

# Contagion and competitive intra-industry effects of bankruptcy announcements

## An empirical analysis\*

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This paper investigates the effect of bankruptcy announcements on the equity value of the bankrupt firm's competitors. On average, bankruptcy announcements decrease the value of a value-weighted portfolio of competitors by 1%. This negative effect is significantly larger for highly levered industries and industries where the unconditional stock returns of the nonbankrupt and bankrupt firms are highly correlated; the effect is significantly positive for highly concentrated industries with low leverage, suggesting that in such industries competitors benefit from the difficulties of the bankrupt firm.

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## 1. Introduction

On average, the announcement of a Chapter 11 bankruptcy filing has a strong negative effect on the value of the filing firm's stock.<sup>1</sup> Presumably, the stock price falls because of an increase in the present value of bankruptcy costs and because the bankruptcy announcement provides information about the true value of the firm's assets and the shareholders' claim on those assets. But a look at the stock-price reaction for the bankrupt firm does not reveal how much of the information in the bankruptcy announcement is firm-specific and how much is industry-wide, nor does it tell us whether other firms in the industry benefit from the difficulties of the bankrupt firm. To address these issues, we study the effect of bankruptcy announcements on the bankrupt firm's competitors.

An oft-repeated concern is that bankruptcy is contagious within an industry.<sup>2</sup> The common view is that one firm's bankruptcy makes customers and suppliers wary of the other firms in the same industry irrespective of their economic health and hence makes them worse off. An alternative, more benign, view of contagion is that the bankruptcy announcement reveals negative information about the components of cash flows that are common to all firms in the industry and, consequently, decreases the market's expectation of the profitability of the industry's firms. From an empirical perspective, it is difficult to distinguish between these two views of contagion, but they have strongly different implications for public policy. If contagion is only an information effect, it has no social costs.

We find that, on average, the market value of a value-weighted portfolio of the common stock of the bankrupt firm's competitors decreases by 1% at the time of the bankruptcy announcement and the decline is statistically significant. The conclusion that the bankruptcy announcement has a moderate effect on competitors is important in understanding the economy-wide effects of bankruptcies. The effect appears to be greater for highly leveraged industries; for industries with a debt-to-asset ratio exceeding the sample median, the value of competitors' equity falls by almost 3% on average.

The bankruptcy announcement need not convey only bad news for competitors. It can potentially increase the value of the nonbankrupt firms in the industry by redistributing wealth from the bankrupt firms to their competitors.<sup>3</sup> First, the bankruptcy announcement can reveal that the bankrupt firm has

<sup>1</sup>See, for instance, Altman (1969) and Clark and Weinstein (1983).

<sup>2</sup>See Bernanke (1983) for a discussion of such contagion in the context of the Great Depression. Contagion has been studied in the context of various industries. The first study to report stock returns for competitors of a firm making a bankruptcy announcement is Warner (1977), who, using monthly returns, found no contagion in the railroad industry.

<sup>3</sup>See Altman (1984) for an early statement of this hypothesis.

become less efficient and that the competitive position of the other firms in the industry has improved. Second, indirect bankruptcy costs can make the bankrupt firm less efficient and hence create profitable opportunities for other firms in the industry. Using the Herfindahl index of industry concentration as a proxy for the degree of imperfect competition, we find that the value of competitors' equity actually increases by 2.2% in more concentrated industries with low leverage.

The paper proceeds as follows. In section 2, we discuss what determines the effect of a firm's bankruptcy on its competitors. We document the stock-price reaction of competitors to the bankruptcy announcement in section 3. In section 4, we provide evidence on how the industry effect of bankruptcy announcements differs across industries, and concluding remarks are presented in section 5.

## **2. The industry effects of bankruptcy announcements**

A bankruptcy announcement should convey information about the bankrupt firm's cash flows. First, the present value of cash flows falls by the increase in the present value of bankruptcy costs. Second, the announcement provides information to investors that the firm is less profitable than anticipated. This second effect should be felt by all firms with cash flow characteristics similar to those of the bankrupt firm, so we call it the contagion effect of bankruptcy announcements. In addition, however, a bankruptcy announcement can convey information about how well firms in an industry are doing relative to each other. For instance, the bankrupt firm may be doing poorly because other firms are doing well, so the bankruptcy announcement conveys information about how, for a given total market value of the industry, wealth is distributed within the industry. We call this the competitive effect of bankruptcy announcements. In this section, we analyze the determinants of these two industry effects of bankruptcy announcements.

