THE JOURNAL OF FINANCE • VOL. XLIX, NO. 3 • JULY 1994

Financial Distress and Corporate Performance

TIM C. OPLER and SHERIDAN TITMAN*

ABSTRACT

This study finds that highly leveraged firms lose substantial market share to their more conservatively financed competitors in industry downturns. Specifically, firms in the top leverage decile in industries that experience output contractions see their sales decline by 26 percent more than do firms in the bottom leverage decile. A similar decline takes place in the market value of equity. These findings are consistent with the view that the indirect costs of financial distress are significant and positive. Consistent with the theory that firms with specialized products are especially vulnerable to financial distress, we find that highly leveraged firms that engage in research and development suffer the most in economically distressed periods. We also find that the adverse consequences of leverage are more pronounced in concentrated industries.

FINANCIAL ECONOMISTS HAVE NOT reached a consensus on how financial distress affects corporate performance. Traditionally, the financial economics literature has portrayed financial distress as a costly event whose possibility is important in determining firms' optimal capital structures. Financial distress is seen as costly because it creates a tendency for firms to do things that are harmful to debtholders and nonfinancial stakeholders (i.e., customers, suppliers, and employees), impairing access to credit and raising costs of stakeholder relationships.[1] In addition, financial distress can be costly if a firm's weakened condition induces an aggressive response by competitors seizing the opportunity to gain market share.[2] More recent articles have

*Opler is from Southern Methodist University. Titman is from Boston College. We appreciate helpful comments from Brian Betker, Robert Gertner, Jean Helwege, Steve Kaplan, Vojislav Maksimovic, Ralph Walkling, Mike Vetsuypens, and seminar participants at the 1994 American Finance Association Meetings, the 1993 European Finance Association Meetings, the Haute Etudes Commerciales International Corporate Finance Symposium, the 1992 National Bureau of Economic Research Summer Institute, the Texas Finance Symposium, the Board of Governors of the Federal Reserve, Hong Kong University of Science and Technology, INSEAD, Ohio State University, and Tilburg University.

[1]These tendencies arise because of conflicts of interest between borrowers and lenders (Jensen and Meckling (1976), Myers (1977), and Stulz (1990)), between firms and their nonfinancial stakeholders (Baxter (1967), Titman (1984), and Maksimovic and Titman (1990)), and between shareholders and managers (Gilson and Vetsuypens (1993) and Novaes and Zingales (1993)).

[2]See for example, Bolton and Scharfstein (1990), Fudenberg and Tirole (1986), and Poitevin (1989). A recent empirical study by Chevalier (1993) finds evidence consistent with predatory pricing of this kind. Consistent with the view of these articles, Lang and Stulz (1992) show that bankruptcy announcements in concentrated industries are the most likely to raise share prices of competitors. It should also be noted that if all the firms in an industry simultaneously increase leverage (or suffer from financial distress), prices can increase, benefitting all industry participants (see Phillips (1993)).

argued that financial distress can improve corporate performance and advocate changes in corporate form (e.g., leveraged buyouts) that are financed primarily with debt. These articles point out that financial distress can improve firm values by forcing managers to make difficult value-maximizing choices, which they would otherwise avoid (Jensen (1989) and Wruck (1990)).[3]

Although anecdotal evidence suggests that financial distress can cause significant losses in some cases and motivate value-maximizing choices in others, it is quite difficult to quantify the overall costs and benefits of financial distress.[4] One of the best known attempts to measure the indirect costs of financial distress is that of Altman (1984) who examined a sample of firms that later went bankrupt. Altman had two ways of estimating financial distress costs for this sample of firms. The first measured the decline in their sales relative to others in their industry, and the second measured the deviation between the firms' actual earnings and forecasts of their earnings over the three years prior to filing for bankruptcy. Although both sets of estimates indicate that the distressed firms lost both earnings and sales, it is not clear that these losses should be attributed to financial distress. Specifically, part of the observed drop in sales must be attributed to the fact that unexpected declines in sales are likely to have contributed to financial distress in the first place. In other words, the causality between the observed sales drops and financial distress may be the opposite of that assumed by Altman.

This article examines the indirect costs of financial distress in a way that minimizes the problem of reverse causality. We identify industries that have experienced economic distress and investigate whether firms in those industries with high financial leverage prior to the distressed period fare differently than their more conservatively financed counterparts. If financial distress is costly, then more highly leveraged firms will have the greatest operating difficulties in a downturn. Alternatively, if financial distress benefits firms by forcing efficient operating changes, then more highly leveraged firms will perform better than less leveraged firms.

Our findings indicate that highly leveraged firms lose market share to their less leveraged competitors in industry downturns. This is consistent with a number of different interpretations. It could reflect a reluctance by customers to do business with distressed firms. We refer to such losses as customer driven. Alternatively, financially strong firms may be taking advantage of these distressed periods to aggressively advertise or price their products in an effort to drive out vulnerable competitors. We call these losses competitor driven. The evidence could also indicate that more leveraged firms are quicker to efficiently downsize in response to an industry downturn. We call these losses manager driven. Unlike manager-driven reductions in sales that can be interpreted as a benefit of financial distress, customer-driven and

[3]Financial distress can also improve a firm's bargaining power with its unions and other stakeholders that earn economic rents (Bronars and Deere (1991), Perroti and Spier (1993), and Dasgupta and Sengupta (1993)).

[4]See case studies by Baldwin and Mason (1983) and Cutler and Summers (1988).

competitor-driven sales losses are clearly costly to shareholders.[5] In Table I we summarize these three possible explanations for the observed decline in sales for the highly leveraged firms along with some empirical implications which are described in more detail below.

Unfortunately, we cannot directly determine whether sales declines in periods of financial distress are manager driven, customer driven, or competitor driven. However, since firms with different attributes should be affected by these three sources of sales losses differently, we can gauge their relative importance. For example, we expect competitor-driven sales losses to be most severe in concentrated industries. Hence, if losses in market share of highly leveraged firms are mainly caused by the aggressive behavior of their less leveraged rivals, we would expect leverage to have a much stronger effect on performance in concentrated industries where there is high potential for strategic interaction among competitors. In addition, customer-driven sales losses are most likely to take place in firms that have relatively high research and development (R&D) expenditures. The idea here is that R&D is an indicator of the specialization of the firms' products, as in Titman and Wessels (1988) and Opler and Titman (1993), and that firms with more specialized products are more sensitive to customer-driven sales losses in financial distress than are other firms. The tendency to lose sales as a function of leverage may also be a function of firm size. Small firms may be more financially vulnerable, and may thus be more subject to customer-driven and competitor-driven sales losses. Alternatively, larger firms may benefit the most from the discipline of financial distress and may be more subject to manager-driven sales reductions.

