

Insider Trades and Private Information: The Special Case of Delayed-Disclosure Trades

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In certain circumstances, insider trades such as private transactions between executives and their firms could be disclosed after the end of the firm's fiscal year, on a Form-5 filing. We find that insider sales disclosed in such a delayed manner for large firms are predictive of negative future returns (−6 to −8 percent), as well as lower future annual earnings relative to analyst forecasts. These results stand in contrast to existing findings on the uninformative nature of quickly disclosed open-market insider sales. The Sarbanes-Oxley Act curtailed the use of Form 5 under the presumption that managers used this vehicle opportunistically. Our systematic evidence supports this presumption. (*JEL* K22, G34, G38, G30, M41)

Corporate insiders have two primary motives for selling shares: (i) liquidity/diversification reasons, and (ii) the desire to capitalize on private information about the firm's performance before its disclosure to investors. The empirical literature on insider trading finds little evidence that insider sales for large firms are informative about future firm performance.¹ Lakonishok and Lee (2001, p. 107) interpret this evidence as suggesting that large firms' insiders' liquidity and portfolio rebalancing needs dominate their desire to capitalize on private information. However, theory suggests that it may be difficult to uncover multiple motives from a direct observation of prices and trading levels [Ausubel (1990)]. This

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¹ Lakonishok and Lee (2001), Jeng et al. (2003), and Jenter (2005) find that insider sales are not informative about future firm performance. In fact, Lakonishok and Lee find that the ability of insider trades to predict returns is primarily limited to purchase transactions in small firms. Carpenter and Remers (2001) similarly find that stock option exercises are informative only for small firms. Finally, Seyhun (1998) shows that the information content of insider trades is lower when insiders sell or when they belong to large firms.

article uses a novel disclosure feature of certain trades to disentangle the dual motives of insiders.

Prior literature has pointed to the disclosure regime as a key factor that is intricately linked to the extent to which insiders trade on their private information [Grossman and Stiglitz (1980), Huddart et al. (2001), Mendelson and Tunca (2004)]. This suggests that the variation in the disclosure requirements of insider trades can be used to separate insiders' liquidity motive from their private information motive. In this article, we focus on a specific class of delayed-disclosure trades that dramatically increased in frequency in the late 1990s. These trades, comprising various categories of private, non-open-market insider trades, such as stock sales by the executive to the firm, could be filed on SEC Form 5. Unlike standard open-market insider trades that had to be disclosed on SEC Form 4 quickly (by the tenth day of the next month during our sample period), Form-5 trades could be disclosed *annually* (within 45 days after the end of the fiscal year). The private nature of the trades, coupled with their delayed disclosure, suggests that managers may have viewed Form 5 as a more attractive trading vehicle for capitalizing on their private information.²

We analyze Form-5 trades for S&P 500 firms for the period 1998–2001.³ About 24% of our sample firm-years contain nonzero Form-5 insider sales, and annual Form-5 sales in these firm-years average \$2.4M.⁴ We find little investor reaction immediately after the trading date of (at the time a secret) Form-5 sales; however, following the disclosure of such sales at the end of year, the stock prices decline by about 6–8%. More interestingly, short-run event return tests indicate that most of the decline happens quickly upon the public filing of these sales, and long-run event returns

² Ample anecdotal evidence points in this direction. Kenneth Lay, the former chairman and chief executive of Enron, publicly proclaimed a robust future for the company in 2001, while selling \$70 million of Enron shares under Form 5. Under existing rules, these sales did not have to be disclosed until the following year [Norris (2002)]. Figure 1 provides the 2002 Form-5 filings of Ken Lay at Enron. Although the sales started in February 2001 and occurred throughout the year, the disclosures were not filed with the SEC until February 14, 2002. Similarly, Tyco executives Dennis Kozlowski and Mark Swartz sold \$109 million worth of Tyco stock back to the firm but were able to defer disclosure of the sales for a period of 385 days. Another example involves Colgate-Palmolive executive William Shanahan who, in July 2000, sold \$25.2 million worth of his company's stock, and disclosed it after a lag of 198 days in a Form-5 filing in February 2001 [Geller (2002)].

³ We focus on large firms because it is for these firms that previous studies have found little evidence of informed trading (see Footnote 1). Further, the Form-5 sales of the firms in our sample comprise approximately 89% of the dollar value of total Form-5 sales in the insider-trading database during the sample period. We stop the sample period in 2001 because the Sarbanes–Oxley Act of 2002 changed the regulatory treatment of Form-5 trades.

⁴ One can question whether managers would derive utility from behaving opportunistically for such amounts of money. This is ultimately an empirical issue for human economic behavior and is far from being theoretically resolved [North (2005)]. Much anecdotal evidence, however, suggests that managers behave opportunistically for relatively small sums. For example, Richard Strong of Strong Capital Management conducted illegal insider trades worth \$600K, a relatively small amount compared to his net worth of \$800M [Atlas (2004)]. Similarly, Martha Stewart's well-publicized legal travails arose from a sale of stock that allowed her to avoid losses of \$45,673 [Anderson (2005)].

FORM 5 Check box if registrant subject to Section 30 of the Securities Exchange Act of 1934, Section 17(b) of the Public Utility Holding Company Act of 1935 or Section 30(b) of the Investment Company Act of 1940. ☐ Form 3 Filing Required ☐ Form 4 Transaction Reported		UNITED STATES SECURITIES AND EXCHANGE COMMISSION Washington, D.C. 20549 ANNUAL STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP Filed pursuant to Section 16(a) of the Securities Exchange Act of 1934, Section 17(b) of the Public Utility Holding Company Act of 1935 or Section 30(b) of the Investment Company Act of 1940		OMB APPROVAL OMB Number: 3235-0262 Expires: September 30, 1998 Estimated average burden hours per response: 1.0		
1. Name and Address of Reporting Person* LAY, KENNETH L. (Last) (First) (Middle) 1400 SMITH STREET (Street) HOUSTON, TEXAS 77002-7369 (City) (State) (Zip)		2. Issuer Name and Ticker or Trading Symbol ENRON CORP. (ENR)		3. Relationship of Reporting Person(s) to Issuer (Check all that apply) ☒ Director ☐ 10% Owner ☐ Officer ☐ Other (specify below)		
4. Statement for Month/Year December 31, 2001		5. If Amendment, Date of Original (Month/Year)		7. Individual or Joint/Group Filing (Check Applicable) ☒ Form filed by One Reporting Person ☐ Form filed by More than One Reporting Person		
Table I -- Non-Derivative Securities Acquired, Disposed of, or Beneficially Owned						
1. Title of Security (Instr. 3)	2. Transaction Date (Month/Day/Year)	3. Transaction Code (Instr. 8)	4. Securities Acquired (A) or Disposed of (D) (Instr. 3, 4 and 5)	5. Amount of Securities Beneficially Owned as End of Issuer's Fiscal Year (Instr. 3 and 4)	6. Ownership Form: Direct (D) or Indirect (I) (Instr. 4)	7. Nature of Beneficial Ownership (Instr. 4)
Common Stock	02/01/01	D	Amount (A) or (D) Price	\$5,814.00	D	
Common Stock	04/27/01	D		\$63.50	D	
Common Stock	05/14/01	D		\$59.75	D	
Common Stock	08/19/01	D		\$53.00	D	
Common Stock	06/12/01	D		\$59.37	D	
Common Stock	06/19/01	D		\$6.66	D	
Common Stock	06/22/01	D		\$40.00	D	
Common Stock	06/14/01	D		\$44.19	D	
Common Stock	06/27/01	D		\$46.72	D	
Common Stock	06/28/01	D		\$48.34	D	

Reminder: Report on a separate line for each class of securities beneficially owned directly or indirectly.
 * If the form filed by more than one reporting person, see instruction 4(b)(5).

1 of 3 (Over)
SEC 2270 (7-98)

Figure 1
Example of a Form-5 filing.

test indicate—for the most part—little evidence of initial over- or under-reaction. By contrast, Form-4 sales have little ability to predict future returns, consistent with results from prior studies.

What could the market be reacting to? That is, what information could insiders have at the time of the Form-5 sale that the market can only infer upon the public filing? To answer this question directly, we examine an important piece of managers' private information that is of interest to investors, namely future profits. As a result of their close proximity to firm operations, managers are likely to acquire early private knowledge of future firm-specific information regarding trends in customer purchases, supplier lead-times, etc., all of which have an impact on future firm profits. We examine the extent to which Form-5 trades explain future earnings over and beyond information that is publicly available in the current year, and find that Form-5 sales are a significant negative predictor of next-year earnings. The occurrence of Form-5 sales in a given firm-year is associated with a 4 to 9 cent decrease in next-year earnings-per-share (mean sample EPS is \$1.40). Our result obtains after controlling for a proxy for current public information on future earnings, namely, the current year's final median analyst forecast for next-year's earnings. Our result thus suggests that managers' private information underlying Form-5 trades remains unknown to analysts and investors throughout the current year. They infer it only upon the disclosure of Form-5 sales; further, this inference

appears to be accurate—we show that the magnitudes of the initial market reaction and the subsequent EPS decreases triangulate on average.

Private information is necessary, but not sufficient, for insiders to trade opportunistically. In addition to information rents, insiders must assess other relevant costs and benefits. However, as in most “revealed preference” settings, we cannot measure all the costs and benefits perceived by the manager making Form-5 trades. We therefore attempt to directly measure two potential benefits that managers receive from using delayed-disclosure sales. First, we find that managers who sell on Form 5 raise more external financing from investors in that year. Such activities would clearly be more costly for managers to accomplish if the counter parties knew that managers were aware of impending bad news and were divesting their personal shareholdings. Second, we find that managers who make greater use of Form 5 also extract more pay from the compensation committee than is warranted by the firm’s performance.⁵ These findings further buttress our inference that managers use Form-5 trades to take advantage of their private information.