### *2.1. The contagion effect*

The contagion effect is the change in the value of competitors that cannot be attributed to wealth redistribution from the bankrupt firm. If one views a firm as a portfolio of investments whose true value is not known to outside investors, a bankruptcy filing reveals information to outsiders about that value. If bankruptcy is costly, this information is negative, since the bankrupt firm could avoid bankruptcy by raising funds if the value of its investments was higher. Other firms in the industry are likely to have investments whose cash

flow characteristics are similar to those of the bankrupt firm.<sup>4</sup> The bankruptcy announcement also conveys bad news about these firms since the value of their investments is correlated with the value of the bankrupt firm's investments. All else being equal, one would expect the contagion effect to be more important for firms with highly similar cash flow characteristics than for other firms.

The bankruptcy announcement, in addition to conveying negative information, can decrease the market value of competitors by affecting their dealings with customers, regulators, and suppliers. For instance, customers with limited information about individual firms in an industry could reassess their perception of the creditworthiness of all firms in the industry. As a result, these firms might experience a fall in demand and have to advertise their creditworthiness.

*Interaction with leverage.* The contagion effect applies to a firm's total value. To understand how it reduces the value of a firm's equity, one must take leverage into account. If the bankruptcy filing conveys negative information about the industry, all being else equal, the percentage fall in equity of nonbankrupt firms increases with their leverage because the greater the leverage (1) the greater the elasticity of the value of equity with respect to the total value of the firm and (2) the greater the increase in the present value of direct bankruptcy costs, since the decline in firm value increases the probability of bankruptcy.

## 2.2. *Competitive effect*

A simple scenario that leads to a competitive effect is as follows. Consider an industry with imperfect competition, so that each firm faces an imperfectly elastic demand curve. Next, assume that the bankrupt firm experiences an unexpected decrease in demand because its product has become less attractive in relation to the competitors' products. This demand decrease could result from past developments or from the bankruptcy itself as an indirect bankruptcy cost. If the bankruptcy announcement conveys information about the demand shift, this information is positive for the other firms in the industry because they have experienced or can expect an increase in demand.

*Interaction with the degree of competition.* In a perfectly competitive industry, shareholders of existing firms cannot earn rents from an increase in demand. In less competitive industries, however, the increase in demand increases the present value of the rents to shareholders because the firms whose demand

<sup>4</sup>Obviously, there are bankruptcy announcements that take place for purely idiosyncratic reasons which convey no information about the industry. For such bankruptcies, one would expect the contagion effect to be nonexistent. Aharony and Swary (1983) provide supportive evidence. In a study of three bank bankruptcies, they do not find a significant contagion effect for the bankruptcy which apparently occurred for idiosyncratic reasons.

increases can raise the price for their current output. The importance of the competitive effect should therefore be inversely related to the degree of competition.

A competitive effect could occur for other reasons than a shift in demand. For instance, a drop in production efficiency for the bankrupt firm could result in higher marginal costs and hence higher prices and lower output. In this case, competitors could increase their prices because their products would be substitutes for the now more expensive products of the bankrupt firm.

The bankruptcy announcement can also enable competitors to prey on the bankrupt firm because bankruptcy weakens it or simply reveals that it is weak. For instance, it may be difficult for bankrupt firms to respond to predatory moves that require additional investments. They may find it difficult to raise funds quickly, and management's attention may be diverted by the bankruptcy process.

*Interaction with leverage.* Like the contagion effect, the competitive effect changes the total value of firms. For given cash flows accruing to nonbankrupt firms, the competitive effect on the equity value in more highly leveraged industries should be stronger, all else being equal, because of the greater elasticity of the equity value to cash flows in such industries. At the same time, though, leverage reduces firms' ability to invest and hence to exploit changes in their competitive position.<sup>5</sup> Bolton and Scharfstein (1990) provide an explicit model in which a firm with little debt can prey on a highly leveraged firm because the highly leveraged firm has less flexibility to respond to changes in market conditions. Hence, leverage has an ambiguous effect on the value of a firm's equity: it makes the firm less able to take advantage of the competitive effect, but increases the benefit to shareholders of a change in firm value.

The extent to which bankruptcy enables competitors to prey on the bankrupt firm can be limited by the benefits of Chapter 11 to the filing firm.<sup>6</sup> For instance, the filing firm can unilaterally abrogate contractual obligations and thereby gain a competitive advantage over its competitors. If the announcement effect for the bankrupt firm is negative, this effect cannot be dominant.

