What Do Institutional Investors Know and Act on before Almost Everyone Else: Evidence from Corporate Bankruptcies

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We analyze investment behavior of institutional managers who hold and trade shares of firms that file for bankruptcy. We find that during the five-year period preceding a bankruptcy filing, institutional investors (except those managing investment companies) are net buyers with a positive abnormal net number of shares traded during the period. Institutional managers start to sell shares of bankrupt firms sooner in some firms than in others; these earlier sales are of smaller firms with weaker operating performance, and lower equity risk. We do not find evidence that institutional stockholders trade strategically and avoid material price declines before they occur.

INTRODUCTION

An informed investor is compensated for the costly investigation into asset value by his or her ability to identify and acquire assets that yield greater potential returns on the investments (Rock, 1986).[1] Some academics argue that institutional investors are prone to behave rationally and to appear as "intelligent" investors who stabilize security prices by offsetting irrational trades by individual investors (Lakonishok, et al., 1994). Because of the size of the investments and their time horizons,[2] institutional investors have strong incentives to gather costly information about firms whose shares they acquire for their portfolios and to decide whether contemporaneous weak performance is an indication of poor firm quality or a result of desirable long-term firm investment (Admati, et al., 1994), Maug, 1998, Edmans, 2009).

In this paper we analyze the investment behavior of institutional investors. We examine quarterly changes in their investment holdings of firms during five years prior to these firms filing for reorganization. The existing empirical literature on institutional trading does not provide concrete evidence as to how sophisticated the investment strategies are that institutions employ in their overall trading. While some researchers argue that institutional investors are capable of picking winners and exhibit fully rational herding behavior that promotes price discovery and predicts stock returns (Nofsinger and Sias, 1999, Sias, 2004), others conclude that managers mechanically acquire stocks with certain desirable characteristics and price levels (Falkenstein, 1996) and irrationally engage in herding causing temporary price bubbles (Dreman and Lufkin, 2000) and future price corrections (Gutierrez and Kelley, 2009). Irrespective, we can, to this point, find no empirical evidence relevant to institutional holdings/trading of companies as they approach bankruptcy.

It is well established that the investment returns of firms in financial distress are invariably quite negative and equity holders suffer significant capital losses starting several years prior to Chapter 11 filings (Clark and Weinstein, 1983). Firms usually start experiencing financial difficulties long before petitioning for reorganization in the federal court by filing Chapter 11 (Altman, 1968, Aharony, Jones, and Swary, 1980, Clark and Weinstein, 1983) and investors continue to suffer sizable losses up to the time of filing (Clark and Weinstein, 1983). Aharony, et al. (1980) observe a negative cumulative differential portfolio return starting roughly four years before bankruptcy with investors having to continuously adjust for declining solvency over the four-year period.

We examine the investment behavior of institutional investors in light of two contrasting pieces of evidence: (1) institutional investors possess valuable information and act as informed investors and (2) they invest in securities of distressed firms, possibly disregarding the empirical evidence that these investments lack profitability and result in significant capital losses.[3] The analysis presented in this paper is intended to provide a first examination of whether institutional investors utilize information they acquire to accurately time transactions during the five years prior to Chapter 11 filings. If institutional investors accurately process valuable information they possess (or should possess) regarding the future stock performance of the firms in which they invest, we conjecture that because of their in-depth knowledge they would engage in sell-offs prior to the filings. Timing of a sell-off, however, is of a greater importance than the mere fact that the investors dispose of the holdings sometime during the five-year period. Do the institutional investors divest long before a struggling firm goes under, prior to its share price significantly declining? Or do they hold on to the shares of distressed firms until it is well established that bankruptcy is inevitable (thus, achieving the same negative results as other investors)? In addition, do institutions behave differently if other institutional managers are holding shares of the same firms and does the magnitude of these (other institutional) holdings matter?[4] We attempt to answer these questions and expect to observe investment behavior that closely resembles that of corporate insiders, when the latter sell (postpone purchase) before significant stock-price decreases and buy (postpone sales) before significant price increases (Jaffe, 1974, Seyhun, 1986, Seyhun and Bradley, 1997).

The remainder of our paper is structured as follows. In Section II, we provide the necessary background on the trading behavior of institutional investors. In Section III, we present our hypotheses. In Section IV, we describe our data and in Section V, we develop our test methodology and report regression results. Section VI concludes our paper.

BACKGROUND ON THE INVESTMENT BEHAVIOR OF INSTITUTIONAL INVESTORS

Most large shareholders are institutional investors, rather than individual investors. Further, in many firms these large investors own substantial stakes. Institutional shareholders actively monitor firms in which they invest. Monitoring is costly and more difficult for smaller investors (Black, 1992, Wahal, 1996, DelGuercio and Hawkins, 1998, Gillan and Starks, 2000, Noe, 2002, Woidtke, 2002, Cremers and Nair, 2005, and Almazan, et al., 2005). However, the extent of the institutional investors' monitoring may be limited by the free-rider problem due to the private cost of monitoring (Shleifer and Vishny, 1986), fiduciary duties and responsibilities (Badrinath, et al., 1989, Gillan and Starks, 2000), and potential business relations with the firms (banks, insurance companies, and trusts are especially sensitive to this issue) (Brickley, Lease, and Smith, 1988).

Arbel, et al. (1983) find that institutions typically avoid investing in thinly traded stock and in firms with small capitalizations. Institutional investors avoid taking greater risks associated with investment in small firms such as greater return volatility and lower liquidity. These constraints that affect investment decisions of institutions may lead to market segmentation, herding behavior, and continuous neglect of certain securities (Arbel, et al., 1983, Nofsinger and Sias, 1999). Similarly, Falkenstein (1996) believes that managers acquire stocks with certain desirable characteristics and price levels. He observes that managers have preference for stocks with high visibility and low transaction costs and avoid investments with low idiosyncratic volatility.[5]

Institutional investors engage in positive-feedback trading, and institutional herding[6] impacts share prices more than the herding behavior of individual investors (Nofsinger and Sias, 1999, Sias, 2004, Choi and Sias, 2008). Nofsinger and Sias (1999) find that securities institutional investors add to their portfolios outperform those they sell and that this phenomenon does not stem from momentum strategies. They conclude that institutions' herding behavior is fully rational and observe no evidence of returns reversal in the two years following the herding period. Sias (2004) complements this literature on institutional herding by demonstrating that the fraction of institutions buying securities in a quarter positively correlates with the demand for the securities in the previous quarter, directly evidencing herding behavior. He finds that herding promotes price discovery and correctly predicts stock returns.

In contrast, Gutierrez and Kelley (2009) find that stocks with "buy" herds realize negative abnormal returns two to three years after the herding. This finding suggests that buy herds cause overvaluation and result in future price correction and this contrasts with earlier conclusions that herding promotes price discovery. Gutierrez and Kelley (2009) do not observe the same relation between "sell" herds and future returns; the "sell" herds do not predict future returns. They explain these asymmetric findings for "buy" and "sell" herds by concluding that price impact of the latter is temporary, while price impact of the former is permanent.

Alternatively, some researchers suggest that institutional herding is a result of irrational psychological behavior and causes temporary price bubbles (Dreman and Lufkin, 2000). Scharfstein and Stein (1990) describe managers' herding and feedback trading as a fad often encouraged by agency problems: "Managers simply mimic the investment decisions of other managers, ignoring substantive private information" (Scharfstein and Stein, 1990, p. 465).

Several researchers provide evidence that higher institutional ownership has an effect on stock prices and returns (Brown and Brooke, 1993, Gompers and Metrick, 2001), negatively impacts bid-ask spreads (Jennings, et al., 2002), and negatively (positively) correlates with stock return volatility among non-dividend (dividend) paying stocks (Rubin and Smith, 2009). Gompers and Metrick (2001) find that institutions demand stock characteristics that differ from the rest of the market: "Institutions invest in stocks that are large, more liquid, and have had relatively low returns during the previous year" (pp. 1-2). They state that the increase in institutional share holdings of large stocks leads to higher demand for large, more liquid stocks, thereby affecting stock market prices and returns. Consistent with the research findings that support managers' superior investment abilities, Gompers and Metrick (2001) present evidence that level of institutional ownership forecasts returns, with forecasting power the strongest when institutional inflows are the highest.

DEVELOPMENT OF HYPOTHESES

From extant literature we gather that institutions avoid investing in illiquid and risky securities and prefer investing in shares of large firms. Institutions favor stocks with high visibility and low transaction costs. We also know that institutions exhibit herding behavior and engage in a positive-feedback trading. To determine factors that influence institutional investors' trading of the securities of the firms approaching bankruptcy, we develop and test the following hypothesis:

> *H1: Institutional investors delay selling shares of bankrupt firms that are larger, more liquid, less risky, less levered, and are more heavily held by other institutional investors. They also favor investments with relatively stronger market and operating performances than the rest of the firms.*

It is important to learn when the institutional investors' buying and selling of individual firms occurs. Thus, we offer a hypothesis that examines the relation between the timing of institutional investors' trading and security returns. We analyze institutions' investment behaviors and determine whether they sell the investments before the stock price declines and purchase the shares after the stock price has fallen.

If the selling occurs after the price declines, then the institutional managers would incur losses just as other shareholders would with investments in the securities of the same firms. Hence:

> *H2: Institutional investors sell shares of distressed firms to avoid capital losses. This behavior is similar to that of insiders, when they sell (postpone purchases) before significant stock-price decreases and buy (postpone sales) before significant price increases.*

SAMPLE SELECTION AND DATA ANALYSIS

Firm Characteristics and Institutional Ownership

We use *Thompson Financial Services SDC Platinum* database to obtain our sample of U.S. firms that filed for Chapter 11 reorganization and emerged from bankruptcy during the period of October 1993 through December 2011. The total initial sample consists of 1,831 firms filing for reorganization during this period. We do not restrict the sample by industry or regulatory requirements.