Perhaps the best way to determine whether the observed sales loss reflects a cost or benefit of financial distress is to examine the effect of leverage on *firm value*. If the sales losses are customer or competitor driven, indicating that financial distress is costly, then we would expect to observe the more highly leveraged firms to lose value during industry downturns relative to their less leveraged competitors. However, if the financial discipline produces a more efficient competitor, then the more highly leveraged firms should gain in value relative to the less leveraged firms in their industries.

Unfortunately, we do not have data on changes in the market value of firm debt, so we cannot look at how the total market values of firms change. Instead, we must examine changes in stock prices and operating income. Our results show that the stock returns of the more leveraged firms in distressed industries are substantially lower than their less leveraged competitors. This, of course, is not by itself particularly informative, since the stock prices of more leveraged firms will be more sensitive to industry-wide downturns, even if financial distress is not costly, because of the pure leverage effect (the stock prices of highly leveraged firms are more sensitive to changes in firm value).

[5]Some recent articles have focused on manager-driven changes during financial distress. Studies by Hoshi, Kashap, and Scharfstein (1990), Asquith, Gertner, and Scharfstein (1992), Sharpe (1994), and Ofek (1993) find that financially distressed firms have a greater tendency to cut investment, sell assets, and reduce employment than their nonleveraged counterparts.

Table I

Summary of Potential Causes of Performance Declines by Highly Leveraged Firms in Periods of Economic Distress

Explanation of Performance Decline	Explanation	Explanation Predicts Loss of Sales Revenue?	Explanation Predicts Decline in Firm Value?	Other Predictions
Customer driven	Customers and stakeholders abandon the firm	Yes	Yes	Performance decline worse for firms with specialized products
Competitor driven	Competitors reduce prices to gain market share	Yes	Yes	Performance decline worse in concentrated industries
Manager driven	Managers efficiently downsize by cutting poorly performing assets	Yes	No	Performance decline may be related to firm size

However, differences in the stock price reactions of high and low leverage firms during industry downturns are shown to depend on concentration ratios, firm size, and R&D expenditures in ways that are consistent with theory and that cannot be explained by this pure leverage effect. In addition, operating income, which does not suffer from this leverage-related bias, also falls more for highly leveraged firms during industry downturns, which supports the idea that the sales losses are customer or competitor driven.

The remainder of this article is organized as follows: Section I describes our strategy for estimating the effect of financial distress on sales and stock returns. The sample is described in Section II, and the results are presented in Section III. Our conclusions are discussed in Section IV.

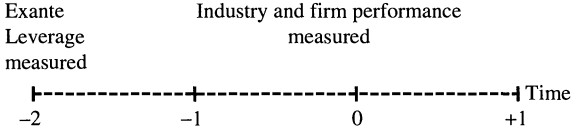
I. Research Design

We investigate the link between financial distress and corporate performance by testing whether firms with high leverage are more likely to experience performance losses in industry downturns than other firms. A 3-digit SIC industry is identified as being economically distressed when its median sales growth is negative and when it experiences median stock returns below -30 percent. The negative stock return criteria are needed in order to eliminate downturns that are not considered either long-term or serious by participants in financial markets. Large negative stock returns also indicate that the downturn was unanticipated. The negative change in sales is required to eliminate those otherwise healthy industries that experience negative stock returns because prior expectations were unduly optimistic.

Firm performance during the distressed period is measured by sales growth, stock returns, and changes in operating income relative to industry averages. Sales growth is of interest because it is the most direct measure of customer-driven losses in sales. However, as discussed in the Introduction, we would also like to estimate the extent to which losses in sales translate into lost profits and value. For this reason we also look at stock returns and operating income. Unfortunately, stock returns of more highly leveraged firms are more sensitive to economic stimulus, so we expect a negative relation between leverage and stock returns during downturns even under the null hypothesis of leverage irrelevancy. Operating income does not share this property (since we look at EBIT). However, unlike stock returns and sales growth, this variable can be manipulated by a firm in financial distress. In particular, some of the financially distressed (i.e., highly leveraged) firms may manipulate their accounting policies to temporarily increase operating income to avoid technical defaults.[6] This would bias operating incomes upwards for

[6] Firms might be able to manipulate their operating income in a given year or quarter by selling their products to customers before they really need to. They could do this, for example, by offering extended credit terms. Firms might also be able to manipulate operating income by increasing their inventories. If average production costs are considerably higher than are marginal costs, then an inventory buildup can increase operating income. A preliminary examination of accounts payable and inventories of the firms in our sample did not reveal any evidence of manipulation of this kind.

distressed firms, making it less likely that they would reflect financial stress costs.



A time line illustrating our empirical method is given above. We measure ex ante financial leverage two years prior to the base year (year -2) and observe sales growth, stock returns, and the growth in operating income from a year before until a year after the base year (year -1 to year $+1$).[7] The one-year lag between the measurement of financial vulnerability and the measurement of economic distress is introduced to minimize any endogeneity problem arising from the effect of economic distress on a firm's access to capital. Specifically, if we used the firm's current leverage ratio to measure financial vulnerability, we could generate a spurious negative correlation between leverage and performance since the poorly performing firms might be required to increase their borrowing to cover their losses. For reasons given below, financial leverage is defined as the book values of debt divided by the book value of assets.[8]

A major concern in developing this research design relates to potential reverse causality problems present in earlier work. While our results cannot be biased by the fact that drops in sales and profitability can be a direct cause of financial distress, a more indirect bias can still exist. Our analysis implicitly assumes that ex ante leverage ratios are exogenous. While this is considerably less troublesome than assuming that financial distress is exogenous, it may still make it difficult to interpret our results. The assumption requires, for example, that otherwise identical firms happen to choose different leverage ratios for reasons that we have not directly modeled.

This assumption could be justified with models like Maksimovic and Zechner (1991) where firms in the same industry are indifferent between a higher risk/higher leverage strategy or a lower risk/lower leverage strategy. Alternatively, one could develop a model where some firms in an industry optimally choose to be highly leveraged because of tax advantages, while otherwise identical firms optimally choose to be more conservatively financed so that they will be strategically positioned to profit in the event of an industry downturn. Shleifer and Vishny (1992), for example, discuss how less lever-

[7]The fact that we require the firms in our sample to survive until year $+1$ biases our estimates against finding financial distress costs. Firms that are highly leveraged and suffer the most due to their financial distress may go bankrupt and will not appear in our sample. This possibility is analyzed in Section III.*E*.

