

The Effect of Illegal Insider Trading on Takeover Premia*

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Abstract. This paper empirically investigates whether illegal insider trading increases the premium a bidder pays for a target. Illegal insider trading is trading by traditional corporate insiders, as well as others in a position of trust and confidence (e.g. investment bankers, lawyers), based on material, non-public information ('inside information'). The paper examines the premia of takeovers with known illegal insider trading and compares them to a control sample of takeovers matched by industry, time period, and size that do not have detected illegal insider trading. After controlling for differences in merger characteristics, such as number of bidders, type of offer, form of payment, etc., we find that takeovers with detected illegal insider trading have takeover premia which are approximately 10 percentage points, or almost one-third, higher than the control sample. We conduct additional tests in an attempt to determine the direction of causality between illegal insider trading and takeover premia size and explore the effect of potential detection bias. The results suggest both that illegal inside traders base their trades on factors other than premia size, and that illegal insider trading in takeovers with large premia is not necessarily more likely to be detected. Our findings are consistent with the hypothesis that the illegal insider trading itself tends to create larger takeover premia.

1. Introduction

This paper empirically investigates the relation between illegal-insider-trading activities in takeover-target stocks and the size of the premium that the bidder pays in successful takeovers. The paper compares the premia of takeovers in the United States with detected illegal insider trading to a matched sample of takeovers with no detected illegal insider trading and analyzes whether differences in takeover premia between the two samples may be due to illegal insider trading.

There is a large literature that focuses on the stock-price effects of *legal* transactions made by registered corporate insiders (officers, directors, and significant holders of any equity class).¹ In the United States, these corporate insiders must self-report their trades in their company's stock to the U.S. Securities and Exchange Commission (SEC). These legal transactions are by definition not based upon material, non-public information; corporate insiders cannot legally trade on such information, so they are unlikely to report violative transactions to the SEC. In contrast to the body of research on legal transactions, the study here concentrates exclusively on detected *illegal*-insider-trading data for analysis, because the pur-

pose of this paper is to investigate how such illegal trading might affect takeover premiums. Thus, unless otherwise specified, 'insider trading' in this paper means 'illegal insider trading'. By 'detected' we mean that the SEC has successfully pursued a civil or administrative case for insider trading in the target firm's stock.

The nature of the relation between insider trading and takeover premia is at the core of the debate over the economic desirability of insider-trading restrictions. Advocates of insider-trading regulation argue that insider trading impedes the market for corporate control by increasing the premium a bidder must offer to acquire a target. This argument implies a wealth transfer from the bidder to the shareholders of the target firm. More significantly, the increase in costs to bidders suggests that some otherwise economically efficient mergers may never occur. Critics of insider-trading regulation, however, question the causal link between insider trading and the size of takeover premia.

The potential for insider trading to adversely affect the market for corporate control flows from a variety of sources. First, because insider trading leads to at least partial incorporation of takeover information into prices, if such trading occurs prior to open-market purchases by the bidder, it can reduce the value to the bidder of acquiring an initial toehold stake in the target. Indeed, if the bidder responds by decreasing the size of the toehold stake, the probability of a successful takeover may decrease.² Second, illegal insider trading might lead to an increase in the premium a bidder must offer to a target. An increased takeover premium may occur, for example, if insider-trading-induced price movements attract the attention of competing bidders. An increased takeover premium might also result if the target's stock price influences the bidder's offer.³ The bidder may adjust its bid based upon the target's current stock price when the market value of the target provides the bidder with important (albeit incomplete) information about the target's intrinsic value. The bidder may interpret the insider-trading-induced stock-price change as evidence that the value of the target's cash flows has changed, and revise its bid accordingly.

Evaluating the impact of illegal insider trading on takeover premia seems especially relevant in light of the impending economic union of Europe. The unification is expected to lead to wide-ranging changes in financial institutions, infrastructure and regulations. An increased number of takeovers is also anticipated with the imminent economic union.⁴ With the development of broader-based stock exchanges, such as London's Alternative Investment Market (AIM) and EASDAQ (the pan-European equivalent of the U.S.'s NASDAQ), European takeovers are more likely to involve public companies, which in turn expands the opportunities for illegal insider trading. While the growth in takeovers points to a proliferation in the potential for insider trading, the ultimate unification of the region also facilitates and encourages a united approach to securities-market regulation. Such an approach must set appropriate sanctions, if any, for illegal insider trading. Transactions deemed as illegal insider trading in the United States are currently legal in some other countries. Nevertheless, investigation of the effects of illegal insider

trading on takeover premia has relevance even in those countries in their decisions whether to revise the existing regulatory and legal structure.

We find that takeovers with detected illegal insider trading have takeover premia which average 30% higher than a control sample of takeovers matched by industry, time period, and size that do not have detected illegal insider trading. This finding is robust with respect to various differences in merger characteristics, such as number of bidders, type of offer, form of payment, and level of inside ownership. Overall, the findings are consistent with the hypothesis that illegal insider trading leads to higher takeover premia.

The paper consists of five sections. Section 2 of the paper describes the sample of takeovers and its construction. Section 3 contains the empirical analysis and discusses potential endogeneity issues. Section 4 discusses related empirical research. Section 5 summarizes the findings and their potential policy implications.

2. Sample Construction and Description

2.1. THE ILLEGAL-INSIDER-TRADING SAMPLE

The core of the analysis here derives from the Meulbroek (1992) data sample of takeover transactions in the United States with detected illegal insider trading. This sample identifies individuals charged with illegal insider trading by the SEC in civil or administrative cases between 1980 and 1989. Section 10(b) of the 1934 U.S. Securities and Exchange Act regulates insider trading, stating, in part, that insiders must disclose material inside information, or refrain from trading. Information is material when a reasonable investor considers it important to his/her investment decision. Hence, the law applies to more than trading and tipping by traditional corporate insiders, such as officers and directors. People in other positions of trust and confidence who transmit or use material, non-public information, or people who steal such information, also violate insider-trading laws, and are therefore included in this sample. In the context of takeover contests, employees of investment banks and law firms are prototypical examples of inside traders in the non-corporate insider class.

The individuals in the Meulbroek (1992) sample engaged in 145 takeover-related episodes between 1974 and 1989. The traders used their inside information to illegally buy stock in the target company. Of these 145 transactions, 112 were applicable to the analysis in this paper. We eliminated the insider-trading episodes in which either one cannot calculate a takeover premium or to do so would be inappropriate. The 33 episodes not included in the analysis involve either unsuccessful takeovers with no payment to shareholders, or the sale of less than 30% of the shares outstanding.⁵ The final sample consists of 50 tender offers, 47 mergers, 12 leveraged buyouts and 3 management buyouts.

2.2. THE CONTROL SAMPLE: SUCCESSFUL TAKEOVERS WITH NO DETECTED ILLEGAL INSIDER TRADING

To more accurately isolate the effect of insider trading on takeover premia, the analysis employs a control sample to take account of influences on takeover premia that are not related to insider-trading activity. We construct a control sample by individually matching each of the 112 takeover transactions involving illegal insider trading to a takeover with no detected illegal insider trading from the same industry and time period.⁶ If more than one transaction satisfies the industry and time-period criteria, the control sample includes the transaction closest in deal size to the insider-trading merger.⁷

Mergerstat Review is the starting point for the construction of the matched sample of takeovers with no insider trading. Since 1981, *Mergerstat Review* has published a yearly list (its *Transactions Roster*) of successful control transactions, classified by target firm into one of 50 industries. Transactions from this list were eliminated as candidates for the control sample if the target firm was not publicly traded with stock price information available from the Center for Research in Security Prices (CRSP). Transactions were also eliminated if they involved an acquisition of less than 30% of the target firm's stock.

The selection of an appropriate comparison firm from the same industry as the insider-trading firm requires identifying the industry of the insider-trading firm. The *Mergerstat Review* data set contains 80% of the takeovers from the insider-trading sample; the remaining 20% of the insider-trading sample does not appear in *Mergerstat Review* either because the takeover involving insider trading occurs prior to the commencement of the *Review* in 1981⁸ or because the *Mergerstat* database is not exhaustive.⁹ *Mergerstat* publishes a conversion table which lists the S.I.C. codes associated with each of its 50 industries. This conversion table facilitates the identification of the appropriate *Mergerstat* industry for the 20% of the insider-trading sample which does not appear in the *Transactions Roster*.

We use CRSP and IDD Information Services merger reports to determine the historical S.I.C. codes of each firm in the insider-trading sample, and then use these S.I.C. codes to assign each of the firms to a *Mergerstat* industry. If *Mergerstat Review* already lists the insider-trading transaction, we use the S.I.C. codes to check the accuracy of *Mergerstat*'s industry assignment. In 30 percent of the transactions, the actual *Mergerstat* industry code differs from the pseudo-*Mergerstat* code produced by converting four-digit S.I.C. codes into *Mergerstat* industries. To resolve these discrepancies, we use information on sales, stratified by industry segment, from *Moody's Industrial Manual* and *Value Line* to determine the correct industry code. This procedure revealed that the *Mergerstat*-reported industry code was incorrect for 6 percent (that is, in 1/5 of the cases where an initial discrepancy existed) of the insider-trading sample.