Institutions are required to file 13f forms with the Securities and Exchange Commission (SEC) on a quarterly basis.[7] Using a sample of 13f quarterly filings obtained from Thomson Reuters' Institutional (13f) Holdings – s34, we analyze changes in institutional holdings for firms filing and emerging from bankruptcy between 1993 and 2011 during the five years (twenty quarters) preceding the filings.[8] Thomson Reuters does not provide net change holdings for the institutions no longer filing 13f forms with the SEC; instead the data provider reports zero change in holdings for these institutions. To address this issue, we calculate the sell-off amounts as a negative of the prior quarter's holdings and report them as a net change for the quarter when no 13f report is filed with the SEC for the first time.[9] After identifying firms in the initial sample whose shares were held by institutional investors during the 1988-2011 period, our sample is reduced from 1,831 firms to 1,142 firms.[10] During the twenty-quarter period we consider for each firm, most of the firms were held by more than one manager resulting in 124,844 quarterly institutional holding observations for the 1,142 firms in the sample.[11]

We utilize Compustat to obtain the accounting related data and derive several performance measure ratios using the data.[12] We use Center for Research in Security Prices (CRSP) to obtain stock market related data. Following Seyhun and Bradley's (1997) methodology to capture shares' abnormal performance we determine market-adjusted abnormal return as quarterly holding period return adjusted for the NYSE/Amex/Nasdaq value-weighted return and share turnover as trading volume divided by total shares outstanding. Market adjusted returns capture the extent of underperformance of shares of the firms approaching bankruptcy and are used in studies similar to ours (Seyhun and Bradley, 1997, Brav, et al., 2000, Kadiyala and Rau, 2004). We also report trading volume and bid-ask spread obtained from CRSP.

TABLE 1
DESCRIPTIVE STATISTICS FOR THE SAMPLE FIRMS

Panel A: Firm Characteristics						
Time horizon (in years):	-5		-4		-3	
	Mean	Median	Mean	Median	Mean	Median
Performance indicators:	(n=563)		(n=636)		(n=667)	
Total assets ($ mill)	1,142.690	134.361	1,181.950	134.674	1,316.860	159.204
Sales ($ mill)	528.105	120.034	536.977	113.172	573.207	124.006
Sales/totla assets	1.192	1.033	1.141	0.953	1.101	0.901
Operating ROA	-0.294	0.068	-0.108	0.060	-0.123	0.054
ROA	-0.427	0.000	-0.231	-0.012	-0.305	-0.039
Total liabilities/total assets	0.794	0.639	0.737	0.667	0.888	0.696
Market debt/equity ratio	9.335	1.095	4.423	1.242	6.473	1.326

Time horizon (in years):	-5		-4		-3	
	Mean	Median	Mean	Median	Mean	Median
Current ratio	2.698	1.665	2.732	1.669	2.475	1.635
Cash ratio	0.892	0.169	0.997	0.164	0.865	0.155
Altman Z-score	2.080	2.357	2.776	2.093	0.951	1.710
Volatility	0.564	0.574	0.571	0.560	0.671	0.600
Market-adjusted return	-0.002	-0.012	-0.004	-0.014	-0.008	-0.018
Market characteristics:	(n=225)		(n=285)		(n=377)	
Market value of equity ($ mill.)	354.965	108.302	373.715	97.463	432.532	85.684
B/M ratio	0.046	0.523	0.283	0.568	-0.295	0.503
Trading volume (thousands)	54.506	12.882	61.987	15.196	75.046	17.606
Share turnover	0.001	0.001	0.001	0.001	0.002	0.001
Bid-ask spread	0.569	0.305	0.339	0.250	0.388	0.255

Time horizon (in years):	-2		-1		0	
	Mean	Median	Mean	Median	Mean	Median
Performance indicators:	(n=656)		(n=481)		(n=129)	
Total assets ($ mill)	1,545.650	174.900	2,316.000	156.513	844.058	205.622
Sales ($ mill)	590.159	150.378	788.164	165.593	622.449	284.091
Sales/totla assets	1.153	0.932	1.342	1.065	1.388	1.255
Operating ROA	-0.369	0.022	-0.710	-0.021	-0.308	0.018
ROA	-0.484	-0.092	-1.165	-0.227	-0.434	-0.300
Total liabilities/total assets	1.132	0.743	2.081	0.891	1.766	1.096
Market debt/equity ratio	16.941	2.081	51.869	6.447	213.518	79.535
Current ratio	2.021	1.542	1.322	0.934	3.407	1.344
Cash ratio	0.583	0.121	0.331	0.070	1.339	0.131
Altman Z-score	1.411	1.234	-3.945	-0.158	-5.191	-0.399
Volatility	0.685	0.635	0.780	0.698	0.786	0.660
Market-adjusted return	-0.036	-0.044	-0.097	-0.103	-0.189	-0.239
Market characteristics:	(n=446)		(n=354)		(n=94)	
Market value of equity ($ mill.)	426.250	62.675	349.341	22.526	96.913	4.640
B/M ratio	-1.158	0.457	-11.221	0.240	-82.031	-3.434
Trading volume (thousands)	99.636	19.941	158.554	23.336	498.382	35.548
Share turnover	0.002	0.001	0.002	0.001	0.004	0.002
Bid-ask spread	0.359	0.262	0.285	0.180	0.211	0.188

(TABLE 1 continues)

Panel B: Institutional Ownership						
Time horizon (in quarters):	-20, -17		-16, -13		-12, -9	
	Mean	Median	Mean	Median	Mean	Median
	(n=582)		(n=667)		(n=780)	
All 13(f) institutions as a percentage of all shares outstanding	32%	27%	32%	26%	31%	25%
Largest institution as a percentage of all institutional holdings	37%	28%	38%	29%	41%	32%
Largest 5 institutions as a percentage of all institutional holdings	73%	75%	74%	75%	75%	78%
Largest 10 institutions as a percentage of all institutional holdings	85%	92%	86%	93%	87%	94%

Time horizon (in quarters):	-8, -5		-4, -1		Quarter 0	
	Mean	Median	Mean	Median	Mean	Median
	(n=885)		(n=913)		(n=881)	
All 13(f) institutions as a percentage of all shares outstanding	29%	21%	21%	13%	8%	3%
Largest institution as a percentage of all institutional holdings	44%	35%	50%	43%	66%	66%
Largest 5 institutions as a percentage of all institutional holdings	77%	82%	83%	91%	95%	100%
Largest 10 institutions as a percentage of all institutional holdings	88%	96%	92%	99%	98%	100%

Panel C: Ownership by Manager Type						
Time horizon (in quarters):	-20, -17		-16, -13		-12, -9	
	Mean	Median	Mean	Median	Mean	Median
	(n=582)		(n=667)		(n=780)	
1=Banks	5%	2%	5%	2%	5%	2%
2=Insurance companies	2%	1%	2%	1%	2%	1%
3=Investment co. and their mgrs	5%	2%	4%	2%	5%	2%
4=Independent inv. advisors	17%	12%	17%	13%	18%	14%
5=All others	3%	0%	3%	1%	4%	1%

Time horizon (in quarters):	-8, -5		-4, -1		Quarter 0	
	Mean	Median	Mean	Median	Mean	Median
	(n=885)		(n=913)		(n=881)	
1=Banks	5%	2%	4%	2%	2%	0%
2=Insurance companies	2%	1%	2%	0%	0%	0%
3=Investment co. and their mgrs	4%	2%	3%	1%	1%	0%
4=Independent inv. advisors	17%	13%	14%	9%	6%	2%
5=All others	5%	1%	4%	1%	1%	0%

NOTES: This table presents firm characteristics and institutional ownership descriptive statistics for the sample of 124,844 quarterly institutional holding observations for 1,142 firms that file Chapter 11 and emerge from bankruptcy reorganization between October 1993 and December 2011. The sample of 13f quarterly holdings is obtained for the period starting in the fourth quarter of 1988 (or five years preceding the earliest Chapter 11 filing in our sample) through the third quarter of 2011 (or quarter of the latest filing in the sample). Data on performance characteristics is obtained from Compustat and CRSP. Data on quarterly institutional (13f) holdings comes from Thomson Reuters' Institutional (13f) Holdings – s34. Panel A reports total assets (in millions of $), sales (in millions of dollars), and several performance related ratios. Panel B includes data on institutional ownership reported for the five time horizons, consisting of four quarters each, and for quarter 0, quarter of filing. The ownership in the panel is reported for all 13f filers as a percentage of shares outstanding, and for three size-type ownership categories as a percentage of total shares owned by institutions – the largest, the largest five, and the largest ten. Panel C breaks down the data by time horizons and by manager types: 1=banks, 2=insurance companies, 3=investment companies and their managers, 4=independent investment advisors, and 5=all others. The ownerships for each manager type are reported as percentages of total shares outstanding. In parenthesis, n is a number of observations.

In Panel A of Table 1 we provide descriptive statistics for the sample firms. We report annual measures starting with year t-5, where year t=0 is the year of bankruptcy filing. While the median market value starts declining significantly in year t-4, the mean market value does not decline significantly until year t-1, suggesting there are many large firms in the sample that actually have an increase in the value during the period prior to a bankruptcy filing.[13] Both mean and median total assets and sales increase from t-5 through t-1 and median total assets and sales are higher at t=0 than in any other year. The firms become more levered from year t-4 to year t-1 (both mean and median debt-to-assets ratio increase during this period) with the ability to meet current obligations (measured by current and cash ratios) declining during this period, especially from t-3 on.[14] The firms also struggle operationally–both mean and median operating ROA and ROA are decreasing from year t-4 to year t-1.[15] The debt-to-equity ratio grows steadily from year t-4 to year t-1 and increases dramatically from year t-1 to year t=0. The firms' median book-to-market ratios are below unity for all years presented in the table and are decreasing starting in year t-4. Mean and median Altman's Z-scores fall below 1.8, the upper limit of the range for high probability of bankruptcy, in year t-3 and continue to decline. By most operational measures there are ample financial data suggesting firms are in deep trouble. Finally, trading volume and share turnover increase gradually earlier in the five-year period and then sharply as bankruptcy filing approaches.