[8]Specifically, we defined debt/assets as COMPUSTAT annual items (No. 9 + No. 34)/No. 6.

aged firms in an industry can profit from buying the assets of their more leveraged counterparts at fire sale prices in the event of an industry downturn. Differences in management tastes and ownership structures could also explain differences in leverage ratios within an industry.

The endogeneity of the capital structure choice is still problematic, however, if firms that face the highest potential financial distress costs are the least likely to be leveraged. If this is the case, our results will tend to understate the adverse effect of leverage on performance, because highly leveraged firms will tend to be the least subject to financial distress. This endogeneity problem also reduces the power of our later tests that stratify the sample of economically distressed industries into those that are expected to have the highest and the lowest financial distress costs. As expected, there are very few highly leveraged firms in those industries that are expected to have the highest financial distress costs.

Perhaps more problematic is the possibility that leverage is an indicator of the economic vulnerability as well as the financial vulnerability of a firm. For example, if the least efficient firms are the most likely to go out of business during industry-wide contractions, and if highly leveraged firms tended to be the least efficient, then one would observe a negative relation between leverage and performance during industry downturns even when financial distress is not costly. The negative correlation between profitability and leverage observed in a number of empirical studies suggests that this may be a valid concern. To reduce this bias, leverage is measured in terms of book values rather than market values, given that Titman and Wessels (1988) find that the relation between leverage and profitability is substantially weaker when book values are used.

Measuring leverage using book values rather than market values also avoids the problem that the market value of equity may forecast future sales performance. For example, firms that experience a loss of growth opportunities will experience a downturn in their market value and a corresponding increase in their leverage ratios measured with market values. However, measuring leverage with book values may not completely eliminate the problem. Firms that expect to grow in the future may accumulate financial slack for reasons suggested in Myers (1977) and Myers and Majluf (1984) and thus choose less debt relative to assets measured either at book value or market value. One could alternatively argue, based on the signalling arguments put forth by Ross (1977) and others, that more highly leveraged firms have the best prospects. In addition, in the agency model described in Grossman and Hart (1982), managers choose high debt ratios as a means to commit themselves to increased output. Hence, at least in theory, high leverage can predict either increased or decreased future performance.

Most of the above arguments apply to industry expansions as well as downturns. For this reason the relation between performance and leverage in healthy industries is also of interest. Evidence that sales growth or operating income is negatively related to leverage would provide support for the Myers

(1977) and Myers and Majluf (1984) models and would be inconsistent with the Ross (1977) and Grossman and Hart (1982) models. In addition, by contrasting the effect of debt on performance in economically depressed industries and non-depressed industries, we can observe the extent to which the negative effect of debt observed during the industry downturn is due to the financial distress and to what extent it is due to the fact that firms with better prospects have lower leverage ratios. To further mitigate these biases we include measures of profitability and investment expenditures prior to the distress period as control variables in regressions predicting firm performance.

II. Sample Selection

We use firm level data from the 1992 Standard & Poors COMPUSTAT PST, FC, and Research files. These files contain 105,074 firm-years of data on income statement and balance sheet items in the 1972 to 1991 period. We exclude: (1) firms in the financial sector because the accounting treatment of revenues and profits for these firms is significantly different than that in other sectors; (2) firms that are in industries too small to provide a reasonable benchmark for industry adjustment (industries must have four or more firms); (3) firms that list two or more industry segments in their annual report, since including these firms would make industry adjustments problematic; (4) firms for which data required in our analyses were unavailable (i.e., information on ex ante leverage, stock returns, and sales growth); and (5) firms in industries with unsufficient cross-sectional variability in leverage (industries must have at least one firm in the top three sample leverage deciles and one firm not in the top three deciles per year). After applying these selection criteria we retained 46,799 firm-years of data for our empirical analysis.

Roughly 3 percent of all observations in the sample were in industries defined as troubled. Table II shows the number of firms in troubled industries and the number of troubled industries by year. The number of firms in troubled industries rises in the early 1980s and in 1990 (reflecting the 1990 to 1992 recession). The large cluster of firms in troubled industries in 1982 to 1985 is attributable to poor performance in various parts of the heavily populated oil and gas sector.[9] Other sectors that are heavily represented in the troubled industry subsample include silver mining, special machinery, real estate development, and steel.

Table III gives descriptive information on the main variables analyzed in the study. Panel A describes firms in industries experiencing poor performance, while Panel B describes firms in all other industries. Both sets of firms exhibit considerable cross-sectional variation in the leverage ratios. For

[9] The direction of our main results does not change when oil and gas firms are excluded.

Table II

Distribution of Firms by Year

The sample consists of 46,799 publicly traded firm-years in the 1972 to 1991 period. Of these firm years, 1,368 (3 percent) were in industries with poor performance that exhibited negative median sales growth and median stock returns below −30 percent.

Base Year	No. of Firms in Industries with Normal Performance	No. of Firms in Industries with Poor Performance	No. of Poorly Performing Industries
1974	1,973	36	3
1975	2,344	0	0
1976	3,417	9	1
1977	3,237	0	0
1978	2,967	0	0
1979	2,865	0	0
1980	2,754	10	2
1981	2,626	38	6
1982	2,462	228	5
1983	2,320	215	4
1984	2,451	205	6
1985	2,385	198	9
1986	2,473	148	4
1987	2,749	16	3
1988	2,921	9	3
1989	2,960	92	12
1990	2,527	161	14

example, among troubled industries the interquartile range of the ex ante debt/assets ratio is 35.1 percent. On average, firms in industries experiencing poor performance were also much smaller than their counterparts in other industries. The average base-year sales of firms in depressed industries was $181 million—less than half the average in other industries. The depressed and nondepressed industries also differ in terms of R&D intensity: the average R&D intensity is considerably lower in the troubled industries where more than 75 percent of the firms report no R&D expenditures. The mean four-firm concentration ratio is similar between the groups of troubled and nontroubled industries. The average rate of two-year sales growth for firms in depressed industries of −7.4 percent is, of course, lower than it is in other industries (24 percent).[10] Two-year stock returns also differ significantly in the two groups (mean of −39 percent in depressed industries versus a mean of 18 percent in healthy industries). The interquartile range of stock returns is roughly one and a half times that of sales growth.

[10] The distribution of sales growth and equity returns is highly skewed to the right. Thus, we trim cases where firms have sales growth or equity returns in excess of 200 percent. The economic significance of our results does not depend on this cut.

Table III

Description of Sample Firms in Industries with Poor Performance and Normal Performance

The sample contains 46,799 years of data in the 1972 to 1991 period. Of these firms, 1,368 (3 percent) were in industries with poor performance with negative median sales growth and median stock returns below −30 percent. Assets are measured at book value. Ex ante leverage is measured two years before the base year. Sales growth, operating income change, and stock returns are measured over a two-year period centered on the base year.