<sup>5</sup>See Stulz (1990) for a model that shows the tradeoff between the disciplinary benefits of debt emphasized by Jensen (1986) and the negative effect of leverage on a firm's ability to invest in positive NPV projects when such projects occur unexpectedly and their value is difficult for outsiders to ascertain.

<sup>6</sup>See Wruck (1990) for a review of the literature and further analysis of benefits of a Chapter 11 filing for the bankrupt firm.

### 3. Valuation effects of bankruptcy announcements

The effect of a bankruptcy announcement on competitors is the sum of the contagion and competitive effects. Whereas in general one would expect the contagion effect to be negative and the competitive effect to be positive, no theoretical argument suggests that one of the effects ought to dominate the other irrespective of the characteristics of the industry. If a bankruptcy is caused mainly by a decrease in efficiency, so that the firm will either emerge from bankruptcy smaller or exit the industry altogether, competitors are likely to benefit. If, on the other hand, a bankruptcy is caused by a decrease in demand or an increase in costs common to all firms in the industry, the contagion effect will dominate as long as the common effect is large enough or the degree of imperfect competition low enough.

In this section, we report estimates of the shareholder wealth effect of bankruptcy announcements for the bankrupt firm and its competitors. If the stock price of competitors increases on average, this would be evidence that on average the competitive effect dominates the contagion effect. Our sample consists of all bankruptcies between January 1970 and December 1989 of firms with liabilities in excess of 120 million. This sample was collected by Altman (1990). We focus on large bankruptcies to restrict our attention to cases with a potential industry-wide effect. We define a bankrupt firm's industry as all other firms with the same primary four-digit SIC code in COMPUSTAT.

To compute the shareholder wealth effect of a bankruptcy announcement on the bankrupt firm's competitors, we form a value-weighted portfolio of all firms in the same industry with stock returns available from the Center for Research in Security Prices (CRSP) files.<sup>7</sup> If an industry has several bankruptcy announcements in the sample, we create a value-weighted portfolio for each announcement to reflect the industry's shifting composition. We also estimated abnormal returns for competitors using equally-weighted industry portfolios; since the results are similar to those for value-weighted portfolios, we do not report them here.

Our event date is the date of the *Wall Street Journal* publication of the Chapter 11 filing. For the bankrupt firm, the abnormal return on a particular day is computed as a market model residual, where the parameters of the market model are estimated from -250 to -50 days before the first distress announcement in the *Wall Street Journal*,<sup>8</sup> the market portfolio is the CRSP

<sup>7</sup>Because of computational constraints, we form industry portfolio by randomly selecting 50 firms in COMPUSTAT with the same primary four-digit SIC code as the bankrupt firm and then use the firms among these 50 that have returns on the CRSP files to form industry portfolios. For 48 out of 59 bankruptcies, the number of firms in the industry is less than 50, in which case our procedure uses all firms in COMPUSTAT as the starting point for industry portfolios.

<sup>8</sup>See Gilson, John, and Lang (1990) for a description of first distress announcements.

Table 1  
Abnormal returns associated with bankruptcy announcements.

The abnormal return (*AR*) is the market model residual in percent. The sample includes all bankruptcies between January 1970 and December 1989 of firms with more than \$120 million in liabilities for which a primary four-digit SIC code is available from the COMPUSTAT data file (59 bankruptcies). An industry portfolio is a value-weighted portfolio of firms with the same primary four-digit SIC code for which returns are available from the CRSP files. # denotes the number of abnormal returns available to compute the average abnormal return.

Day relative to bankruptcy announcement	Average abnormal return for bankrupt firms			Average abnormal return for industry portfolios		
	#	AR	z-stat.	#	AR	z-stat.
- 5	45	- 0.55	- 1.25	59	- 0.05	- 0.22
- 4	43	- 1.60	- 3.69	59	0.13	1.52
- 3	42	- 5.55	- 9.20	59	0.02	0.43
- 2	42	- 5.37	- 12.10	59	- 0.27	- 1.22
- 1	41	- 18.93	- 41.42	59	- 0.26	- 2.27
0	40	- 2.50	- 6.34	59	- 0.09	- 0.93
+ 1	40	1.90	2.50	59	- 0.50	- 3.45
+ 2	38	3.47	6.33	59	- 0.14	- 0.87
+ 3	36	2.59	8.16	59	0.05	0.68
+ 4	36	2.35	5.32	59	0.08	0.08
+ 5	35	- 0.40	2.33	59	- 0.02	- 0.68
- 1, 0	40	- 21.66	27.67	59	- 0.35	- 2.26
- 5, + 5	35	- 28.25	16.85	59	- 1.07	- 1.99