In Panels B and C, we summarize characteristics of and changes in institutional ownership during the five-year period. We report means and medians of ownership percentages for various institutional groups. To obtain the results in Panel B, we determine quarterly institutional ownerships of each security and then average them for the four quarters of each year prior to a bankruptcy filing. We report these average annual institutional holdings for all 13f filers as a percentage of total shares outstanding as of each of the five annual periods before filing and the quarter of filing. Then, we report the largest institutional holding as a percentage of total institutional holdings, and the largest five and ten institutional holdings as a percentage of total institutional holdings.

As reported in Panel B, means and medians for all institutional holdings remain relatively unchanged from -20, -17 through -8, -5 quarter horizons (years t-5 through t-2). Mean (median) 13f holdings declines by about 28 percent (38 percent) from -8, -5 to -4, -1 and by 62 percent (77 percent) from -4, -1 to the quarter of filing. One should keep in mind when evaluating these results that some changes in 13f holdings reported for quarter 0 occur after Chapter 11 filings, making these changes reactive and not proactive, as one would expect from informed and sophisticated investors.[16] We also find that the proportional ownership (of the total institutional ownership) of the largest, the five largest, and the ten largest institutions tends to grow during this period–simply put, the institutional ownership tends to become more concentrated among fewer institutions. Thus institutions as a group do not divest

themselves of these securities particularly quickly prior to a bankruptcy filing (irrespective of financial indicators), and some of them maintain meaningful ownership in these securities quite close to a bankruptcy filing.[17] The descriptive evidence to this point does not suggest the increased trading is divestiture by institutional investors.

In Table 1, Panel C, we categorize institutional ownership by manager type and weigh the ownership by the total shares outstanding as of each corresponding quarter period. The largest ownership share belongs to independent investment advisors with mean percentage holdings between 14 and 18 percent during the five-year period and decreasing to about 6 percent in the quarter of filing. While institutions in the other classifications hold smaller percentages of firm shares outstanding than do the independent investment advisors, their pattern of holdings during the five-year period through filing does not seem to be different from the independent investment advisors' pattern.

Corporate Bankruptcies and Institutional Trading

A purpose of our paper is to determine whether institutional investors holding shares of distressed firms sell the investments well before the bankruptcy filings and before the market becomes fully aware of the firms' financial and/or operating issues. To accomplish this goal, we group the institutional trading data by firm filing for reorganization and by quarter when either shareholding or net holding change are not equal to zero. In Table 2, we report the number of firms classified as net buyers, non-traders, or net sellers for each quarter horizon preceding filings of the reorganization petitions.[18]

TABLE 2
NET TRADING BEHAVIOR OF INSTITUTIONAL INVESTORS BEFORE FILING FOR A BANKRUPTCY PETITION, 1988-2011

Quarter horizons	Total sample firms	All sample firms			Total control firms	All control firms		
		Net buyers	Non-traders	Net sellers		Net buyers	Non-traders	Net sellers
-20, -17	582	312	16	254	3,213	1,453	503	1,258
-16, -13	667	328	22	317	3,529	1,384	496	1,649
-12, -9	780	361	25	394	3,630	1,232	467	1,931
-8, -5	885	365	38	482	3,787	1,326	493	1,968
-4, -1	913	258	53	602	3,636	1,363	506	1,768
0	881	88	61	732	2,784	1,179	188	1,417

NOTES: This table reports number of firms where institutional shareholders are net buyers, non-traders, or net-sellers for institutions in the sample and for benchmark group of institutions. The sample of net changes in 13f quarterly holdings is obtained for the period 1988-2011. Data on quarterly institutional (13f) holdings comes from Thomson Reuters' Institutional (13f) Holdings – s34. The results are reported for each quarter horizon preceding a bankruptcy filing and for quarter 0, quarter of filing. Included are total number of institutions by period used in determining groups of three types of traders for both sample and control group. Institutions are considered as net buyers if the number of shares purchased exceeds the number of shares sold, as non-traders if no shares are traded in the quarters with holdings, and as net sellers if the number of shares sold exceeds the number of shares purchased.

Several aspects of aggregate activity for our sample firms are quite interesting. First, the proportion of our sample with net institutional ownership/trading grows as bankruptcy filing approaches. Second, the balance between net buying and net selling is slightly tilted toward net buying during the years t-5 through t-4. Third, while the balance becomes somewhat tilted toward net selling by year t-2, heavy net selling does not seem to occur until t-1 (and, of course, it is heavy during t=0). In aggregate, the results reported in Table 2 indicate that institutional investors as a group do not engage in selling of shares of the

firms that subsequently file for Chapter 11 any earlier than two years prior to the filing of Chapter 11 reorganization petitions. In addition, some types of institutions (investment companies and their managers, independent investment advisors, and institutions in "All other" category) may engage in short selling during the pre-filing period in anticipation of the share price decline.

In Table 2 we also report similar statistics for control firms. We first collect a sample consisting of all other firms not filing for bankruptcy during this time period.[19] We then obtain data on institutional holdings during 1988-2011 for these firms. Finally, for each quarter, we size match the sample firms with holdings and/or net holding changes with all other firms not in the sample with holdings and/or net holding changes based on a 90 percent to 110 percent range of our sample firms' total assets. Frequently, in the empirical literature, a control sample consists of the same-industry firms of comparable size. We eschew this standard method of identifying control firms and utilize a modification of Seyhun and Bradley's (1997) methodology. Seyhun and Bradley (1997) point out limitations of the conventional method when dealing with distressed and bankrupt firms emphasizing that non-filer firms in the same industry are likely to experience financial difficulty along with the filers.

Many firms in the sample are matched with multiple control firms and every firm has at least one control firm. Our control sample consists of 14,635 firm observations[20] whose shares are held by institutional investors at one point or another during twenty quarters prior to corresponding sample firms' bankruptcy filings. We analyze institutional holdings and net changes in those holdings for each firm in the control sample during the twenty-quarter period preceding the filings of each corresponding sample firm. A summary of the net buying/selling activity for the control firms is presented in the final three columns of Table 2.

In aggregate, we find that for the control firms there is more net selling than net buying activity during the four years prior to and the year of bankruptcy filing. There tends to be more non-trading activity in the control firms than in the sample firms. When comparing net selling activities of sample and control groups, we find that proportions of sample and control firms with net selling activities are similar (for instance, in year t-4, 48% of sample firms and 47% of control firms have net selling activities; in year t-3, 50% of sample firms and 53% of control firms have net selling activities; and in year t-2, 55% of sample and 52% of control firms have net selling activities), and the difference in net selling activity for sample and control institutions is quite pronounced in year t-1, with a lot more net selling in the sample (66%) than control (49%) firms.

To test statistical significance of trading by the institutions reported in Table 2, we calculate "abnormal" trading for each firm in the sample. First, we eliminate observations with zero holdings for all four quarters in a year for both sample and control firms.[21] Our measure of "expected" institutional quarterly trading activity is the net change of institutional holdings for firms in the control sample. Abnormal trading is calculated as the difference in the net institutional holding changes for the sample firms in a certain quarter before filing and the net institutional holding changes for corresponding control firm(s) in the same quarter. Once we obtain quarterly abnormal institutional trading, we then average these measures across four quarters in a year preceding quarter 0 and report mean annual abnormal trading for each event time in Table 3. We also report abnormal trading for quarters -4, -3, -2, -1, and 0, the quarter of Chapter 11 filings. Sample institutional abnormal purchases are positive numbers and abnormal sales are negative numbers. We present a summary of abnormal trading activity in Table 3.

TABLE 3
MEAN QUARTERLY ABNORMAL NET NUMBER OF SHARES TRADED PER FIRM OVER THE INDICATED HORIZON

| Quarter horizons | All | Manager type | | | | |
		1	2	3	4	5
-20, -17	7,424	-523	6,995	-38,970	9,543	29,443
	(<.0001)	(0.1379)	(<.0001)	(<.0001)	(<.0001)	(<.0001)

(TABLE 3 continues)

Quarter horizons	All	Manager type				
		1	2	3	4	5
-16, -13	5,351	898	14,281	-11,336	6,462	9,953
	(<.0001)	(0.0002)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
-12, -9	-166	-6,010	-2,634	-18,099	-2,118	14,635
	(0.4173)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
-8, -5	9,387	4,243	15,162	-23,837	1,330	34,019
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
-4	19,489	12,259	4,657	7,373	14,468	45,989
	(<.0001)	(0.0485)	(0.5604)	(0.7836)	(0.0321)	(<.0001)
-3	-36,519	-20,189	-17,675	-57,494	-32,692	-60,005
	(0.0007)	(<.0001)	(0.0054)	(0.0033)	(<.0001)	(0.2146)
-2	-17,916	-14,942	-7,683	-90,052	-17,096	-3,407
	(<.0001)	(0.0003)	(0.5705)	(0.0026)	(0.0006)	(0.5111)
-1	-28,531	-26,455	-25,052	-113,842	-24,702	-13,419
	(<.0001)	(<.0001)	(0.0088)	(0.0935)	(0.0001)	(0.0477)
0	-116,389	-60,769	-67,610	-281,639	-159,141	-53,682
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
-20, -1	4,863	2,109	2,433	-15,608	4,356	16,805
	(<.0001)	(0.0514)	(0.1303)	(0.0035)	(0.0003)	(<.0001)
-16, -1	2,242	-445	1,619	-23,836	1,683	15,334
	(0.1260)	(0.8133)	(0.4101)	(0.0009)	(0.3805)	(0.0012)
-12, -1	-942	-1,478	-2,188	-29,531	-2,809	14,094
	(0.5861)	(0.4619)	(0.3387)	(0.0005)	(0.2248)	(0.0105)
-8, -1	450	140	472	-28,399	-1,490	14,547
	(0.7971)	(0.9145)	(0.8565)	(0.0014)	(0.4197)	(0.0267)
-4, -1	-4,287	-8,211	-1,837	-55,152	-5,301	12,702
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
-2, -1	-23,224	-20,699	-16,368	-101,947	-20,899	-8,413
	(<.0001)	(<.0001)	(0.0476)	(0.0057)	(<.0001)	(0.0529)

NOTES: Mean quarterly abnormal net number of shares traded per sample firm as compared to that per control firm is included in this table. The data on sample and control net holding changes is obtained for the period 1988-2011 from Thomson Reuters' Institutional (13f) Holdings – s34. The results are reported for each quarter horizon preceding a bankruptcy filing, for quarter 0, quarter of filing, and for periods of 20, 16, 12, 8, and 2 quarters before the filing. The data are also categorized by manager types: 1=banks, 2=insurance companies, 3=investment companies and their managers, 4=independent investment advisors, and 5=all others. Institutional purchases are coded as positive numbers and sales as negative numbers. The sample trades are adjusted by the number of shares traded by institutions holding shares of control firms of similar size in the same quarter to arrive at an abnormal net number. P-values are reported in parentheses.