If activities such as Form-5 sales are bad, why don’t shareholders prevent them? This line of questioning leads Bertrand and Mullainathan (2001) to argue that one way to explore whether a given empirical result reflects manager opportunism is to ascertain whether the result is weaker in firms with good governance. Given the private nature of Form-5 transactions, Bertrand and Mullainathan’s approach is particularly relevant to our setting. We explore two measures of effective governance suggested in the prior literature: the presence of institutional blockholders [Shleifer and Vishny (1997)] and outside directors with explicit equity incentives [Yermack (2004)]. The negative associations between Form-5 sales and both future earnings and stock returns are weakened in such firms (though the statistical significance is marginal for firms with institutional blockholdings). These findings suggest that governance can mitigate managerial opportunism in Form-5 sales.

The remainder of the article is structured as follows. Section 1 develops the institutional background and the design of the empirical tests. Section 2 describes the data. Sections 3 and 4 contain the main results, as well as additional analyses and sensitivity tests. Section 5 provides concluding comments.

⁵ See Norris (2003) for an example of how executives of Computer Associates delayed bad news in order to get higher pay in the interim. The U.S. Senate Permanent Subcommittee of Investigations (2002) report indicates that Enron’s compensation committee was completely unaware of the management’s Form-5 transactions, and used public information to evaluate managerial performance.

1. Empirical Design

1.1 Institutional background

Prior to the ratification of the Sarbanes–Oxley Act of 2002 and subsequent changes in the SEC’s rules pertaining to insider-trading disclosures, open-market sales by executives had to be disclosed to the SEC in a Form-4 filing by the tenth day of the next month. However, certain types of stock transactions by executives were exempt from this requirement and could be reported any time within 45 days after the end of the fiscal year, as a Form-5 filing (though managers always had the option of forsaking this delayed disclosure, and reporting transactions qualifying for Form-5 treatment in a timely fashion on Form 4). These trades were largely those exempt from Section 16(b) of the Securities Exchange Act, and could be categorized as follows:

1. Transactions between an Issuer and Its Officers or Directors (Rule 16b-3).⁶ This included any transaction involving the disposition to the issuer of equity securities, provided the transaction was approved by the board of directors of the issuer, or a committee of the board of directors that was composed solely of two or more Non-Employee Directors, or a shareholder majority.
2. Bona fide gifts made by insiders (Rule 16b-5).⁷
3. Mergers, Reclassification, and Consolidations (Rule 16b-7). For example, immediate reporting on Form 4 was not required of a manager of an acquired firm who automatically received shares of the acquirer in exchange for his original shares. We conduct sensitivity analyses in Section 4 that control for such transactions.
4. Rules 16b-1 and 16b-8 provided disclosure exemptions for certain transactions by regulated entities and voting trusts. Note that these parties are not insider executives, and do not pertain to our study.

There were some exceptions, however, to the above rules:

1. Rule 16b-6 listed certain derivative securities transactions as exempt from Section 16(b) of the Securities Exchange Act. However, conversions of derivative securities into shares had to be reported on Form 4 (this early reporting exception is due to Rule 16a-3A).

⁶ Note that the rules promulgated under the Securities Exchange Act, such as Rule 16-b3, pertained to Section 16-b of the Act, but were different from Section 16-b of the Act itself. The website www.law.uc.edu/CCL has the complete text of the Act, as well as the rules promulgated under the Act.

⁷ Gifts are not necessarily innocuous. One KPMG tax shelter involved “donating” stock to a certain kind of charity that does not have to pay tax on income from businesses unrelated to its charitable purpose, and allocating income from the business to those shares, but not actually distributing it [Crenshaw (2003)]. Also see Johnston (2003), which describes several tax shelters designed by Jonathan Blattmachr, a partner at Milbank, Tweed, Hadley & McCloy, which involved donations to charitable entities.

2. Certain tax conditioned purchase plans (Rule 16-b(3)(c)) were completely exempt from disclosure. Such plans are typically pension and retirement plans [Lassila and Kilpatrick (2001, Ch. 6)].

In addition to the above, SEC instructions indicated that the manager could file on Form 5 any transactions that should have been filed on Form 4, but, for whatever reason, were excluded. Also, if share purchases by the manager (including derivatives) did not exceed a total of \$10,000 over a period of 6 months, these could also be reported late on Form 5.

With respect to filing procedures, there was no mandate that Form 5 filings had to be made electronically on EDGAR; rather, they could be mailed physically [Sloan (2002)]. To obtain copies of Form-5 transactions, investors then had to physically obtain the paper filings from the SEC by visiting the SEC premises [Hallinan (2002)].

1.2 Recent changes to the law

The SEC had a benign view of Form-5 filings and subscribed to the notion that such sales were largely immaterial and driven by the liquidity needs of management [Berenson (2002), Leonhardt (2002)]. However, in early 2002, Congress started hearings pertaining to the Sarbanes–Oxley Act, and on August 27, 2002, the SEC substantially revised and tightened the above rules in order to comply with the Sarbanes–Oxley Act. This section briefly describes the changes (for the full list of changes, see www.sec.gov):

1. Form 4 is no longer a monthly form that is mailed physically, but has to be filed electronically on EDGAR in 2 days (in cases where trade execution is difficult, the insider is given 3 days to file).
2. The small acquisition rule disclosing insider purchases of \$10,000 or less on Form 5 is now a Form 4 filing.
3. Transactions between the firm and the insider (Rule 16b-3) are now on Form 4 rather than Form 5.
4. Form 5 itself has been changed and, in addition to information on the transaction date, requires the filer to report the deemed execution date.

Note that the new laws came into effect on August 29, 2002, and thus do not apply to our sample period (1998–2001). Nonetheless, our study remains relevant, for several reasons. First, the Act is based on presumptions about corporate activities, which we systematically test in this study. Indeed, the U.S. General Accounting Office (GAO) has requested such systematic empirical evidence pertaining to the Act. Second, the Act is not immutable and can be weakened through further legislation, a prospect that is increasingly likely given a growing consensus across the executive and legislative branches that the Act's provisions need to

be revisited (<http://www.whitehouse.gov/news/releases/2006/10/20061030-7.html>). It is inevitable that issues pertaining to private transactions and delayed disclosure will arise again.

2. Data

2.1 Sample and data sources

We construct our sample using S&P 500 firms with valid data on insider trading from the Thomson Financial database in Wharton Research Data Services (WRDS). We obtain data on analyst forecasts from the I/B/E/S database, data on financial items from COMPUSTAT, and data on stock returns from Center for Research in Security Prices (CRSP). In addition, our data on institutional holdings come from Thomson Financial, and the data on board of directors' equity-based incentives are from the ExecuComp database.

The insider-trading and corporate-governance variables are measured over the fiscal period 1998–2001, while the future returns and earnings are measured over the fiscal period 1999–2002. We use these time periods because managers began to receive more stock and option-based pay in the 1990s (half of the insider transactions in the Thomson Financial database in WRDS occur after the year 1994). The late 1990s also saw a boom in stock prices and, as Jensen (2004) notes, such overvalued equity can exacerbate agency problems such as opportunistic stock sales. Given the traditional restrictions on insider trading and the mandated timely disclosure rules for open-market sales, new vehicles such as Form-5 sales became increasingly attractive to managers in this environment. As Table 1, Panel A shows, for the eight years spanning 1990–1997, total Form-5 sales for our sample firms were \$145M, whereas for the four years spanning 1998–2001, total Form-5 sales for our sample firms were \$474M, a duration-adjusted increase of 654%. Further, as we note in Sections 1.1 and 1.2, the regulatory regime changed substantially in 2002 with the passage of the Sarbanes–Oxley Act. Consequently, we stop our sample at the end of 2001—in fact, Table 1, Panel A indicates that Form-5 sales dropped by 90% in 2002. Our final sample comprises 445 firms, with about 1457 firm-years, representing 50 two-digit SIC code industries.

2.2 Descriptive statistics of insider trades and shareholdings

We focus on insiders who have the title of CEO, COO, CAO, CFO, or President. Seyhun (1998, Ch. 3) argues that these executives are at the top of the “information hierarchy” of future firm performance; Lakonishok and Lee (2001, p. 83) use a similar characterization of management insiders. Table 1, Panels B–F, provide descriptive statistics.

Table 1
Descriptive statistics of top executive Form-5 insider trading for a sample of S&P 500 firms during 1998–2001

Panel A: Dollar values (in Millions) of top executive insider Form-5 trading

Calendar year ¹	Form-5 sales	Form-5 buys
1990	0	18
1991	0	116
1992	11	64
1993	0	22
1994	10	38
1995	27	77
1996	70	58
1997	27	102
1998	92	1079 ²
1999	81	31
2000	200	60
2001	101	12
2002	10	28
2003	10	2
2004	0	1

¹ The numbers are similar for fiscal years.
² This figure is largely driven by one observation of \$1.02 billion in Form 5 purchases.

Panel B: Top executive insider trading

Variables	Observations	Mean	St. Dev.	Min	Median	Max
<i>F5S_YES_{it}</i>	1457	0.24	0.43	0.00	0.00	1.00
<i>F5B_YES_{it}</i>	1457	0.24	0.43	0.00	0.00	1.00
<i>F4S_YES_{it}</i>	1457	0.82	0.38	0.00	1.00	1.00
<i>F4B_YES_{it}</i>	1457	0.78	0.41	0.00	1.00	1.00

Panel C: Value of top executive insider trading for nonzero observations

Variables	Observations	Mean	St. Dev.	Min	Median	Max
<i>F5S_\$_{it}</i>	352	2,391,380	9,151,271	341	326,863	105,000,000
<i>F5B_\$_{it}</i>	353	8,450,610	87,500,000	12	93,240	1,020,000,000
<i>F4S_\$_{it}</i>	1196	33,000,000	446,000,000	21	3,355,828	14,900,000,000 ¹
<i>F4B_\$_{it}</i>	1138	8,531,269	99,000,000	5	924,642	2,890,000,000

¹ We excluded a Form-4 sales observation with a dollar value of \$597 billion. This number appears to be a data entry error, for it is larger than the market cap of companies such as Microsoft.