To further clarify this verification procedure, consider the following example: *Mergerstat* records the 1982 sale of Peavey Co. in the Agricultural Production

Industry (Industry 1). CRSP and IDD list Peavey Co.'s SIC code as 2041, which corresponds to *Mergerstat* Industry 2, Food Processing, rather than Agricultural Production. Further checking against *Value Line* reveals that Peavey Co. has 16% of its sales in Agricultural Products, 50% in Food Products and 34% in Retail. *Value Line* assigns Peavey to Food Processing. Based upon this information, we assign Peavey an industry code of 2, Food Processing.

After identifying the appropriate *Mergerstat* industry, the second step in the construction of the control sample involves selecting a matching takeover, for each of the 112 insider-trading transactions, from the same *Mergerstat* industry and year as the insider-trading takeover. To help ensure that the control sample is free of detected illegal insider trading, we eliminate all transactions that appear in the Meulbroek (1992) insider-trading sample, as well as all subsequent transactions involving illegal insider trading mentioned in SEC litigation releases.¹⁰ If more than one candidate for the matching transactions remains, the transaction closest in deal size to the insider-trading takeover is used.

In some cases, a match for the insider-trading firm in the same industry and year, and with a similar transaction size was unavailable. For these cases, the search for a matching firm is expanded to include transactions in the same industry, but from surrounding years.

Since *Mergerstat Review* is unavailable prior to 1981, a different selection process generates the matching transactions for the 12 insider-trading transactions that occur prior to 1981. The initial list of eligible matching transactions in this case derives from CRSP delisting codes. This list includes all firms which delist from CRSP for reasons of merger (CRSP delisting code in the 200's), exchange of stock (300's), going private (543), and for unknown reasons (500). From this list, the matching transaction added to the control sample is one that occurs in the same year and involves a target firm of similar size with the same four-digit S.I.C. code. The *Wall Street Journal* is used as a second source to confirm the nature of the transaction. If a target firm in the same four-digit S.I.C. code is not available, we again rely on the *Mergerstat* conversion table to first identify four-digit S.I.C. codes in the same *Mergerstat* industry, and then use the CRSP-derived list to identify potential transactions in this *Mergerstat* industry. The selected matching firm is the firm which falls into the same *Mergerstat* industry code which is most similar in market value of equity to the insider-trading firm.

The total sample of firms selected to match the 112 firms with insider trading has a temporal distribution in which 36 percent of the transactions occur in the same year and 85 percent occur within two years of each other. The size distribution has 70 percent of the firms with no identified insider trading located between one-half and twice the size of their matching insider-trading firm. Table I displays the industry distribution of the insider-trading sample and the control sample, and it illustrates the successful matching of the illegal-insider-trading sample with takeovers within the same industry. Table II shows the time distribution of these two samples. The two samples have a roughly parallel distribution across time, except that the high

incidence of insider trading in 1982 forced us to find matching transactions in the surrounding years.

2.3. OTHER DATA

Additional deal- and firm-specific information is drawn from *Dow Jones News Retrieval*, *Wall Street Journal* articles, IDD, target-firm proxy statements, and CRSP. For each deal, we collect the *in-play date* (defined as the date a firm is first mentioned in the press as a potential target), the *first-bid date* (which is the same as the in-play date when no news of the impending takeover appears in the press prior to the first bid),¹¹ the *takeover-completion date*, the *number of bids*, the *number and identity of the bidders*, the *form of payment* (cash versus stock), *final-deal price per share*, *management response to first bid* (friendly versus hostile), *final-transaction type* (tender offer, merger, or leveraged buy-out), *bidder and target market values*, and *level of inside ownership* in the target (ownership by officers and directors of the target stock, taken from the proxy statement immediately preceding the first bid).¹² The dates on which insider trading occurs are from Meulbroek (1992), as is information concerning the source of the SEC investigation, and whether the insider trader transacted in more than one stock.

3. Empirical Analysis

Table III describes the deal characteristics of both the sample with detected illegal insider trading and the matching control sample. Deal- and firm-characteristics appear to be similar across the two samples. For instance, the mean target-firm size is \$457 million in the insider-trading sample, and \$437 million in the control sample, which reflects the relative success in matching the samples by deal size. The insider-trading sample has a marginally larger percentage of hostile deals, 33% versus 28% in the control sample, but the difference is not statistically significant. Targets in the insider-trading sample are more likely to attract both multiple bids and multiple bidders; fifty-two percent of the insider-trading sample have multiple bids, and 35% of this sample have more than one bidder. In contrast, 33% of the firms in the control sample have multiple bids and 22% have multiple bidders. Since average premia are in general higher in multiple-bid contests than in single-bid takeovers,¹³ the observed difference in number of bids and bidders between the insider-trading and control samples raises a question of causality: does illegal insider trading lead to a greater number of bids and bidders, or are the inside traders attracted to such deals because of their higher premia? Our subsequent regression analysis controls for the number of bids and bidders, and we provide an extensive discussion of the issue of causality in the empirical analysis to follow.

Table III also shows that the cross-sectional deal-type characteristics appear similar across the two samples, although the individual-paired transactions often have different characteristics. That is, 49% of the insider-trading sample are tender

Table I. Industry distribution of sample with detected illegal insider trading and matched takeover sample with no detected illegal insider trading

	Illegal Insider Trading Sample	Control Sample
1 Agricultural processing	1	1
2 Food processing	4	4
3 Beverages	2	2
4 Apparel	1	1
5 Textiles	4	4
6 Timber & forest products	0	0
7 Paper	1	1
8 Packaging & containers	2	2
9 Furniture	0	0
10 Building products	0	0
11 Household goods	3	3
12 Printing & publishing	3	3
13 Chemicals, paints & coatings	2	2
14 Drugs, medical supplies & equipment	5	5
15 Toiletries & cosmetics	0	0
16 Plastics & rubber	0	0
17 Stone, glass & clay	1	1
18 Primary metal processing	0	0
19 Fabricated metal processing	3	3
20 Industrial & farm equipment and machinery	8	8
21 Construction, mining & oil field machinery & equipment	0	0
22 Valves, pumps & hydraulics	2	2
23 Autos & trucks	0	0
24 Automotive products and accessories	1	1
25 Electrical equipment	1	1
26 Office equipment & computer hardware	4	4
27 Electronics	2	2
28 Aerospace, aircraft & defense	2	2
29 Instruments & photographic equipment	4	4
30 Toys & recreational products	0	0
31 Miscellaneous manufacturing	0	0
32 Oil & gas	7	7
33 Mining & minerals	3	3
34 Transportation	2	2
35 Communications	0	0
36 Broadcasting	0	0
37 Electric, gas, water & sanitary services	2	2
38 Wholesale distribution	0	0
39 Retail	10	10
40 Banking & finance	4	4

Table I. Continued

		Illegal Insider Trading Sample	Control Sample
41	Insurance	2	2
42	Real estate	0	0
43	Brokerage, investment & management consulting services	1	1
44	Computer software, supplies & services	4	4
45	Construction contractors & engineering services	0	0
48	Energy services	0	0
47	Health services	3	3
48	Leisure & entertainment	3	3
49	Miscellaneous services	4	4
50	Conglomerate	11	11
Total		112	112

Table II. Time distribution of sample with detected illegal insider trading and matched takeover sample with no detected illegal insider trading

Year	Illegal Insider Trading Sample	Control Sample
1974	1	0
1976	0	2
1977	1	1
1978	4	4
1979	1	1
1980	7	5
1981	11	10
1982	24	9
1983	14	13
1984	15	25
1985	15	13
1986	9	13
1987	4	8
1988	6	3
1989	0	4
1990	0	1
Total	112	112

Table III. Deal and firm characteristics of sample with detected illegal insider trading and matched takeover sample with no detected illegal insider trading

	Illegal Insider Trading Sample	Control Sample	Incidence of Different Characteristics Across Matched Pairs	Test for Difference in Means*
Tender Offers	49.1%	44.6%	55.0%	0.670
Mergers	35.7%	42.0%	55.0%	-0.960
LBO	8.0%	10.7%	55.0%	-0.690
MBO	6.3%	2.7%	55.0%	1.290
Hostile	30.4%	24.1%	35.0%	1.050
Cash	86.6%	78.6%	18.8%	1.590
Auction	35.0%	22.0%	33.9%	2.070
(>1 bidder)				
Multiple Bids	51.8%	33.4%	41.1%	2.700
Number of Bidders	1.4	1.3	—	7.500
Number of Bids	2.0	1.6	—	7.300
Market Value of	457.0	437.0	—	0.200
Target Equity (\$ million)				
Market Value of	2187.0	3509.0	—	1.100
Bidder Equity (\$ million)				
Inside Ownership (%)	16.5	20.6	—	1.630

* For dummy variables, the test statistic is a z-statistic of the difference in the percent of observations equal to one across the two samples. For the continuous variables, the test statistic is a t-statistic of the difference in means.

offers versus 45% of the control sample; 36% of the insider-trading sample transactions are mergers, versus 42% of the transactions in the control sample, and so on. Although we did not systematically match one type of transaction in the illegal-insider-trading sample with a different type of transaction in the control sample, at the individually-paired transaction level, 55% of the firms in the insider-trading sample match a different type of transaction in the control sample. Our regression analysis will control for these differences.