The results reported in Table 3 are striking. During the four years, t-5 through t-2, in aggregate, the institutional investors of firms that ultimately file for bankruptcy are net buyers of these firms as

compared to the control firms (there is slight net selling in t-3). The net buying in year t-2, during which there are clear indicators, in aggregate, of financial decline (see Table 1), is large. Institutions are net buyers in the fourth quarter prior to the quarter of filing and consistent net sellers during quarters q-3 through q=0. However, the behavior of these investors is not uniform across the broad institutional investor classes. The managers of investment companies are heavy net sellers (compared to their control sample counterparts) during all periods except quarter q-4. In contrast, those classified as "all others" (admittedly, a catch-all conveying little information) are net buyers in all five of the prior years (including relatively high net purchasing activity in both years t-2 and t-1 and quarter q-4). Banks are relatively heavy sellers in years t-3 and t-1, but relatively heavy purchasers in year t-2. Irrespective of their activities during the five years prior to a bankruptcy filing, massive selling occurs during the quarter of bankruptcy filing in each institutional investor classification, far dwarfing the prior five years of activities, indicating that the institutions do massive divestiture during the quarter of filing.[22] The significant abnormal net selling begins in quarter q-3 and continues through the quarter of filing for all manager types with exception of manager types 5, "All others", (selling is not statistically significant for this group until q-1) and manager type 2, insurance companies, (abnormal net selling is not statistically significant for this group in q-2). These results are consistent with the notion from extant research that describes institutions as investors that exhibit herding as a result of irrational psychological behavior. Institutions appear to be significant net buyers (with exception of investment companies and their managers) of the distressed firms' shares in the quarters and years preceding a bankruptcy filing, until third quarter before the filing. The amount of net buying is statistically significant and economically material during this time period. To some these results may seem surprising, given the amount of information these investors presumably obtain and the level of investment sophistication expected from institutions.

In summary, institutional investors engage in net buying activities for quite some time during five years preceding bankruptcy filings. Until about one year before the filings, institutions initiate positions in deteriorating firms instead of eliminating them. In the year preceding quarter of bankruptcy filings and in the quarter of the filings institutional managers become net sellers with a negative abnormal net number of shares traded.

TEST METHODOLOGY AND PRESENTATION OF REGRESSION RESULTS

Timing of Institutional Selling of Bankrupt Firms

We would like to discern between two schools of thought when it comes to the investment behavior of institutional managers: 1) the notion that institutional investors are informed and sophisticated investors capable of outperforming the market, and 2) conversely, the argument that institutions exhibit irrational herding behavior.[23] Thus far, we provide clear evidence of institutional managers' inability to timely recognize failing investments held in their portfolios.

Our first hypothesis is concerned with what drives the delay in institutions selling the firms that ultimately file for bankruptcy protection. First, we define a dependent variable that measures when the institutions of a firm became "net sellers". As a first step in this definition, we determine abnormal net changes in holdings for each institutional manager in each quarter approaching bankruptcy filing. We then calculate mean annual abnormal net changes in institutional holdings. For instance, for year t-5 the average abnormal net holding change consists of abnormal net holding changes in quarters -20 through -17. We define our dependent variable to equal to 0, 1, 2, 3, 4, or 5, depending on the year when an institution first became a net seller based on its mean abnormal net change trading figure as compared to trading in the preceding years. We assess each mean abnormal net change based on the following criteria: for example, if an institution is a net seller for the first time in year t-3 (or quarters -12 through -9),[24] then we assign 3 as a dependent variable for that manager; if that same institution is a net buyer in the following year, year t-2 (same as quarter period -8 ,-5), and the amount of the average abnormal net purchase is greater than the absolute value of the sum of abnormal net changes for all prior periods, then we change the dependent variable for this manager from 3 to 0; if, however, the amount of the average abnormal net purchase in year t-2 is less than the absolute value of the sum of abnormal net changes for

prior periods or the manager is a net seller in year t-2, then the dependent variable remains equaling to 3.[25] We repeat this process for every period for each institutional manager with either holdings or net changes not equaling zero during a year.[26]

Our dependent variable takes values 0 through 5; an ordered probability (logit) model is a suitable tool for our analysis. By using an ordered logit model we estimate change in log odds of institutional investors starting to sell earlier in the five-year period preceding bankruptcy filings.

We regress our dependent variable on several firm and market characteristics for all managers in the sample; subsequently, we divide our sample into several sub-samples to assess trading behavior of each type of institutional manager in our sample. As explanatory variables we choose natural logarithms of total assets (LNAT), market capitalization (LNMKTVL), and sales (LNSALES), as well as the following ratios: return on assets (ROA), debt-to-assets (LTAT), current ratio (CURR), asset turnover (STOAT), debt-to-equity (DTEQ), and book-to-market (BM). We also utilize standard deviation of security returns measured over one year period as an annual risk measure (RISK), stock return adjusted for the NYSE/Amex/Nasdaq value-weighted return (ARVW), and share turnover as trading volume divided by total shares outstanding (LQDT). We include two sets of variables that measure institutional herding behavior to describe the relation between trading by other institutions and the possibility of managers in the sample initiating selling shares of distressed firms in the earlier years: the number of 13f holders in the quarter of institutional trading (NUM13F) within the year of dependent variable and its lagged value (NUM13FLAG) in the year prior to the year of dependent variable, the total number of shares held by institutions in the quarter of institutional trading as a percentage of shares outstanding (IHPC) and its lagged value (IHPCLAG), and the number of shares held by the largest ten institutional owners in the quarter of institutional trading as a percentage of total shares outstanding (TENPC) and its lagged value (TENPCLAG). Because 13f institutional stock owners are not obligated to report their holdings until after the quarter end, we use lagged values to measure effect of those holdings on the current quarter's institutional trading. However, due to the possibility of information sharing among institutions or information leakage, the changes in institutional holdings could become known to other institutions (and possibly to the market) during the quarter of the trading. To measure impact of this "preliminary" trading information dispersion, we consider contemporaneous measures of institutional investments and their changes.

TABLE 4
PROPENSITY OF INSTITUTIONAL INVESTORS TO SELL WELL IN ADVANCE OF A BANKRUPTCY FILING

			Manager type			
	All		1		2	
Variables	Estimates	Point estimates	Estimates	Point estimates	Estimates	Point estimates
Intercept 5	-2.4058	-	-2.6923	-	-2.2398	-
	(<.0001)		(<.0001)		(<.0001)	
Intercept 4	-1.5556	-	-1.7932	-	-1.4193	-
	(<.0001)		(<.0001)		(<.0001)	
Intercept 3	-0.9453	-	-1.1757	-	-0.8246	-
	(<.0001)		(<.0001)		(0.0016)	
Intercept 2	-0.4131	-	-0.6487	-	-0.3117	-
	(<.0001)		(<.0001)		(0.2314)	
Intercept 1	-0.0826	-	-0.3181	-	-0.0054	-
	(0.2431)		(0.0480)		(0.9835)	
LNAT	-0.0973	0.907	-0.1411	0.868	-0.1915	0.826
	(<.0001)		(<.0001)		(<.0001)	

(TABLE 4 continues)

	All		Manager type 1		2	
Variables	Estimates	Point estimates	Estimates	Point estimates	Estimates	Point estimates
LNSALES	0.0286	1.029	0.0729	1.076	0.1041	1.110
	(0.0007)		(0.0001)		(0.0016)	
STOAT	0.0553	1.057	0.0170	1.017	0.0391	1.040
	(<.0001)		(0.4202)		(0.2662)	
ROA	-0.0609	0.941	-0.0332	0.967	-0.0474	0.954
	(<.0001)		(0.1203)		(0.1806)	
LTAT	0.0880	1.092	0.1037	1.109	0.1644	1.179
	(<.0001)		(<.0001)		(<.0001)	
DTEQ	-0.0016	0.998	-0.0024	0.998	-0.0022	0.998
	(<.0001)		(<.0001)		(0.0327)	
CURR	-0.0018	0.998	0.0063	1.006	-0.0090	0.991
	(0.5262)		(0.3236)		(0.4132)	
ARVW	0.2557	1.291	0.3523	1.422	0.4313	1.539
	(<.0001)		(<.0001)		(0.0016)	
LNMKTVL	0.0743	1.077	0.0718	1.074	0.0856	1.089
	(<.0001)		(<.0001)		(0.0003)	
BM	0.0034	1.003	0.0006	1.001	0.0031	1.003
	(<.0001)		(0.6898)		(0.2390)	
LQDT	3.4131	1.511	6.7121	2.674	-6.3675	0.201
	(0.8566)		(0.2174)		(0.4639)	
RISK	-0.1388	0.870	-0.0937	0.911	-0.0951	0.909
	(<.0001)		(<.0001)		(0.0046)	
NUM13F	-0.0121	0.988	-0.0150	0.985	-0.0101	0.990
	(<.0001)		(<.0001)		(<.0001)	
IHPC	-0.1520	0.859	0.0393	1.040	-0.7539	0.471
	(0.0122)		(0.7814)		(0.0011)	
TENPC	-0.8249	0.438	-1.1398	0.320	-1.2273	0.293
	(<.0001)		(<.0001)		(0.0028)	
NUM13FLAG	0.0078	1.008	0.0106	1.011	0.0060	1.006
	(<.0001)		(<.0001)		(0.0007)	
IHPCLAG	0.5621	1.754	0.5073	1.661	1.2105	3.355
	(<.0001)		(0.0004)		(<.0001)	
TENPCLAG	-0.0701	0.932	0.4534	1.574	0.2163	1.241
	(0.5205)		(0.0757)		(0.5915)	
LogLikelihood	6,364		1,364		476	
	(<.0001)		(<.0001)		(<.0001)	
Degrees of freedom	18		18		18	
No. of observations	203,175		41,448		14,984	

