THE JOURNAL OF FINANCE • VOL. XLVII, NO. 1 • MARCH 1992

Bankruptcy and Insider Trading: Differences Between Exchange-Listed and OTC Firms

THOMAS GOSNELL, ARTHUR J. KEOWN, and JOHN M. PINKERTON*

ABSTRACT

Over the two-year period prior to the bankruptcy announcement, insider trading is significantly greater for OTC bankrupt firms, but not for exchange-listed firms, than for an industry-size matched sample of nonbankrupt firms. In addition, the level of insider selling increases over the final five months leading to the first public announcement of OTC firms. Finally, firms displaying the most negative price reaction over the announcement period are found to have a significantly larger proportion of insider selling than other firms.

A NUMBER OF STUDIES, using the information contained in the SEC's *Official Summary of Securities Transactions and Holdings*, have examined the profitability of insider trading. In general, these studies have found that insiders, using monopolistic information to their advantage, have been able to generate abnormal returns trading in their stocks. In fact, several studies have found that non-insiders may be able to participate in these abnormal profits by using the information contained in the "Official Summary." This has created a small industry that provides and analyzes insider trading reports. Interestingly, a recent study by Loderer and Sheehan (1989) reports that prior to a bankruptcy, an event which generally results in a major drop in share price, there is little evidence that insiders reduce their stockholdings or hold less stock compared to insiders in similar firms that did not go bankrupt.

Our study examines whether insiders trade in a systematic pattern to avoid bankruptcy losses. Specifically, we examine the pattern of insider trading surrounding the first public announcement of a filing for bankruptcy while differentiating between exchange-listed and OTC stocks. The benefit to the insider of trading prior to a bankruptcy announcement is documented by Clark and Weinstein (1983) who show that shareholders experience large

*Assistant Professor, Department of Finance, University of Miami; The R. B. Pamplin Professor of Finance, Department of Finance, The R. B. Pamplin College of Business, Virginia Polytechnic Institute and State University; and Crestar Professor of Banking, Department of Finance, The R. B. Pamplin College of Business, Virginia Polytechnic Institute and State University, respectively. We are grateful to an anonymous referee for this Journal and René Stulz for their comments and suggestions. We also wish to thank John Wright and Robert Gabele of Investnet Group, Inc., for generously supplying the data and the University of Miami School of Business Administration Corporate Affiliates for their financial support.

losses during the month of a bankruptcy filing with much of the losses concentrated during the three days surrounding the announcement.

The study by Loderer and Sheehan (1989) concludes that the stockholdings of insiders of bankrupt firms listed on the NYSE and AMEX are reduced no less than the stockholdings of insiders of similar firms that do not go bankrupt. For each of 178 bankruptcy events for NYSE and AMEX firms over the period 1971–1985, data were gathered on the stockholdings of the highest paid officers from the firm's five most recent annual proxy statements prior to the bankruptcy filing date. Depending upon the availability of data, the holdings of up to six executives were examined. Data were also compiled on the directors as a group, the outside directors, the officers and directors as a group, the holders of blocks of stock in excess of five percent, and the outside holders of such blocks. They find no evidence of any significant reduction in stockholdings by insiders prior to the bankruptcy.

Our study extends that of Loderer and Sheehan by including OTC firms in the sample. Additionally, we also measure insider behavior by using the actual transactions of insiders as reported to the SEC rather than by using changes in annual proxy statements. Specifically, we examine insider trading during a 31-month period surrounding the first public announcement of a bankruptcy filing. The initial public announcement is determined by searching the Dow Jones News Retrieval Service over the period 1985 through 1987. Insider transactions are retrieved from the Investnet Data Base, which includes all insider transactions reported to the SEC. The distribution of insider transactions is compiled for subperiods during the 24 months before and 6 months after the first public announcement of each firm's bankruptcy.

Our results indicate that the number of insider selling transactions for OTC firms, as opposed to exchange-listed firms, increases significantly before the first public announcement of bankruptcy, particularly during the 5 months just prior to filing. The increase in selling for OTC firms is exhibited in both the number of insider transactions and the volume. Furthermore, in the six months following an announcement of bankruptcy, selling by insiders of the bankrupt OTC firms decreases from the previous six-month period but is still greater than the selling by insiders of firms that do not go bankrupt. Our results also reveal that the firms which suffer the largest declines in share price surrounding the bankruptcy announcement also experience the greatest proportion of insider sell transactions before the bankruptcy announcement.