3.1. BASIC SPECIFICATION

A straightforward way to investigate the relation between illegal insider trading and the size of takeover premia is to compare the average premia and stock price run-ups in the sample with detected illegal insider trading with the corresponding averages in the sample with no illegal detected insider trading. To measure premia, we calculate abnormal returns using standard event-study methodology. A conditional market-model regression (using a separate regression for each takeover) provides

estimates of the total takeover premium, the in-play day premium, and the pre-in-play price run-up. The basic regression specification is as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \text{Run-up}(T)_{it} + \delta_i \text{In-Play}_{it} + \eta_i \text{Premium}_{it} + \epsilon_{it}. \quad (1)$$

The term R_{it} is the realized logarithmic return at time t for firm i ($i = 1, \dots, 112$ for each sample), R_{mt} is the CRSP value-weighted market index logarithmic return at time t , $\text{Run-up}(T)_{it}$ is a dummy variable which equals one for firm i at time t for all days from T days prior to the in-play date through the in-play date. The in-play date is the first day that news concerning a takeover becomes public; In-Play_{it} is a dummy variable which equals one on this date. The in-play date is usually the actual date of the first bid, but can be earlier if news stories of merger talks occur that mention the bidder.¹⁴ Premium_{it} is a dummy variable which equals one from the in-play day until 10 days following the last bid.¹⁵ ϵ_{it} is the residual which is assumed to be serially independent and normally distributed with a zero mean and standard deviation of σ_i .

The regressions use daily-returns data starting 250 trading days before the in-play date and ending 10 days following the last bid.¹⁶ The cumulative abnormal return over the T days prior to the pre-in-play date through the merger-completion date (referred to as the *Run-up* in the tables) is defined as $\gamma_i \times T_i$, where T_i is the number of days that the dummy variable $\text{Run-up}(T)_{it}$ equals one and γ_i is the estimated coefficient from the above regression. Similarly, the estimated coefficient (δ_i) of In-Play_{it} from the above regression provides the abnormal return on the in-play day (referred to as the *In-Play Date Premium* in the tables). Finally, the *Total Premium* is the cumulative abnormal return starting T days before the in-play day and continuing through the merger-completion date (10 days following the last bid). The *Total Premium* is the sum of *Run-up*, *In-Play Date Premium*, and the cumulative abnormal return from the in-play day through the merger-completion date (calculated as $\eta_i \times$ the number of days that Premium_{it} equals one).

The tables report two measures of the *Total Premium*, which differ only in the number of days (T) prior to the in-play date used in the regressions for the *Run-up* variable. The regressions employ either a 50-day or a 20-day period prior to the in-play day to estimate the premium. The total premium estimate based on the 20-day pre-in-play period facilitates comparison with previous work on illegal insider trading and stock price run-up (see Jarrell and Poulsen (1989)). The limitation of this 20-day measure, however, is that insider trading occurs with some frequency even prior to the beginning of the 20-day run-up period. Of the 369 days on which insider trading occurs in the sample of takeovers with detected insider trading, 214, or 58% occur during days -20 through 0 , relative to the in-play day. Forty-five (12%) of the insider-trading days occur before this 20-day pre-in-play period begins. The *Total Premium* measure based upon a 20-day pre-in-play window will miss the price movement associated with insider trading that occurs prior to the

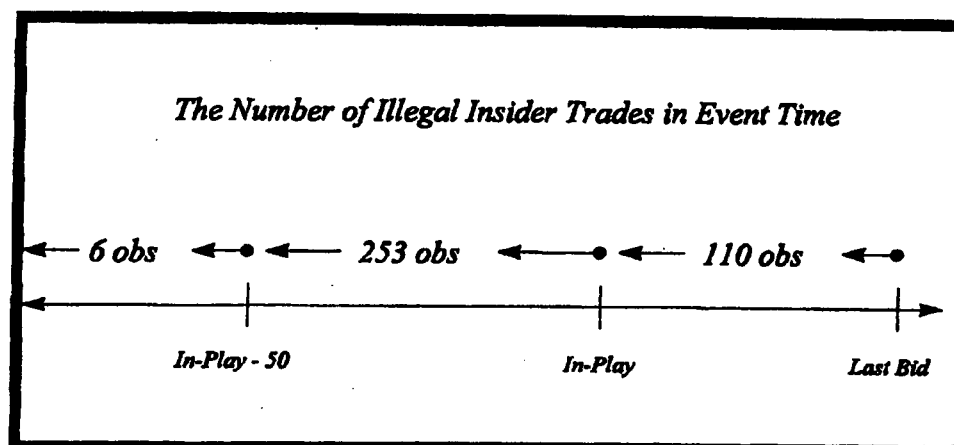


Figure 1.

20-day pre-in-play period. To more accurately compare the premia of takeovers without detected insider trading to takeovers with such trading, the *Total Premium* measure should reflect all of the price movement attributable to the takeover offer. The alternative measure of *Total Premium* accounts for the observed pattern of insider-trading days by using a 50-day pre-in-play window instead of a 20-day window. Figure 1 shows that all but 6 (2%) insider-trading days are included in the 50-day pre-in-play window.¹⁷ In the empirical work to follow, we report results using both measures of *total premium*.

Table IV presents the comparison of cumulative abnormal returns during the run-up period, the in-play date, and the total premium across the two takeover samples. Panel A shows the test results for a 20-day run-up and total premium period, and Panel B displays the 50-day results. Panel A of Table IV reveals that the mean total takeover premium for the sample with detected illegal insider trading is 43%, which is significantly greater than the average 32% premium of the matched control sample. The medians of 43% and 31% for the insider trading and control samples, respectively, follow the same pattern. The 10.6 percentage point difference in premium between the samples is statistically significant with a *t*-statistic of 3.2. This difference translates into premia for the insider-trading sample that are one-third (33%) higher than in the control sample. The abnormal returns on the in-play day itself do not differ significantly between the two samples.

The price run-up and the in-play-day premium together explain about a third of the observed discrepancy in total premium across the two samples. Specifically, the run-up in the insider-trading samples averages 13.2%, versus 10.1% in the control sample; the in-play-day premium is 17.3% in the insider trading sample and 16.7% in the control sample. Thus, one-third¹⁸ of the premium difference develops on or before the in-play date, and the remaining two-thirds of the premium difference occurs between the in-play day and the merger-completion date. Panel B of Table IV, which reports the same statistics calculated using the longer pre-in-play period

Table IV. Price Run-Up, In-Play Day Premium, and Total Premiums for takeovers with detected illegal insider trading and takeovers with no detected illegal insider trading

	Illegal Insider Trading Sample	Control Sample	Difference in Means	T-stat for Mean Diff = 0
Panel A: Total premium begins 20 days before in-play date				
Run-up				
Mean	13.2%	10.1%	3.0%	2.0
Median	12.1%	10.1%		
Std Dev	13.0%	11.2%		
In-play Day Premium				
Mean	17.3%	16.7%	0.5%	0.3
Median	16.9%	14.3%		
Std Dev	12.8%	13.2%		
Total Premium				
Mean	43.1%	32.5%	10.6%	3.2
Median	43.4%	31.3%		
Std Dev	22.2%	25.6%		
Days From In-play Through Completion				
Mean	39.0	50.5	11.5	1.3
Median	24.0	13.0		
Std Dev	46.0	83.0		
No. of Observations	112	112		

Run up is the CAR from 20 days prior to the In-Play Date through the In-Play Date.

The *In-Play Date* is the date of the first news announcement which could reasonably suggest that the firm is a takeover target.

The *In-Play Day Premium* is the AR on the *In-Play Date*.

Days from In-Play Through Completion is the number of days from the In-Play Date through the Last Bid + 10.

The *Total Premium* is the CAR from 20 days prior to the In-Play Date through the merger completion date.

(50 days instead of 20), reinforces the results from Panel A: namely, the insider-trading sample has significantly higher takeover premia, and the price movements on or before the in-play day constitute less than a third of this difference.