(TABLE 4 continues)

| Variables | Manager type (continues) | | | | | |
| | 3 | | 4 | | 5 | |
	Estimates	Point estimates	Estimates	Point estimates	Estimates	Point estimates
Intercept 5	-2.3554	-	-2.2576	-	-2.5011	-
	(<.0001)		(<.0001)		(<.0001)	
Intercept 4	-1.5355	-	-1.4434	-	-1.5890	-
	(<.0001)		(<.0001)		(<.0001)	
Intercept 3	-0.9404	-	-0.8477	-	-0.9412	-
	(0.0002)		(<.0001)		(<.0001)	
Intercept 2	-0.4215	-	-0.3063	-	-0.4094	-
	(0.0990)		(0.0034)		(0.0113)	
Intercept 1	-0.1035	-	0.0236	-	-0.0621	-
	(0.6853)		(0.8216)		(0.7007)	
LNAT	-0.1078	0.898	-0.0847	0.919	-0.0547	0.947
	(0.0031)		(<.0001)		(0.0269)	
LNSALES	0.0695	1.072	0.0206	1.021	-0.0268	0.974
	(0.0211)		(0.0994)		(0.1715)	
STOAT	-0.0012	0.999	0.0479	1.049	0.1303	1.139
	(0.9719)		(0.0005)		(<.0001)	
ROA	-0.1334	0.875	-0.0493	0.952	-0.1063	0.899
	(0.0004)		(0.0007)		(<.0001)	
LTAT	0.0745	1.077	0.0586	1.060	0.0934	1.098
	(0.1190)		(0.0008)		(<.0001)	
DTEQ	-0.0017	0.998	-0.0020	0.998	0.0001	1.001
	(0.0574)		(<.0001)		(0.8719)	
CURR	0.0182	1.018	-0.0116	0.988	0.0101	1.010
	(0.0702)		(0.0062)		(0.1614)	
ARVW	-0.0250	0.975	0.1776	1.194	0.4275	1.533
	(0.8578)		(0.0015)		(<.0001)	
LNMKTVL	0.0439	1.045	0.0795	1.083	0.0589	1.061
	(0.0545)		(<.0001)		(<.0001)	
BM	0.0080	1.008	0.0025	1.002	0.0064	1.006
	(0.0130)		(0.0178)		(<.0001)	
LQDT	6.1301	2.461	-4.6810	0.626	-3.5888	0.728
	(0.4565)		(0.8910)		(0.4621)	
RISK	-0.2069	0.813	-0.1172	0.889	-0.2149	0.807
	(<.0001)		(<.0001)		(<.0001)	
NUM13F	-0.0134	0.987	-0.0137	0.986	-0.0057	0.994
	(<.0001)		(<.0001)		(<.0001)	
IHPC	-0.0802	0.923	-0.0204	0.980	-0.4267	0.653
	(0.7181)		(0.8202)		(0.0011)	
TENPC	-0.9023	0.406	-0.7692	0.463	-0.3537	0.702
	(0.0245)		(<.0001)		(0.1729)	

(TABLE 4 continues)

| | Manager type | | | | | |
| | 3 | | 4 | | 5 | |
Variables	Estimates	Point estimates	Estimates	Point estimates	Estimates	Point estimates
NUM13FLAG	0.0095	1.010	0.0091	1.009	0.0023	1.002
	(<.0001)		(<.0001)		(0.0222)	
IHPCLAG	0.5336	1.705	0.3768	1.458	0.7536	2.125
	(0.0174)		(<.0001)		(<.0001)	
TENPCLAG	-0.0259	0.974	-0.2198	0.803	-0.4291	0.651
	(0.9474)		(0.1623)		(0.1033)	
LogLikelihood	463		3,284		991	
	(<.0001)		(<.0001)		(<.0001)	
Degrees of freedom	18		18		18	
No. of observations	14,993		92,170		39,580	

NOTES: Reported are estimates of the coefficients from ordered logit model. The results are reported for all institutions, and then categorized by manager type: 1=banks, 2=insurance companies, 3=investment companies and their managers, 4=independent investment advisors, and 5=all others. Dependent variable in the regression is determined based on the quarterly abnormal net trading totals. The value of dependent variable ranges from 0 to 5 depending on when an institution became a net seller for the first time. Explanatory variables are as follows: natural logarithms of total assets (LNAT), market capitalization (LNMKTVL), and sales (LNSALES), return on assets (ROA), debt-to-assets (LTAT), current ratio (CURR), asset turnover (STOAT), debt-to-equity (DTEQ), and book-to-market (BM), risk (RISK), value-weighted abnormal return (ARVW), share turnover (LQDT), number of 13f holders (NUM13F) and its lagged value (NUM13FLAG), total number of shares held by institutions as percentage of total shares outstanding (IHPC) and its lagged value (IHPCLAG), and number of shares held by the largest ten institutional owners as percentage of total shares outstanding (TENPC) and its lagged value (TENPCLAG). P-values are reported in parentheses.

In Table 4 we report ordered log-odds (logit) regression coefficients (also known as maximum likelihood estimates), odds ratio estimates (for more intuitive interpretation of the results), and corresponding p-values (reported in parenthesis). We categorize results reported in the table by manager type and find that they are qualitatively identical, where statistically significant, to those for the entire sample. At the bottom of Table 4 we also present likelihood ratios, their degrees of freedom, and associated p-values corresponding to the conclusion that at least one of the regression coefficients in the model is not equal to zero. The majority of the regression coefficients appears to be significantly different from zero; however, several coefficient estimates are not economically material (those with point estimates close to one).

Institutions start selling securities of firms with smaller asset size earlier in the five-year period—for a one unit increase in the natural logarithm of total assets, the odds that institutions start selling in the earlier years are 0.91 times lower than for the years closer to the quarter of bankruptcy, given all other variables are held constant. Institutions also sell less risky and more levered firms, and firms with lower ROA and current ratios sooner during the five-year period (the odds decrease by 0.87 for one unit increase in the risk measure and the odds increase by 1.1 for one unit increase in the debt-to-assets ratio; the odds decrease by 0.94 for one unit increase in ROA ratio and by 0.99 for one unit increase in current ratio). The coefficient estimate on share volume (LQDT) is not different from zero in the regression. Based on the regression results, to this point we cannot reject our first hypothesis that institutional investors delay selling shares of bankrupt firms that are larger, less levered, and operationally stronger, as

indicated by higher ROA and current ratios. However, institutions sell shares of less risky firms sooner during the five-year period.

Surprisingly, the institutional managers sell firms sooner with a higher natural logarithm of sales and asset turnover ratio (for one unit increase in each of these variables the odds of selling well in advance of a bankruptcy filing are 1.03 and 1.06, respectively, greater than for the later years, holding all other variables constant). Even more surprising, institutional shareholders are likely to sell shares of distressed firms with greater value-weighted market adjusted abnormal returns sooner during the five-year period (point estimate for this variable is economically material 1.3). Institutions also hold on to the shares of distressed firms with smaller market capitalization while selling those with smaller total assets.

Institutions exhibit herding behavior. We find that the odds of the institutions selling shares of distressed firms during the earlier years of the five-year period rise with greater prior quarter's number of 13f filers (by 1.008 for each unit increase, which is not economically material) and percentage of shares held by institutional investors (by an economically material 1.75); the odds fall with an increase in the current quarter's number of 13f filers (by 0.99, which is not economically material), percentage of shares held by all institutions (by economically significant 0.86), and percentage of shares held by the largest ten institutions (by also economically significant 0.44). We find, however, interpretation of the coefficients for contemporaneous measures of institutional holdings to be more intuitive; in addition, two of the three lagged values of the variables are either statistically or economically insignificant. Perhaps, the fact that information on institutional trading becomes known to other institutions before the required filing with the SEC may drive our results. This evidence supports our first hypothesis that institutional investors delay selling shares of bankrupt firms that are held by other institutional investors.

In summary, we find that institutional investors delay selling shares of bankrupt firms that are larger, with lower debt-to-total assets ratio, higher debt-to-equity, ROA, and current ratios, and higher equity risk. Institutional investors tend to sell shares of distressed firms with fewer 13f filers and lower percentage of institutional holdings sooner. Looking at these findings in aggregate, it seems as institutional investors ignore several important operating and market performance indicators and closely follow trading strategies of other institutions holding the shares. Our findings support conclusions made in the extant literature suggesting that institutions exhibit herding investment behavior and that the institutional herding is a consequence of an irrational psychological behavior resulting in significant capital losses.