Variable	Mean	Quartile One	Median	Quartile Three
Panel A: Firms in Industries Experiencing Poor Performance (N = 1,368)				
Ex ante debt/assets (%)	29	7.1	26	42
Base-year debt/assets (%)	34	7.1	30	50
Base-year sales ($ millions)	181	1.5	9.9	60
2-year sales growth (%)	−7.4	−41	−15	13
2-year stock return (%)	−39	−75	−50	−18
2-year operating income change (%)	−3.6	−11.5	−3.5	3.6
R&D expense/sales (%)	0.9	0	0	0.01
Four-firm industry concentration (%)	22.3	20.4	20.4	20.4
Panel B: Firms in Industries Experiencing Normal Performance (N = 45,431)				
Ex ante debt/assets (%)	30	12	26	41
Base-year debt/assets (%)	31	12	26	41
Base-year sales ($ millions)	480	9.5	40	173
2-year sales growth (%)	24	−0.3	20	43
2-year stock return (%)	18	−28	8.6	55
2-year operating income change (%)	3.9	−3.0	2.9	9.5
R&D expense/sales (%)	2.4	0	0	1.6
Four-firm concentration ratio (%)	28.4	17.7	23.3	34.9

III. Empirical Results

A. Leverage and Firm Performance in Distressed Industries

This section examines OLS regressions that predict firm-level sales growth, stock returns, and profitability growth as a function of size and profitability controls, industry condition, and ex ante leverage ratios. Changes in firm performance are industry adjusted by removing the 3-digit SIC industry mean change in performance. The regression equations take the form:

$$\begin{aligned} \textit{Firm performance} = \alpha &+ \beta_1 \text{ Log } \textit{of sales} + \beta_2 \textit{ Industry-adjusted profitability} \\ &+ \beta_3 \textit{ Industry-adjusted investment/assets} \\ &+ \beta_4 \textit{ Industry-adjusted asset sale rate} \\ &+ \beta_5 \textit{ Distressed industry dummy} \\ &+ \beta_6 \textit{ High leverage dummy} \\ &+ \beta_7 \textit{ Distressed industry dummy} \\ &\times \textit{High leverage dummy} + \epsilon. \end{aligned}$$

The main question addressed in this regression equation is whether the effect of leverage on firm performance is greater when industries experience poor performance. We use dummy variables to represent high leverage rather than a continuous variable, since we expect the relation between leverage and performance would be difficult to specify in advance and may be nonlinear. We control for prior investment rates and profitability, since these variables can be determinants of sales growth and may be correlated with leverage. In addition, we control for asset sales in order to reduce the effect of divestitures on sales. For each performance variable we report one regression where high-leverage firms are those in the top three leverage deciles and one regression where high-leverage firms are defined as being in the top sample leverage decile.[11]

Table IV reports our main regression results. Of most interest are the coefficient estimates of the average effect of high leverage on performance in all industries and the coefficient estimates of the additional effect of leverage on performance in periods of industry distress. These coefficients are negative and economically significant in all cases. The negative coefficient estimate on the high leverage dummy in the sales growth equation suggests that highly leveraged firms lose market share to their more conservatively financed counterparts even in good times. These estimates suggest that firms anticipating sales growth build up financial slack, perhaps to fund increased investment, rather than increase leverage to signal their prospects. Our main finding is the economically and statistically significant negative coefficients on the *high leverage* × *distressed industry interaction dummy*. Industry-adjusted sales growth is 13.6 percent lower (p-value < 1 percent) for firms in leverage deciles 8 to 10 in distressed industries than for less leveraged firms. Similarly, industry-adjusted sales growth for firms in leverage decile 10 is 26.4 percent lower (p-value < 1 percent), on average, than for firms in leverage decile 1 (the least leveraged firms) in distressed industries. This indicates that leveraged firms lose significant market share in economic downturns.

As we discussed in the introduction, the sales drop experienced by leveraged firms in distressed periods could be manager driven, customer driven, or competitor driven. In other words, the observed drop in sales may reflect efficient downsizing rather than financial distress costs. The regressions reported in Table IV relating stock returns and operating income to leverage in depressed and nondepressed industries shed light on this possibility. If the highly leveraged firms in distressed industries are able to more efficiently downsize, then we would expect the coefficient on the *high leverage* × *distressed interaction* variable to be positive in the stock returns and operating income regressions. If financial distress is costly, on balance, we would expect the opposite.

[11] Leverage deciles using the distribution of debt/assets for the entire sample (across industries and across time). Firms in the bottom leverage decile had debt/assets ratios ranging between zero and 1.2 percent. Those in leverage decile 10 had debt/assets of at least 59.6 percent. Those in leverage deciles 8 to 10 had debt/assets of at least 39.2 percent.

Table IV

OLS Regressions Predicting Mean Industry-Adjusted Sales Growth, Stock Returns, and Operating Income Growth in the 1972 to 1991 Period

Industry adjustment is carried out by subtracting the 3-digit SIC industry mean from the firm's performance. Ex ante leverage is measured two years prior to the base year and is defined as the book value of long-term and short-term debt divided by total assets. Stock returns, operating income growth, and sales growth are measured over a two-year period centered on the base year. Operating income is defined as earnings before interest, taxes, and depreciation. Distressed industries had negative mean sales growth and mean stock returns below −30 percent. A binomial sign test is used to measure the significance of the proportion of leveraged firms in distressed industries with above-median industry performance compared to the same proportion for leveraged firms in nondistressed industries.

	Industry-Adjusted Sales Growth		Industry-Adjusted Stock Returns		Industry-Adjusted Operating Income	
	Whole Sample	Leverage Deciles 1 and 10 Only	Whole Sample	Leverage Deciles 1 and 10 Only	Whole Sample	Leverage Deciles 1 and 10 Only
Intercept	−0.111	−0.110	−0.119	−0.155	−0.025	−0.043
	(−26.1)***	(−11.4)***	(−16.5)***	(−9.88)***	(−3.85)***	(−3.00)**
Log of sales	0.027	0.052	0.031	0.046	0.0056	0.0096
	(31.4)***	(22.0)***	(21.1)***	(11.8)***	(4.23)***	(2.84)***
Industry-adjusted operating income/assets before base year	−0.011	−0.063	0.090	0.019	−0.180	−0.096
	(−1.39)	(−5.39)***	(6.23)***	(0.94)	(−15.0)***	(−5.95)***
Industry-adjusted investment/assets before base year	0.411	0.299	−0.109	−0.190	0.244	0.153
	(19.9)***	(7.31)***	(−3.34)**	(−2.91)***	(7.65)***	(2.57)***
Industry-adjusted asset sales/assets	−0.552	−0.343	−0.364	−0.104	−0.024	−0.014
	(−23.2)***	(−7.64)***	(−8.732)	(−1.32)	(−0.59)	(−0.20)
Distressed industry dummy	0.111	0.206	0.104	0.221	−0.0045	0.107
	(8.00)***	(6.08)***	(5.74)***	(5.42)***	(−0.71)	(2.05)**
Leverage deciles 8–10 dummy	−0.030	—	−0.040	—	−0.0045	—
	(−7.01)***		(−5.92)***		(−0.71)	
Distressed industry dummy x leverage deciles 8–10 dummy	−0.136	—	−0.119	—	−0.067	—
	(−5.64)***		(−3.81)***		(−1.72)*	