Table IV also shows that while the returns during the time the firm is in-play are significantly different across the two samples, the average duration of this in-play period (time from the in-play date through the last bid plus 10 days) does not differ substantially across the samples: the mean duration of the in-play period in the illegal-insider-trading sample is 39 days, with a standard deviation of 46, whereas the mean duration of the in-play period for the control sample is 50 days, with a standard deviation of 83. One might suspect that the longer a control contest lasts, the greater the total premium, and in particular, the higher the returns during the in-play period. The lower point estimate of the duration of the in-play period for

Table IV. *Continued*

	Illegal Insider Trading Sample	Control Sample	Difference in Means	T-stat for Mean Diff = 0
Panel B: Total premium begins 50 days before in-play date				
Run-up				
Mean	15.2%	12.6%	2.6%	1.2
Median	13.0%	12.5%		
Std Dev	17.5%	16.5%		
In-Play Day Premium				
Mean	17.3%	16.7%	0.5%	0.3
Median	16.9%	14.3%		
Std Dev	12.8%	13.2%		
Total Premium				
Mean	45.8%	36.0%	9.8%	2.7
Median	45.8%	34.6%		
Std Dev	25.4%	27.1%		
Days from In-Play Through Completion				
Mean	39.0	50.5	11.5	1.3
Median	24.0	13.0		
Std Dev	46.0	83.0		
No. of observations	112	112		

Run-up is the CAR from 50 days prior to the In-Play Date through the In-Play Date.

The *In-Play Date* is the date of the first news announcement which could reasonably suggest that the firm is a takeover target.

The *In-Play Day Premium* is the AR on the In-Play Date.

Days from In-Play through Completion is the number of days from the In-Play Date through the Last Bid + 10.

The *Total Premium* is the CAR from 50 days prior to the In-Play Date through the merger completion date.

the insider-trading sample, however, rules out the duration of the control contest as an explanation for the higher takeover premia of the illegal-insider-trading sample.

Importantly, Figure 1 and Table IV raise the question of whether the apparent timing of the detected illegal insider trades is inconsistent with the hypothesis that the illegal insider trading creates the premia difference across samples. As seen in Table IV, most of the difference in premia across the two samples develops *after* the in-play date, while Figure 1 shows that most of the insider trading (259 days of a total of 369 insider-trading days, or 70%) takes place *before* the in-play date. The next section examines this observation further.

3.2. THE TIMING OF INSIDER TRADING AND DIFFERENCES IN TAKEOVER PREMIA

Prior research (Meulbroek (1992)) shows that illegal insider trading has an *immediate* impact on price: the average abnormal return on an insider-trading day is 2.55% for the takeover-related sub-sample in that paper. As we shall see, there is also an immediate price impact of insider trading in the sample used in this paper. However, unless there is a non-immediate impact of such trading as well, the finding that most illegal insider trading transpires *before* the in-play date, but that the majority of the takeover premium difference between the illegal-insider-trading sample and the control sample develops *after* the in-play date, would be inconsistent with the hypothesis that illegal insider trading causes the majority of the premium difference.

One can argue that illegal insider trading is likely to cause both an immediate and a delayed impact on the premia size. The immediate impact represents the same-trading-day effect on the target's stock price. The delayed impact represents the reaction of the bidder (and other players including the target) to the immediate price impact. For example, the bidder may interpret the insider-trading-induced price movements as an increase in the target's expected cash flows, or alternatively, as evidence of target-stock accumulation by a heretofore undiscovered and undeclared bidder. Regardless, the bidder's reaction is not observed until the time of subsequent bids. To address whether the immediate impact of insider trading on target stock price itself affects the bidder's actions, resulting in a higher takeover premia, we examine the timing of insider trading and its relation to the in-play date in greater detail.

Note first that, for a specific takeover, illegal insider trading usually occurs *either* before the in-play date, or after the in-play date, and only rarely does it occur *both* before and after the in-play date.¹⁹ The majority of takeovers (72) have insider trading which occurs exclusively before the in-play date; most of the remaining takeovers (32) have insider trading which occurs only after the in-play date. Accounting for this fact, we investigate below whether illegal insider trading has an immediate price impact, how large this price movement is relative to days without insider trading, and whether any premia difference develops after the illegal insider trading occurs.

Table V shows that illegal insider trading has an immediate price effect, regardless of whether it occurs before or after a firm is in-play, but that the price effect is larger if the illegal insider trading occurs prior to the in-play date. Prior to the in-play date, the mean abnormal return on an illegal insider-trading day is 3.5%, which is significantly larger than mean abnormal return of 0.2% on days without insider trading during the run-up period. Similarly, the mean abnormal return on an illegal insider trading day after a firm is already in-play is 1.9% (t -stat = 4.75), which again exceeds the mean abnormal return on a day without illegal insider trading of 0.5% during the 'in-play period'.²⁰

Table V. Abnormal returns on illegal insider trading days and non-insider trading days classified by whether the illegal trading took place before or after the in-play date

	Illegal Insider Trading Before In-play Date	Illegal Insider Trading After In-play Date
AR on Illegal Insider Trading Day	3.5% (0.4)	1.9% (0.4)
Percent of Day's Volume Due To Illegal Insider Trading	25.2% (1.5)	12.2% (3.4)
AR on Non-insider Trading Day in Relevant Period	0.2% <(0.0)	0.5% (0.1)
Number of Days With Insider Trading	2.9 (0.2)	2.4 (0.3)
Number of Days in Period	50.0 (0.0)	67.2 (9.2)
Insider Trading Days/Total Days (%)	5.8%	3.6%
CAR on Insider Trading Days	7.2% (0.8)	4.4% (1.2)
CAR during Relevant Period (including days with insider trading)	15.4% (2.0)	24.2% (3.8)
CAR on Insider Trading Days/CAR during Relevant Period	46.8%	18.2%
Number of Takeovers	72	32

The table displays means. Standard errors in parentheses.

The 8 takeovers with insider trading both before and after the in-play date are excluded from the analysis.

AR on Illegal Insider Trading Day is the mean abnormal return on an insider trading day during the 50 days before the in-play date in the first column, and the mean abnormal return on an insider trading day during the time from in-play through the merger completion date in the second column.

Percent of Day's Volume Due to Illegal Insider Trading is the insider trading volume divided by the total volume traded that day.

AR on Non-Insider Trading Day is the mean abnormal return on the days without insider trading within the 50 days prior to the in-play date in the first column, and after the in-play date through the merger completion date in the second column.

CAR during the Relevant Period is the cumulative abnormal return during the 50 days prior to the in-play date in the first column and the cumulative abnormal return starting after the in-play date through the merger completion date in the second column.

One potential reason for the smaller abnormal return observed on insider trading days that occur after the in-play date is that overall trading volume increases substantially after a firm is in-play. We find that while the mean volume traded by illegal insiders per insider trading day stays roughly the same (8,568 shares before the in-play date versus 15,243 shares after the in-play date, *t*-statistic for the difference is 1.76), overall firm volume increases from 72,087 shares traded to 243,992 shares traded when the firm is in-play.²¹ Consequently, the percent of

trading volume attributable to illegal insider trading (on a day when the illegal insiders trade) decreases from 25.2% to 12.2% (*t*-statistic for no change is -3.5) after the firm is in-play.²² Illegal insider trading still has a significant price effect when it occurs during the in-play period, but its effect is smaller, possibly because it comprises a smaller percentage of the day's trading volume.

Table V also shows that the cumulative abnormal returns developing on days with illegal insider trading constitute a disproportionate fraction of the total abnormal returns. When illegal insider trading occurs before the in-play date, the cumulative abnormal return on insider trading days is 7.2%, or approximately half of the cumulative abnormal return of 15.4% that develops during the run-up period, even though illegal insider trading occurs on only 2.9 of these 50 days. Likewise, when illegal insider trading occurs during the in-play period, the cumulative abnormal return on insider trading days is 4.4%, or roughly one-fifth of the 24.2% cumulative abnormal return that develops during the in-play period, even though insider trading occurs on only 2.4 of the 67.2 days during this period.

In sum, illegal trading has an immediate price effect: it is associated with significant increases in the target's stock price. Of the observed premia difference of 11.5% between the illegal-insider-trading sample and the control sample, the immediate price effect of insider trading can account for 7.2% or 4.4%, depending on whether the illegal insider trading occurs before or after the in-play date.

Turning to the possibility of a delayed premium impact of the illegal insider trading, Table VI shows that the abnormal returns are greater in the illegal-insider-trading sample than in the control sample during the in-play period. If the direct and immediate price impact of insider trading has any secondary, indirect effects, one would expect to observe them during the in-play period. When insider trading occurs before the in-play date, the cumulative abnormal returns during the in-play period is 9.6% versus 1.7% for the control sample during the same period.²³ Similarly, the cumulative abnormal return for the illegal-insider-trading sub-sample of takeovers with insider trading after the in-play date is 24.2% during the in-play period.²⁴

Table VII displays the number of bids and bidders in the illegal-insider-trading sample indicating that multiple bids and bidders are much more likely when illegal insider trading occurs after the in-play date rather than before the in-play date. For example, 72% of the takeovers with illegal insider trading after the in-play date have more than one bidder, whereas only 21% of the takeovers with illegal insider trading before the in-play date have more than one bidder. Thus it appears that illegal insider trading that occurs after the in-play date has a much larger secondary, indirect effect on the offer premia than illegal insider trading that occurs before the in-play date. This increased bidding activity may explain why, as pointed out earlier, most of the premium difference between the insider-trading and control samples develops during the in-play period, despite the relatively low frequency of illegal-insider trades in this period.