Institutional Trading Around Periods of Quarterly Abnormal Holding Period Returns

We now examine the relation between the timing of institutional trading and security returns to test our second hypothesis. Seyhun and Bradley (1997) find that stockholders of bankrupt firms suffer significant capital losses in the years before filing and find that corporate insiders of firms filing bankruptcy petitions and trading a large number of shares sell stock before prices fall and buy stock after prices have fallen. The data in Table 3, however, indicate that institutional managers are net buyers of the shares of failing firms during the five-year period preceding the filings (the average abnormal net number of shares purchased per firm for quarterly period -20, -1, inclusive, is a positive 4,863). Giving institutions the benefit of a doubt, we attempt to further investigate this result and find out whether institutional buying (selling) of bankrupt firms occurs after (before) stock price declines. If the institutions in our sample do not act strategically and, instead, buy (sell) shares before (after) the prices fall, then they would incur capital losses.

To test our second hypothesis we utilize a modification of the methodology developed by Seyhun and Bradley (1997). First, to measure the timing of institutional trading, we partition abnormal holding period returns before and after institutional trading using a dummy variable technique. We begin with calculating quarterly abnormal holding period returns between 1988 and 2011 by subtracting quarterly value-weighted market returns from each firm's returns in the same quarter. Then, for each quarter holding period, we determine the net abnormal trading by institutional managers in the quarter preceding the holding period and the net abnormal trading by the managers in the quarter immediately following the holding quarter period.[27] Next we run the following regression for each quarter-manager combination.

$$\text{AHPR}_t = \beta_0 + \beta_1 \text{DB}_{i,t} + \beta_2 \text{DA}_{i,t} + \varepsilon_t, \text{ for } i = 1, 3 \text{ and } t = -19 \text{ to } 0, (1)$$

where AHPR_t = abnormal holding period return in quarter t; $\text{DB}_{i,t}$ = dummy variable that takes on a value of 1 if institutional managers are net buyers, 0 if they are non-traders, and -1 if they are net sellers during the quarter before the holding period, t; and $\text{DA}_{i,t}$ = dummy variable that takes on a value of 1 if managers buy, 0 if they do not trade, and -1 if they sell during the quarter after the holding period, t.

As Seyhun and Bradley (1997) indicate, if the institutional investors sell shares of stocks before their prices fall, then β_1 should be positive and significant; if institutions sell after the prices fall, then β_2 should be positive and significant. If, however, the institutional investors believe that the market price has fallen and that the investment is now undervalued, they would be enticed to buy shares of this security; this would result in a negative, statistically significant estimate for β_2.

TABLE 5
THE TIMING OF INSTITUTIONAL TRADING

Quarter horizons	Manager type								
	All			1			2		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.00367	0.0024	-0.0053	-0.0058	0.0029	-0.0043	-0.0051	0.0043	-0.0066
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0156)	(0.0004)	(<.0001)	(0.0244)	(0.0007)
-16, -13	-0.00551	-0.0008	0.0012	-0.0067	0.0022	0.000002	-0.0081	-0.0022	0.0023
	(<.0001)	(0.0751)	(0.0052)	(<.0001)	(0.0238)	(0.9987)	(<.0001)	(0.1508)	(0.1407)
-12, -9	-0.00464	-0.0046	0.0021	-0.0057	-0.0056	0.0014	-0.0079	-0.0028	0.0013
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.2290)	(<.0001)	(0.1237)	(0.4896)
-8, -5	-0.03684	-0.0020	0.0012	-0.0371	-0.0020	0.0002	-0.0395	-0.0044	0.0007
	(<.0001)	(<.0001)	(0.0163)	(<.0001)	(0.0770)	(0.8752)	(<.0001)	(0.0179)	(0.7154)
-4, -1	-0.1047	0.0070	0.0088	-0.1043	0.0099	0.0079	-0.1054	0.0034	0.0092
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0002)	(<.0001)	(0.2882)	(0.0090)
-20, -1	-0.0332	-0.0013	0.0028	-0.0338	-0.0003	0.0025	-0.0348	-0.0019	0.0028
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.6208)	(<.0001)	(<.0001)	(0.0515)	(0.0058)

Quarter horizons	Manager type (continues)								
	3			4			5		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.0010	0.0040	-0.0039	-0.0036	0.0019	-0.0052	-0.0018	0.0014	-0.0068
	(0.4510)	(0.0552)	(0.0673)	(<.0001)	(0.0187)	(<.0001)	(0.0352)	(0.2737)	(<.0001)
-16, -13	-0.0002	-0.0028	0.0036	-0.0039	-0.0012	0.0018	-0.0099	-0.0020	-0.0005
	(0.8276)	(0.0959)	(0.0374)	(<.0001)	(0.0626)	(0.0055)	(<.0001)	(0.0427)	(0.6476)
-12, -9	-0.0013	-0.0041	0.0042	-0.0032	-0.0042	0.0036	-0.0076	-0.0051	-0.0010
	(0.2447)	(0.0333)	(0.0302)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.3206)
-8, -5	-0.0380	-0.0056	0.0006	-0.0362	-0.0005	0.0010	-0.0369	-0.0035	0.0033
	(<.0001)	(0.0037)	(0.7678)	(<.0001)	(0.4852)	(0.2020)	(<.0001)	(0.0010)	(0.0026)
-4, -1	-0.1079	0.0077	0.0060	-0.1069	0.0073	0.0088	-0.0991	0.0043	0.0101
	(<.0001)	(0.0229)	(0.1102)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0134)	(<.0001)
-20, -1	-0.0301	-0.0018	0.0035	-0.0322	-0.0008	0.0032	-0.0358	-0.0033	0.0020
	(<.0001)	(0.0866)	(0.0011)	(<.0001)	(0.0354)	(<.0001)	(<.0001)	(<.0001)	(0.0007)

NOTES: The table reports estimated coefficients from institution-by-institution regressions of actual quarterly holding period returns minus value-weighted index return from the Center for Research in Security Prices (CRSP) on the abnormal number of shares traded in the quarterly intervals before and after the holding period. The results are reported for all institutions, and then categorized by manager type: 1=banks, 2=insurance companies, 3=investment companies and their managers, 4=independent investment advisors, and 5=all others. Abnormal trades are coded as one of the three dummy variables: -1 if sales, 0 if no trading, and 1 if purchases. P-values are reported in parentheses.

In Table 5 we report time-series estimates of the coefficients of the estimating equation for all institutions in the sample, by manager type, and by year prior to bankruptcy filing, with the final rows being for the aggregated five-year period. The signs of the coefficients for before-holding period trading (DB) are mixed during the five-year period we analyze. While one might argue that there is an indication of strategic trading in year t-1 (DB's coefficient is 0.007), the overall five-year coefficient is -0.0013 which is significant and suggestive, for the period, of purchasing before prices fall. Further, the estimates for coefficients on after-holding-period abnormal trading (DA) are positive from t-4 forward (and in aggregate for the entire period), suggesting that institutions sell shares of distressed firms after prices fall. Turning to our results by manager type, we find qualitatively similar results as for all managers in the sample.[28]

To analyze trading size effects of large transactions as more informative trades, we compare returns across firms by partitioning the number of shares traded into three groups: small, medium, and large. The upper and lower bounds of each group are determined based on the highest and the lowest number of shares traded in each group. We divided all institutional net holding changes onto three groups and find the highest and the lowest number of net shares traded in each group as follows: (1) we find absolute values of the net sales, (2) we then sort all institutional trades based on their size, (3) we assign the largest 10% of all quarterly net changes to the large trading size category, and equally divide the remaining transactions between medium (45% of transactions) and small (remaining 45% of transactions) categories, finally (4) we assign the smallest transaction in the large trading category as a lower bound for this category, amounts of the largest and the smallest transactions in the medium trading size category as an upper and a lower bounds, respectively, and amount of the largest transaction in the small trading size category as an upper bound. We repeat the same partitioning for each manager type. In the first panel of Table 6 we present regression results for all institutional managers, categorized by quarter horizon relative to the filing and by trading size and in the following five panels we present the same results for each manager type.

TABLE 6
THE TIMING OF INSTITUTIONAL TRADING, CATEGORIZE BY TRANSACTION SIZE

Quarter horizons	All								
	T < 107,500			107,500 <= T < 1,271,050			T >= 1,271,050		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.00385	0.0045	-0.0078	-0.0128	0.0042	-0.0098	-0.0170	0.0109	0.0001
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0276)	(<.0001)	(0.0020)	(0.2846)	(0.9900)
-16, -13	-0.00504	-0.0016	0.0004	-0.0068	-0.0056	-0.0015	-0.0287	-0.0056	-0.0002
	(<.0001)	(0.0007)	(0.4183)	(<.0001)	(<.0001)	(0.2721)	(<.0001)	(0.2602)	(0.9702)
-12, -9	-0.00323	-0.0016	0.0029	-0.0036	-0.0022	0.0054	-0.0040	0.0054	0.0071
	(<.0001)	(0.0014)	(<.0001)	(<.0001)	(0.0882)	(<.0001)	(0.0954)	(0.2092)	(0.1007)
-8, -5	-0.02265	-0.0028	0.0011	-0.0258	-0.0077	0.0038	-0.0184	-0.0056	0.0106
	(<.0001)	(<.0001)	(0.0529)	(<.0001)	(<.0001)	(0.0077)	(<.0001)	(0.2283)	(0.0290)
-4, -1	-0.0917	0.0055	0.0106	-0.1098	0.0004	-0.00172	-0.1306	-0.0123	-0.0115
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.8363)	(0.4266)	(<.0001)	(0.0539)	(0.1091)

(TABLE 6 continues)