The remainder of the paper is organized in three sections. Section I briefly discusses the data and methodology. Section II examines the results, while Section III presents concluding remarks.

I. Data and Methodology

Our sample of 129 is compiled by identifying all bankruptcy announcements from the Dow Jones News Service over the period 1985 through 1987. Of these 129 firms, 113 are listed on the COMPUSTAT industrial files and as

such have information concerning size and industry. Of the 113 firms included on COMPUSTAT, 18 are listed on the NYSE or AMEX while 95 are traded over-the-counter. The insider transactions are dated as they actually occurred for these 113 firms that formed the bankruptcy sample. Since the purpose of this study is to look at the activities of insiders having direct access to information from within the firm, the trading activity is examined for all registered insiders except for those individuals defined as: (1) trustees, (2) individuals with an unknown relationship to the company, and (3) beneficial owners (non-officers or directors) of more than 10% of a class of the company's equity securities. We designate the month in which the bankruptcy announcement was reported on the Dow Jones News Service as the *event month* with insider transactions compiled for each month relative to the event month.

In order to determine whether insider trading is abnormal, a control sample was formed in the following manner. We identify the firm that was both closest in size to the bankrupt firm at the end of the calendar year two years prior to the bankruptcy and in the same industry (as defined by the two-digit SIC code for the bankrupt firm). The average market value of the bankrupt sample is \$131.02 million at the end of the calendar year two years prior to the announcement, whereas the average market value of the control sample is \$122.56 at that time.[1] The control sample is also screened to ensure that no firms in the control sample filed for bankruptcy through the end of 1988. Table I provides descriptive statistics for the bankrupt and control samples. The event month for the control sample firms is designated as the event month for the firm in the bankrupt sample with which it is matched. The relative frequencies of insider transactions in each month of the study period for the control sample are used as measures of the expected distribution of insider transactions.

Insider trading, defined as open market purchases or sales, prior to the bankruptcy announcement is then examined both in terms of the number of insider transactions and insider volume. The number of insider buys and the number of insider sells are determined for each month relative to the event month. The relative frequencies of each type of transaction are compared to the relative frequencies of the control sample transactions during the same months. A chi-square test is performed to determine if the distribution of insider trading for the control sample and the bankrupt sample are drawn from different populations. A similar procedure is used for the volume tables except, instead of using the number of buy and sell transactions, we use the number of shares bought and sold.

We determine the market response to the bankruptcy announcement by estimating the market model over the time period of 100 days through 11 days prior to the announcement. The market's reaction upon the announcement of bankruptcy should reflect any new information released at that time.

[1] Our selection of a control sample differs somewhat from that of Loderer and Sheehan (1989) in that we use market value as a measure of size rather than book value of total assets.

Table I

Market Value for the Bankrupt and Industry-Size Matched Control Samples

A sample of 129 firms declaring bankruptcy between 1985 and 1987 were identified of which 113 were listed on the COMPUSTAT industrial file. Of these 113 firms, 18 were listed on the NYSE or AMEX while 95 were traded over-the-counter. These 113 firms formed the bankrupt sample. A control sample was formed in the following manner. We identified the firm that was both closest in size to each bankrupt firm at the end of the calendar year two years prior to the bankruptcy and in the same industry (as defined by the two-digit SIC code for the bankrupt firm). The control sample was also screened to ensure that no firms in the control sample filed for bankruptcy through the end of 1988.

	Bankrupt Sample	Control Sample	Bankrupt Sample: NYSE and AMEX listed Firms Only	Control Sample NYSE and AMEX Firms Only	Bankrupt Sample: OTC Firms Only	Control Sample: OTC Firms Only
Number of firms	113	113	18	18	95	95
Mean market value of equity 2 years prior to the announcement date (in $ millions)	131	123	668	601	29	32
Median market value of equity 2 years prior to the announcement date (in $ millions)	23	21	173	173	18	16
Minimum market value of equity in the upper quartile of firms ranked by market value of equity 2 years prior to the announcement date (in $ millions)	63	62	416	398	36	36
Maximum market value of equity in the lower quartile of firms ranked by market value of equity 2 years prior to the announcement date (in $ millions)	8	8	54	54	7	7

