITSFEA (see bolded numbers) is consistent with the Act having its intended effect – lowering the incidence of trading that is most likely to be informed. Moreover, the decline in the frequency of pre-event informed buying (of 21.86%) is significantly larger (a greater decline) than the decline in the frequency of post-event informed buying (10.90%). The z -statistic (see Eq. (3) for formula) carries a value of 5.26, significant at the 1% level. The evidence is again consistent with insiders perceiving the Act to address pre-event trading abuses relatively more than post-event trading abuses. Insiders lower their tendency to trade in ways that are likely to be viewed as information motivated prior to earnings announcements, more than they lower their post-event ‘informed’ trading activities.

I also examine changes in the relative emphasis of insiders on post-event versus pre-event informed trading 'due to the Act' using volume based measures. Specifically, I compare the mean and median (across firms) percentage changes in 'informed' pre-event selling (before negative surprises) with mean and median percentage changes in informed post-event selling. I use two measures of trading activity; number of shares sold per period by insiders at a particular firm and number of sell trades executed by insiders per period. Conditional on at least one episode of informed selling either before or after the ITSFEA, the percentage change in pre-event informed selling is calculated as the number of shares sold prior to the average negative earnings surprise by a firm's insiders *after* the Act, minus the average number of shares sold before negative earnings surprises *prior* to the Act, all divided by the second term. Negative numbers imply a decline in this type of trading activity after the Act. Percentage changes in post-event informed selling (after positive surprises) are calculated similarly. My tests compare the mean and median (across firms) percentage changes in informed pre-event selling with informed post-event selling percentage change measures. I conduct a similar analysis of insider buying activity. The results are reported in Table 4.

Panel A of Table 4 presents measures of the percentage changes in pre-event and post-event informed selling. While the conclusions regarding changes in the relative emphasis on post-event versus pre-event informed trading are similar for both shares based and trades based measures, I discuss the results using trade based measures since they suffer less from skewness problems associated with marked increases in the use of post-event informed trading in a few firms. The numbers on the second line of the table in panel A indicate declines in both pre-event and post-event informed selling from before to after the Act. For example, selling before negative earnings surprises exhibited a 61% declines for the average firm after the Act. By contrast, selling after negative earnings surprises decline by a much smaller percent (32%) in the average firm after the Act. The *f*-statistic associated with a test of differences between these two average percentage declines is 8.30, significant at better than the 5% level. The evidence is consistent with insiders increasing their relative emphasis on post-event informed trading versus pre-event informed trading, after the Act. The evidence suggests that insiders perceived the Act to address pre-event trading abuses relatively more than post-event trading abuses. The median results confirm the results in the means that insiders increased their relative use of post-event compared to pre-event informed trading after the Act.

The evidence from panel B of Table 4, analyzing percentage changes in pre-event and post-event informed buying after the Act, is less compelling. Again examining the second line of the table (percentage changes in the number of pre-event and post-event informed purchase transactions), we see that insiders, on average, executed 20.1% fewer post-event informed buys and 33.5% fewer pre-event informed buys after the Act. These numbers are not significantly

Table 4
Changes in the relative emphasis on post-event versus pre-event 'informed' trading^a. Volume based measures

	Negative surprise		Positive surprise		Diff in means	Diff in Medians ^c
	Mean	Median	Mean	Median	F-stat	
Panel A: Percent changes in insider selling ^b before negative and after positive earnings surprises (in response to the Act)						
% Change informed selling ^{a,b} (shares)	-0.308	-1	1.083	-0.930	4.741 *	42.115 *
% Change informed selling ^{a,b} (trades)	-0.612	-1	-0.320	-0.855	8.298 *	40.73 *
Panel B: Percent Changes in Insider Buying ^b Before Positive and After Negative Earnings Surprises (in Response to the Act)						
% Change informed buying ^{a,b} (shares)	4.305	-1	19.14	-1	0.937	10.55 *
% Change informed buying ^{a,b} (trades)	-0.201	-1	-0.335	-1	0.678	8.263 *

^a Table classifies selling before (after) negative (positive) earnings surprises as 'informed' and buying before (after) positive (negative) earnings surprises as 'informed'. Numbers are conditional on trading *either* before or after earnings announcement, or both. If (for example) selling is strictly after a negative earnings surprise, then pre-event 'informed' selling equals zero. If (for example) selling is strictly before a positive earnings surprise then post-event 'informed' selling equals zero.