Panel D: Summary statistics of the sample of top executive insider trades by type

Trade type	Number of trades	Percentage in total trades (%)
Form-5 sales	438	2.40
Form-5 buys	419	2.30
Form-4 sales	10,166	55.73
Form-4 buys	7,217	39.57
All trades	18,240	100.00

Panel E: Categories of top executive Form-5 insider trades

Trade type Trade nature:	Form-5 sales		Form-5 buys	
	Number of trades	In Form-5 sales (%)	Number of trades	In Form-5 sales (%)
<i>(i) All trades</i>				
Open market purchases/sales	42	9.59	14	3.34
Purchase/sales related to employee benefit plans	256	58.45	177	42.24
Purchase/sales due to derivatives	0	0.00	1	0.24
Transactions between the executives and company	87	19.86	1	0.24
Bona fide gift	44	10.05	1	0.24
Others	9	2.05	225	53.70
Total	438	100.00	419	100.00
<i>(ii) Trades with values of \$10,000 or more</i>				
Open market purchases/sales	40	9.64	14	5.86
Purchase/sales related to employee benefit plans	245	59.04	144	60.25
Purchase/sales due to derivatives	0	0.00	1	0.42
Transactions between the executives and company	86	20.72	1	0.42
Bona fide gift	35	8.43	1	0.42
Others	9	2.17	78	32.64
Total	415	100.00	239	100.00

Panel F: Firm and Governance Characteristics

Variables	Observations	Mean	St. Dev.	Min	Median	Max
EPS_{it+1}	1457	1.36	2.36	-51.40	1.39	11.38
EPS_{it}	1457	1.40	2.20	-51.40	1.33	11.38
MTB_{it}	1457	2.73	3.37	0.79	1.73	78.56
$MVEQ_{it}$	1457	23,174.06	48,177.43	483.73	861.71	533,700.60
EPS_{it+1}	1457	1.77	1.43	-13.38	1.60	10.71
$VOLAT_{it}$	1457	0.36	0.15	0.12	0.33	1.10
LEV_{it}	1457	0.19	0.14	0.00	0.17	0.66
$SHARES_{it}$	1457	463.55	843.26	18.31	208.50	9,932.01

Definitions of the variables:

i = Index for sample firms; t = Index for the fiscal year;

$F5S_YES_{it}$ = 1 if the top executives (people holding the title of CEO, COO, CAO, CFO, or President) sold shares that were reported in Form 5, and 0 otherwise;

$F5B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 5, and 0 otherwise;

$F4S_YES_{it}$ = 1 if the top executives sold shares that were reported in Form 4, and 0 otherwise;

$F4B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 4, and 0 otherwise;

$F5S_S_{it}$ = Dollar value of shares sold by all top executives that were reported in Form 5;

$F5B_S_{it}$ = Dollar value of shares purchased by all top executives that were reported in Form 5;

$F4S_S_{it}$ = Dollar value of shares sold by all top executives that were reported in Form 4;

$F4B_S_{it}$ = Dollar value of shares purchased by all top executives that were reported in Form 4;

(For computing dollar values, we ignore those trades for which the trading price is not available.)

EPS_{it+1} = Diluted earnings per share before extraordinary items (COMPUSTAT item 57) for the following year, adjusted for stock splits and stock dividends;

EPS_{it} = Diluted earnings per share before extraordinary items (COMPUSTAT item 57) for the current year, adjusted for stock splits and stock dividends;

MTB_{it} = Market value of equity plus book value of liabilities divided by book value of assets;

$MVEQ_{it}$ = Market value of equity at the end of the fiscal year (in millions);

EPS_{it+1} = The median of the latest analyst forecast in the current year of earnings per share for the following year;

$VOLAT_{it}$ = Stock volatility, measured as standard deviation of daily stock returns over 60 months;

LEV_{it} = Long-term debt divided by book value of total assets; $SHARES_{it}$ = Shares outstanding at the end of the fiscal year (in millions).

At the firm-year level, 24% of firm-years have Form-5 sales (Table 1, Panel B).⁸ The mean and median Form-5 sales are \$2.4M and \$326K, respectively (Table 1, Panel C).⁹ While smaller than the Form-4 sales' dollar volume of \$33M (\$3.3M), note that the average number of Form-5 trades is also smaller. Form-4 sales have 8.45 trades on average per firm-year; the analogous figure for Form-5 sales is 1.24 trades (Table 1, Panel D); so on a per-trade basis, Form-5 sales are quite comparable.

As Section 1.1 notes, there are several categories of Form-5 sales (Table 1, Panel E). However, it may not be possible to assign intent to a trade from the classification assigned to it, since an opportunistic manager could report a trade in a category that was inappropriate for it. For example, there appears to be fairly widespread misuse of gifts via charitable foundations for private gain [Browning (2004), Eichenwald (2004), Strom (2005)].¹⁰ Therefore, for the main analyses, we do not distinguish among the various categories of Form-5 trades. Section 4 provides sensitivity checks using specific categories of trades.

3. Results

Our main premise is that delayed disclosure and limited regulatory scrutiny of Form-5 trades during the sample period (see Sections 1.1 and 1.2) made these trades an attractive vehicle for managers for capitalizing on their private information. However, we cannot directly measure the managers' private information or their perceptions of the costs and benefits of Form-5 trades.¹¹ We therefore conduct several "revealed preference" tests such as returns, earnings, and governance tests.

3.1 Event return tests

Our first set of tests comprises event returns tests that examine stock price behavior over several intervals following Form-5 trading and filing activities. These tests depend on two unobservable factors: (i) the nature of the private information the manager trades on (e.g., long term or short term), and (ii) the process through which investors price this information as it becomes public. We interpret the results in light of these factors.

⁸ The WRDS insider trading database cleanses its insider-trade data from data entry errors in the original SEC filings. We restrict our trades to a cleanse level of H ("cleansed with a very high level of confidence"); the results, however, are insensitive to this restriction.

⁹ This panel has fewer observations because the private transaction price underlying the computation of the dollar values of Form-5 sales is not always filed. For those observations where we do have the data, the percentage difference between this price and the closing market price for that day is insignificant at the 10% two-tailed level.

¹⁰ Also see Footnote 7.

¹¹ This limitation is of course fundamental to all choice theory research [Deaton and Muellbauer (1980), Kreps (1990, Ch. 2)].

Table 2, Panel A, reports the short-run returns to the firm's *first* filing of Form-5 trades at the end of each fiscal year. Since filings are concentrated within 45 days after the end of the fiscal year, multiple filings of a given firm will have almost the same return and could result in inflated *t*-statistics. Further, under reasonable signaling assumptions, one could argue that it is the first filing to which rational investors would react. The average reaction to the first Form-5 sales filing in a fiscal year is about -6 to -7% . This return is significant and appears to persist over several short-term time intervals. There is little short-term reaction to the first buy filing.¹²

We next examine returns following the trading date. Note that investors are not aware of this trading at the time because it is not disclosed. What we are interested in is whether Form-5 trades occur right before the public release of some price-relevant information to investors (or whether investors somehow infer the existence of secret insider trades).

To avoid inflated *t*-statistics in Table 2, Panel A, due to repeated firm observations, we eliminated all but the first Form-5 filing in a fiscal year. There is no such natural event for trading dates—managers can receive private information throughout the year and trade accordingly. We therefore examine all trades and compute the abnormal returns around trading days using the Mitchell and Stafford (2000) calendar portfolio approach. For each sample day, we collect all firms that conducted the trade over the previous n days. If a sample day has no such firms, we drop that sample day. We then compute, for each qualifying sample day, equally weighted as well as market-value-weighted daily portfolio returns of that day's collected firms. We then average these daily returns and multiply the mean by n .

Table 2, Panel B, presents the results. As expected, the number of the qualifying sample days grows with interval length. The return results differ from the filing returns. There are no significant abnormal stock price movements in the days following the execution of Form-5 sales or buys (only one return is significant in the entire table). These transactions do not appear to be timed just before the release of material public information (i.e., insiders do not appear to be trading on short-term private information).¹³

In sum, Form-5 sales appear to be a secret, generating returns only when disclosed. If investors fully appreciate the significance of Form-5 sales, all of the investor reaction should be concentrated, on average, following the disclosure of these trades and there should be no subsequent long run price movements. However, investors may not have immediate

¹² If a firm's first Form-5 sales filing and the first Form-5 buy filing happen on the same day, we include that firm in both categories. The article conducts multivariate tests later.

¹³ As Loughran and Ritter (2000) note, low power is a potential concern with this test. Another possibility for the insignificant results is that, analogous to option backdating, insiders misreport their trading dates. Filing dates, which are key to this article, are recorded by the SEC and thus do not have this problem.

rational expectations and may over-react or under-react in the short run.¹⁴ To gauge this behavior, Lakonishok and Lee (2001, p. 90) advocate supplementing short-run return tests with long-run return test.

Our definition of long run is a year. We again follow the Mitchell and Stafford (2000) approach. To compute a one-year return, we first compute monthly returns of each firm that has had an event (trading or filing) in the last 12 months. The average monthly returns of such firms are in Table 2, Panel C. Only Form-5 sales filings are significant, with a monthly return of -0.007 , corresponding to an annual return of approximately -8.4% .¹⁵ This is close in magnitude to the short-run event study returns in Table 2, Panel A, suggesting little evidence of over-reaction or under-reaction in the short run to the filings—the market appears to react quickly and decisively to Form-5 sales filings.

Other returns are not only insignificant but also have a much smaller magnitude. Specifically, the insignificance of long-run trading returns largely mirrors the temporary response in the short-run trading tests. Form-5 buy filings generate little short-run or long-run market reaction. Perhaps insiders expect Form 5 buys to be perceived by investors as uninformative, so insiders have few incentives to disclose quickly on Form 4.