While market reaction at the time of a bankruptcy announcement is generally negative, reflecting the release of additional unfavorable news, it is positive in some cases. A positive reaction reflects the release of additional favorable news. For example, it might indicate the market's reassessment of

the bankrupt firm as a possible acquisition candidate. The cumulative average residual from day relative -1 through day relative $+1$ is calculated and used as a measure of the market's response to the announcement. The cumulative average residuals are then ranked into quartiles with the highest quartile containing the 25% most positive (or least negative) price reactions and the lowest quartile containing the 25% most negative price reactions. A chi-square test is performed to determine if firms with the most positive reactions at the announcement are drawn from the same population (in terms of insider trading prior to the bankruptcy announcement) as those that exhibited the most negative price reactions.

II. Empirical Analysis

A. Insider Trading on Bankrupt Firms Relative to a Control Sample

Comparing the number of insider buy and sell transactions associated with the bankrupt sample to the number of buy and sell transactions on the control sample reveals that, during the 24 months prior to the announcement month, a significantly larger proportion of sells relative to buys is made by insiders of firms that subsequently declare bankruptcy. As shown in Panel A of Table II, during the 24-month period prior to the event month, 61.65% of all insider transaction for the control sample are sells, while 71.60% of all insider transactions for the sample of firms that eventually declare bankruptcy are sells. The chi-square test results indicate that the bankrupt sample and the control sample are drawn from different populations.[2]

When insider behavior of bankrupt firms is compared to the insider behavior of firms in the control sample during six-month time intervals prior to the bankruptcy, we find that the bankrupt firm insiders do significantly more selling in the time periods of 18–13 months and 6–1 months prior to the bankruptcy announcement. This is shown in Panel A of Table II and with a graph of the proportion of insider sales in event time presented in Figure 1. In addition, during the announcement month and over the following six-month period, insiders of the firms that declared bankruptcy are found to sell more than insiders of those that did not go bankrupt.

The same patterns are displayed when insider trading is measured in terms of volume rather than number of trades, as shown in Panel A of Table III. Over the two-year period prior to the bankruptcy announcement,

[2] To insure that these results were not driven by actions of a few active traders, the relationship between the frequency of insider sale transactions and subsequent bankruptcy announcements was reexamined with insiders involved in over 21 transactions during the two-year period prior to the bankruptcy announcement removed from the sample. These results show that sell transactions make up 66.83% of the total number of transactions for the bankruptcy sample as opposed to 60.00% for the control sample. Again, these results are significant at the .01 level.

Table II

Test of a Relationship Between the Frequency of Insider Sale Transactions and Subsequent Bankruptcy Announcements

Using a sample of 18 NYSE- and AMEX-listed firms and 95 OTC firms that declared bankruptcy during the calendar years of 1985 through 1987, a test of the relationship between insider sale transactions and bankruptcy was performed. For each time period relative to the event month, a 2×2 contingency table was created with one column for bankruptcy firms (bankrupt sample) and the other column for industry-size matched nonbankrupt firms (control sample). One row of the contingency table contained the number of sell transactions by insiders for each of the two samples while the second row contained the respective number of buy transactions by insiders. Pearson's chi-square test of association was used to test for a relationship between firm sample and transaction type. The null hypothesis was that no relationship exists between type of firm and the type of transactions made by insiders of that firm. Reported for each time period relative to the month of the bankruptcy announcement are: 1) the total number of transactions by insiders in the control firms and the bankrupt firms; 2) the proportion of those transactions that were sales; and 3) the probability that the proportion of sale transactions and type of firm were independent.