Table VI. Price Run-Up, In-Play Day Premium, Post-in-Play Premium, and Total Premium for insider trading sample by timing of the illegal insider trading Relative to the in-play date

	Illegal Insider Trading Before In-play Date	Illegal Insider Trading After In-play Date	T-stat for Mean Diff = 0
Run-up			
Mean	15.4%	14.2%	0.3
Median	12.9%	12.5%	
Std Dev	17.1%	19.7%	
In-Play Day Premium			
Mean	21.0%	11.0%	3.9
Median	20.1%	8.1%	
Std Dev	11.9%	12.5%	
Post in-Play Day Premium			
Mean	9.6%	24.2%	-4.0
Median	4.9%	24.1%	
Std Dev	15.1%	21.3%	
Total Premium			
Mean	46.1%	49.4%	-0.6
Median	41.9%	50.0%	
Std Dev	24.6%	28.1%	
No. of Days in In-Play Period			
Mean	23.3	67.2	-4.6
Median	12.0	50.5	
Std Dev	22.7	51.8	
No. of observations	72	32	

Run-up is the CAR from 50 days prior to the In-Play Date through the In-Play Date-1.

The *In-Play Day Premium* is the AR on the In-Play Date.

The *Post In-Play Day Premium* is the CAR from the In-Play Date through the merger completion date.

The *Total Premium* is the CAR from 50 days prior to the In-Play Date through the merger completion date.

No. of Days in the In-Play Period is the number of days from In-Play + 1 through merger completion.

The 8 takeovers with insider trading both before and after the in-play date are excluded from the analysis.

Illegal insider trading which occurs during the in-play period takes place in what appears to be a relatively highly-charged information environment, in the sense that the firm is already the subject of public speculation regarding a potential takeover, and it has possibly received one or more takeover bids. Unexplained price movements, such as those created by illegal insider trading, that occur in this environment are perhaps more likely to influence the bidding process than

Table VII. Deal and firm characteristics of sample with detected insider trading: Dividing sample by timing of the illegal insider trading relative to the in-play date

	Illegal Insider Trading Before In-play Date	Illegal Insider Trading After In-play Date	T-stat for Mean Diff = 0
Auction (>1 Bidder)	21%	72%	-5.6
Multiple Bids	42%	78%	3.6
No. of Bidders	1.2	2.0	-5.0
No. of Bids	1.8	2.8	-3.2
No. of Observations	72	32	

unexplained price movements that occur in the absence of speculation regarding a takeover.

While the hypothesized immediate and delayed effects of illegal-insider-trading-induced price movements is consistent with the above evidence, alternative explanations are also possible. In particular, illegal insider trading may be attracted by bidding activity, rather than the cause of more bidding. That is, illegal inside traders may be trading during this period precisely because they have information about the existence and amount of the competitive bids. In this scenario, the causal relation flows from bidding activity to illegal insider trading, rather than the other way around. The next three sections further investigate the direction of causation. First, we ask whether takeover premia remain larger in the insider-trading sample even after accounting for differences in the number of bids and bidders (and other variables believed to affect takeover premia). Second, we examine whether illegal traders are attracted to takeovers with large premia. Third, we address whether takeovers with large premia are more likely to generate a SEC investigation, and therefore have a greater probability of detection.

3.3. INVESTIGATING ENDOGENEITY I: CROSS-SECTIONAL REGRESSIONS OF TAKEOVER PREMIA

Identifying the direction of causation is always difficult: a first step here is to control for non-insider-trading related characteristics that may affect takeover premia. The control sample helps adjust for two such factors that could affect the observed premia by matching each insider-trading firm with a like firm in the same industry and time period. Other firm- and deal-characteristics, however, also influence takeover premia, and may therefore explain the observed premia differences across the two samples. Inside traders may, for example, trade more frequently in takeovers structured as tender offers simply because the premia in such takeovers are expected to be higher than for other types of takeovers and hence their expect-

ed profits are greater. Under that hypothesis, a large expected takeover premium attracts illegal insider trading, rather than illegal insider trading causing a higher takeover premium.

We regress the total premium on deal- and firm-characteristics known to affect takeover premia characteristics, as well as on an illegal insider-trading dummy, to isolate the impact of illegal insider trading on takeover premia:

$$\begin{aligned} \text{Total Premium}_i = & \alpha_i + \beta_1 \text{Auction}_i + \beta_2 \text{Hostile}_i + \beta_3 \text{Cash}_i + \beta_4 \text{Ins. own}_i + \\ & \beta_5 \text{Illegal Inside}_i + \beta_6 \text{Merger}_i + \beta_7 \text{Tender}_i + \sum_{j=1}^{49} \mu_j \text{Industry}_{ij} + \epsilon_i \end{aligned} \quad (2)$$

The term Auction_i , is a dummy variable which equals one for firm i ($i = 1, \dots, 224$) if there is more than one bidder for firm i . Increased competition for the target firm could potentially result in a higher price, and therefore a higher premium for the target firm.²⁵ Hostile_i is a dummy variable which equals one for firm i if the firm's initial response to the takeover offer is negative. Hostile acquisition offers seem to involve higher premiums.²⁶ Cash_i is a dummy variable which equals one if the form of payment involves cash.²⁷ Ins. own_i , represents the amount of insider ownership in firm i . A target firm with greater insider ownership may require a higher premium, perhaps due to greater negotiating power. Illegal Inside_i is a dummy variable which equals one when the transaction involving firm i has detected illegal insider trading. Merger_i , and Tender_i , are dummy variables which equal one when the transaction involving firm i is a merger or a tender offer, respectively. These variables help control for the possibility that the type of takeover affects the premium.²⁸ Industry_{ij} are 49 dummy variables which control for industry differences. We run the cross-sectional regression (2) for the insider-trading and the control sample combined, and also on each sub-sample separately with the *Illegal Inside* dummy variable removed.²⁹

Table VIII reports the results of these regressions. The dependent variable in Panel A is the *Total Premium (20)*, defined as the cumulative abnormal return (CAR) from 20 days prior to the in-play date through the merger completion date. Panel B employs *Total Premium (50)*, calculated using a 50-day period prior to the in-play announcement. Table VIII reveals that after controlling for deal- and firm-specific characteristics, takeover transactions involving detected illegal insider trading have significantly higher premia than similar transactions without detected illegal insider trading. The coefficient on the insider-trading dummy is 0.09 (panel A, Table VIII), with a t -statistic of 2.83. That is, takeovers with illegal insider trading have premia that average 9 percentage points higher than takeovers without such trading, even after controlling for several deal- and firm-characteristics known to affect takeover premia.

The relatively low R^2 of 18% for the joint regression indicates that 82% of the cross-sectional variation in takeover premia results from factors omitted from

Table VIII. OLS regressions of total premium on deal and firm characteristics

Deal and Firm Characteristics	Illegal Insider Trading Sample	Control Sample	Both Samples
Panel A: Total premium begins 20 days before in-play date			
Auction	<0.00 (0.08)	-0.04 (-0.52)	<-0.00 (0.06)
Hostile	0.03 (0.57)	0.06 (0.82)	0.07 (1.67)
Cash	0.18 (2.44)	0.18 (2.06)	0.19 (3.60)
Inside ownership	0.21 (1.49)	-0.16 (-1.13)	-0.09 (-0.96)
Illegal insider trading	-	-	0.09 (2.83)
Merger	0.18 (2.30)	0.01 (0.10)	0.08 (1.35)
Tender offer	0.15 (2.16)	0.03 (0.41)	0.05 (1.03)
Intercept	-0.01 (-0.06)	0.14 (0.96)	0.02 (0.28)
Test for joint significance of industry dummies (probability level)	0.02	0.06	0.02
Adjusted R squared	0.29	0.18	0.18
Panel B: Total premium begins 50 days before in-play date			
Auction	-0.04 (-0.61)	-0.05 (-0.68)	-0.02 (-0.38)
Hostile	0.01 (0.17)	0.12 (1.61)	0.08 (1.74)
Cash	0.13 (1.50)	0.08 (0.85)	0.11 (1.81)
Inside ownership	0.43 (2.45)	-0.23 (-1.57)	-0.09 (-0.84)
Illegal insider trading	-	-	0.08 (2.41)
Merger	0.17 (1.79)	-0.06 (-0.56)	0.04 (0.56)
Tender offer	0.22 (2.65)	<-0.00 (-0.05)	0.05 (0.86)

Table VIII. *Continued*

Deal and Firm Characteristics	Illegal Insider Trading Sample	Control Sample	Both Samples
Panel B: Total premium begins 50 days before in-play date			
Intercept	0.07 (0.51)	0.33 (2.18)	0.18 (1.84)
Test for joint significance of industry dummies (probability level)	0.26	0.03	0.24
Adjusted <i>R</i> squared	0.16	0.21	0.08

Equation (2). If inside traders base their trading decisions on these omitted variables, or if access to inside information is correlated with these variables, it remains possible that the illegal insider trading proxies for the omitted variables. The higher takeover premia observed in the illegal insider trading sample would then be a consequence of the omitted variables, not of the illegal insider trading. The possibility that illegal insider traders self-select into relatively high-premia takeovers is discussed next.