Mitchell and Stafford (2000) note that contemporaneous cross-correlations are a concern in long-run tests. Following their suggestion, we first correct the standard errors for clustering within calendar months. In addition, Mitchell and Stafford (2000) recommend collapsing all the monthly returns into a calendar-month return—this is the average monthly return of a hypothetical portfolio manager who buys and holds a firm's stock for a period of one year after the firm event under consideration. If there is no firm satisfying this criterion in a given month, that month gets a zero portfolio return. The two procedures yield very similar results, documented in the final two columns of Table 2, Panel C.¹⁶ In particular, none of the return results, including those for Form-5 sales filings, is significant.

The insignificance of these results suggests that the short-run filing returns in Table 2, Panel A, are temporary. However, there are two caveats to this interpretation. First, because the Mitchell and Stafford (2000) methodology (i) aggregates data by calendar month, (ii) includes hot and cold months, and (iii) accords equal weights to every month, low

¹⁴ The market may have behavioral biases or rational investors may be liquidity constrained [Shleifer (2000), Lakonishok and Lee (2001, p. 90)]. In addition, the Form-5 filing period of 45 days after the end of the fiscal year is a period of considerable disclosure activity regarding the firm's annual performance, potentially confounding the short-run returns.

¹⁵ Because of the small sample size, we do not drop the first year to allow for a complete ramp-up. For the same reason, we do not drop months with fewer than ten observations, the cutoff suggested by Mitchell and Stafford (2000). Also note that we are now examining *calendar* years 1998–2001, which is different from the *fiscal* years 1998–2001.

¹⁶ Mitchell and Stafford (2000, pp. 326–328) also allow for correlations across calendar months that diminish linearly with the gap between the months. Our tests assume no correlation across months.

power is a potential problem [Loughran and Ritter (2000), Mitchell and Stafford (2000, p. 289)]. This problem is further exacerbated in our short time-series setting of about 44 months. Mitchell and Stafford (2000, pp. 321–323) argue that the calendar portfolio has sufficient power, but they make that claim for a sample size an order of magnitude larger than ours. Second, a key aspect of the event returns tests conducted so far is that we cannot compare sample firms with Form-5 trades to sample firms that did not have Form-5 trades in the sample. This comparison is perhaps more relevant to our article. Accordingly, we next include both sets of firms and control for contemporaneous cross-sectional correlations.

Table 2, Panel D, presents the results using the full sample.¹⁷ Once again, following Mitchell and Stafford (2000), we use calendar month returns, corrected for contemporaneous cross-sectional correlations using calendar-month clustered standard errors. We also correct for the common component of calendar-month returns using calendar-month indicators. Mitchell and Stafford (2000, p. 290) point that corporate events could cluster not only in time but also in industry. We therefore include 2-digit SIC industry indicators.¹⁸ Rozeff and Zaman (1998) and Jenter (2005) argue that firm-specific factors such as size and market-to-book must be controlled for before interpreting abnormal return in the cross-section. We include past returns as controls for stock price momentum. We also include market-to-book ratio (market value of equity plus book value of liabilities divided by book value of assets) and volatility as control variables. Form-5 sales filings are significant, generating an annualized return of -7% relative to non-Form-5 sample firms. This magnitude is consistent with our findings in Table 2, Panels A and C. The market does appear to react relatively quickly and decisively to Form-5 sales filings.

3.2 Firm-level tests

Our Form-5 sales filing results across a variety of specifications stand in contrast to prior literature that finds little evidence of informativeness of Form-4 trades in large firms (see Footnote 1). We now explicitly compare the informativeness of Form-4 and Form-5 trades. To conduct this multivariate test in a simplified specification, we change the unit of

¹⁷ We do not follow a matched-sample approach, but include all large firms in this analysis. The main advantage is that our sample mirrors the population of large firms; our inferences are therefore applicable to the population [Snedecor and Cochran (1989, Ch. 21)]. Manski and Lerman (1977) show that it is difficult to draw population inferences from statistical analyses on unrepresentative samples, and typically requires the imposition of parametric assumptions on the sampling choice.

¹⁸ While industry and calendar-month indicators remove any common component of firm returns in that industry and in that calendar-month, they also remove any inter-industry and across-calendar-month variations in Form-5 sales. These variations could be important: the predictability of returns across industries and across time could be in effect due to such Form-5 sales variations. This is one of the reasons we begin Section 3.1 with univariate returns tests.

Table 2
Event return analyses of top executive form 5 insider trades for a sample of S&P 500 Firms during 1998–2001
Panel A. Abnormal returns for the first Form-5 filing in each fiscal year 1998–2001

Intervals (in days) of the abnormal returns												
	(-5, -1)	(0, 0)	(0, 1)	(0, 2)	(0, 3)	(0, 4)	(0, 5)	(0, 10)	(0, 20)	(0, 30)	(0, 50)	(0, 100)
First Form-5 sales filing of the fiscal year	0.00855	-0.00061	-0.00041	-0.07225	-0.07033	-0.06979	-0.06792	-0.07037	-0.07785	-0.08111	-0.03682	-0.04373
<i>p</i> -value	[0.009]***	[0.690]	[0.845]	[0.011]**	[0.013]**	[0.014]**	[0.017]**	[0.015]**	[0.007]***	[0.006]***	[0.166]	[0.078]*
Observations	312	312	312	312	312	312	312	312	312	312	312	312
First Form-5 buys filing of the fiscal year	0.00616	0.00242	0.00312	-0.04436	-0.04377	-0.04146	-0.04103	-0.03885	-0.03809	-0.04837	-0.01171	-0.01467
<i>p</i> -value	[0.353]	[0.276]	[0.314]	[0.191]	[0.204]	[0.225]	[0.221]	[0.300]	[0.338]	[0.227]	[0.692]	[0.654]
Observations	304	304	304	304	304	304	304	304	304	304	304	304

This table restricts our sample to the firms' first Form-5 filing each fiscal year. We examine the first Form-5 sales filing and the first buy filing separately (if a firm's first Form-5 sales filing and the first Form-5 buy filing occur on the same day, this observation is included for both events). For each such firm-day, we compute abnormal returns as the firm's buy-and-hold return on an interval minus the value-weighted market return on the same interval. The intervals are in the form of (beginning day, ending day), inclusive, with the SEC filing day as day 0. We drop observations with missing returns. The *p*-values of *t*-tests of whether the mean is different from zero are presented in bracket below the average abnormal return. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed). We define top executives as people holding the title of CEO, COO, CAO, CFO, or President.

Table 2
(Continued)
Panel B: Abnormal returns for Form-5 trades in calendar years 1998–2001 using calendar portfolios

Intervals (in days) of the abnormal returns	(0, 0) Mean [p-value]	(0, -1) Mean [p-value]	(0, -2) Mean [p-value]	(0, -3) Mean [p-value]	(0, -4) Mean [p-value]	(0, -5) Mean [p-value]	(0, -10) Mean [p-value]	(0, -20) Mean [p-value]	(0, -30) Mean [p-value]	(0, -50) Mean [p-value]	(0, -100) Mean [p-value]
Form-5 Sales Transactions Equal weighted Observations	0.00007 [0.9527] 411	0.00085 [0.6236] 628	0.00022 [0.3158] 772	0.00171 [0.5259] 868	0.00119 [0.7042] 937	0.00133 [0.6993] 977	0.001183 [0.8196] 1046	0.00773 [0.2775] 1072	0.014152 [0.1180] 1083	0.007638 [0.5817] 1103	0.041686 [0.1070] 1150
Form-5 sales Transactions Value Weighted Observations	0.00011 [0.9256] 411	0.00116 [0.5177] 628	0.002802 [0.2151] 772	0.00217 [0.4385] 868	0.00005 [0.8777] 937	0.00137 [0.7078] 977	0.00057 [0.9222] 1046	0.010636 [0.2099] 1072	0.016021 [0.1534] 1083	0.003635 [0.8170] 1103	0.030781 [0.2687] 1150
Form-5 buys Transactions Equal Weighted Observations	0.00079 [0.5846] 350	0.00253 [0.2334] 558	0.003742 [0.1595] 708	0.00162 [0.6234] 807	0.00027 [0.9408] 877	0.0009 [0.8213] 927	0.00415 [0.4229] 1051	0.00842 [0.2370] 1113	0.003758 [0.7000] 1153	0.012113 [0.4264] 1206	0.044504 [0.0679]* 1206
Form-5 buys Transactions Value Weighted Observations	0.00044 [0.7564] 350	0.001361 [0.5270] 558	0.00174 [0.5192] 708	-0.00022 [0.9491] 807	-0.00177 [0.6487] 877	-0.00195 [0.6504] 927	-0.00059 [0.9199] 1051	-0.00476 [0.6032] 1113	-0.01521 [0.2318] 1153	-0.01425 [0.4645] 1206	0.011299 [0.7311] 1206

We compute trading calendar portfolio as follows. We first pick an interval length (starting with one day and continuing to hundred days). The intervals are in the form of (beginning day, ending day), inclusive, with the beginning day as day 0. For every day in the sample and for the interval length preceding that day, we select all the firms that transacted a Form-5 sell (buy) over that interval. We then compute that day's equal-weighted and market-value-weighted portfolio abnormal returns for these firms (we drop all firms with missing daily returns). Next, if a sample day has no qualifying firms, we drop it (the observations number lists the number of qualifying sample days for each interval). We then compute the mean daily portfolio abnormal return over all qualifying firms, multiply it by the interval length, and report it. The p -values of t -tests of whether the mean is different from zero are presented in bracket below the average abnormal return. We define top executives as people holding the title of CEO, COO, CAO, CFO, or President. * indicates significance at the 10% two-tailed level.