Panel A: All sample firms

Time Period: Months Relative to Event Months	Control Sample (113 firms) Number of Shares Traded	% Sales	Bankrupt Sample (113 firms) Number of Shares Traded	% Sales	Test of Independence Firm Type and Trade Type *p*-Value
−24 to −1	1,043	61.65	1,352	71.60	0.01
−24 to −19	223	69.96	292	68.84	0.78
−18 to −13	259	47.10	423	68.32	0.01
−12 to −7	244	67.62	312	66.03	0.69
−6 to −1	317	63.09	325	83.69	0.01
0	73	52.05	78	92.31	0.01
+1 to +6	406	51.97	158	72.51	0.01

Panel B: NYSE- and AMEX-listed sample firms only

Time Period: Months Relative to Event Months	Control Sample (18 firms) Number of Trades	% Sales	Bankrupt Sample (18 firms) Number of Trades	% Sales	Test of Independence Firm Type and Trade Type *p*-Value
−24 to −1	400	63.50	240	49.58	0.01
−24 to −19	92	65.22	57	43.86	0.01
−18 to −13	107	47.66	67	32.84	0.05
−12 to −7	90	71.11	76	48.68	0.01
−6 to −1	111	71.17	40	87.50	0.04
0	25	56.00	1	100.00	0.38
+1 to +6	210	49.05	69	81.16	0.01

Table II—*Continued*

Panel C: Non-exchange-listed sample firms only

Time Period: Months Relative to Event Months	Control Sample (95 firms) Number of Trades	Control Sample (95 firms) % Sales	Bankrupt Sample (95 firms) Number of Trades	Bankrupt Sample (95 firms) % Sales	Test of Independence Firm Type and Trade Type *p*-Value
−24 to −1	643	60.50	1112	76.35	0.01
−24 to −19	131	73.28	235	74.89	0.73
−18 to −13	152	46.71	356	75.00	0.01
−12 to −7	154	65.58	236	71.61	0.21
−6 to −1	206	58.74	285	83.16	0.01
0	48	50.00	773	92.21	0.01
+1 to +6	196	55.10	89	64.04	0.16

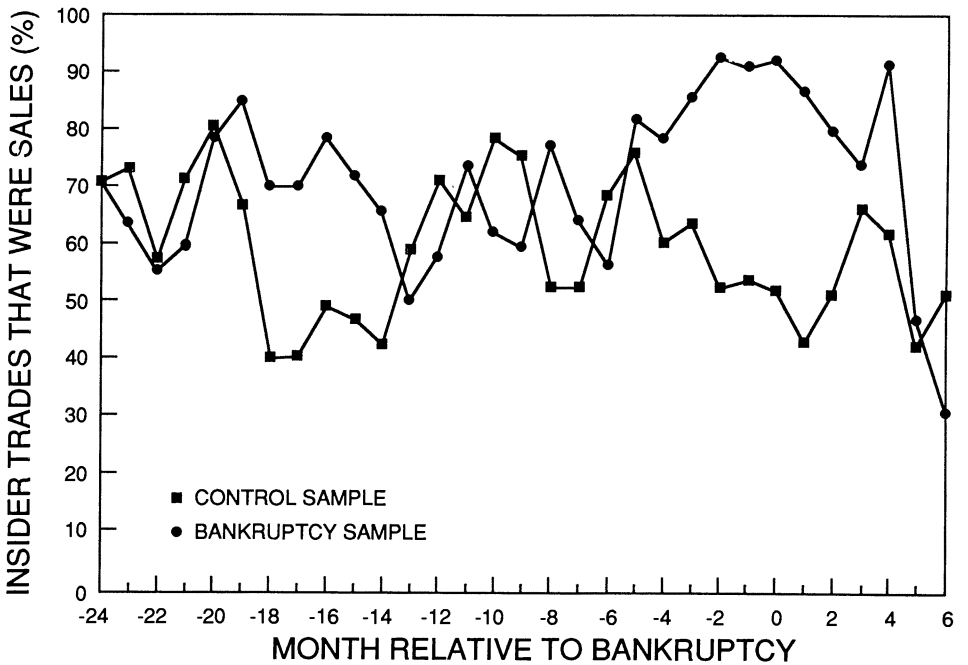

Figure 1. Proportion of insiders' transactions that are sales for bankrupt firms and nonbankrupt firms in the months surrounding the bankruptcy announcement Each of 113 bankrupt firms that declared bankruptcy during the calendar years of 1985 through 1987 is matched with a control firm in the same industry and with the same equity value. For each month relative to the bankruptcy announcement date, the proportion of insider sale transactions in each sample is computed. The results for each sample are graphed in event time.