3.4. INVESTIGATING ENDOGENEITY II: DO LARGE TAKEOVER PREMIA ATTRACT ILLEGAL INSIDER TRADING?

Illegal insider traders have an incentive to select takeovers with large premia, since these takeovers typically yield the largest expected profits.³⁰ As discussed above, for this self-selection to explain the higher premia in the insider-trading sample, the inside traders must base their trading decisions on variables *not* included in Equation (2). We search for such a basis for illegal-insider trading decisions using two tests described below.

Our first test examines the cross-sectional standard deviations of the takeover premia: if inside traders uniformly choose takeovers with higher premia, then one expects that the cross-sectional standard deviation of the premia will be smaller in the insider-trading sample than in the control sample. That is, if insiders and non-insiders face the same total distribution of merger premia and the former truncate (from below) the distribution created by systematically excluding the lower-premia mergers, then the insider-trading sample of premia will have a smaller standard deviation than the full distribution of the non-insiders.³¹

Table IV shows that the standard deviation of *Premium* (20) is 22.2% for the insider-trading sample, and 25.6% for the control sample and the differences are not statistically significant. A similar conclusion holds for *Premium* (50). This finding thus provides no support for the hypothesis that inside traders systematically choose takeovers with larger premia. This result is perhaps not surprising since even if insider traders were to require a certain minimum profit level in order to

Table IX. Price run-up, in-play day premium, and total premium in illegal-insider-trading sample segmented by number of stocks traded by inside trader

	Illegally Trade in More Than One Stock	Illegally Trade in Exactly One Stock	T-stat for Mean Diff = 0
Panel A: Total premium begins 20 days before in-play date			
Pre In-play Run-up	13.3%	12.6%	-0.3
(Std error)	(1.3%)	(2.7%)	
In-play Day Premium	16.3%	19.1%	1.04
(Std error)	(1.3%)	(2.7%)	
Total Premium	43.2%	40.8%	-0.4
(Std error)	(2.3%)	(5.1%)	
N	80	32	
Panel B: Total premium begins 50 days before in-play date			
Pre In-play Run-up	15.2%	15.0%	-0.05
(Std error)	(1.8%)	(3.6%)	
In-play Day Premium	16.3%	19.1%	1.04
(Std error)	(1.3%)	(2.7%)	
Total Premium	46.0%	43.7%	-0.4
(Std error)	(2.6%)	(5.8%)	
N	80	32	

compensate them for the risk of trading, most takeover premia appear large enough to generate substantial profit opportunities.

To further test whether large takeover premia induce illegal insider trading, we stratify the sample according to the number of different stocks traded by the insider. Presumably, inside traders have a greater opportunity to choose among several takeover transactions if, for instance, they are part of an illegal-insider-trading ring, or have access to information concerning several firms. Inside traders who have access only to information involving a single takeover have much less scope for selection. Thus, if the size of the takeover premium is in fact an important decision criterion for inside traders, then one would expect to observe this effect most strongly among those with the largest opportunity set.

With this differential selection ability in mind, we compare the takeover premia across two sub-samples based upon whether the inside trader transacted in a single stock only or transacted in more than one stock.³² As shown in Table IX, the mean premium for the multiple-stock traders is 43%, while the mean premium for the single-stock traders is 40%. The difference between the two mean premia is not statistically significant. Therefore, the multiple-stock trader's opportunity to choose between different takeover transactions does not seem to translate into the selection of transactions with the largest premia. This result fails to support the hypothesis that the observed positive correlation between insider trading and takeover premia simply reflects inside traders choosing to trade in takeovers with large premia.

3.5. INVESTIGATING ENDOGENEITY III: DO LARGE TAKEOVER PREMIA TEND TO ATTRACT A SEC INVESTIGATION?

Another possible explanation for the positive correlation between detected illegal insider trading and the size of takeover premia is that large premia are more likely to lead to SEC detection. If so, then takeovers with large premia are overrepresented in the sample of takeovers with detected illegal insider trading.³³ To gauge the impact of incomplete detection, we divide the insider-trading sample into two groups based upon case source: 'exchange referrals' and 'public complaints'.³⁴ The source of the SEC case investigation conveys information about whether the size of the takeover premium is more likely to trigger detection. Cases which begin as public complaints are less likely to evolve from large premia. Many public complaints arise when the informant knows the inside trader: ex-spouses are a typical source of public complaints. In one instance, a divorce trial led to the discovery of illegal trading. Former employees of the inside trader are also a frequent source of public complaints. Fellow conspirators sometimes expose the inside trader, as in the case where a CEO asked a neighbor to place the inside trade. The neighbor later turned in the CEO when they disagreed over who should pay the taxes. When revenge or threat of exposure is a motive, as may be the case with many 'public complaints', this motive is less likely to depend on the size of the takeover premia.

In contrast, other types of detection seem more likely to result from large takeover premia. For example, the stock exchanges, the press, the bidder, the target, or the SEC itself may be more likely to investigate transactions with large takeover premia for possible insider trading than to investigate takeovers involving small premia. We refer to these sources collectively as 'exchange referrals', after the major component of this category. If larger premia lead to more frequent detection, this bias is most likely to appear in the 'exchange-referral' sample, and consequently one would expect premia to be higher in this sample. Table X shows the takeover premia for the insider-trading sample, based upon the case source. The results in Table X do not support the hypothesis that larger premia precipitate greater detection: the mean premium for the public-complaint sample is 41%, which is indistinguishable from the mean of 44% for the exchange-referral sample.³⁵ One possible explanation of these results is that illegal inside traders tend to avoid takeovers with large premia if they suspect that large premia attract SEC attention.

4. Other Studies Related to Illegal Insider Trading and Takeover Premia

Jarrell and Poulsen (1989) ask whether the price run-up typically observed before tender offer in-play dates reflects illegal insider trading, or legitimate anticipation created by other sources, such as public news announcements regarding a potential takeover. They report that rumors in the news media concerning a potential bid and the bidder's toehold stake are associated with greater pre-in-play-announcement price run-up, but illegal-insider-trading allegations are not correlated with this price

Table X. Price run-up, in-play day premium, and total Premium in the illegal-insider-trading sample segmented by number of source of the SEC case investigation

	Exchange Referred	Public Complaint	T-stat for Mean Diff = 0
Panel A: Total permium begins 20 days before in-play date			
Pre In-play Run-up	13.7%	12.6%	-0.4
(Std error)	(1.7%)	(1.8%)	
In-play Day Premium	16.2%	17.9%	0.7
(Std error)	(1.7%)	(1.8%)	
Total Premium	41.6%	43.8%	0.5
(Std error)	(3.2%)	(3.2%)	
N	53	56	
Panel B: Total permium begins 50 days before in-play date			
Pre In-play Run-up	14.7%	15.8%	0.3
(Std error)	(2.5%)	(2.3%)	
In-play Day Premium	16.2%	17.9%	0.7
(Std error)	(1.7%)	(1.8%)	
Total Premium	43.7%	47.5%	0.8
(Std error)	(3.4%)	(3.7%)	
N	53	56	

run-up. Allegations of illegal insider trading are, however, positively correlated with the abnormal return on the in-play date. Our findings are consistent with Jarrell and Poulsen's earlier work, but we have a somewhat different focus. Jarrell and Poulsen investigate the effect of illegal insider trading on the price run-up observed prior to the in-play date, while we ask whether illegal insider trading affects total takeover premia. To determine whether illegal insider trading potentially induces more bids and bidders, this paper measures the total takeover premia through the last bid date. Also, because we have additional data not available to Jarrell and Poulsen on the dates of illegal insider trading as well as information about how the insider trading was detected, we can more precisely address the question of whether the positive correlation between illegal insider trading and takeover premia documented in this paper is consistent with the timing of the illegal insider trading. As a result, we are in a better position than Jarrell and Poulsen to infer the direction of the causality.³⁶

Schwert (1996) investigates the relation between the behavior of a target's pre-takeover stock price and the bidder's takeover costs using a large sample of takeovers. His research explores whether pre-bid price run-up in the target's stock price influences the post-bid mark-up (the percentage takeover premium paid over the target's market price just prior to the takeover announcement). Schwert's central empirical finding is that the post-bid mark-up is unrelated to the pre-bid target stock price run-up, so that the total takeover premium paid by the bidder is higher, all

else equal, the larger is the price run-up in the target's stock price. Schwert's line of argument combines this association of higher takeover premia with greater pre-bid target run-up, together with the Meulbroek (1992) result that approximately half of the cumulative pre-bid target stock price run-up occurs on the relatively few days when insiders are illegally trading, to infer indirectly that illegal insider trading is costly to bidders. Schwert, however, also reports a puzzling exception to his central finding that comes from a sub-sample of takeovers which involve detected insider trading.³⁷ For this important sub-set, he detects statistically significant evidence that about one-third of the pre-takeover price run-up is offset by a smaller post-bid takeover premium. He offers the possibility that in the case of detected insider trading, the bidders somehow partially infer it and adjust their mark-up downward. If so, then the pre-takeover stock price run-up appears to be less costly for bidders when illegal insider trading is associated with the takeover.