^b Percent changes (per firm) in insider selling and buying (in response to the Act) are calculated as (for example) the change in mean number of shares sold (per announcement) prior to negative earnings surprises from before ITSFEA to after ITSFEA, all divided by the mean number of shares sold prior to negative surprises before ITSFEA.

^c Medians tests are Wilcoxon Sum Sign Rank tests.

* Significant at the 5% level or better.

different from each other, indicating that the Act did not affect insiders' relative emphasis on post-event versus pre-event informed buying.¹⁰ The evidence suggests that insiders did not perceive the Act to address pre-event buying abuses differently than post-event buying abuses.

4.4. Changes in the correlation between insider trading and information proxies

Until now, my tests of the Act's effects on information based trading have relied upon an analysis of trading around positive or negative surprises. Specifically, I have classified selling before (after) negative (positive) earnings surprises or buying before (after) positive (negative) earnings surprises as informed. A richer characterization of the Act's effects might be attained by analyzing changes in the types of information that insiders trade upon. Below, I estimate regressions of pre-event insider trading indices and (separately) post-event insider trading indices on proxies for various types of information that insiders may trade upon. Each information proxy is included by itself (stand-alone) and interacted with a post-ITSFEA indicator variable designed to pick up changes in the sensitivity of insider trading to the proxy.

Panel A of Table 5 regresses the insider sale and purchase index (ISPI) for pre-event trades on proxies for earnings surprise and the stock's average abnormal return from the trade date through the earnings announcement. I use three different proxies for earnings surprise to assess the robustness of my cross-sectional results. The three measures are as follows:

Surp1: $(\text{Actual Earnings} - \text{Median Analyst's Forecast}) / \text{Price}_{t-2 \text{ days}}$

Surp2: $(\text{Actual Earnings} - \text{Mean Analyst's Forecast}) / \text{Price}_{t-2 \text{ days}}$

Surp3: $(\text{Actual Earnings} - \text{Median Analyst's Forecast}) / \text{Standard Deviation of Analysts' Forecasts}$.

The results suggest that ITSFEA encouraged insiders to trade *against* the forthcoming earnings surprise. In all three specifications (corresponding to the three different surprise proxies) the coefficient on surprise by itself is insignificant (t 's = -0.26 , -0.70 , -1.16). However, in the latter two specifications, the coefficient on the interactive earnings surprise variable (which takes on the value of the earnings surprise for announcements occurring after the Act, 0 otherwise) is

¹⁰ Wilcoxon Sum Sign Rank tests of the difference between median percentage declines in pre-event and post-event informed buying yield significant chi-square statistics, even though the median percentage decline for each group is 100%. Further examination of the data indicate that the number of observations above the median (less than a 100% decline in informed buying) is larger for the post-event informed buying group than for the pre-event informed buying group. While these numbers indicate a significant difference in the median declines in pre-event versus post-event informed buying, suggesting insiders increased their relative emphasis on post-event as opposed to pre-event informed buying, they are not robust to tests of the mean percentage decline.

significant with associated *t*-statistics of -2.83 and -2.14 respectively. These numbers indicate relatively less buying (more selling) prior to more positive earnings surprises. Taken together, the evidence is consistent with insiders changing their pre-announcement trading behavior in such a way as to limit the likelihood of sanctions. In particular, insiders who executed pre-announcement trades following the Act could simply point to the observed average negative relation between their trade and earnings surprise, should their trading be questioned.