Table III

Test of a Relationship Between the Frequency of Insider Sales Volume and Subsequent Bankruptcy Announcements for NYSE and AMEX Firms

Using a sample of 18 NYSE- and AMEX-listed firms and 95 OTC firms that declared bankruptcy during the calendar years of 1985 through 1987, a test of the relationship between insider selling volume and bankruptcy was performed. For each time period relative to the event month, a 2×2 contingency table was created with one column for bankruptcy firms (bankrupt sample) and the other column for industry-size matched nonbankrupt firms (control sample). One row of the contingency table contained the number of shares sold by insiders for each of the two samples while the second row contained the respective number of shares bought by insiders. Pearson's chi-square test of association was used to test for a relationship between firm sample and transaction type. The null hypothesis was that no relationship exists between type of firm and the type of transactions made by insiders of that firm. Reported for each time period relative to the month of the bankruptcy announcement are: 1) the total number of shares traded by insiders in the control firms and the bankrupt firms; 2) the proportion of those volumes that were sales; and 3) the probability that the proportion of sale volumes and type of firm were independent.

Panel A: All sample firms

	Control Sample (113 firms)		Bankrupt Sample (113 firms)		Test of Independence Firm Type and Trade Type
Time Period: Months Relative to Event Months	Number of Shares Traded	% Sales	Number of Shares Traded	% Sales	p-Value
−24 to −1	24,883,221	56.53	25,584,171	73.76	0.01
−24 to −19	2,096,707	65.43	5,070,640	40.04	0.01
−18 to −13	12,892,863	56.47	5,545,320	74.13	0.01
−12 to −7	1,976,035	76.76	5,669,885	72.00	0.01
−6 to −1	7,917,616	49.21	9,298,356	92.99	0.01
0	609,562	63.65	1,808,482	96.67	0.01
+1 to +6	10,923,076	75.36	27,631,574	65.34	0.01

Panel B: NYSE- and AMEX-listed sample firms only

	Control Sample (18 firms)		Bankrupt Sample (18 firms)		Test of Independence Firm Type and Trade Type
Time Period: Months Relative to Event Months	Number of Shares Traded	% Sales	Number of Shares Traded	% Sales	p-Value
−24 to −1	2,380,179	74.85	3,910,582	38.60	0.01
−24 to −19	348,022	66.53	1,567,248	46.82	0.01
−18 to −13	497,385	54.30	549,964	52.43	0.01
−12 to −7	481,422	79.80	1,401,432	14.21	0.01
−6 to −1	1,053,350	85.05	391,938	73.52	0.01
0	126,895	96.73	120	100.00	0.04
+1 to +6	1,433,146	80.26	529,786	82.68	0.01

Table III—*Continued*

Panel C: Non-exchange-listed sample firms only

Time Period: Months Relative to Event Months	Control Sample (95 firms) Number of Shares Traded	Control Sample (95 firms) % Sales	Bankrupt Sample (95 firms) Number of Shares Traded	Bankrupt Sample (95 firms) % Sales	Test of Independence Firm Type and Trade Type *p*-Value
−24 to −1	22,503,042	54.59	21,673,589	80.10	0.01
−24 to −19	1,748,685	65.21	3,503,392	37.00	0.01
−18 to −13	12,395,478	56.55	4,995,356	76.52	0.01
−12 to −7	1,494,613	75.78	4,268,423	90.98	0.01
−6 to −1	6,864,266	43.71	8,906,418	93.85	0.01
0	482,667	54.95	1,808,362	96.67	0.01
+1 to +6	9,489,930	74.62	27,101,788	65.00	0.01

73.76% of all insider trading volume represents sells as opposed to 56.53% for the control sample. Over the final six months prior to the bankruptcy announcement, the percentage of insider selling volume for the bankrupt sample climbs dramatically, reaching a level of 92.99% of all transactions. Again, the chi-square test results comparing the bankrupt sample to the control sample are significant.

We isolate the final six-month period prior to and including the bankruptcy month, break it down into months, and examine it in terms of the number of buy and sell transactions. Trades in the final four months prior to the announcement and in the announcement month for the bankrupt sample are found to be significantly different from the control sample at the .05 level. Moreover, for firms that later announced bankruptcy, the percent of insider transactions that are sells is over 91% each month during months −2 through 0. It also appears that while selling transactions become more common during months −2 through 0 for the bankruptcy sample, they become less common for the control sample. This is interesting in light of the findings of Lang and Stulz (1991) who report that the competitors of bankrupt firms experience significant negative abnormal returns over the period surrounding the bankruptcy announcement.