Table 2
(Continued)

Panel C: Firm calendar-month returns for calendar years 1998–2001 based on Form-5 trades occurring the 12-month period prior to the current calendar month

	Firm calendar-month return [p-value]	Firm calendar-month return mean [p-value based on standard errors corrected for clustering in calendar month]	Equal weighted portfolio return for calendar month mean [p-value]
(i) SEC filings			
Form 5 sales	−0.00727	−0.00727	−0.00646
p-value	[0.003]***	[0.548]	[0.540]
Observations	2995	2995	45
Form 5 buys	−0.00398	−0.00398	0.00072
p-value	[0.117]	[0.750]	[0.948]
Observations	2836	2836	44
(ii) Trading			
Form 5 sales	−0.00406	−0.00406	−0.00336
p-value	[0.106]	[0.716]	[0.731]
Observations	3411	3411	46
Form 5 buys	0.00107	0.00107	−0.00407
p-value	[0.645]	[0.928]	[0.726]
Observations	3418	3418	46

This table restricts our sample to those firms that had Form 5 trades. For each calendar month of the sample, a sample firm is classified as having Form 5 sales (respectively buys) filing or trading if the firm experienced Form 5 sales (respectively buys) filing or trading during the 12-month period prior to the current month. Thus, at most one observation of a sample firm with Form 5 trades can occur for each calendar month. The abnormal return for such a sample firm over a calendar month is the firm's monthly stock return minus value-weighted market return over the same month. We drop observations with missing returns. The results are based on separate analyses of firms classified as having Form 5 sales (respectively buys) filing or trading (over the 12 month-period prior to the current month). For the final column, we compute, for each calendar month, an equal-weighted Form 5 sales (respectively buys) filing (Part (i)) or trading (Part (ii)) portfolio that includes all sample firms that experienced Form 5 sales (respectively buys) filing or trading during the 12-month period prior to the current calendar month. Abnormal return for the calendar month is the difference between that month's return on the portfolio firms and that month's market value-weighted average monthly return of all CRSP firms not included in the portfolio (we drop observations with missing returns). This process generates only one observation for each calendar month for Form 5 sales (respectively buys) filing or trading. The *p*-values of *t*-tests of whether the mean is different from zero are presented in bracket below the average abnormal return. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed). We define top executives as people holding the title of CEO, COO, CAO, CFO, or President.

analysis from the trade to the fiscal firm-year. Such aggregation is standard practice in the insider trading literature.¹⁹

A key feature of insider trading confronting an empirical researcher is the dynamic nature of trading: managers in a firm make many trades in each period. Prior literature has not converged on a sufficient statistic to capture this process over a unit of observation [Seyhun (1998, Ch. 2)]. Further complicating this process is the recent evidence that managers display considerable individual heterogeneity in their policies [Bertrand

¹⁹ Lakonishok and Lee (2001), Section 5 aggregate at the firm-month level, computing the volume of insider trade for the last 6 months, and returns for the next 12 months. This procedure, however, induces serial correlation, which must be controlled for in their tests. In contrast, Seyhun (1992) uses a nonoverlapping time period to reduce serial dependence. This is the procedure we employ. We aggregate our Form-5 trades over a year, rather than over 6 months, because these trades are less frequent than Form-4 trades.

Table 2
(Continued)

Panel D: Firm calendar-month returns for calendar years 1998–2001 in a multivariate setting including sample firms with and without Form-5 trades

Dependent variable Independent variable	(i) SEC filings $XRET_{it}$	(ii) Trading $XRET_{it}$
	Estimated coefficients [p-value]	
$F5S_YES_C_{it}$	−0.00614 [0.015]**	−0.00437 [0.103]
$F5B_YES_C_{it}$	0.00022 [0.931]	0.00082 [0.762]
$RET_{i,36m}$	0.00276 [0.000]***	0.00279 [0.000]***
$Ln(MTB)_{it-1}$	−0.0118 [0.083]*	−0.01128 [0.093]*
$VOLAT_{it-1}$	0.03211 [0.404]	0.03289 [0.371]
Constant	−0.09494 [0.001]***	−0.09682 [0.001]***
Fixed effects	2-digit SIC industry; calendar month	2-digit SIC industry; calendar month
Sample size	14,007	14,637
Adjusted R^2	19.7%	19.6%

Definitions of the variables:

i = Index for sample firms (this table includes firms both with and without Form 5 trades); t = Index for the calendar month;

$XRET_{it}$ = The abnormal return for firm i over calendar month t , calculated as firm i 's monthly stock return minus value-weighted market return over the same month (we drop observations with missing returns);

$F5S_YES_C_{it}$ = One if the top executives (people holding the title of CEO, COO, CAO, CFO, or President) sold shares in the 12 months prior to month t that were reported in Form 5, and 0 otherwise;

$F5B_YES_C_{it}$ = One if the top executives purchased shares in the 12 months prior to month t that were reported in Form 5, and 0 otherwise;

$RET_{i,36m}$ = stock returns over 36 month prior to the beginning of the calendar month;

MTB_{it-1} = market value of equity plus book value of liabilities divided by book value of assets measured at the end of the previous month;

$VOLAT_{it-1}$ = Stock volatility, measured as standard deviation of daily stock returns over 60 months prior to the current month

The p -values are based on standard errors corrected for clustering in calendar months. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed).

and Schoar (2003)]. A relatively honest manager, for example, may choose to moderately misuse Form 5, making large trades only when she is certain that the trade is otherwise acceptable; others, by contrast, might misuse Form 5 heavily. We therefore use simple indicator variables to represent the incidence of various forms of insider trading in a firm-year. We later show the robustness of our results to other measures of insider trades.

Table 3, Panel A, presents the univariate correlations among current year's insider trading indicators, as well as next-year returns. As before, firms with Form-5 sales do significantly *worse* than other firms in the upcoming year (coefficient = −0.05, p -value = 0.04). By contrast, other types of insider activities on both Form 4 and Form 5 are insignificantly associated with next year's returns. However, Form-4 and Form-5 trading

indicators are significantly correlated in the cross-section, suggesting the need for a multivariate regression.²⁰

Our multivariate regression follows a specification similar to that of Lakonishok and Lee (2001, Section 5.4). The motivation for our inclusion of controls is the same as that for Table 2, Panel D. In particular, note that year dummies proxy for the market performance in that year. We also correct the standard errors for cross-sectional correlations by clustering by year.²¹

While the problem of correlated omitted variables is a concern, an opposing concern is that the large number of regressors spuriously induces the significance of the main measures of interest. To satisfy both of these issues, Table 3, Panel B, provides three multivariate regressions with and without various controls and fixed effects (see Footnote 18 on the pros and cons of fixed effects).

The results indicate that the Form-5 sales indicator is consistently significant, with Form-5 sales firms' subsequent annual returns lower by a substantial magnitude of 6 to 8 percentage points, a finding in agreement with the trade-level returns in Section 3.1. Form-5 buys are insignificant: perhaps investors expect insiders to choose Form 4 when making informed purchases [Lakonishok and Lee (2001, p. 109)]. However, as with Lakonishok and Lee, Form-4 sales and purchases are insignificant.²²

In sum, we find that, unlike Form-4 sales, Form-5 sales *are* predictive of lower returns in the future.²³ However, the reaction occurs only after the public disclosure of Form-5 sales, and not when the trades are made (Table 2, Panel B). What could be an example of manager's private information that the market is otherwise unaware of and has to infer from the disclosure of Form-5 sales?

²⁰ However, none of the correlations exceed 0.3 in magnitude; thus, multicollinearity is not a concern [Kennedy (1998, p. 187)].

²¹ The econometrics of clustered standard errors is based on asymptotics as the number of clusters grows large. While we have a relatively large number of calendar-month clusters in Section 3.1, we only have four clusters in this annual specification; so the standard errors, at least for this table, may not behave very well. On the other hand, clustering this way is quite conservative, since the true underlying within-cluster correlation is probably modest.

²² These results are robust to serial correlation corrections for standard errors, and the inclusion of firm-level indicators. The results are also robust to endogenizing the Form-5 sales indicator. To implement the latter, we obtain the fitted value of F5S_YES by regressing it on an indicator variable that denotes Form-5 sales activity in other firms in the same 2-digit industry. Following Lev and Sougiannis (1996), we do not use a single first-stage regression covering the entire sample but rather repeat these first-stage regressions for each combination of 2-digit SIC code industry and fiscal year. The results (not reported here) are consistent with those in Table 3, Panel B.

²³ We also re-estimate Table 3, Panel B using returns 2 years ahead (with next year's return included as a control for momentum). Both the magnitude and the significance of Form-5 sales decline (coefficient = -0.039, *p*-value = 0.104), suggesting that the relevant private information is largely impounded in the stock price quickly after the filing.

Table 3

Annual firm-level regressions of stock returns on top executive insider trading for a sample of S&P 500 firms during fiscal years 1998–2001

Panel A: Univariate correlations (with p -values in brackets)

	RET_{it+1}	$F5S_YES_{it}$	$F5B_YES_{it}$	$F4S_YES_{it}$
$F5S_YES_{it}$	−0.0533 [0.042]**			
$F5B_YES_{it}$	−0.0124 [0.635]	0.2646 [0.000]***		
$F4S_YES_{it}$	−0.0066 [0.801]	−0.0887 [0.001]***	−0.1046 [0.000]***	
$F4B_YES_{it}$	0.0132 [0.615]	−0.065 [0.012]**	−0.0919 [0.000]***	0.0783 [0.003]***

Panel B: Panel regressions

Dependent variable Independent variables (expected sign)	RET_{it+1} Estimated coefficient [p-value]		
	(1)	(2)	(3)
$F5S_YES_{it}$ (−)	−0.08407 [0.059]*	−0.07126 [0.088]*	−0.06586 [0.073]*
$F5B_YES_{it}$ (+)	−0.00276 [0.934]	0.00553 [0.912]	0.01068 [0.845]
$F4S_YES_{it}$ (−)	−0.02927 [0.641]	−0.01477 [0.815]	−0.01599 [0.764]
$F4B_YES_{it}$ (+)	0.01652 [0.339]	0.01493 [0.322]	0.01199 [0.598]
$RET_{it-2,t}$		−0.00741 [0.062]*	−0.00719 [0.056]*
$Ln(MTB)_{it-1}$		−0.04893 [0.197]	−0.05921 [0.374]
$VOLAT_{it-1}$		0.50341 [0.476]	0.31232 [0.535]
Constant	0.12337 [0.039]**	−0.00934 [0.973]	0.23478 [0.140]
2-digit SIC	Not included	Not included	Included
industry fixed effects			
Year fixed effects	Included	Included	Included
Sample size	1457	1457	1457
Adjusted R^2	8.02%	9.44%	8.90%

Definitions of the variables:

 i = Index for sample firms (this table includes firms both with and without Form 5 trades); t = Index for the fiscal year; RET_{it+1} = Annual stock return for the following year; $F5S_YES_{it}$ = 1 if the top executives (people holding the title of CEO, COO, CAO, CFO, or President) sold shares that were reported in Form 5, and 0 otherwise; $F5B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 5, and 0 otherwise; $F4S_YES_{it}$ = 1 if the top executives sold shares that were reported in Form 4, and 0 otherwise; $F4B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 4, and 0 otherwise; $RET_{it-2,t}$ = Annual stock return for years t , $t - 1$ and $t - 2$; MTB_{it} = Market value of equity plus book value of liabilities divided by book value of assets measured at the end of the fiscal year t ; $VOLAT_{it}$ = Stock volatility, measured as standard deviation of daily stock returns over 60 months.The p -values are based on standard errors corrected for clustering in years. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed).