value-weighted portfolio, and the beta coefficient is estimated using the method proposed by Scholes and Williams (1977). To obtain the abnormal return for the value-weighted industry portfolio, we estimate the market model parameters using the return of the value-weighted portfolio. This procedure accounts for cross-sectional dependence among returns in the industry. Z-statistics are used to evaluate the significance of the abnormal returns of bankrupt firms and of the industry portfolios.<sup>9</sup>

In table 1, we provide estimates of abnormal returns for the event date and the surrounding days. The bankrupt firms experience significant negative abnormal returns for each of the four days preceding and the day of the *WSJ* announcement. The percentage shareholder wealth loss of 18.93% on the day before the announcement, which is typically the filing day, is similar to estimates reported for a smaller sample in Clark and Weinstein (1983). From day - 5 to day + 5

<sup>9</sup>We follow the same approach as Mikkelsen and Partch (1985). Similar results obtain when we use market-adjusted excess returns and compute the standard deviation of average abnormal returns using the cross-sectional volatility of abnormal returns.

and day  $-1$  to day 0, the bankrupt firms experience average losses of 28.5% and 21.66%.

The average return of industry portfolios is the equally-weighted average return of 59 value-weighted portfolios. The industry portfolios experience significant average abnormal returns on two days: a loss significant at the 0.05 level on day  $-1$  and one significant at the 0.01 level on day  $+1$ . The industry portfolios experience average stock-price reactions significant at the 0.05 level of  $-1.07\%$  for the period from day  $-5$  to  $+5$  and of  $-0.35\%$  for the traditional event window of days  $-1$  and 0. It follows from these results that, on average, the contagion effect dominates the competitive effect.

In interpreting the abnormal returns, it is important to remember that the dollar value of an industry's equity is typically considerably larger than the value of the bankrupt firm's equity. The small percentage loss for the industry could therefore conceivably correspond to a larger dollar loss for the industry than for the bankrupt firm. We investigated the dollar losses and found them roughly equivalent on average for the industry portfolios and the bankrupt firm. If we assume instead that all COMPUSTAT firms with the same four-digit SIC code as the bankrupt firm experience the same percentage loss as the industry portfolio comprising the subset of firms for which stock returns are available, the dollar loss of competitors is substantially larger than the dollar loss of the bankrupt firm.

The analysis in section 2 suggests that the abnormal returns of the industry portfolio should depend on industry characteristics. In table 2, we report the cumulative abnormal return for each industry for a period of eleven days centered on the announcement date. If an industry has more than one bankruptcy in our sample, we report the average of the industry portfolio abnormal returns across all bankruptcies. There are 41 industries in the sample. Twenty-five (60.9%) have negative average abnormal returns, which is significantly more than one would expect under the null hypothesis of no abnormal returns.

Eight industries in our sample have more than one bankruptcy. Of these industries, six have negative average abnormal returns. Further, three of the four industries with significant negative average abnormal returns have more than one bankruptcy in our sample. Hence, for industries experiencing more than one large bankruptcy in our sample period, the competitors' abnormal return averaged across bankruptcy announcements is typically negative and more likely to be significant. This suggests that a large bankruptcy conveys more negative information about the competitors in industries that are performing poorly. A plausible explanation is that, if the industry is doing poorly, a bankruptcy is more likely to be caused by industry-wide shocks than by a redistribution of wealth within an industry. An investigation of the industry returns in excess of the market for the 750 days before the first distress announcement of bankrupt firms for each industry yields evidence to support this conjecture. Whereas for the sample as a whole, the average industry net-of-market return

Table 2

Abnormal returns for each industry in the sample.

The sample includes all bankruptcies between January 1970 and December 1989 of firms with more than \$120 million in liabilities for which a primary four-digit SIC code is available from the COMPUSTAT data file (59 bankruptcies). For each bankrupt firm, we form a value-weighted portfolio of firms with the same four-digit SIC code for which returns are available from the CRSP files. For each industry, the abnormal return (*AR*) is the average of the industry portfolio market model residual in percent computed for each bankruptcy over the eleven days surrounding the announcement. The *z*-statistics are computed for each industry using the standardized industry portfolio abnormal return for each bankruptcy. *N* is the number of bankruptcy announcements for an industry, and *#* is the average number of firms in the industry portfolios.