Table IV—*Continued*

	Industry-Adjusted Sales Growth		Industry-Adjusted Stock Returns		Industry-Adjusted Operating Income	
	Whole Sample	Leverage Deciles 1 and 10 Only	Whole Sample	Leverage Deciles 1 and 10 Only	Whole Sample	Leverage Deciles 1 and 10 Only
Leverage decile 10 dummy	—	−0.109	—	−0.071	—	−0.007
		(−10.6)***		(−4.50)***		(−0.50)
Distressed industry dummy x leverage decile 10 dummy	—	−0.264	—	−0.265	—	−0.147
		(−5.24)***		(−4.40)***		(1.82)*
Adjusted R^2	0.05	0.07	0.02	0.03	0.01	0.01
No. of observations	46,623	9,394	33,711	6,019	38,112	7,210
Proportion of leveraged firms above median industry performance in nondistressed industries (%)	48.0	45.0	48.1	45.0	55.4	56.7
Proportion of leveraged firms above median industry performance in distressed industries (%)	44.8	39.3**	42.4**	39.3*	46.3***	43.3**

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

The operating income regressions generally support the idea that financial distress is costly; however, the results are not statistically significant. These inconclusive results reflect the large cross-sectional variation in the changes in operating income. As we mentioned earlier, these inconclusive results may also reflect a tendency for firms facing financial difficulties to take actions that temporarily boost operating income. This would bias our results against finding a negative relation between operating income and leverage in distressed periods.

In the stock return regressions, the coefficient of the leverage interaction variable is statistically and economically significant and negative supporting the view that the observed drop in sales performance is not manager driven. For example, firms in distressed industries in leverage deciles 8 to 10 experience a drop in equity value 11.9 percent greater than do firms in leverage deciles 1 to 7. However, as we mentioned earlier, the results of this regression alone are not conclusive, since the pure leverage effect might cause the more highly leveraged firms to perform worse than average when industry returns are negative. This pure leverage effect should also cause the highly leveraged firms to perform better than average during the non-distressed periods. However, the estimate of the high leverage dummy is negative, indicating that leveraged firms have lower stock returns in nondistressed periods.[12]

B. A Nonparametric Test

The residuals in the above regressions are not normally distributed, and we thus have reason to be concerned about the reported t-statistics for our estimates. To address these concerns we provide a nonparametric test of the hypothesis that leverage affects performance in depressed industries. The bottom two rows of Table IV show the percentage of highly leveraged firms that perform better than the industry median (using the leverage definition for the column specified) in both distressed and nondistressed industries. A simple binomial test is then used to determine whether the percentage observed in the sample of distressed industries is statistically different than the percentage observed in nondistressed industries.

These binomial tests indicate that the percentage of firms in leverage deciles 8 to 10 that have sales growth that exceeds the industry median is 44.8 percent, which is less than the 48 percent of the leverage decile 8 to 10 firms that outperform the median in nondistressed industries, but this difference is not statistically significant. However, only 37.7 percent of the leverage decile 10 firms outperform the median along this dimension, which is reliably less than 48.1 percent observed in nondistressed industries. For stock returns and operating income, the results of these tests are statistically significant and are consistent with the view that financial distress is costly.

[12] This result is quite surprising and requires further analysis. It is consistent, however, with related findings in Fama and French (1992).

C. Sources of Indirect Financial Distress Costs

In the last subsection we presented evidence that leveraged firms experience disproportionately large declines in sales and equity value in periods of economic distress. However, we cannot conclusively claim that these declines represent financial distress costs, since the drop in sales could also reflect efficient downsizing while the drop in stock prices could arguably have been driven by the pure leverage effect. In this subsection we further investigate the cause of these losses by documenting the cross-sectional determinants of the effect of leverage on firm performance. Our purpose is to ask whether firms that should experience the highest financial distress costs in theory are indeed the ones that lose the most sales and suffer the greatest stock price declines when distressed. The cross-sectional variables considered are R&D /sales, firm size, and industry concentration. Our financial distress cost interpretation of the previous results will be on a firmer basis if the extent of the decline in sales and stock prices is related to our ex ante beliefs about which firms are most likely to suffer financial distress costs.

In theory, small firms may experience the most problems in periods of financial distress given their increased likelihood of actually being forced out of business. Small distressed firms may also have greater difficulty accessing needed capital because of heightened informational asymmetry between insiders and outsiders. On the other hand, large firms may be the most subject to the incentive problems discussed by Jensen (1989) and may thus be more likely to have underperforming lines of business that need to be cut. Novaes and Zingales (1993), however, argue that managing large firms in periods of financial distress may be especially costly, because their more complicated internal organizations require implicit contracts that may be difficult to enforce during times of financial distress.

As discussed in Titman and Wessels (1988), R&D expenditures can proxy for the degree of product specialization. We expect customers to be more reluctant to purchase products from a distressed firm with very specialized products that require future servicing (Baxter (1967), Titman (1984), and Maksimovic and Titman (1991)). Empirically, we attempt to measure this effect with an R&D intensity dummy that takes the value one when a firm has an R&D/sales ratio two years before the base year above 0.1 percent, and zero otherwise.

The concentration ratio of the industry can proxy for a number of things. For example, it is likely that firms in highly concentrated industries are more likely to produce specialized products, which would imply higher financial distress costs in the concentrated industries. Concentration also proxies for the gains associated with removing a weakened competitor discussed by Bolton and Scharfstein (1990), Poitevin (1989), and Fudenberg and Tirole (1986). These theories would suggest greater losses in sales for the more financially distressed firms in the concentrated industries. In addition, Bronars and Deere (1991) and others suggest that financial distress can benefit firms, since financial distress can help them gain concessions from

Table V

OLS Regressions Predicting Mean Industry-Adjusted Sales Growth and Stock Returns as a Function of Industry Performance, Firm Leverage, and Controls in the 1972 to 1991 Period Stratified by Key Firm and Industry Characteristics

Leverage is defined two years prior to the base year as the book value of long-term and short-term debt divided by total assets. Stock returns are dividend and split adjusted and are measured at calendar year-end one year prior to the base year until one year after the base year. Industries that exhibited poor performance had negative mean sales growth and mean stock returns less than −30 percent in the two-year period centered on the base year. R&D-intensive firms are those with R&D/sales two years before the base year above 0.1 percent. High concentration industries are those with a four-firm concentration ratio above 40 percent in 1981. Firm size (sales) is measured one year before the base year.