Perhaps the most important fundamental variable underlying stock prices is earnings. Owing to their proximity to firm operations, managers are likely to have a far more accurate estimate of future earnings than outsiders. Another key advantage of earnings is that we have a natural measure of current investor information about future earnings, namely, current-year analyst forecasts of future earnings, which we can use to ascertain whether private information underlying Form 5 trades is unknown to investors in the present year.

3.3 Cross-sectional variation in future earnings

As our measure of future earnings, we use the diluted EPS before extraordinary items, adjusted for dividends, for the following year (EPS_{it+1}). The use of EPS as the earnings measure is standard in the literature [e.g., Brown et al. (1987), Barth et al. (1999)].²⁴ To alleviate spurious variation in the EPS measure of a given firm due to temporal changes in the number of that firm's shares outstanding, we control for stock splits in measuring EPS. The mean EPS is \$1.4 per share, a magnitude similar to that in Barth, Elliott, and Finn (Table 1).

Similar firms may have different numbers of shares outstanding, which affects the EPS. Unlike returns, EPS therefore cannot be directly compared across firms. We use the analyst forecast as a baseline model of cross-sectional variation in EPS. To control for other determinants of EPS, we use firm characteristics such as market-to-book and leverage. Leverage controls for financing (interest expense) effects, lender monitoring, and other capital structure effects on earnings. We also include the log of number of shares outstanding to control for any denominator-induced variation in future EPS. Past stock market returns contain information about future earnings [Kothari and Sloan (1992)], and also drive insider transactions [Heath, Huddart, and Lang (1999)]. So we also control for stock performance.

Table 4 contains three specifications whose results are largely consistent with those in Table 3. Form-4 sales remain insignificant throughout. In contrast, Form-5 sales are significantly negatively correlated with future earnings (albeit with p -values exceeding 0.05 in two of the specifications). Note that current-year analyst forecasts in Table 4 are on average accurate and significant, suggesting that analysts are good forecasters of future earnings. Yet Form 5 sales remain significant, suggesting that analysts are unaware of these sales or their implications for future earnings. Finally, in contrast to the return regressions, Form-5 buys have a significantly positive association with future earnings in one of our specifications.

²⁴ One could argue that there is a timing mismatch because year $t + 1$ earnings are released after the end of the fiscal year $t + 1$, but note that that is just the final report; firms keep investors apprised of ongoing earnings performance through channels other than just the final annual report (e.g., conference calls, quarterly reports, etc.).

Table 4**Annual firm-level regressions of earnings per share on top executive insider trading for a sample of S&P 500 firms during fiscal years 1998–2001**

Dependent variable	EPS_{it+1}		
Independent variables	Estimated coefficient [<i>p</i> -value]		
(expected sign)	(1)	(2)	(3)
$F5S_YES_{it} (-)$	-0.04093 [0.086]*	-0.0597 [0.067]*	-0.09566 [0.031]**
$F5B_YES_{it} (+)$	0.14363 [0.129]	0.12203 [0.104]	0.11213 [0.018]**
$F4S_YES_{it} (-)$	-0.00759 [0.916]	0.03664 [0.650]	-0.02076 [0.856]
$F4B_YES_{it} (+)$	0.07438 [0.558]	0.11653 [0.416]	0.07333 [0.606]
$RET_{it-2,t}$		-0.06666 [0.450]	-0.06792 [0.452]
EPS_F_{it+1}	1.01157 [0.000]***	0.99437 [0.000]***	0.98221 [0.000]***
$Ln(MTB)_{it-1}$		0.19208 [0.186]	0.32583 [0.155]
$VOLAT_{it-1}$		-0.47312 [0.250]	-0.33441 [0.519]
LEV_{it-1}		-0.10074 [0.856]	0.31055 [0.478]
$Ln(SHARES)_{it-1}$		-0.01437 [0.683]	-0.0424 [0.024]**
Constant	-0.49813 [0.000]***	-0.33019 [0.342]	-0.01117 [0.969]
2-digit SIC industry fixed effects	Not included	Not included	Included
Year fixed effects	Included	Included	Included
Sample size	1457	1457	1457
Adjusted R^2	1.89%	43.3%	43.33%

Definitions of the variables:

 i = Index for sample firms (this table includes firms both with and without Form 5 trades); t = Index for the fiscal year; EPS_{it+1} = Earnings per share diluted (COMPUSTAT item 57) for the following year, adjusted for stock splits and stock dividends; $F5S_YES_{it}$ = 1 if the top executives (people holding the title of CEO, COO, CAO, CFO, or President) sold shares that were reported in Form 5, and 0 otherwise; $F5B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 5, and 0 otherwise; $F4S_YES_{it}$ = 1 if the top executives sold shares that were reported in Form 4, and 0 otherwise; $F4B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 4, and 0 otherwise; $RET_{it-2,t}$ = Annual stock return for years t , $t - 1$ and $t - 2$; EPS_F_{it+1} = The median of the latest analyst forecast in the current year of earnings per share for the following year; MTB_{it} = Market value of equity plus book value of liabilities divided by book value of assets measured at the end of the fiscal year; $VOLAT_{it}$ = Stock volatility, measured as standard deviation of daily stock returns over 60 months; ELV_{it} = Long-term debt divided by book value of total assets; $SHARES_{it}$ = Shares outstanding at the end of the fiscal year.The *p*-values are based on standard errors corrected for clustering in years.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed).

Given the role of EPS as a proxy for managers' private information, we triangulate magnitudes of the findings in Table 4 with the returns tests. Firms with Form-5 sales have a 4 to 9 cent decline in next year's EPS. A 9 cent drop in EPS is about 7% of the sample mean EPS. To maintain a constant P/E ratio, the price would also have to drop by that amount, which coincides with the magnitude of the initial price reaction in Table 2, Panel B. After the Form-5 filing, the information about next year's EPS continues to leak out throughout the year via quarterly reports, conference calls, etc. The market sees no reason to revise its initial reaction substantially (see Section 3.1). Thus, at least according to our rough triangulation, the returns and the EPS tests appear to be mutually consistent, once again attesting to the accuracy of the initial market reaction to Form-5 filings.

The above results suggest that managers trade on their private information on long-run earnings. We also explicitly check whether managers trade on short-run private information. Such a test would also help corroborate our previous findings on the limited market reaction following the trading dates of Form-5 sales. We assume that short-run private information is impounded in current-year earnings, which then becomes our dependent variable. We find no evidence that current year Form-5 sales are associated with current year EPS (we use previous year EPS as a baseline). The coefficient on the Form 5 sales indicator is -0.013 , with a p -value of 0.855 . This insignificance is consistent with prior literature that finds that the legal penalties for trading are typically higher if the manager trades on short-term specific information, such as upcoming mergers [Meulbroek (1992), Bainbridge (2000)]; managers therefore tend to trade on long-run private information [Noe (1999), Beneish and Vargus (2002), Ke, Huddart, and Petroni (2003)].²⁵

3.4 Benefits of delayed reporting

The discussion at the end of the previous section tried to infer indirectly the potential legal costs managers believe they face in opportunistic insider trading. We now expand upon such "revealed preference" analyses by providing direct evidence on some of the potential benefits of delaying the disclosure of insider sales. Since our focus is on the delayed disclosure aspect of Form-5 trades, we would like to identify benefits that accrue because investors remain uninformed about Form-5 sales throughout the year. One obvious benefit is that managers can make use of investor ignorance to raise external financing throughout the year. Investors are

²⁵ As an illustration of such long-term private information, consider the recent revelation that Merck knew about problems with its drug Vioxx long before investors found out. Shares of Merck fell by 5% only after the public disclosure of this fact. This disclosure came *five* years later in the form of an "Expression of Concern" editorial in the *New England Journal of Medicine* about important information that had been omitted by the authors of a previously published Vioxx article in that journal [Berenson (2005), Curfman, Morrissey, and Drazen (2005)].

unlikely to provide additional funds if they know that managers are privately bearish about the firm's prospects.

For external financing, we first focus on both debt and equity. To account for inflows and outflows, we measure annual changes in debt and equity and sum them.²⁶ In specifications both with and without controls, Table 5 shows that firms that have more Form-5 sales in a given year raise more external financing in that year. The mean (standard deviation) of the external financing dependent variable is 0.154 (0.537), so the coefficients of 0.06 and 0.075 on the Form-5 sales indicator appear to be economically significant as well. We also present the results using changes in common equity only in Table 5; the Form-5 sales indicator continues to remain significant.