Industry	SIC code	<i>N</i> / <i>#</i>	<i>AR</i>	<i>z</i> -stat.
Crude petr. and natural gs	1311	6/22	- 4.40	- 1.86
Drilling oil and gas wells	1381	1/18	- 18.10	- 3.65
Meat packing plants	2011	1/6	- 3.50	- 1.02
Sugar and confectionery prods	2060	1/8	- 2.90	- 1.10
Misc. food preps kdred pds	2090	1/9	- 4.10	- 1.30
Textile mill products	2200	1/16	- 2.50	- 0.89
Paper mills	2621	1/23	0.40	0.22
Pharmaceutical preparations	2834	1/26	0.10	0.06
Petroleum refining	2911	1/22	- 0.70	- 0.27
Fabricated rubber pds, nec	3060	1/5	3.90	1.56
Abrasive, abestos, misc minrl	3290	1/6	- 3.80	- 1.21
Steel works and blast furnaces	3312	3/24	- 3.83	- 2.44
Steel pipe and tubes	3317	1/4	6.90	1.31
Rolling and draw nonfer metal	3350	1/7	3.50	0.72
Construction machinery and eq	3531	1/7	7.60	1.53
Oil and gas field machy, equip	3533	2/10	- 7.60	- 2.86
Printing trades machy, equip	3555	1/3	1.30	0.26
Computer storage devices	3572	1/13	- 3.60	- 0.67
Misc indl, coml., machy & eq	3590	1/9	10.40	2.53
Electric housewares and fans	3634	1/9	6.40	2.16
Shp & boat bldg & repairing	3730	1/3	- 3.10	- 0.39
Doll and stuffed toys	3942	1/1	- 1.00	- 0.11
Railroad, line-haul operatng	4011	1/11	- 0.40	- 0.15
Water transportation	4400	3/5	1.10	0.34
Air transport, scheduled	4512	3/24	- 1.53	- 0.62
Electric services	4911	1/40	2.10	1.06
Elec apparatus & equip-whsl	5063	1/4	- 0.80	- 1.46
Petroleum bulk stations-whsl	5172	1/7	- 2.00	- 0.49
Lumber & oth bldg matl-retl	5211	1/9	2.25	0.13
Department stores	5311	1/27	5.80	2.29
Variety store	5331	4/20	0.78	0.20
Grocery stores	5411	1/21	- 1.90	- 1.18
Apparel and accessory stores	5600	1/6	4.10	0.72
Eating places	5812	2/18	- 0.60	- 0.19
Drug & proprietary stores	5912	1/11	- 3.00	- 0.99
Hobby, toy and game shops	5945	1/4	- 4.10	- 0.66
Savings instn. not fed chart	6036	1/13	- 3.40	- 0.92
Sbdivid, develop, ex cemetery	6552	2/9	- 2.00	- 0.95
Real estate investment trust	6798	1/13	- 4.60	- 0.79
Investors, nec	6799	1/3	- 1.60	- 0.19
Motion pic, videotape prodtn	7812	1/20	0.70	0.18

for the 750 days before the first distress announcement is insignificantly positive, it is significantly negative for the industries with multiple bankruptcies.

#### **4. Abnormal returns and industry characteristics**

As discussed in section 2, the contagion effect reduces the value of competitors; its effect on stock prices increases with the similarity of cash flow characteristics in an industry and with the competitors' leverage. The wealth gain of competitors resulting from the competitive effect increases with the degree of imperfect competition of an industry. For a given degree of imperfect competition, the relation between industry leverage and the competitive effect is ambiguous, since leverage increases the sensitivity of equity value of cash flows but decreases the firm's ability to respond to improvements in its competitive position. If the latter effect dominates the former, the competitive effect on competitors' stock price is decreased by leverage. Hence, in this case, the analysis suggests that, all else being equal, the competitors lose in industries with high leverage and intense competition and lose less or even gain in industries with low leverage and less competition. Table 3 provides evidence on competitors' returns by dividing the sample according to industry leverage, the degree of competition, and the similarity of cash flow characteristics.