While Schwert's conclusions are mixed, the analysis in this paper is generally consistent with the hypothesis that insider trading imposes costs on bidders. In contrast to Schwert, however, the basis for that support here is more direct: we show that bidders pay substantially larger premia in takeovers with detected illegal insider trading than in a control sample of takeovers with no detected insider trading. The application of our illegal insider-trading data set makes possible a stronger test of the central hypothesis and it addresses a fundamental endogeneity difficulty with Schwert's analysis. As Schwert (p.182) recognizes, his finding that pre-bid run-ups and takeover premia are positively correlated raises a key interpretative dilemma concerning whether a larger pre-bid run-up causes a larger takeover premium, or vice versa. That is, does a large price run-up induce a large takeover premium, or is the price run-up, whether a result of insider trading or legitimate speculation based upon public information (or both), generally larger when the takeover premium is larger? As we have seen, resolving the direction of causation is difficult. Using more discriminating data not available to Schwert, the analysis here employs information about the exact dates of illegal insider trades, the type of inside trader, and the source of the SEC insider-trading investigation to evaluate the likely direction of causation.

5. Conclusions

This paper explores the effect of insider trading on takeover premia by comparing premia in a takeover sample with detected illegal insider trading to a control sample of takeovers without detected illegal insider trading. Takeover premia in the illegal insider-trading sample average nearly one-third higher, approximately 10 percentage points more than the average premium in the control sample. When we use regression analysis to control for other deal- and firm-specific characteristics not explicitly matched in the control sample, the average premium is still a significant 9 percentage points higher in the sample with illegal insider trading.

Significant positive correlation between detected illegal insider trading and takeover premia need not imply that such trading induces the larger premia. We

therefore conduct a number of additional tests to investigate the direction of causality. First, using information on the type of inside trader as well as the standard deviation of the takeover premia across the two samples, we find no evidence that insider traders selectively trade in takeovers with large premia. Second, examining the source of SEC case investigations, we find no support for the hypothesis that larger premia are more likely to lead to detection of illegal trading. These test results are consistent with the hypothesis that illegal insider trading causes higher takeover premia.

We show that illegal insider trading has a significant immediate price impact. In the pre-in-play-date period (from Table V), the average abnormal return on an insider-trading day is 3.5% versus 0.2% on a typical day with no insider trading. In the post-in-play-date period, the corresponding average daily returns are 1.9% versus 0.5%. A blending of the two, weighted by the number of takeovers, produces for the entire period an average abnormal return per insider-trading day of 3.0% against 0.3% average per non-insider trading day.³⁸ Moreover, we report that the average size of the abnormal returns on days with illegal insider trading is positively associated with the percentage of trading volume by insiders on those days.

Evidence of an immediate price impact implies that illegal insider trading does cause takeover premia to be larger, unless there subsequently is an offsetting lower set of returns on days with no illegal insider trading. We find no evidence of such offsetting returns in the control sample. Consequently, although the precise quantitative assessment of the extent that illegal insider trading increases takeover premia is surely open to further refinement, our overall conclusion is that such trading increases takeover premia.

This paper's investigation of the effect of illegal insider trading on takeover premia offers some empirical insight for thinking about decisions on whether to change or maintain current insider trading laws and on how severely to penalize violators of the law. If insider trading leads to higher takeover premia, some otherwise efficient mergers may not occur. The public policy implications of these results depend on the magnitude of the observed relation between insider trading and takeover premia, on whether one views the relation as causal or spurious, on the magnitude of the potential benefits of the forgone mergers³⁹ and on the possible unintended repercussions on information flow from a stricter insider-trading policy. If the effect of insider trading on takeover premia is large, and takeovers are important contributors to economic efficiency, then insider-trading enforcement should be strict and penalties for violations should be high. Of course, such an enforcement and penalty strategy may also have unintended consequences, producing, for example, a chilling effect on the flow of non-insider information among market participants.

Notes

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¹ See, for example, Seyhun (1986) and Eckbo and Smith (1997).

² For evidence that a toehold stake increases the probability of a successful takeover bid, see Jennings and Mazzeo (1993) and Betton and Eckbo (1996).

³ Schwert (1996) reports that pre-announcement price run-ups tend to be associated with larger merger premia.

⁴ The move to implement uniform financial treatment in the region is illustrated by the recent agreement to give the European Commission considerably greater powers to approve or enjoin proposed cross-border mergers. Such assignments point to an easing of national restrictions for such mergers, which is likely to stimulate merger activity. Moreover, it exemplifies the willingness of the European community to address such needed restructuring issues. *Financial Times*, April 28, 1997, p. 2.

⁵ The 33 transactions not included in this paper comprise 2 episodes involving illegal insider trading in the shares of the bidding firm, 1 debt restructuring, 3 sales of assets or divisions, 8 sales of less than 30% of the firm, 18 unsuccessful takeovers or mergers, and 1 instance of insider trading after the final bid.

⁶ Mitchell and Mulherin (1994) document that the incidence of takeovers varies by industry and time period. Nathan and O'Keefe (1989) report that takeover premia have increased from 1968 through 1985.

⁷ Asquith, Bruner, and Mullins (1983) find that deal size is positively related to size of premia for large cash deals, and negatively related for stock deals, and investment bankers report that they put more weight on deals of similar size in their estimates of appropriate premia.

⁸ Twelve of the illegal-insider-trading takeovers occur prior to 1981.

⁹ *Mergerstat* describes its *Transactions Roster* as containing only acquisitions for which both a purchase price and the seller's net earnings are available.

¹⁰ This procedure purges the control sample of all takeovers with detected insider trading. Note that the SEC sometimes fails to disclose the names of the bidder and/or the target in public sources. This non-disclosure is most frequent when the defendant has engaged in insider trading in a number of stocks. The SEC Litigation Release sometimes will mention one or two of the stocks, but not all of them. So, if a defendant insider trades in multiple takeover contests, the SEC might publicly disclose the identities of some, but not all, of the takeover contests. Hence, an advantage of the Meulbroek (1992) data set is that it contains the names of the takeovers contests where the SEC successfully pursued a civil or administrative case, regardless of whether the SEC later publicly disclosed the identity of the takeover contest.

Of course, the SEC's detection mechanisms are not perfect, in which case some insider trading may go undetected. If so, the control sample may in fact have some takeovers involving undetected insider trading. If insider trading does increase takeover premia, however, this potential contamination of the control sample should make distinguishing the takeover premia of the two samples more difficult, biasing the tests *against* finding any significant difference attributable to insider trading.

¹¹ Note that our in-play date is sometimes the date of a first-bid, but other times it is news of a less specific nature, such as an announcement that a bidder is considering buying a target, or news by the target that it is seeking a bidder, when such news appears in the press prior to an actual bid. The in-play date is intended to reflect the first date that the market views a firm as 'in-play', that is, the date it actually becomes publicly identified as a takeover target. In the cases where the in-play date reflects news of an impending takeover, rather than an actual bid, one would expect to see a significant price reaction on the in-play date, but that reaction is likely to be smaller in magnitude than if a formal bid had been announced. We use *Dow Jones News Retrieval* to determine whether a news release occurs before or after the market close. If the announcement occurs after the market close, we use the next trading day as the announcement date.

¹² Other data collected, but subsequently excluded from the reported regressions because they had no significant effect, are the toehold of successful bidder, toeholds of other bidders, average *Mergerstat* P/E for the target's industry in the year prior to the takeover, and average takeover premium reported by *Mergerstat* for the target's industry in the year of and year prior to the takeover.

¹³ Betton and Eckbo (1996).

¹⁴ The in-play day precedes the date of the first bid for 34 firms, or 30.4% of the insider-trading sample, and for 29 firms, or 25.9% of the control sample.

¹⁵ We used a returns cut-off of 10 days following the final bid instead of the CRSP de-listing date because in a few instances, the firm's equity continues to trade after the merger.

¹⁶ The full 250 trading days of returns data prior to the in-play date were unavailable for three companies (E-II Holdings, Oil Base Inc., and Herman's Sporting Goods) since the stock of these companies begins trading only after the 250 day period begins. In these cases, the regressions incorporate whatever returns data are available (of these three firms, E-II Holdings has the fewest number of return observations available – 140).