Examining the final six months prior to and including the bankruptcy month in terms of volume, we find that the volume of sales make up a larger proportion of total volume for firms that later filed for bankruptcy than for the control sample in all but month −3. Perhaps the most interesting finding associated with the monthly volume data is that, during months −4, −2, −1, and 0, the percent of insider trading volume resulting from sales for firms that later announced bankruptcy is 99.19%, 97.44%, 94.28% and 96.67% respectively. Meanwhile, it appears that the frequency of insider

sales in control firms tends to decline as the date of the bankruptcy filing draws near.

An alternative way of measuring insider trading is to find the number of firms that experienced net insider buying or selling. Firms are classified each month based on both transactions and volume. Firms whose insiders are net buyers are classified as *firm-month buyers*, and firms whose insiders are net sellers are classified as *firm-month sellers*. Using this method of categorization, the bankruptcy sample continues to reveal a significantly larger percent of net selling months than does the control sample, although the percent of months categorized as net selling months is down somewhat from the percent of trades categorized as sells. Over the two-year period prior to the bankruptcy announcement when net selling is based on number of transactions, insiders are net sellers in 63.66% of the firm-months. If net selling is based on number of shares traded, 63.26% of the firm-months are categorized as sell months. During the six-month period prior to bankruptcy, the percent of firm-months categorized as sell months jumps to 72.63% and 71.43% based upon the number of transactions and the number of shares traded, respectively.

By including OTC firms in our sample and relying on an alternative data source, our work expands upon that of Loderer and Sheehan (1989). Using data taken from annual proxy statements for exchange-listed firms, they examined the reported changes in insider holdings over the five years prior to each of 178 different bankruptcy events compared to changes in insider holdings in 159 control firms over the same time periods. While they did report that the median holdings of the six highest paid executives in the bankrupt sample firms tended to decrease over the five years prior to bankruptcy, the changes were not statistically significant.

One possible explanation for the divergence in findings may be that the Loderer and Sheehan study deals exclusively with NYSE and AMEX firms, while our study is dominated by smaller OTC firms. If insiders of smaller firms own more stock or are less diversified in their personal portfolios, or if smaller firms are less likely to recover from a bankruptcy filing with any equity position intact, then smaller firms may have more insider trading associated with them prior to bankruptcy. Moreover, since listed firms are more closely scrutinized by the media than OTC firms, there could be stiffer penalties if insiders reduce their stockholdings. For example, suppliers may become suspicious about the firm's survival while warranties and service guarantees provided by the firm may become less valuable. To examine this possibility, the sample is subdivided into two samples—one composed of 18 NYSE and AMEX listed firms, and the other of 95 OTC firms. As shown in Panels B of Tables II and III, for NYSE and AMEX sample of bankrupt firms, the level of insider selling prior to bankruptcy is decidedly lower than for the control sample. In fact, for the bankruptcy sample over the two-year period prior to the announcement, only 49.58% of the trades on NYSE and AMEX firms are sales as opposed to 63.50% for the control sample. In terms of trading volume over the same period, only 38.60% of the bankruptcy trading

volume on NYSE and AMEX firms are sales as opposed to 74.85% for the control sample.[3] For the 95 OTC sample firms, the bankruptcy sample has a significantly larger percentage of sales both in terms of transactions and trading volume, with the percent of sales reaching 83.16% and 93.85% for transactions and trading volume respectively over the final six months prior to the announcement. Thus, it appears that the divergent nature of our findings relative to those of Loderer and Sheehan are driven by the inclusion of OTC listed firms in our sample.[4]

Finally, it should be noted that the Loderer and Sheehan study examines bankruptcies over the period 1971 through 1985, while our study only deals with bankruptcies announced from 1985 through 1987. Only six NYSE and AMEX firms declared bankruptcy during 1985. Therefore, the inferences about sample and methodolgy differences that can be made from the overlapping period are limited at best; however, the same pattern of a higher percentage of selling by insiders of OTC firms as opposed to NYSE and AMEX listed firms is seen in the 1985 subsample.