Quarter horizons	All (continues)								
	T < 107,500			107,500 <= T < 1,271,050			T >= 1,271,050		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -1	-0.0318	-0.0007	0.0029	-0.0398	-0.0045	0.0002	-0.0561	-0.0084	-0.0041
	(<.0001)	(0.0215)	(<.0001)	(<.0001)	(<.0001)	(0.8167)	(<.0001)	(0.0037)	(0.1815)
Quarter horizons	**Manager type 1**								
	T < 44,473			44,473 <= T < 588,400			T >= 588,400		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.0049	0.0045	-0.0071	-0.0094	0.0094	-0.0057	-0.0081	0.0029	-0.0063
	(<.0001)	(0.0041)	(<.0001)	(0.0002)	(0.0151)	(0.1377)	(0.3760)	(0.8515)	(0.6799)
-16, -13	-0.0066	0.0008	-0.0007	-0.0085	-0.0025	0.0012	-0.0281	-0.0084	0.0000
	(<.0001)	(0.4912)	(0.5485)	(<.0001)	(0.3475)	(0.6501)	(<.0001)	(0.2360)	(0.9952)
-12, -9	-0.0056	-0.0017	0.0028	-0.0038	-0.0017	0.0057	-0.0124	-0.0038	0.0019
	(<.0001)	(0.1246)	(0.0150)	(0.0285)	(0.5265)	(0.0365)	(0.0010)	(0.5630)	(0.7820)
-8, -5	-0.0223	-0.0030	-0.0005	-0.0277	-0.0041	0.0007	-0.0266	-0.0063	0.0033
	(<.0001)	(0.0206)	(0.7217)	(<.0001)	(0.1738)	(0.8184)	(<.0001)	(0.3640)	(0.6620)
-4, -1	-0.0909	0.0079	0.0091	-0.1076	0.0013	0.0074	-0.1214	-0.0114	0.0062
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.7476)	(0.1079)	(<.0001)	(0.3292)	(0.6247)
-20, -1	-0.0321	0.00012	0.0020	-0.0400	-0.0009	0.0034	-0.0527	-0.0102	0.0009
	(<.0001)	(0.8497)	(0.0025)	(<.0001)	(0.5724)	(0.0433)	(<.0001)	(0.0262)	(0.8568)
Quarter horizons	**Manager type 2**								
	T < 32,992			32,992 <= T < 515,080			T >= 515,080		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.0036	0.0082	-0.0072	-0.0141	0.0076	-0.0120	-0.0102	-0.0124	-0.0338
	(0.0319)	(0.0010)	(0.0031)	(<.0001)	(0.1767)	(0.0307)	(0.2759)	(0.4507)	(0.0407)
-16, -13	-0.0072	-0.0039	0.0007	-0.0109	-0.0034	-0.0015	-0.0273	-0.0041	-0.0098
	(<.0001)	(0.0306)	(0.6884)	(<.0001)	(0.3381)	(0.6756)	(<.0001)	(0.7395)	(0.4340)
-12, -9	-0.0059	0.0003	0.0025	-0.0052	-0.0019	0.0044	-0.0091	0.0011	0.0191
	(<.0001)	(0.8669)	(0.2067)	(0.0204)	(0.6066)	(0.2345)	(0.1472)	(0.9211)	(0.0709)
-8, -5	-0.0252	-0.0055	-0.0006	-0.0303	0.0005	0.0042	-0.0325	-0.0154	0.0129
	(<.0001)	(0.0090)	(0.7648)	(<.0001)	(0.9007)	(0.3331)	(<.0001)	(0.1691)	(0.2635)
-4, -1	-0.0899	0.0027	0.0133	-0.1108	-0.0073	-0.0036	-0.1374	-0.0157	-0.0076
	(<.0001)	(0.3408)	(<.0001)	(<.0001)	(0.2148)	(0.5893)	(<.0001)	(0.3903)	(0.7158)
-20, -1	-0.0324	-0.0013	0.0030	-0.0404	-0.0023	0.0006	-0.0576	-0.0128	0.0001
	(<.0001)	(0.2442)	(0.0080)	(<.0001)	(0.3178)	(0.8009)	(<.0001)	(0.0734)	(0.9893)
Quarter horizons	**Manager type 3**								
	T < 98,309			98,309 <= T < 1,440,556			T >= 1,440,556		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.0018	0.0057	-0.0083	-0.0121	0.0029	-0.0066	-0.0317	-0.0263	0.0113
	(0.3237)	(0.0343)	(0.0019)	(0.0010)	(0.6130)	(0.2503)	(0.0028)	(0.1660)	(0.5633)
-16, -13	0.0001	-0.0015	0.0028	0.0032	-0.0056	0.0001	-0.0255	0.0137	-0.0160
	(0.9677)	(0.4476)	(0.1527)	(0.1992)	(0.1667)	(0.9755)	(0.0010)	(0.3185)	(0.2557)
-12, -9	0.0007	-0.0033	0.0035	-0.0021	-0.0021	0.0099	-0.0024	0.0114	-0.0016
	(0.5636)	(0.1030)	(0.0882)	(0.3840)	(0.6192)	(0.0171)	(0.7138)	(0.3520)	(0.8982)

(TABLE 6 continues)

Quarter horizons	Manager type 3 (continues)								
	T < 98,309			98,309 <= T < 1,440,556			T >= 1,440,556		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-8, -5	-0.0220	-0.0053	0.0010	-0.0244	-0.0124	0.0063	-0.0304	-0.0009	0.0092
	(<.0001)	(0.0236)	(0.6638)	(<.0001)	(0.0062)	(0.1570)	(<.0001)	(0.9402)	(0.4640)
-4, -1	-0.0917	0.0069	0.0097	-0.1124	-0.0055	-0.0008	-0.1198	-0.0095	-0.0026
	(<.0001)	(0.0245)	(0.0056)	(<.0001)	(0.3640)	(0.9055)	(<.0001)	(0.5965)	0.8945
-20, -1	-0.0279	-0.0004	0.0032	-0.0341	-0.0070	0.0036	-0.0556	0.0002	-0.0069
	(<.0001)	(0.7179)	(0.0075)	(<.0001)	(0.0030)	(0.1350)	(<.0001)	(0.9815)	(0.3907)

Quarter horizons	Manager type 4								
	T < 86,925			86,925 <= T < 1,141,500			T >= 1,141,500		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.0039	0.0036	-0.0077	-0.0115	0.0026	-0.0113	-0.0198	0.0222	-0.0067
	(<.0001)	(0.0003)	(<.0001)	(<.0001)	(0.2812)	(<.0001)	(0.0064)	(0.1063)	(0.6270)
-16, -13	-0.0039	-0.0014	0.0011	-0.0035	-0.0059	-0.0023	-0.0264	-0.0129	0.0063
	(<.0001)	(0.0584)	(0.1368)	(0.0012)	(0.0005)	(0.1948)	(<.0001)	(0.0544)	(0.3776)
-12, -9	-0.0018	-0.0011	0.0041	-0.0025	-0.0043	0.0032	-0.0024	0.01006	0.0137
	(<.0001)	(0.1372)	(<.0001)	(0.0152)	(0.0111)	(0.0620)	(0.4605)	(0.0758)	(0.0185)
-8, -5	-0.0214	-0.0004	0.0022	-0.0252	-0.0096	0.0028	-0.0177	0.0036	0.0093
	(<.0001)	(0.6169)	(0.0098)	(<.0001)	(<.0001)	(0.1335)	(<.0001)	(0.5976)	(0.1890)
-4, -1	-0.0927	0.0059	0.0113	-0.1085	0.0038	-0.0033	-0.1337	-0.0083	-0.0129
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.1282)	(0.2410)	(<.0001)	(0.3134)	(0.1681)
-20, -1	-0.0306	0.0002	0.0037	-0.0371	-0.0050	-0.0010	-0.0558	-0.0029	-0.0030
	(<.0001)	(0.5890)	(<.0001)	(<.0001)	(<.0001)	(0.3398)	(<.0001)	(0.4479)	(0.4609)

Quarter horizons	Manager type 5								
	T < 46,243			46,243 <= T < 748,100			T >= 748,100		
	Intercept	DB	DA	Intercept	DB	DA	Intercept	DB	DA
-20, -17	-0.0016	0.0042	-0.0078	-0.0121	0.0117	-0.0123	-0.0159	-0.0134	-0.0052
	(0.1589)	(0.0145)	(<.0001)	(<.0001)	(0.0012)	(0.0005)	(0.0558)	(0.3117)	(0.6944)
-16, -13	-0.0074	-0.0041	-0.0011	-0.0138	-0.0042	-0.0040	-0.0254	-0.0062	0.0017
	(<.0001)	(0.0003)	(0.3550)	(<.0001)	(0.0912)	(0.1108)	(<.0001)	(0.4621)	(0.8465)
-12, -9	-0.0047	-0.0023	-0.0003	-0.0043	0.0001	0.0047	-0.0142	0.0012	0.0027
	(<.0001)	(0.0337)	(0.7974)	(0.0013)	(0.9864)	(0.0298)	(0.0003)	(0.8659)	(0.6911)
-8, -5	-0.0246	-0.0051	0.0013	-0.0236	-0.0060	0.0026	-0.0168	-0.0163	-0.0046
	(<.0001)	(<.0001)	(0.3121)	(<.0001)	(0.0136)	(0.2841)	(<.0001)	(0.0271)	(0.5551)
-4, -1	-0.0880	0.0055	0.0116	-0.0995	-0.0026	0.0012	-0.1185	-0.0152	-0.0164
	(<.0001)	(0.0006)	(<.0001)	(<.0001)	(0.4243)	(0.7357)	(<.0001)	(0.1358)	(0.1544)
-20, -1	-0.0340	-0.0023	0.0022	-0.0407	-0.0047	0.0001	-0.0539	-0.0175	-0.0064
	(<.0001)	(0.0004)	(0.0009)	(<.0001)	(0.0006)	(0.9515)	(<.0001)	(0.0002)	(0.1942)

NOTES: The upper and lower bounds of each trading size group are determined based on the highest and the lowest number of shares traded in each group.