We next examine whether managers selling on Form 5 extract more pay than warranted by firm performance. We measure excess pay as the residual from a regression of the log of the average total annual pay (cash plus stock) of the top five executives on annual stock returns and return on equity (*ROE*). The standard deviation of the resulting variable (*XPAY*) is 0.88. We regress excess pay on insider trading indicators and firm characteristics. Since managers of larger firms are likely to receive higher pay, we also include a size variable (market value of equity) in this regression. Managers receiving higher pay, especially in the form of stock compensation, are more likely to unload their shares [Ofek and Yermack (2000)]: our inclusion of the open-market Form-4 sales dummy controls for such sales. The results, presented in the last column of Table 5, indicate that managers selling on Form 5 do appear to extract a modestly higher amount of pay as well.²⁷

An interesting feature of Table 5 is that other insider sales indicators are also significant. One possibility is that Form-5 trades are symptomatic of a larger governance breakdown that allows managers to conduct trades opportunistically while raising external financing and garnering excess pay.

3.5 Role of the board and institutional investors

If Form-5 trades are opportunistic, they should be less prevalent in a well-governed firm. In this section, we examine the effectiveness of two mechanisms, institutional block ownership and outsider representation on the board, in mitigating opportunistic managerial behavior. Institutional

²⁶ Managers may capitalize on high equity prices during the year by making stock acquisitions. Our equity change measure accounts for such transactions.

²⁷ Some studies have argued that it may be an optimal form of compensation to allow managers to profit from insider trading [e.g., Carleton and Fischel (1983), Roulstone (2003)]. This theory would suggest, in contrast to our findings, that managers who are paid less in explicit compensation are the ones likely to trade more opportunistically on Form 5. However, Ausubel (1990) shows that this theoretical association does not hold in settings such as ours where investors have incomplete information. Moreover, other studies in law and economics have suggested that insider trading is not an efficient form of managerial compensation [Easterbrook (1981), Bainbridge (2000)].

Table 5

Annual firm-level regressions of changes in external financing and excessive executive pay on top executive insider trading for a sample of S&P 500 firms during fiscal years 1998–2001

Dependent variable Independent variables (expected sign)	$\Delta XFIN_{it}$	$\Delta XFIN_{it}$	$\Delta COMEQ_{it}$	$\Delta COMEQ_{it}$	$XPAY_{it}$
	Estimated coefficient [<i>p</i> -value]				
	(1)	(2)	(3)	(4)	(5)
$F5S_YES_{it}$ (+)	0.06119 [0.000]***	0.07599 [0.000]***	0.03805 [0.009]***	0.05175 [0.005]***	0.04210 [0.045]**
$F5B_YES_{it}$ (–)	–0.05845 [0.017]**	–0.01472 [0.026]**	–0.04465 [0.076]*	–0.00445 [0.300]	0.06329 [0.236]
$F4S_YES_{it}$ (+)	0.07271 [0.022]**	0.03523 [0.114]	0.08711 [0.000]***	0.04220 [0.004]***	0.06739 [0.377]
$F4B_YES_{it}$ (–)	0.04218 [0.022]**	0.04423 [0.013]**	0.02200 [0.381]	0.01923 [0.320]	0.12355 [0.000]***
$RET_{it-2,t}$		0.0169 [0.069]*		0.01619 [0.040]**	0.00540 [0.274]
EPS_F_{it+1}		–0.00096 [0.820]		–0.00129 [0.767]	0.03965 [0.000]***
$Ln(MTB)_{it-1}$		0.21888 [0.002]***		0.16964 [0.007]***	0.45506 [0.000]***
$VOLAT_{it-1}$		0.15567 [0.397]		0.11089 [0.246]	1.71058 [0.000]***
LEV_{it-1}		0.16069 [0.397]		0.12994 [0.343]	0.48704 [0.000]***
$Ln(SHARES)_{it-1}$		–0.08079 [0.002]***		–0.05997 [0.031]**	
$Ln(MVEQ)_{it-1}$					0.40419 [0.000]***
Constant	0.03877 [0.056]*	0.20758 [0.000]***	0.00635 [0.830]	0.10419 [0.052]*	0.04210 [0.045]**
2-digit SIC industry fixed effects	Not included	Included	Not included	Included	Included
Year fixed effects	Included	Included	Included	Included	Included
Sample size	1,452	1,452	1,454	1,454	1,449
Adjusted R^2	1.59%	15.27%	1.02%	14.66%	46.95%

Definitions of the variables:

i = Index for sample firms (this table includes firms both with and without Form 5 trades); t = Index for the fiscal year;

$\Delta XFIN_{it}$ = The sum of annual changes in long-term debt (COMPUSTAT item 9) and short-term debt (COMPUSTAT item 34), scaled by total assets (COMPUSTAT item 6), and annual changes in common equity (COMPUSTAT item 60) and scaled by total assets (COMPUSTAT item 6);

$\Delta COMEQ_{it}$ = Annual changes in common equity (COMPUSTAT item 60) and scaled by total assets (COMPUSTAT item 6);

$XPAY_{it}$ = Residuals of average annual total pay (including salary, annual bonus, equity grants, and all other annual pay), obtained by regressing $\ln(\text{average annual total pay of top executives (people holding the title of CEO, COO, CAO, CFO, or President)})$ on annual stock returns and return on equity (ROE) for all the S&P 500 firms for which these data are available (these data requirements are less restrictive than the table's regressions and yield a slightly larger number of observations);

$F5S_YES_{it}$ = 1 if the top executives sold shares that were reported in Form 5, and 0 otherwise;

$F5B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 5, and 0 otherwise;

$F4S_YES_{it}$ = 1 if the top executives sold shares that were reported in Form 4, and 0 otherwise;

$F4B_YES_{it}$ = 1 if the top executives purchased shares that were reported in Form 4, and 0 otherwise;

$RET_{it-2,t}$ = Annual stock return for years t , $t-1$ and $t-2$;

EPS_F_{it+1} = The median of the latest analyst forecast in the current year of earnings per share for the following year;

MTB_{it} = Market value of equity plus book value of liabilities divided by book value of assets measured at the end of the fiscal year t ;

$VOLAT_{it}$ = Stock volatility, measured as standard deviation of daily stock returns over 60 months;

LEV_{it} = Long-term debt divided by book value of total assets; $SHARES_{it}$ = Shares outstanding at the end of the fiscal year. $MVEQ_{it}$ = Market value of equity at the end of the fiscal year (in millions);

The p -values are based on standard errors corrected for clustering in years. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed).

blockholders and outside directors have the incentives, expertise, and power to evaluate and monitor situations such as Form-5 sales as they arise [e.g., Shleifer and Vishny (1997)]. If these mechanisms are indeed effective, either because they create a disciplined atmosphere or because they explicitly curtail opportunistic use of Form 5, the negative association between Form-5 sales and future performance will be weaker for firms with higher institutional holdings and better corporate governance. To test this, we interact the Form-5 sales indicator, *F5S_YES*, with the following indicators:

INST_BLK_{it} = An indicator variable that is set to 1 if there is an institutional blockholder owning at least 5% of shares outstanding;

DIR_EQG_{it} = An indicator variable that is set to 1 if outside directors on the board receive equity grants.²⁸

Following standard statistical practice, we also include these two variables as regressors [Southwood (1978)]. The results are presented in Table 6. The interactive effects of institutional holdings in Table 6 for both future returns and earnings are positive and significant, albeit marginally, suggesting that institutional shareholders have some power to prevent managers from making opportunistic use of Form-5 sales. However, motivated directors have a much stronger effect, especially for the returns test—perhaps directors are much more involved in governance affairs than large institutional shareholders. In fact, the interactive effects of the director indicator in the last two columns of Table 6 (coefficients = 0.18 and 0.52) substantially reduce the corresponding main effects of Form-5 sales (coefficients = −0.22 and −0.55).²⁹ This conclusion is further supported by our (untabulated) finding that the coefficient on the Form-5 sales regressor is statistically insignificant at the 10% two-tailed level when the sample is restricted to observations with *DIR_EQG_{it}* = 1.

Finally, we investigate and find that the univariate associations between the Form-5 sales indicator and the institutional investor and director indicators are insignificant at the 10% two-tailed level. These insignificant associations, in conjunction with the significant interactive effects in Table 6, suggest an economic implication: *ex post* monitors such as institutions and directors do not blindly prevent all Form-5 sales, merely the ones that are opportunistic in nature.

²⁸ Conventional wisdom suggests that outside directors have incentives to monitor a firm well because it enhances their reputation and, potentially, their value in the labor market. However, a systematic study of outside director compensation by Yermack (2004, p. 2282) suggests that director incentives arise more from explicit incentives rather than implicit considerations tied to the labor market.

²⁹ Our tests rule out multicollinearity between the interaction effect regressor and the main effect regressors.

Table 6
Annual firm-level regressions of stock returns and earnings per share on top executive insider trading and governance variables for a sample of S&P 500 firms during fiscal years 1998–2001

Dependent variable Independent variable (expected sign)	RET _{it+1}	EPS _{it+1} Estimated coefficient [p-value]	RET _{it+1}	EPS _{it+1}
	(1)	(2)	(3)	(4)
<i>F5S_YES_{it}</i> (–)	–0.10393 [0.026]**	–0.15958 [0.094]*	–0.22225 [0.001]***	–0.55112 [0.054]*
<i>F5B_YES_{it}</i> (+)	0.02427 [0.710]	0.10592 [0.039]**	0.01266 [0.826]	0.12084 [0.042]**
<i>F4S_YES_{it}</i> (–)	–0.00378 [0.922]	–0.00218 [0.985]	–0.01611 [0.750]	–0.01935 [0.868]
<i>F4B_YES_{it}</i> (+)	0.01217 [0.719]	0.09731 [0.494]	0.0126 [0.603]	0.08132 [0.565]
<i>INST_BLK_{it–1}</i>	–0.01809 [0.651]	–0.17305 [0.141]		
<i>INST_BLK_{it–1} × F5S_YES_{it}</i> (+)	0.05543 [0.089]*	0.1227 [0.085]*		
<i>DIR_EQG_{it–1}</i>			–0.05721 [0.539]	–0.29901 [0.127]
<i>DIR_EQG_{it–1} × F5S_YES_{it}</i> (+)			0.17738 [0.001]***	0.52135 [0.094]*
<i>RET_{it–2,t}</i>	–0.00797 [0.019]**	–0.06851 [0.451]	–0.00717 [0.050]*	–0.06797 [0.461]
<i>EPS_F_{it+1}</i>		0.98877 [0.000]***		0.98122 [0.000]***
<i>Ln(MTB)_{it–1}</i>	–0.07351 [0.170]	0.34038 [0.122]	–0.06051 [0.392]	0.30718 [0.155]
<i>VOLAT_{it–1}</i>	0.3429 [0.539]	–0.32591 [0.575]	0.31133 [0.538]	–0.31423 [0.550]
<i>LEV_{it–1}</i>		0.33196 [0.522]		0.32572 [0.427]
<i>Ln(SHARES)_{it–1}</i>		–0.06843 [0.000]***		–0.02839 [0.098]*
Constant	0.21899 [0.150]	–0.27591 [0.442]	0.28504 [0.062]*	0.16452 [0.514]
2-digit SIC industry fixed effects	Included	Included	Included	Included
Year fixed effects	Included	Included	Included	Included
Sample size	1359	1359	1455	1455
Adjusted R ²	9.6%	57.82%	8.97%	49.38%