*Leverage.* Leverage magnifies the contagion effect but not the competitive effect. Hence, one would expect the equity value of competitors in highly leveraged industries to fall more in percentage terms than the equity value of competitors in industries with low leverage. Table 3 compares the abnormal returns of high- and low-leverage industries. The sample median of the ratio of the book value of long-term debt to the book value of total assets is 0.22, which suggests that most industries in our sample are not highly leveraged. As expected, the abnormal return for the high-leverage sample is  $-2.87\%$  and significant at the 0.01 level, whereas the abnormal return for the low-leverage subsample is positive and insignificant.

*Degree of competition.* As a proxy for the degree of competition, we use the Herfindahl ratio constructed from the sales of the competitors for the whole industry.<sup>10</sup> The Herfindahl ratio is the most traditional measure of concentration used in the industrial organization literature and is widely viewed as

<sup>10</sup>A random sampling of firms leads to a biased estimate of the Herfindahl ratio. Consequently, we used all firms in COMPUSTAT with the same primary four-digit SIC code to construct the index, even those firms with no corresponding stock returns. The results are similar if we use only the firms in the industry portfolios for which stock returns are available. Our measure of the Herfindahl index uses firm sales as opposed to line-of-business sales, which are not available for our sample.

Table 3

Market model cumulative residuals for subsamples of industry portfolios for eleven days around the bankruptcy announcement.

The bankruptcy announcements include all bankruptcies between January 1970 and December 1989 of firms with more than \$120 million in liabilities for which a primary four-digit SIC code is available from the COMPUSTAT data file (59 bankruptcies). An industry portfolio is a value-weighted portfolio of firms with the same primary four-digit SIC code as the bankrupt firm for which returns are available from the CRSP files. The industry characteristics are obtained from COMPUSTAT for the fiscal year preceding the announcement except for the returns correlation which is the correlation between the industry portfolio return and the bankrupt firm return for the year preceding the announcement. The numbers in parentheses are *z*-statistics and the numbers in square brackets are *z*-statistics for differences in subsamples.

Industry portfolio characteristics	# of industry portfolios with industry characteristics below/above the sample median	Average abnormal returns for the subsample of industry portfolios with the value of the industry portfolio characteristics below/above the sample median	
		Below	Above
Leverage (debt to total assets ratio)	27/26	0.37 (0.60)	- 2.87 ( - 3.78) <sup>a</sup> [ - 3.08] <sup>a</sup>
Herfindahl index (lower values mean a higher degree of competition)	29/30	- 2.29 ( - 2.82) <sup>a</sup>	0.15 (0.09) [2.04] <sup>b</sup>
Herfindahl index (subsample of industry portfolios with below-median leverage)	13/14	- 1.60 ( - 0.90)	2.21 (1.81) <sup>c</sup> [1.93] <sup>c</sup>
Herfindahl index (subsample of industry portfolios with above-median leverage)	14/12	- 3.22 ( - 3.27) <sup>a</sup>	- 2.46 ( - 2.04) <sup>b</sup> [ - 1.01]
Returns correlation	22/22	0.79 (0.66)	- 2.34 ( - 2.25) <sup>b</sup> [ - 2.06] <sup>b</sup>

<sup>a</sup>Significant at the 0.01 level.

<sup>b</sup>Significant at the 0.05 level.

<sup>c</sup>Significant at the 0.10 level.

a proxy for the degree of imperfect competition.<sup>11</sup> It is defined here as the squared sum of the fractions of industry sales by the nonbankrupt firms, since the relevant measure of imperfect competition is for the bankrupt firms' competitors. The same results hold if the Herfindahl ratio is computed using all firms in the industry, including the bankrupt firm. Since the competitive effect

<sup>11</sup>See Carlton and Perloff (1990, p. 369). Cowling and Waterson (1976) show that the Herfindahl index is positively related to the price-cost ratio.

increases with the degree of concentration whereas the contagion effect is unrelated to concentration, one expects the average abnormal return to be higher for industries whose Herfindahl index exceeds the sample median. Table 3 compares the average abnormal returns for low- and high-Herfindahl index industries, where high-Herfindahl index industries are industries for which the Herfindahl index exceeds the sample median of 0.18. As expected, the average abnormal return is significantly lower for industries with a low Herfindahl index.