Interestingly, in the largest transaction size category the coefficients for before-holding period trading (DB) are negative and statistically significant for all institutional investors and manager types 1 (banks), 2 (insurance companies), and 5 (all others) during the five-year period we analyze. While one would expect large trades to be more informative, we find that these transactions are an indication of institutional share purchases before the prices decline. The overall five-year coefficient is -0.01, which is statistically significant. The estimates for coefficients on after-holding-period abnormal trading (DA) are not different from zero. We reject our second hypothesis that institutional investors sell shares of distressed firms to avoid capital losses and that they invest similarly to insiders who sell (postpone purchase) shares before significant stock-price decreases and buy (postpone sales) before significant price increases.

CONCLUSION

In this paper we analyze the investment behavior of institutional managers who hold firms that subsequently file bankruptcy petitions. We find that during the five-year period preceding a bankruptcy filing managers are net buyers with a positive abnormal net number of shares (versus the control sample) traded during the period. When analyzing institutional trading behavior for five years prior to bankruptcy filing we find that institutional investors do not sell heavily until the year prior to filing and during the quarter of filing. As opposed to the group as a whole, investment company managers are heavy sellers during the entire period.

Irrespective of these findings, we attempt to assess the likelihood of institutions starting to sell earlier during the five-year period preceding a bankruptcy filing in relationship to important firm-specific operating and market variables. The propensity of institutional managers to start selling shares of bankrupt firms sooner appears to positively correlate with firm's leverage; it negatively correlates with firm's size, ROA, market debt-to-equity and current ratios, as well as its riskiness. We observe strong signs of herding when assessing what prompts the institutions to start selling and find that smaller shareholdings of all institutional investors and of the largest ten institutional investors, as well as fewer institutions owning the same security tend to increase the likelihood of institutional managers to start selling shares well in advance of a bankruptcy filing.

Given institutional managers do not seem to sell early in the pre-bankruptcy process we attempt to find signs of a sound logic in the institutions' investment strategy. We evaluate the timing of institutional managers' trading and determine whether they sell securities of bankrupt firms before the share prices fall significantly avoiding great capital losses. We fail to find evidence that institutional stockholders trade strategically and avoid material price declines before they occur.

In our analysis of institutional investment behavior we do not find convincing evidence that would persuade us to believe in sophistication, ingenuity, and astuteness of institutions' investment strategies–at least as it might pertain to firms during the five years prior to filing Chapter 11 petitions. As much and as hard as we have tried to find signs of any of these qualities, we disappoint ourselves with findings of irrational herding behavior and delayed reaction to the signs of trouble that bankrupt firms start showing several years before they file for reorganization. We provide support for earlier findings that suggest that institutional herding is a result of irrational psychological behavior and those managers' herding and feedback trading are a fad possibly encouraged by agency problems.

ENDNOTES

1. Or identify and divest assets that have low or negative potential returns.
2. According to Hotchkiss and Strickland (2003) who investigate investor composition, low turnover institutional investors (those with average holding period of 3 years or longer) own the greatest percentage of shares outstanding (mean of 27.4% and median of 27.5%); high turnover managers, with holding period of less than 1.5 years, hold on average 10.8% of shares outstanding (with median of 8.7%). Maug (1998) finds that information cost and cost of monitoring inversely relates to market liquidity and that frequently traded shares reduce institutional investors' incentives to gather information through monitoring because the share liquidity allows institutions to sell their holdings more easily. We believe that the marginal

3. On November 1, 2012 The *Wall Street Journal's* professional edition with Factiva announced the launch of Vega-Chi trading platform solely for institutional investors. The platform focuses on high yield and distressed securities only and offers institutional investors the ability to trade directly with each other. This launch indicates that institutional investors have an appetite for shares of distressed firms and risky investments. Previously, in the October 22, 2012 issue of the *Journal*, Nick Elliott reports that according to the Institutional Shareholder Services (ISS) annual survey, investors rank "risk oversight" in sixth place on a list of nine other topics, two notches down from previous ISS surveys in 2010 and 2011, when it ranked as the fourth-highest concern.

4. This question addresses the issue of institutional herding during five years preceding bankruptcy filings. It also addresses institutional independence of analysis.

5. Falkenstein (1996) explains this occurrence with fund managers taking advantage of the option-like payoff to their relative performance by avoiding the lowest volatility stocks rather than investing in the most highly volatile stocks.

6. Nofsinger and Sias (1999, footnote 1, p.1,) define feedback trading as a special case of herding that "results when lag returns, or variables correlated with lag returns (e.g., earnings momentum, decisions of previous traders, changes in firms characteristics, etc.), act as the common signal; herding is a group of investors trading in the same direction over a period of time."

7. Refer to http://www.sec.gov/answers/form13f.htm for further SEC filing guidelines.

8. Thomson Reuters adjusts the reported holdings and net changes for stock splits (including reverse stock splits which are a more frequent occurrence in the case of bankrupt firms), and we use the split-adjusted values.

9. The institutions may not necessarily sell their entire holdings when they stop the SEC's 13f reporting. Some institutions may sell-off and some may have their holdings fall under the SEC's reporting threshold requirement. By assuming that all institutions that stop the reporting sell-off their shareholdings we obtain more conservative results in our analysis of timeliness of institutional selling of shares of struggling firms as they approach bankruptcy.

10. There were 689 firms (or 38% of 1,831 firms in the initial sample) that were not held by institutions during 1988-2011 time period.

11. The mean (median) number of institutional investors per firm is 109 (56).

12. We calculate the following performance related variables based on the Compustat data: sales divided by total assets; operating income before depreciation divided by total assets (operating ROA); net income divided by total assets (ROA); total liabilities divided by total assets; total liabilities divided by market value of equity; current assets divided by current liabilities (current ratio); cash divided by current liabilities (cash ratio); and a sum of common equity, deferred taxes, and investment tax credit divided by market capitalization (B/M ratio). Altman's Z-score (Altman, 1968) is defined as 3.3x((pretax income + interest expense)/total assets) + 0.999x(sales/total assets) + 0.6x(market capitalization/total liabilities) + 1.2x(working capital/total assets) + 1.4(retained earnings/total assets).

13. An unanswered question at this point is whether some of these firms execute SEOs during this five year period, which may partially drive the unexpected lack of a decline in mean market capitalization until year t-1. In addition, we observe an increase in the number of firms from year t-5 to t-2 and then a sharp decrease from year t-2 to the quarter of bankruptcy.

14. However, both current and cash ratios are unexpectedly high at t=0. These results may be because we lose smaller firms from our sample during the later quarters (we lose about 1/4 of the firms from t-2 to t-1 and then another 2/3 of the firms from t-1 to t=0). Hence, increases in total assets, sales, and debt-to-assets ratio as the firms approach bankruptcy filings is indication of having larger firms in the sample, which are allowed a bigger leverage than smaller firms that are no longer in the sample.

15. Again, with some t=0 improvement.

16. Some occur before Chapter 11 filing, but well after public knowledge that filing is either certain or near certain; thus these too are reactive, not proactive.

17. Using the median holdings, the largest institution (five largest institutions) held 7.56 percent (20.25 percent) of struggling firms five years prior to filing and by year t-2 this had only been reduced to 7.35 percent (17.22 percent). In year t-1 it was 5.59 percent (11.83 percent).

18. Not all firms had institutional ownership every quarter (or even year); thus the number of firms reported in Table 2, in any given year is fewer than the sample size of 1,142.

19. By excluding firms that have filed for bankruptcy within reasonably long period of time from sample firm's filing we possibly introduce a selection bias. In addition, for firms that filed for bankruptcy earlier in our sample period (for example, in 1993) we exclude many more firms that did not file from that point in time on until 2011, when our sample period ends (in our example this time period is 1993-2011), than for firms that filed for bankruptcy close to the end of our sample period (for example if a firm filed in 2010, this "exclusion" period would only be 2010-2011). In 1993, the total population of firms on CRSP consisted of 30,068 firms. During the following eighteen years (from 1993 through 2011) 1,831 firms (or 6% of the total population) filed for Chapter 11.

20. We have 11,459 firms in our control sample. These firms have not filed for bankruptcy between 1993 and 2011. Some firms are in the control sample more than once.

21. We do that to avoid comparing changes in institutional holdings, for example, for sample firms that have zero holdings for all four quarters in a given year with corresponding control firms with quarterly holdings in the same year. We also ensure that net changes in the first quarter of each year that reflect share sell-off are included in that year's data (those firms may not have an institutional holding during the remainder of the year).

22. Care must be exercised in looking at quarter 0 results; because of the nature of the data, we do not know what proportion of these net sales is before or after the bankruptcy filings.

23. Overriding both schools is the concept of monitoring. Institutions may own securities and inadequately monitor their operational performance (as opposed to using available information poorly), thus not selling when they "should" sell. As the results of Table 3 indicate there is net buying activity through year t-2, suggesting the possibility of not only poor monitoring, but, in that process, using information suggesting purchase of these firms.

24. The institution would have been either non-trader or net buyer in years -5 and -4.

25. Another situation that we encounter when determining the dependent variable for each institutional manager in the sample is when a manager becomes, for instance, a net seller for the first time in year -5 (dependent variable equals to 5), then he or she either does not trade or still sells in years -4 and -3 (in this case the dependent variable remains 5), and then buys in year -2; in this situation the "selling behavior" is still wiped out if the purchase in year -2 exceeds the absolute value of the sum of all selling or non-trading in years -5, -4, and -3; if this is not the case, then the manager's dependent variable is not changed.

26. We delete quarters when both holding and net change are zero to prevent comparing zero change in the sample's institutional ownership that is due to zero holding with control sample's ownership with holdings in the same quarter; this comparison would lead to an understatement of abnormal net selling for institutions in the sample.

27. As in Table 3, abnormal trading is calculated as the difference in the net institutional holding changes for the sample firms in a certain quarter before filing and the net institutional holding changes for corresponding control firm(s) in the same quarter.

28. Earlier we had found investment funds and their managers (type =3) had, in contrast with all other institutions, engaged in heavy selling throughout this time period. However, their results, as presented in Table 6, are not different from other institutions; they do not seem to sell prior to losses the firms suffer.

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