Panel A: Split by R&D Intensity

	Industry-Adjusted Sales Growth		Industry-Adjusted Stock Returns	
	R&D/Sales > 0.1%	R&D/Sales < 0.1%	R&D/Sales > 0.1%	R&D/Sales < 0.1%
Intercept	−0.097	−0.120	−0.140	−0.017
	(−13.6)***	(−22.9)***	(−12.4)***	(−11.4)***
Log of sales	0.025	0.028	0.036	0.094
	(16.5)***	(27.1)***	(14.9)***	(4.82)***
Industry-adjusted operating income/assets before base year	−0.024	0.018	0.056	0.142
	(−2.16)**	(1.39)	(2.79)***	(6.36)***
Industry-adjusted investment/assets before base year	0.464	0.393	−0.115	−0.111
	(10.2)***	(17.3)***	(−1.70)*	(−3.00)***
Industry-adjusted asset sales/assets	−0.630	−0.519	−0.470	−0.323
	(−13.0)***	(−19.3)***	(−5.72)***	(−6.81)***
Distressed industry dummy	0.132	0.113	0.121	0.094
	(3.67)***	(7.70)***	(2.65)***	(4.82)***
Leverage deciles 8–10 dummy	−0.038	−0.024	−0.0076	−0.049
	(−4.56)***	(−4.78)***	(−0.59)	(−6.19)***
Distressed industry dummy x leverage deciles 8–10 dummy	−0.177	−0.136	−0.198	−0.100
	(−2.47)**	(−5.47)***	(−2.18)**	(−3.07)***
No. of observations	17,701	28,921	13,804	19,906
Adjusted R^2	0.03	0.05	0.02	0.02

Panel B: Split by Industry Concentration

	Industry-Adjusted Sales Growth		Industry-Adjusted Stock Returns	
	High Concentration	Other Industries	High Concentration	Other Industries
Intercept	−0.070	−0.119	−0.095	−0.123
	(−6.61)***	(−24.9)***	(−4.75)***	(−15.4)***
Log of sales	0.013	0.031	0.024	0.032
	(7.12)***	(30.2)***	(6.76)***	(19.4)***
Industry-adjusted operating income/assets before base year	0.029	−0.031	0.047	0.106
	(1.85)*	(−3.24)***	(1.90)*	(5.81)***

Table V—*Continued*

Panel B: Split by Industry Concentration

	Industry-Adjusted Sales Growth		Industry-Adjusted Stock Returns	
	High Concentration	Other Industries	High Concentration	Other Industries
Industry-adjusted investment/assets before base year	0.473 (9.49)***	0.402 (17.2)***	−0.190 (−2.32)**	−0.083 (−2.25)**
Industry-adjusted asset sales/assets	−0.527 (−8.58)***	−0.546 (−20.4)***	−0.485 (−4.45)***	−0.352 (−7.56)***
Distressed industry dummy	0.075 (1.85)*	0.118 (7.82)***	0.058 (1.04)	0.111 (5.66)***
Leverage deciles 8–10 dummy	−0.0025 (−0.26)	−0.039 (−8.02)***	−0.069 (−3.92)***	−0.037 (−4.94)***
Distressed industry dummy x leverage deciles 8–10 dummy	−0.186 (−2.30)***	−0.129 (−4.95)***	−0.134 (−1.20)	−0.120 (−3.59)***
No. of observations	7,391	37,360	4,605	27,863
Adjusted R^2	0.03	0.05	0.02	0.02

Panel C: Split by Firm Size

	Industry-Adjusted Sales Growth		Industry-Adjusted Stock Returns	
	Sales < $100 Million	Sales < $100 Million	Sales < $100 Million	Sales > $100 Million
Intercept	−0.228 (−40.0)***	−0.276 (−23.3)***	−0.213 (−21.0)***	−0.136 (−6.32)***
Log of sales	0.087 (50.9)***	0.038 (21.2)***	0.070 (23.9)***	0.026 (7.73)***
Industry-adjusted operating income/assets before base year	−0.093 (−10.2)***	0.423 (14.9)***	0.019 (1.17)	0.370 (7.49)***
Investment/assets before base year	0.328 (13.3)***	0.548 (15.0)***	−0.127 (−3.27)***	−0.132 (−2.04)**
Industry-adjusted asset sales/assets	−0.470 (−16.8)***	−0.573 (−12.0)***	−0.307 (−6.27)***	−0.382 (−4.42)***
Distressed industry dummy	0.187 (11.2)***	0.050 (2.08)**	0.153 (7.17)***	0.132 (3.42)***
Leverage deciles 8–10 dummy	−0.047 (−8.22)***	0.013 (2.37)**	−0.058 (−6.33)***	−0.0081 (−0.84)
Distressed industry x leverage deciles 8–10 dummy	−0.163 (−5.33)***	−0.112 (−3.35)***	−0.129 (−3.35)***	−0.162 (−2.84)***
No. of observations	30,089	16,533	20,387	13,323
Adjusted R^2	0.10	0.07	0.04	0.01

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

their unions. It is not clear how this would effect a firm's sales, but this does suggest that in concentrated industries, where the incidence of unionization is much higher, stock returns and changes in operating income should be positively correlated with leverage during times of distress. We classify industries with a four-firm concentration ratio above 40 percent as highly concentrated. Data on industry concentration are constructed using the TRINET large establishment database.[13]

Table V shows partitions of the data based on R&D intensity, firm size, industry concentration, and levels of asset sales. Highly leveraged firms that engage in R&D experience greater losses in market share during industry downturns than do other firms. Specifically, in periods of economic distress, leveraged R&D-intensive firms experience an average decline in sales of -17.7 percent (p-value < 5 percent). The sales drop for these R&D-intensive firms is larger than that for other firms (-13.6 percent). This R&D effect is also present in stock returns. High leverage is associated with a mean share price decline of -19.8 percent for R&D-intensive firms in industries with poor performance (versus a drop of -10 percent for non-R&D-intensive firms in the sample). This finding is consistent with the view that leverage is especially costly for firms with specialized products.[14]

We also observe larger drops in sales and market value of equity among firms in concentrated industries (-18.6 and -13.4 percent, respectively). This supports the idea that debt is more costly when well-funded rivals can exercise market power. These findings are consistent with the findings of Lang and Stulz (1992) who show that bankruptcy announcements in highly concentrated industries raise the equity value of rivals positioned to gain business from financially weak firms.