At the same time, this change in pre-announcement trading behavior did not affect the correlation between insider trading and the stock's cumulative net of market return from the trade date through the earnings announcement (averaged across all pre-announcement trades for that earnings announcement) (or MAR). The coefficients on MAR are (respectively by specification) 0.752 , 0.506 , and 0.677 (*t*-stats = 2.55 , 1.55 , 2.23), while the coefficients on MAR interacted with post-ITSFEA (= 1 after the Act, 0 otherwise) are all insignificant. Controlling for earnings surprise, pre-announcement trading is generally increasing in MAR. This suggests that insiders adopted more subtle trading strategies in response to the Act. In particular, they continued to sell (buy) more prior to the larger stock price declines (increases) preceding earnings announcements, while restricting this activity to those earnings announcements with more positive (negative) earnings forecast errors.

Panel B of Table 5 examines the correlation between post-announcement insider trading and earnings information before and after ITSFEA. For this analysis I construct three additional information proxies; growth in earnings from the just announced earnings event to the next quarter's earnings event ($G = [\text{Actual Earnings}_{t+1} - \text{Actual Earnings}_t] / \text{Price}_{t-2 \text{ days}}$);¹¹ the cumulative market adjusted return over the one month calendar window preceding the earnings announcement (Runup); and the two-day abnormal return to the earnings announcement calculated using market model methodology.

The results indicate that post-event insider trades consummated after ITSFEA are, in general, significantly more sensitive to earnings information proxies than their pre-ITSFEA counterparts. In particular, the coefficients on the Runup interactive variables in all three specifications (-1.16 , -1.19 and -1.21 respectively) are significant at better than the 5% level (*t*-stats = -3.94 , -3.54 and -3.95 respectively). In other words, insider selling (buying) relative to total trading after more positive (negative) information releases leading up to the earnings announcement, increased after ITSFEA. To the extent that the information released is correlated with earnings information, this evidence is inconsistent with the argument that post-announcement trading is largely postponed liquidity

¹¹ If insiders 'trade on' this information, it's assumed that they had some information regarding the forthcoming (next quarter) earnings amount at the time of trade.

Table 5
Changes in the types of information that insiders trade upon

Panel A: Results from regressing pre-event insider trading index ($ISPI_{pre}$) on benchmark index ($ISPI_{bench}$), earnings surprise ($Surp1$, $Surp2$ or $Surp3$)^a, the cumulated market adjusted return from the insider trading date through the earnings announcement date (MAR)^b, and ITSFEA interactives of these variables (= measured value for post-ITSFEA events; 0 otherwise).

(PI = 1 for post-ITSFEA earnings announcements, 0 else)

Model: $ISPI_{pre} = \alpha_0 + \alpha_1 * ISPI_{bench} + \alpha_2 * Surp + \alpha_3 * MAR + \alpha_4 * Surp * PI + \alpha_5 * MAR * PI$

	α_0	α_1	α_2	α_3	α_4	α_5
Surp1 results						
Coeff.	-0.109	0.586	-0.170	0.752	-1.16	-0.643
T-stat.	-6.05	23.10	-0.261	2.55	-1.44	-1.24
Surp2 results						
Coeff.	-0.121	0.594	-0.450	0.506	-5.00	-0.436
T-stat.	-6.01	21.19	-0.698	1.55	-2.83	-0.736
Surp3 results						
Coeff.	-0.136	0.572	-0.006	0.677	-0.017	-0.263
T-stat.	-7.10	21.63	-1.16	2.23	-2.14	-0.483

Panel B: Results from regressing post-event insider trading index ($ISPI_{post}$) on benchmark and pre-event indices ($ISPI_{bench,pre}$), earnings surprise (Surp1, Surp2 or Surp3)^a, earnings growth (G)^c, the two-day abnormal announcement return (Pe2day)^d, the market adjusted return over the 30 calendar days prior to the earnings announcement (Runup)^e, and ITSFEA interactives of these variables (= measured value for post-ITSFEA events; 0 otherwise).