B. Insider Trading and the Market Reaction to the Bankruptcy Announcement

In order to measure the impact of bankruptcy filings on shareholder wealth, market prices are collected for the bankruptcy sample firms contained in either the CRSP Daily Master file or the NASDAQ file. An event study methodology is used to compute abnormal returns around the bankruptcy announcement day. A ninety-day estimation period over the interval of day relative -100 through day relative -11 is used to estimate the market model parameters. Due to the possibility of relatively thin trading, particularly for NASDAQ-traded firms, Scholes-Williams (1977) slope parameter estimates are computed. The market index used is the CRSP equally weighted index adjusted for dividends. The estimated market model is used to compute residual or excess returns over the three-day time period

[3] During the period 7 to 12 months prior to the announcement there were two large trades that dominated the transactions for the bankruptcy sample. A purchase of 266,666 shares of Tacoma Boat Building took place on October 9, 1984, and a purchase of 444,898 shares of Wheeling Pittsburgh Steel took place April 2, 1984. Interestingly, the Tacoma Boat Building purchase took place six days before Midland Capital Corporation and Tacoma announced a definitive agreement under which Midland Capital and other investors were to invest a total of $20 million in Tacoma. The Wheeling Pittsburgh purchase took place 25 days prior to an announcement that Wheeling expected a profitable second quarter and that the company's cash position had improved substantially after a $4.9 million loss during the first quarter.

[4] One possible explanation for this apparent difference in results between exchange-listed and OTC firms is that insiders of this particular sample of exchange-listed firms may not have experienced falling stock prices during the two years preceding bankruptcy. To test this, the cumulative returns (unadjusted for the market) for the fourteen NYSE and AMEX firms for which announcement period returns were available, were calculated over the period month $t = -24$ through $t = -6$ and found to be -30.50%. Over the entire 24-month period prior to the announcement date, their cumulative return was -54.84%. Thus, it appears that the lack of selling on the part of insiders of listed firms was not the result of an absence of a stock price decline prior to the announcement.

of day relative −1 through day relative +1. Testing of the hypothesis of the difference between mean excess returns and 0 is performed using a standard error computed cross-sectionally during the event period. Using the event period standard error mitigates the problem of changes in the residual variance in the event period relative to the model estimation period.[5] Because of missing data and trading suspensions, only 56 of our 113 sample firms are used in the event study. To be included each firm has to have a closing market price available for each day relative −2 through day relative +1. This allows the computation of one-day returns on each of day relative −1 through day relative +1. Daily returns are computed as follows:

$$r_{it} = \frac{P_{it} + d_{it} - P_{it-1}}{P_{it-1}}$$

where

r_{it} = the one day stock price return to firm i on day t,
P_{it} = the closing stock price for firm i on day t,
P_{it-1}= the cash dividend paid to firm i shareholders on day t.

Of the 56 firms in the event study, 54 firms have complete price information during the market model parameter estimation period, one firm has missing one daily price, and a second firm has missing two daily prices.

Once the price reaction to the bankruptcy announcement is determined, firms are placed into quartiles based upon that reaction. Price reaction is defined here as the cumulative average residual from day relative −1 through day relative +1. The mean excess return over the three-day announcement period for the entire sample is −27.55%. This is comparable to Clark and Weinstein's (1983) finding of a 36% loss over a three-day announcement period for a sample of 20 firms filing under Chapter XI. For the most negative quartile the mean excess return is −54.38% over the announcement period while it is +0.28% for the most positive quartile, with 35.7% of the reaction of firms in this quartile being positive.

This market response reflects the amount of additional information released as a result of the bankruptcy announcement. If the degree of distress the firm is suffering is public information, the market will capitalize a large portion of the bankruptcy and liquidation costs prior to the announcement, which results in little or no market reaction over the announcement period. While the mean excess return over this period is expected to be negative, positive returns for a portion of the sample are not unexpected. Warner (1977), for example, found bankruptcy announcements were associated with a positive market reaction for the bonds of those railroads that reorganized after filing. He attributed this to the release of new information at the time of filing. Moreover, Clark and Weinstein found 34.4% of the daily excess

[5] See Brown and Warner (1985).

returns over the three-day announcement period for firms announcing Chapter XI filing to be positive. Thus, it is the market interpretation of the information released over the announcement period, information previously available only within the firm, that determines the level and direction of the market reaction.