The third partition in Panel C divides firms into those with sales greater than \$100 million and those with sales less than \$100 million. Smaller firms experience drops in sales during periods of distress that are greater than the drops experienced by large firms. However, they also experience drops in the market value of equity that are less than the average for larger firms (-12.9 versus -16.2 percent). These mixed findings do not lend strong support to either the view that small firms are likely to encounter operating problems caused by credit rationing in periods of financial distress or that large firms are more likely to benefit by efficiently downsizing during periods of financial distress.

We wish to emphasize that the leverage subgroups are formed in a way that makes it unlikely that the effects of leverage across the subgroups discussed in Table V are due to differences in leverage between the sub-

[13] The TRINET database and its uses are described by Rumelt, Hatfield, and Voigt (1993). The four-firm concentration ratio is defined as the fraction of persons in a 3-digit SIC employed by the largest four firms in that industry.

[14] Shleifer and Vishny (1992) argue that financial distress costs are likely to be higher among firms with illiquid assets. To the extent that R&D/sales is a proxy for asset illiquidity, the sharper decline in stock returns in firms with R&D/sales over 0.1 percent also supports their theory. It is not clear, however, how the asset illiquidity theory would account for the disproportionate decline in sales in R&D-intensive firms.

groups. In Table VI we show the mean difference in leverage between subgroups analyzed in Table V. Interestingly, firms that are R&D-intensive in the high leverage group have a lower mean leverage than other firms, although the difference is not large. Similarly, we do not find large differences in leverage between high- and low-concentration groups, large- and small-firm groups, and high-asset-sales and low-asset-sales groups. This implies that the stock return results presented in this subsection are not due to the tendency of debt to amplify stock returns.

The observed difference in the sensitivity of sales growth to leverage in these three partitions is consistent with theories that suggest either a customer-driven or competitor-driven loss in sales and market value of equity during financial distress. To our knowledge, there is no equally plausible

Table VI

Mean Debt / Assets Ratio by Industry and Firm Characteristics Identified in the 1972 to 1991 Period

The number of firms in each cell is shown in parentheses. Leverage is defined two years prior to the base year as the book value of long-term and short-term debt divided by total assets. High-debt firms have leverage in deciles 8 to 10. Stock returns are dividend and split adjusted and are measured at calendar year-end one year prior to the base year until one year after the base year. Industries that exhibited poor performance had negative mean sales growth and mean stock returns less than −30 percent in the two-year period centered on the base year. R&D-intensive firms are those with R&D/sales two years before the base year above 0.1 percent. High concentration industries are those with a four-firm concentration ratio above 40 percent in 1981. Firm size (sales) is measured one year before the base year. Asset sales/assets is the sum of asset sales in the base year and the year after the base year divided by assets.

	Poor Industry Performance		Normal Industry Performance	
	High Debt	Others	High Debt	Others
Panel A: Split by R&D Intensity				
R&D-intensive firms (%)	45.2	14.7	48.4	15.5
	(52)	(157)	(3,627)	(13,892)
Other firms (%)	50.7	13.6	49.4	19.3
	(399)	(760)	(10,297)	(17,615)
Panel B: Split by Industry Concentration				
High concentration (%)	47.1	10.3	49.2	19.9
	(21)	(59)	(2,309)	5,018)
Other industries (%)	49.6	14.2	49.0	17.1
	(412)	(831)	(10,992)	(25,252)
Panel C: Split by Firm Size				
Sales < $100 million (%)	49.5	11.8	51.2	14.9
	(314)	(772)	(9,259)	(19,877)
Sales > $100 million (%)	49.6	24.2	46.1	21.0
	(137)	(145)	(4,665)	(11,630)

story based on managers optimally cutting back resources in distressed industries that can explain these results.

D. Effect of Financial Distress on Asset Sales, Employment and Investment

There have been a number of recent articles that have examined the tendency of financially distressed firms to cut investment and employment and to sell assets. These actions would contribute to what we call management-driven losses in sales. Although these studies attribute these actions at least in part to the firms' financial conditions, their research designs do not generally allow them to rule out the possibility that these changes are taken in response to the fundamental conditions of the firms rather than just their financial conditions (Sharpe (1994), discussed below, is an exception).[15] As we discussed in the Introduction, it is difficult to ascribe actions of financially distressed firms to their financial conditions, since most financially distressed firms also suffer from a fundamental decline in their businesses due, for example, to bad management or an economic downturn.

The research design developed in this article to evaluate the effect of financial distress on various measures of firm performance can also be used to examine how a firm's financial condition affects important corporate decisions during times of economic distress. By examining the effect of a firm's financial condition on decisions relating to employment, investment, and asset sales, we can better understand the results reported in the previous subsections. Table VII reports the results of three regressions that include the same independent variables as those reported in the previous tables with asset sales/assets, employment growth rates, and investment growth rates as dependent variables. As in the previous regressions we are particularly interested in the coefficients of the *distressed industry dummy* $\times$ *leverage decile 8 to 10 dummy* interaction variable.

The asset sales regression suggests that financial distress has an insignificant affect on asset sales. Highly leveraged firms do sell assets to a greater extent than their less leveraged counterparts. However, this leverage effect is only slightly more pronounced during industry downturns than it is during other times. These results provide additional evidence indicating that highly leveraged firms did not experience a decline in market share during industry downturns because they were selling assets. These results are different than the Asquith, Gertner, and Scharfstein (1991) findings. That is partly due to the fact that our methodologies are different, but we should also note that they probably have more reliable data on asset sales.[16]

[15]Asquith, Gertner, and Sharfstein (1991) do however examine how bank debt versus public debt affects these decisions, which does provide some insights relating to these issues.

[16]The asset-sale rate is defined as the sum of asset sales in the base year and the year after the base year (COMPUSTAT item No. 107) over assets measured one year before the base year. (COMPUSTAT item No. 6). COMPUSTAT item No. 107 is taken from firms' statement of changes in cash flow. This item, however, is not reported consistently by firms, and discrepancies arise in asset sales reported in financial footnotes and on the statement of changes in cash flow. Thus, our results concerning asset-sale rates are best regarded as suggestive.