Model: $ISPI_{post} = \alpha_0 + \alpha_1 * ISPI_{bench} + \alpha_2 * ISPI_{pre} + \alpha_3 * Surp + \alpha_4 * G + \alpha_5 * Runup + \alpha_6 * Pe2day +$

$\alpha_7 * Surp * PI + \alpha_8 * G * PI + \alpha_9 * Runup * PI + \alpha_{10} * Pe2day * PI$

	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	α_9	α_{10}
Surp1 results											
Coeff.	-0.234	0.333	0.371	-0.281	1.12	-1.31	-0.454	-1.29	0.106	-1.16	-0.88
T-stat.	-16.97	13.47	16.77	-1.12	3.32	-7.28	-1.22	-1.77	0.16	-3.94	-1.38
Surp2 results											
Coeff.	-0.229	0.350	0.359	-0.350	1.205	-1.301	-0.761	-1.986	-0.213	-1.189	-1.647
T-stat.	-14.76	12.71	14.32	-0.99	2.51	-6.50	-1.89	-1.77	-0.27	-3.54	-2.09
Surp3 results											
Coeff.	-0.244	0.329	0.372	-0.007	1.068	-1.31	-0.298	-0.005	-0.397	-1.212	-1.192
T-stat.	-16.7	12.93	16.24	-1.98	3.40	-6.96	-0.764	-0.835	-0.63	-3.95	-1.77

^a Surp1: (Actual Earnings - Median Analyst's Forecast)/Price_{t-2days}; Surp2: (Actual Earnings - Mean Analyst's Forecast)/Price_{t-2days}; Surp3: (Actual Earnings - Median Analyst's Forecast)/standard deviation of analysts' forecasts.

^b Stock's cumulative net of market return over the window [insider trade date, earnings announcement date].

^c (Actual Earnings_{t+1} - Actual Earnings_t)/Price_{t-2days}.

^d Two-day abnormal return to the earnings announcement.

^e Stock's cumulative net of market return over the calendar window $[t-31, t-2]$ where t is the earnings announcement date.

motivated trading due to fears of sanctions. Specifically, postponement of liquidity sales due to concerns over sanctions would imply a more *positive* relationship between post-announcement insider trading and Runup. The data do not indicate such a relationship. I also find similar evidence in the changes in correlation between earnings surprise and post-event insider trading. The coefficient on the surprise interactive variable is significant at the 10% level (two-tailed test, $t = -1.77$) in the first two specifications, indicating that insiders increased their selling relative to buying after more positive surprises.

The results in panel B also indicate that post-announcement insider trading is increasing in my measure of earnings growth both before and after ITSFEA. The coefficient on growth is significant in all three specifications (t -stats = 3.32, 2.51 and 3.40) while the coefficient on its interactive term is insignificant in each specification. This suggests that insiders may possess private knowledge about earnings one quarter ahead that they trade upon for profit in the post-announcement period.

Finally, I find marginal evidence that insiders increased their post-event tendency to trade against the unexplained portion of the market's reaction to the earnings announcement. Controlling for the effects of other earnings information proxies, post-announcement insider trading is decreasing in the two-day abnormal return to the earnings announcement interacted with the post-ITSFEA indicator variable. The coefficients on the two-day abnormal return interactive terms are significant at the 10% level in the latter two specifications (t -stats = -2.09 and -1.77 respectively).

4.5. The information content of earnings announcements before and after ITSFEA

An implication of less informed trading prior to earnings announcements after the Act is that such earnings announcements will be more informative. Specifically, if insider trading leads to price discovery (as shown in Cornell and Sirri (1992), Meulbroek (1992) and Garfinkel and Nimalendran (1996)), then less insider trading will lead to less price discovery (earnings information leakage) prior to the announcement and more information communicated through the actual announcement. Table 6 presents weighted ¹² estimates from fixed effects regressions of abnormal announcement returns to earnings events on measures of surprise and a stock price runup control variable. The specification is similar in nature to the ones found in studies of earnings response coefficients (see Easton and Zmijewski (1989) in particular). The coefficient on earnings surprise is designed to measure the informativeness of earnings announcements. I utilize a

¹² The weight is the inverse of the standard deviation of prediction errors from a market model estimation of the stock's daily return on the market's daily return over the window $[-100, -21]$. See Mikkelsen and Parth (1986) for details.