Definitions of the variables:

i = Index for sample firms (this table includes firms both with and without Form 5 trades); *t* = Index for the fiscal year; *RET_{it+1}* = Annual stock return for the following year;

EPS_{it+1} = Earnings per share diluted (COMPUSTAT item 57) for the following year, adjusted for stock splits and stock dividends;

F5S_YES_{it} = 1 if the top executives (people holding the title of CEO, COO, CAO, CFO, or President) sold shares that were reported in Form 5, and 0 otherwise;

F5B_YES_{it} = 1 if the top executives purchased shares that were reported in Form 5, and 0 otherwise;

F4S_YES_{it} = 1 if the top executives sold shares that were reported in Form 4, and 0 otherwise;

F4B_YES_{it} = 1 if the top executives purchased shares that were reported in Form 4, and 0 otherwise;

INST_BLK_{it} = 1 if there is an institutional investor owning at least 5% of shares outstanding, and 0 otherwise; *DIR_EQG_{it}* = 1 if outside directors receive stock or option grants during the fiscal year, and 0 otherwise.

RET_{it–2,t} = Annual stock return for years *t*, *t* – 1 and *t* – 2;

EPS_F_{it+1} = The median of the latest analyst forecast in the current year of earnings per share for the following year;

MTB_{it} = Market value of equity plus book value of liabilities divided by book value of assets measured at the end of the fiscal year *t*;

VOLAT_{it} = Stock volatility, measured as standard deviation of daily stock returns over 60 months;

LEV_{it} = Long-term debt divided by book value of total assets; *SHARES_{it}* = Shares outstanding at the end of the fiscal year.

The *p*-values are based on standard errors corrected for clustering in years. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed).

4. Additional Analyses

4.1 Sensitivity analyses

The key aspect of Form-5 sales this study focuses on is their delayed disclosure. However, Form-5 transactions that take place at the end of the fiscal year are not really delayed-disclosure transactions, as they have to be disclosed soon after the end of the fiscal year. To check the robustness of our results to these considerations, we re-code all Form-5 transactions reported within 41 days as timely, that is, as effectively being Form-4 disclosures (recall from Section 1.1 that Form-4 sales had to be reported by the tenth day of the next month during our sample period). The new measure of Form 5 sales is correlated with the old measure at 0.96, and our results in Table 3, Panel B, continue to hold for this new measure of Form 5 sales.³⁰

Next, we test whether the effect of the delay in Form-5 reporting can be decomposed from that of the opaque manner in which it is disclosed subsequently. To this end, we attempt to discern whether there is a difference in the economic import of Form-5 sales conducted earlier in the year and those that are transacted later. We do so by restricting attention to those Form-5 firms that start their Form-5 sales activities in the first half of the fiscal year and obtain, using the specification in Column 3 of Table 3, Panel B, a coefficient of -0.083 (p -value = 0.07), which is slightly more negative than the current coefficient of -0.066 . Thus longer delays appear to be associated with somewhat worse future performance (though the difference is not statistically significant).

Our sample period of the late 1990s saw a dramatic increase in earnings restatements by firms. To investigate the possibility that the future performance effect of Form-5 sales is driven by earnings restatements, we collect all earnings restatement information from the GAO earnings restatement database (<http://www.gao.gov/new.items/d03395r.pdf>). When we drop these firm years, we lose 165 observations, but still obtain our results.

Finally, Section 1.1 indicates that a Form-5 filing was allowed for a manager of an acquired firm when he automatically received the shares of the acquirer in exchange for his original shares. To test the sensitivity of our results to the possibility that a manager's Form-5 trades resulted from the acquisition of his prior firm by the current employer, we exclude from Table 3, Panel B, all sample firms that made an acquisition of at least \$100M (as recorded in the SDC database). Our rationale for the cut-off is that managers of smaller acquired firms are unlikely to be hired as top executives by the acquirer. This reduces the number of observations in Table 3, Panel B, to 1198, but the coefficients on the Form-5 sales indicators in the three columns (-0.088 , -0.079 , -0.066) and the p -values (0.08, 0.06, and 0.07) remain largely the same.

³⁰ Because Section 4 indicates similar results for event-study and panel returns regressions, this section focuses on the panel returns regressions in Table 3, Panel B.

4.2 Alternative measures of insider trading

In addition to our array of tests so far, we also replicate our returns results for several alternative measures of insider trading. We adopt the basic regression specification of Table 3, Panel B, where we include the four trading metrics, a constant, and year dummies. First, following Lakonishok and Lee (2001), we define the net purchase ratio as the difference between the number of purchases by all top executives filed in Form 5 and the number of sales by all top executives filed in Form 5, scaled by the total number of top executive Form-5 trades in a given firm-year. We find that this insider trading metric is insignificant, perhaps not surprising because, by construction, this measure assigns equal weight to both Form-5 sales and purchases; from our earlier results, we know that Form-5 sales and purchases contain different levels of information about future returns.

Next, we measure insider sales as a proportion of managerial ownership. A manager's level of ownership is also a dynamic variable that changes with stock grants, option exercises, stock splits, insider sales, etc. To account for these effects, we scale each insider transaction by the executive's ownership level immediately preceding that transaction. We then sum all the direct trades for each executive for each firm-year (by direct, we mean the trades made by the executive in his name, not as a representative of some other legal entity). To get an average level of insider sales, we then average the measure across all executives in that firm in that year. The results indicate that Form-5 sales are significantly and negatively associated with future returns (coefficient = -0.002 , p -value = 0.08).

We then use a dollar metric where we measure the log of the dollar value of insider trades by top insiders. The results again indicate that the log of Form-5 dollar sales are negatively associated with future returns, albeit marginally (coefficient = -0.003 , p -value = 0.10). We also recompute our trading measures by excluding trades smaller than \$10,000, and find that the results continue to hold.

Finally, we decompose Form-5 sales into the various categories shown in Table 1, Panel E. Form-5 sales related to employee benefit plans, while a large category of Form-5 sales, seem, at least at first sight, to be trades that are less likely to be opportunistic. To test this conjecture, we recode the Form-5 sales indicator in Table 3, Panel B, as 1 only if the firm conducted employee benefit-related Form-5 sales. This indicator is uniformly insignificant (p -values exceed 0.8) with magnitudes about one-tenth of those in Table 3, Panel B.³¹ We then recode the Form-5 sales indicator as one only if the sales were categorized as transactions between the executives and the company (see Footnote 2), bona fide gifts (see

³¹ This insignificance continues to hold when we combine the open market and derivative categories with the benefit category.

Footnote 7), or other. For this version of Table 3, Panel B, the indicator is highly significant with coefficients ranging from -0.08 to -0.10 with p -values ranging 0.06 to 0.002 .³² Thus, our results appear to be driven by the “correct” categories of Form-5 sales.

5. Conclusion

This article examines whether data on quick and late-disclosure trades can help to disentangle the liquidity and private information motives for insider trading. The results suggest that managers in large firms may have used late-disclosure Form-5 sales for information-based trading and quick-disclosure Form-4 sales for liquidity-based trading during the sample period.

From an institutional perspective, our results raise the question of why the SEC did not more actively monitor Form-5 trades. To the best of our knowledge, it appears that the regulators simply did not consider Form 5 a tool for managerial opportunism [Leonhardt (2002)]. However, in light of the recent evidence on misuses of Form 5, the SEC reversed its stance on April 10, 2002, and proposed timely disclosure requirements for virtually all insider trades [Norris (2002)]. The final SEC rules mandated electronic filings after July 30, 2003.

Form-5 trades also received considerable attention in the Sarbanes–Oxley Act, which eliminated several Form-5 provisions on the basis of anecdotal evidence of their misuse at firms such as Enron. In response, the U.S. GAO noted that the provisions of the Act could be better justified with *systematic* empirical evidence. Our findings suggest that Form-5 trades prior to the passage of Sarbanes–Oxley were opportunistic in a large sample of firms, and therefore worthy of attention.

But is the Sarbanes–Oxley Act’s solution of curtailing Form-5 trades satisfactory?³³ We find that well-governed firms had made some headway in preventing the misuse of Form 5. The underlying cause for opportunistic Form 5 trades could thus be a deeper breakdown of ethical and governance culture in the firm. The relative merits of addressing these problems through private negotiations such as good governance or public regulations such as Form 5 stopgaps are a topic of perennial discussion. For a comprehensive analysis of this issue, we refer the interested reader to North (2005).

³² We also recode the Form 5 sales indicator to reflect only the transactions between the executives and the company. This indicator has a coefficient of -0.12 , but is insignificant at the two-tailed 10% level (p -values range from 0.12 to 0.4 for the specifications in Table 3, Panel B). One potential reason for this low significance is low power, for far fewer firms have that category of sales.

³³ See Banerjee and Eckerd (2001) on the limited effectiveness of regulatory restrictions on insider trading.

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