*Interaction of leverage and the degree of competition.* We argued earlier that the contagion and competitive effects are negatively related to industry leverage, provided that leverage has a substantial impact on the firms' ability to exploit changes in competitive position. Since the competitive effect increases the equity value of competitors whereas the contagion effect decreases it, one would expect industries where the competitive effect is strongest to have significantly higher abnormal returns than industries where the contagion effect is strongest. In particular, the competitive effect should be strongest for the subsample with low leverage and a low degree of competition, whereas the contagion effect should be highest for the subsample with high leverage and a high degree of competition. The boldface numbers in table 3 strongly support this hypothesis: the portfolios of industries with low leverage and a low degree of competition experience a significant positive abnormal return of 2.21% and industries with high leverage and a high degree of competition have a significant negative abnormal return of - 3.22%. These results indicate that a bankruptcy announcement can be good news for competitors. They further support theories suggesting that highly leveraged firms are less able to exploit changes in their competitive position, since the competitive effect is lower for the firms that have above-median leverage.

*Similarity of cash flows.* The contagion effect is expected to be larger for industries in which competitors have investments similar to those of the bankrupt firm. One measure of similarity is the correlation of returns between the competitors and the bankrupt firm. In our sample, the median correlation is 0.20. Using this measure, we find in table 3 that industries whose returns are highly correlated with those of the bankrupt firm have significantly lower abnormal returns than the other industry portfolios. Unfortunately, this measure of similarity is highly negatively correlated with the Herfindahl index (the correlation coefficient is - 0.40), so that instead of measuring similarity we may be simply using another proxy for the degree of competition.

One would expect the competitive effect to be greater for industries where the bankrupt firm eventually liquidates, since in this case bankruptcy ends with the elimination of a competitor. In our sample, only six bankrupt firms have liquidated by the end of 1990. On the day of the *Wall Street Journal*

announcement of the bankruptcy, the portfolios for the industries in which the bankrupt firm liquidates experience a positive average abnormal return of 1.03% significant at the 0.01 level, whereas the other portfolios have an average negative abnormal returns of  $-0.54\%$  significant at the 0.01 level. The difference between the returns of these two subsamples is significant at the 0.01 level. Similar results apply for the day  $-5$  to day  $+5$  period. This evidence should be viewed with caution because of the small number of bankrupt firms that liquidate, but strengthens our results because it divides the sample between firms where the competitive effect is expected to differ in a way that does not rely on an index of concentration.

*Sensitivity analysis.* The four-way classification in the bold print area of table 3, which divides the sample according to leverage and the Herfindahl index, is equivalent to a regression of abnormal returns on a constant and three dummy variables. To investigate whether our results are spurious because concentration and leverage serve as proxies for other variables, we present estimates of such regressions in table 4, including additional explanatory variables we believe might be related to abnormal returns. In these regressions, the constant corresponds to the abnormal return of the low-debt/low-Herfindahl ratio group, which in table 3 has the lowest abnormal return. The regression estimates are obtained using weighted least squares with weights equal to the reciprocal of the standard deviation of the market model residual for the industry portfolios.

A fully anticipated bankruptcy announcement should have no effect on the equity value of the industry. To investigate how the degree of anticipation affects our results, we use two proxies: (1) the cumulative return of the industry portfolio in excess of the market for five days before the first distress announcement of the bankrupt firm to five days before the bankruptcy announcement and (2) the cumulative industry return in excess of the market for the three years preceding the first distress announcement. The sample means of these variables are insignificantly different from zero. When we control for these two variables, the low-debt/high-Herfindahl index group has a significantly different abnormal return from the high-debt/low-Herfindahl index group at the 0.01 level and the variables that stand for the degree of anticipation have insignificant positive coefficients. Consequently, the degree to which the bankruptcy is anticipated does not seem to affect the interpretation of our results.

If competitors have a low stock price, we could observe spurious contagion simply because of bid-ask bounce and dealer inventory effects, i.e., the bankruptcy announcement could lead to sales of competitor stocks that would be absorbed by dealers who then would lower their ask price to decrease their inventory. Further, the announcement effect for industries with high stock prices may also be smaller because these industries have more third-party information production, so that their announcement effect might be dampened. If highly

Table 4

Weighted least squares regressions of industry portfolio market model cumulative residuals for eleven days around the bankruptcy announcement on industry characteristics.