Table 6

Effects of ITSFEA on information based trading; informativeness of earnings announcements before and after ITSFEA; multivariate tests of differences in earnings response coefficients; fixed effects regressions ^a (*t*-statistics in parentheses)

Dependent variable: 2-day prediction error ^b

	Pre-ITSFEA	Post-ITSFEA	All
Surprise ^c	0.045 (3.81)	0.108 (5.93)	0.054 (4.54)
Runup ^d	−0.019 (−4.23)	−0.011 (−2.68)	−0.019 (−4.33)
Surprise ^c * Post-ITSFEA ^e			0.098 (4.20)
Runup ^d * Post-ITSFEA ^e			0.008 (1.26)
<i>N</i>	7393	5484	13037
Adjusted <i>R</i> ²	0.0039	0.0068	0.0071
<i>F</i> -statistic	15.465	19.801	24.364
<i>p</i> -value (<i>F</i>)	0.0001	0.0001	0.0001

^a Regressions are weighted by the inverse of the standard deviation of prediction errors calculated over the (market model estimation) window [*t* − 100, *t* − 21] (*t* is earnings announcement date).

^b 2-day prediction error = Two day abnormal return to the earnings announcement (calculated using the methodology of Mikkelsen and Parth (1986)).

^c Earnings surprise = [Actual Earnings minus Median Analyst's Forecast] all divided by stock price two days prior to the earnings announcement.

^d Runup = the cumulative market adjusted return in the stock over the window [*t* − 31, *t* − 2] (in calendar days) where *t* is the earnings announcement date.

^e Post-ITSFEA is a dummy variable equal to one if the earnings announcement is after ITSFEA, 0 else.

fixed effects methodology to control for firm specific effects on the information content of earnings surprises.

The evidence in Table 6 is generally consistent with the notion that ITSFEA lowered the incidence of informed trading prior to earnings events. The coefficient on earnings surprise is significantly larger in the post-ITSFEA period than in the pre-ITSFEA period. The coefficient on earnings surprise interacted with the post-ITSFEA dummy (.098 in the third column of Table 6) is significantly positive (*t* = 4.20). If informed trading moves prices then the information content of an earnings announcement should be lower when more informed trading occurs prior to an earnings event. The larger coefficient on earnings surprise after ITSFEA, indicating greater information content for the average earnings event, is consistent with less informed trading prior to such events.

5. Conclusion

This paper presents new evidence on the effects of government regulations on insiders' trading behavior. Specifically, I examine insider trading around earnings

announcements both before and after the *Insider Trading and Securities Fraud Enforcement Act* (ITSFEA). I pay particular attention to the Act's effects on the timing of insider trades around news events since the Act appears to have been written to address pre-event trading abuses.

I find evidence consistent with the Act affecting insiders' timing of liquidity sales around negative earnings surprises. Conditional on insiders selling either before or after a negative earnings surprise, they are more likely to execute such trades after the announcement in the post-ITSFEA period. In addition, insiders appear to postpone their sales transactions until after positive surprises, more often after the Act. This evidence is inconsistent with the Act's expected effect on liquidity sales around positive earnings surprises, but is consistent with the notion that insiders perceived the Act to address pre-event trading abuses relatively more than post-event trading abuses.

I document significant declines in the frequency of informed pre-event and post-event selling and buying after the Act. However, the declines in informed pre-event trading are significantly larger than the declines in informed post-event trading. Moreover, the increase in relative emphasis on post-event informed selling persists using volume based measures of insider trading.

As an alternative test of the Act's effects on information based trading, I examine the correlations between insider trading indices and earnings information proxies before and after the Act. I find that the Act appeared to encourage insiders to trade against the forthcoming earnings surprise; the correlation between pre-event trading and earnings surprise proxies is significantly more negative after the Act. I also find that insiders increased their tendency to trade against just passed earnings information after the Act. The correlation between earnings information proxies such as earnings surprise, the runup in stock price prior to earnings announcements and the two-day announcement return is significantly more negative after the Act in several specifications.

Finally, I examine the informativeness of earnings announcements before and after ITSFEA as an alternative test of the Act's effects on information based trading. I find that after ITSFEA, the average earnings response coefficient is larger, consistent with less informed trading prior to earnings announcements during the post-Act period and the notion that informed trading encourages price discovery.

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