¹⁷ We did not increase the pre-in-play window to incorporate the last 6 insider-trading days because in at least one instance the insider trading occurred a year prior to the in-play date. Extending the pre-in-play window to one year to include this one instance of insider trading would add too much additional noise to the premium estimate.

¹⁸ $[(13.2 - 10.1) + (17.3 - 16.7)]/10.6 = 0.33$.

¹⁹ Eight takeovers (7% of the sample) have insider trading that occurs both before and after the in-play date. The analysis to follow excludes these takeovers in both the pre-in-play sub-sample and in the post-in-play sub-sample. We repeated the analysis including these 8 observations in each of the sub-samples, and found that the results are invariant to their exclusion. There are 11 takeovers with insider trading on the in-play date itself. Because of the ambiguity that we do not know whether the intraday insider trading happens either before or after actual news announcement on the in-play day, this analysis excludes these days from both the pre-in-play sample and the post-in-play sample.

²⁰ The 'in-play period' begins one day after the in-play date, and ends ten days after the last bid.

²¹ *T*-statistic for the increase in overall firm volume is 3.7.

²² Note that the 25.2% and 12.2% figures represent the mean ratios, rather than the ratio of the means, which are $8,526/72,087 = 11.9\%$ and $15,243/243,992 = 6.3\%$, respectively.

²³ From Table IV, the control sample cumulative abnormal returns during the in-play period are $31.0 - 16.7 - 12.6 = 1.7\%$.

²⁴ Of course, some of the price movement (4.4% of the 24.2% total) during the in-play period for this sub-sample represents the immediate price impact of illegal insider trading.

²⁵ Slutsky and Caves (1991) and Betton and Eckbo (1996) find that the presence of a rival bidder increases the takeover premium.

²⁶ Huang and Walkling (1987) detect a positive (but insignificant) relation between takeover premia and the reaction of the target to the bid. Jarrell and Poulsen (1989) and Betton and Eckbo (1996) report that the correlation between takeover premia and the target reaction is statistically insignificant for a sample of cash tender offers.

²⁷ Slutsky and Caves (1991) and Huang and Walkling (1987) report that cash offers are positively (and significantly) correlated with takeover premia, while Betton and Eckbo (1996) find that the effect of the payment method is insignificant after accounting for the size of the bidder's toehold in the target.

²⁸ Asquith, Bruner and Mullins (1983) and Huang and Walkling (1987) find that tender offers are associated with higher premia than mergers.

²⁹ We also tried numerous specifications with variables that we ex-ante thought might affect the total premium, but ex-post did not. Such variables included the length of the in-play period, whether the bidder had a foothold stake, the average P/E for the target's *Mergerstat* industry in the year prior to takeover, and the average takeover premium paid for takeovers in the target's *Mergerstat* industry in the concurrent year and the year prior to the takeover. None of these variables was statistically different from zero. Furthermore, the inclusion of any of these variables does not change the main results in the paper.

³⁰ Of course, the takeover premia are not the actual expected profits to the illegal insider, because they ignore the penalties imposed if such trading is detected. Moreover, any attempt to measure the

expected gains to illegal insider trading would also have to account for the illegal insider trades that suffer losses, perhaps as the result of a cancelled merger caused by events unknown to the insider in advance. As noted at the outset, the 18 cases in the Meulbroek (1992) data set of illegal insider trading involving cancelled mergers were deleted from our sample.

³¹ That is, for any random variable, such that $X < B$ is possible, $\text{Var}(X) > \text{Var}(\max[X, B])$, where B is the truncation boundary.

³² When the SEC uncovers insider trading in one stock, it also checks the past trading history of the defendant for suspicious trading around the time of information announcements. If the inside trader works in an investment bank, for instance, the SEC will investigate the trading in all of the deals in which the bank was involved during the time the inside trader was an employee, focusing particularly on the deals in which the employee directly participated. Similarly, it will also study the trading surrounding deals of any previous employers. This SEC investigation policy ensures that one can be fairly confident that the illegal transactions of the one-stock inside traders are truly confined to a single stock.

³³ Note that the usual selection bias of not detecting *all* insider trading will lead to a downward bias in the *illegal insider* coefficient estimate. In other words, the control sample probably contains some takeovers in which insider trading occurred but was not discovered. In this case, the coefficient on the *Illegal Inside* dummy will be downwardly biased, unless the detection process misses certain tails of the distribution, e.g. takeovers with small premia.

³⁴ Meulbroek (1992) provides a frequency distribution of the source of the SEC case investigation. The most frequent source of an investigation for that sample is public complaint (41% of episodes), followed by exchange referral (31%). The remaining categories include SEC-initiated investigations, press stories, issuer referrals, another SEC case, broker referrals, bidder referrals, and miscellaneous.

³⁵ Even though larger premia do not appear to lead to greater detection, the SEC may still choose to pursue cases with large premia. We have no formal description of how the SEC selects its cases, but based upon our experience working with the SEC's enforcement division, we would guess that the absolute dollar premium, rather than the percentage premium, is more closely correlated with the SEC's decision to pursue a case. If so, then measuring premium in percentage terms should avoid this source of endogeneity, unless the percentage premium is associated with the size. Moreover, we also have the impression that the SEC cares about more than the high-profile cases (normally associated with large takeover premia – measured in dollars). Specifically, the SEC tends to be concerned about the number of cases, and hence pursues a number of small cases that can be quickly settled, thereby boosting the overall number of cases it files as well as its win-lose percentage.

³⁶ Jarrell and Poulsen's finding of no correlation between price run-up prior to the in-play date and illegal insider trading is less surprising when one considers both the timing of the insider trading and the lengthy discovery process for illegal insider trading. More specifically, the work here shows that illegal trading frequently occurs after the in-play date, in which case one does not expect illegal insider trading to contribute to price run-up. Also, discovery of illegal insider trading sometimes takes many years, so that some of the tender offers they classify as having no illegal insider trading have subsequently been found to have such trading.

³⁷ Schwert identifies the sub-sample of takeovers that involve detected illegal insider trading by using public sources for this information (a Lexis-Nexis search of the target company names). As mentioned earlier in this paper (footnote 10), such a search of public sources will identify many, but not all, of the takeover contests where the SEC successfully brought an illegal-insider-trading suit. Our list of takeovers involving illegal insider trading differs from Schwert's in that it draws upon non-public sources (internal SEC documents) to assemble a more complete sample of takeovers involving detected illegal insider trading.

³⁸ This calculation excludes the returns from the in-play day itself and the 8 transactions which had insider-trading in both the pre- and post-periods. If, instead of using a per-merger weighting, one weights equally each insider-trading day separately and includes the 8 across-both-periods transactions, then the average insider-trading day return is 2.14% versus 0.27% per non-insider-trading day, approximately nine times larger.

³⁹ Of course, mergers need not be beneficial. See, for example, Mitchell and Lehn (1990).

References

- Asquith, P., Bruner, R., and Mullins, D. (1983) The gains to bidding firms from merger, *Journal of Financial Economics*, **11**, 121–139.
- Betton, S. and Eckbo, B. E. (1996) Toeholds, competition, and state-contingent payoffs in takeovers, Working Paper, Stockholm School of Economics.
- Eckbo, B. E. and Smith, D. C. (1997) The conditional performance of insider trades, *Journal of Finance*, forthcoming.
- Huang, Y. and Walkling, R. (1987) Target abnormal returns associated with acquisition announcements: Payment, acquisition form, and managerial resistance, *Journal of Financial Economics*, **19**, 329–349.
- Jarrell, G. and Poulsen, A. (1989) Stock trading before the announcement of tender offers: Insider trading or market anticipation?, *Journal of Law, Economics, and Organization*, **5**, 225–248.
- Jennings, R. and Mazzeo, M. (1993) Competing bids, target management resistance, and the structure of takeover bids, *Review of Financial Studies*, **6**, 883–910.
- Meulbroek, Lisa K. (1992) An empirical analysis of illegal insider trading, *Journal of Finance* **47**, 1,661–1,699.
- Mitchell, Mark, and Lehn, Kenneth (1990) Do bad bidders make good targets? *Journal of Political Economy*.
- Mitchell, Mark, and Mulherin, J. Harold (1996) The impact of industry shocks on takeover and restructuring activity, *Journal of Financial Economics* **41**(2), 193–230.
- Nathan, K. and O'Keefe, T. (1989) The rise in takeover premiums: An exploratory study, *Journal of Financial Economics*, **23**, 101–119.
- Schwert, G. William (1996) Markup pricing in mergers and acquisitions, *Journal of Financial Economics*, **41**(2), 153–192.
- Seyhun, H. N. (1986) Insiders' profits, costs of trading, and market efficiency, *Journal of Financial Economics*, **16**, 189–212.
- Slutsky, A. and Caves, R. (1991) Synergy, agency, and the determinants of premia paid in mergers, *Journal of Industrial Economics*, **XXXIX**(3), 277–296.

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