The bankruptcy announcements include all bankruptcies between January 1970 and December 1989 of firms with more than \$120 million in liabilities for which a primary four-digit SIC code is available from the COMPUSTAT data file (59 bankruptcies). For each bankruptcy, we form a value-weighted industry portfolio of firms with the same primary four-digit SIC code and returns available from the CRSP files. The industry characteristics are computed from COMPUSTAT for the fiscal year preceding the announcement except for the returns correlation and the anticipation variables. The returns correlation is the correlation between the industry portfolio and the bankrupt firm returns for the year preceding the announcement. The distress return is the industry portfolio cumulative return in excess of the market from five days before the first distress announcement to five days before the bankruptcy announcement. The pre-distress cumulative return is the industry portfolio cumulative return in excess of the market from 800 to 50 days before the first distress announcement. *t*-statistics are in parentheses.

Regression # / # portfolios	1/53	2/53	3/40	4/53
Constant	- 3.12 (- 2.44) <sup>b</sup>	- 9.41 (- 3.23) <sup>a</sup>	- 6.54 (- 1.91) <sup>c</sup>	- 6.52 (- 1.74) <sup>c</sup>
1 if high debt/high Herfindahl index; 0 otherwise	0.24 (0.12)	0.36 (0.20)	- 0.55 (- 0.27)	
1 if low debt/high Herfindahl index; 0 otherwise	5.19 (2.77) <sup>a</sup>	5.46 (3.06) <sup>a</sup>	4.62 (2.10) <sup>b</sup>	
1 if low debt/low Herfindahl index; 0 otherwise	2.15 (1.19)	1.63 (0.95)	1.69 (0.88)	
Herfindahl index				9.07 (1.85) <sup>c</sup>
Returns correlation			- 11.78 (- 1.76) <sup>c</sup>	
Leverage				- 9.30 (- 1.05)
Log of average price		2.40 (2.47) <sup>b</sup>	2.50 (2.40) <sup>b</sup>	2.14 (2.13) <sup>b</sup>
Distress cumulative return	2.89 (0.58)	2.21 (0.46)		2.54 (0.52)
Predistress cumulated return	2.21 (1.16)			
<i>R</i> -squared adj.	0.09	0.17	0.26	0.10
<i>p</i> -value for <i>F</i> -stat.	0.09	0.01	0.01	0.06

<sup>a</sup>Significant at the 0.01 level.

<sup>b</sup>Significant at the 0.05 level.

<sup>c</sup>Significant at the 0.10 level.

competitive industries have low stock prices, these effects might explain why we find that industries with a high Herfindahl index have higher abnormal returns than industries with a low Herfindahl index. To control for these effects, we use the log of the average stock price of competitors as an explanatory variable. This variable is significant and has the expected positive sign, but it does not affect our result that the abnormal return of low-leverage/high-Herfindahl index industries is significantly higher than that of high-leverage/low-Herfindahl index industries. We also estimated the regression replacing the log of average price with the log of average total assets. This variable has a positive coefficient, but it is not significant.

Earlier, we pointed out that our measure of the similarity of cash flows between the bankrupt firm and its competitors is highly correlated with the Herfindahl index. To investigate whether the Herfindahl index serves as a proxy for the similarity of cash flows, we use the correlation between the abnormal returns of the bankrupt firm and of the competitors for the year before the announcement as an additional explanatory variable in our regression. As expected, the sign on the correlation variable is negative and significant, but the introduction of this variable leaves our results on leverage and concentration unchanged.

Finally, we estimate a regression of abnormal returns on the Herfindahl index, leverage, the log of the average stock price, and the cumulative industry return in excess of the market before the first distress announcement. The Herfindahl index has a significant positive coefficient, as expected. The coefficient on leverage is not measured precisely, but it has the expected negative sign.

## **5. Concluding remarks**

This paper provides evidence that a bankruptcy announcement has both a contagion effect and a competitive effect on other firms in the same industry. The contagion effect is the wealth loss experienced by firms with cash flow characteristics similar to those of the bankrupt firm because the bankruptcy announcement conveys information about the present value of cash flows for these firms. The competitive effect is the wealth gain experienced by competitors because the bankruptcy announcement conveys information about the present and future competitive positions of firms in the bankrupt firm's industry. Whereas the literature has focused on the contagion effect, we show that the competitive effect is dominant in industries where leverage and the degree of competition (represented by the Herfindahl index) are low. For the whole sample, the value of a value-weighted portfolio of the common stock of competitors falls on average by 1% in reaction to the bankruptcy announcement. For the subsample of industries with low leverage and a low degree of competition, however, the

portfolio increases by 2.2%. In contrast, competitors lose 3.2% for the subsample of industries with high leverage and a high degree of competition.

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