One possible explanation for the absence of a large negative market reaction to the bankruptcy announcement by some firms is that these firms may have experienced dramatic price declines several months before the announcement. To test whether or not this is true, a market-adjusted return for each firm is calculated over the period trading day $t = -120$ through trading day $t = -5$. This is done by calculating each firm's raw cumulative return over this period and subtracting from that the market's cumulative return over the same time period. The market index is defined here as the CRSP equally weighted index adjusted for dividends. The cumulative returns for the bankruptcy sample are then placed into quartiles based upon the three-day market reaction with the quartile of firms experiencing the most negative reaction over the three-day announcement period earning a -59.33% return over this earlier 115-day trading period. Firms placed in the next two quartiles earn market adjusted returns of -65.28 and -65.04% respectively, over this period, while the quartile of firms with the least negative reaction over the three-day announcement period earn market-adjusted returns of -52.03% over this same period. The correlation coefficient between the three-day market reaction and the market-adjusted return over the period $t = -120$ through $t = -5$ is then calculated and found to be positive but insignificant with a value of 0.2253. Thus, it appears that the lack of a negative market reaction to the announcement for some firms is not a result of dramatic price declines several months before the announcement.

We then determine if there are differences in insider trading between the groups. Insider trading in the most positive price response quartile is compared to insider trading in the most negative price response quartile over the two-year period leading up to the bankruptcy announcement. The results show that not only is insider trading more common among firms with the most negative reaction to the bankruptcy announcement, but selling makes up a larger percent of the transactions. In fact, selling transactions make up 83.68% of the transactions for the most negative quartile and 68.99% for the most positive quartile, which is significantly different at the .001 level. These results become even more dramatic over the final six-month period prior to the bankruptcy announcement. Thus, using the market response over this period as a proxy for the degree of shareholder wealth loss that is incurred, it appears that a higher level of insider selling occurs before bankruptcies with large shareholder wealth losses.

III. Conclusion

In this paper we examine insider trading prior to bankruptcy announcements. We find that insider selling does in fact increase significantly as the

bankruptcy announcement approached. Insider selling accounted for 83.69% of all insider trades and 92.99% of the insider volume of transactions over the final six months prior to bankruptcy. Moreover, in months -4, -2, and -1, 99.19%, 97.44%, and 94.28%, respectively, of the volume of insider trades are sales. These results are found to be driven by OTC firms with mixed results found for exchange-listed firms. In effect, our results describe the situation for small OTC firms, in which better-informed corporate insiders are found to use their superior information concerning the financial state of the firm in trading with a less-informed market. These results can also be interpreted in a signaling framework where insiders of OTC firms convey changes in the financial state of the firm through revisions in their holdings. Moreover, it may also be fruitful to view insider trading on OTC firms jointly with other corporate signals (Altman (1968), Altman and Spivack (1983)) as a means in which corporate information is conveyed to the market.

REFERENCES

Altman, Edward I., 1968, Financial ratios, discriminant analysis and the prediction of corporate bankruptcy, *Journal of Finance* 23, 589–609.

——— and Joseph Spivack, 1983, Predicting bankruptcy: The value line relative financial strength system vs. the zeta bankruptcy classification approach, *Financial Analysts Journal* 39, 60–67.

Brown, Stephen J. and Jerold B. Warner, 1985, Using daily stock returns: The case of event studies, *Journal of Financial Economics* 14, 3–31.

Clark, Truman A. and Mark I. Weinstein, 1983, The behavior of the common stock of bankrupt firms, *Journal of Finance* 38, 489–504.

Lang, Larry and René M. Stulz, 1992, Contagion and competitive intra-industry effects of bankruptcy announcements, Working paper, The Ohio State University, Columbus, OH.

Loderer, Claudio and Dennis P. Sheehan, 1989, Corporate bankruptcy and managers' self-serving behavior, *Journal of Finance* 44, 1059–1075.

Sholes, Myron and Joseph Williams, 1977, Estimating betas from nonsynchronous data, *Journal of Financial Economics* 5, 309–327.

Warner, Jerold B., 1977, Bankruptcy, absolute priority, and the pricing of risky debt claims, *Journal of Financial Economics* 4, 239–276.