Table VII

OLS Regressions Predicting Mean Industry-Adjusted Asset Sales/Assets, Employment Growth, and Capital Expenditure Growth in the 1972 to 1991 Period

Industry adjustment is carried out by subtracting the 3-digit SIC industry mean from the firm's performance. Ex ante leverage is measured two years prior to the base year and is defined as the book value of long-term and short-term debt divided by total assets. Employment growth and investment (capital expenditures) growth are measured over a two-year period centered on the base year. Distressed industries had negative mean sales growth and mean stock returns below −30 percent. Asset sales/assets is the sum of asset sales in the base year and the year after the base year divided by total assets at book.

Independent Variable	Asset Sales/Assets	Employment Growth	Investment Growth
Intercept	−0.009	−0.188	−0.180
	(−11.0)***	(−25.4)***	(−23.8)***
Log of sales	−0.0032	0.047	0.046
	(19.4)***	(31.7)***	(30.4)***
Industry-adjusted operating income/assets before base year	−0.0081	0.119	0.089
	(−5.18)***	(7.28)***	(5.94)***
Industry-adjusted investment/assets before base year	0.062	−0.199	−0.179
	(15.5)***	(−5.59)***	(−4.88)**
Industry-adjusted asset sales/assets	—	−0.526	−0.513
		(−12.2)***	(−11.6)***
Distressed industry dummy	−0.0081	0.127	0.117
	(−3.02)***	(5.59)***	(5.01)***
Leverage deciles 8–10 dummy	0.012	−0.032	−0.040
	(14.8)***	(−4.50)***	(−5.38)***
Distressed industry dummy x leverage deciles 8–10 dummy	0.0071	−0.096	−0.044
	(1.52)	(−2.42)**	(−1.03)
Adjusted R^2	0.02	0.04	0.04
No. of observations	46,623	39,876	39,644

***Significant at the 1 percent level.
**Significant at the 5 percent level.

The investment regression is similar to the asset sales regression in that it does provide support for the idea that leveraged firms invest less, but it doesn't support the idea that the tendency to do this is related to whether or not the industry is distressed. The significant negative coefficient on the high leverage dummy and the significant positive coefficient on the prior profitability variable supports the idea that financial slack is an important determinant of investment expenditures (Myers (1977) and Myers and Majluf (1984)). However, since the coefficient of the interaction term is not reliably negative, we must conclude that financial distress per se does not have a major effect on investment. As was the case for asset sales, this evidence is inconsistent with the idea that the observed drop in sales in manager driven.

The employment growth regression does, however, provide support for the idea that some of the drop in sales could be manager driven. The evidence

Table VIII

Mean Bankruptcy and Merger Rate by Leverage and Industry Performance in the 1972 to 1991 Period

Leverage is measured two years prior to the base year and is defined as the book value of long-term and short-term debt divided by total assets. The bankruptcy rate is the proportion of all firms which exited the COMPUSTAT because of bankruptcy or liquidation in the base year or the two years following the base year. The merger rate is the proportion of all firms which exited the COMPUSTAT because they were merged into another firm in the base year or the two years following the base year. The mean rate of exit for other reasons is the proportion of all firms which exited the COMPUSTAT but did not go bankrupt or merge into another firm. Industries which exhibited poor performance had negative median sales growth and median stock market returns below −30 percent in the two year period centered on the base year.

	Mean Bankruptcy Rate (%)	Mean Merger Rate (%)	Mean Rate of Exit for Other Reasons (%)
Poor industry			
Leverage deciles 8–10	6.5	12.1	3.4
Leverage deciles 1–7	2.7	11.4	5.6
Normal industry			
Leverage deciles 8–10	3.9	10.0	2.4
Leverage deciles 1–7	2.0	13.9	1.7

indicates that, in general, employment growth is slower for the more leveraged firms. This is not surprising given that more highly leveraged firms have lower rates of investment growth and higher asset sales. However, the interaction term in this regression is also significantly negative, indicating that leverage has a significantly stronger effect on employment during economic downturns. This evidence, which is consistent with the recent evidence in Sharpe (1994), suggests that some of the observed drop in sales that we attribute to financial distress could be manager driven.

E. Effect of Leverage and Industry Economic Distress on Firm Exit

While we have focused on the effect that leverage may have on the performance of surviving firms, it is also possible that leverage is so costly that firms go out of business and their performance cannot be measured at all. Thus, our results may understate the magnitude of financial distress costs by failing to account for a differential in bankruptcy rates across leverage and industry economic conditions. Table VIII shows the mean bankruptcy rate across the subgroups defined in our samples.[17] Highly leveraged firms in distressed industries experienced bankruptcy at more than double the rate of less leveraged firms (6.5 versus 2.7 percent). It appears that our results may understate the costs of bankruptcy because firms drop

[17] Bankruptcy is defined using COMPUSTAT disappearance codes for bankruptcy and liquidation (Footnote item No. 35).

out of the sample disproportionately from highly leveraged groups. It is also noteworthy that firms can drop out of the sample for reasons other than bankruptcy. For example, firms may respond to financial distress by seeking a merger partner (e.g., Stiglitz (1972)).

Table VIII shows that many firms exit our sample because of mergers and acquisitions but that the rate of exit by highly leveraged firms in industry downturns is not abnormally high. This may reflect the difficulty of finding a buyer in a distressed industry (Shleifer and Vishny (1992)). Firms also occasionally exit the sample because of other reasons (e.g., COMPUSTAT stops covering a firm as it becomes too small to garner investor interest). The results in Table VIII show that exit is higher when firms are in troubled industries. However, after controlling for industry effects, leverage does not appear to materially affect the chance that a firm will exit for reasons other than bankruptcy or mergers.

IV. Concluding Discussion

The evidence in this article indicates that there is a positive relationship between financial condition and firm performance in industry downturns. During these downturns, more highly leveraged firms tend to lose market share and experience lower operating profits than their competitors. Because we look at distressed industries rather than distressed firms and look at performance relative to industry averages, our tests minimize the reverse causality problem that made it difficult to interpret previous work.

The relation between leverage and performance tends to be more pronounced for those firms with significant R&D expenditures and for those in more concentrated industries. These findings are consistent with the hypothesis that the observed losses in sales are at least partially customer driven and competitor driven rather than being driven by cost-cutting managers optimally downsizing in declining industries. We hasten to add that other authors have noted that financial distress pushes firms to change operating strategies in ways that seem to clearly raise efficiency (see, Brown, James, and Ryngaert (1992), Gilson (1989), and Ofek (1993)). It thus appears that financial distress can simultaneously cause substantial and costly losses of business while promoting needed changes in operations.

Additional research is needed to tie the results presented in this article with the results in other recent articles that examine how corporate decisions are affected by financial distress. As we mentioned earlier, previous research has examined how financial distress affects investment expenditures, asset sales, employment, and executive turnover. In this study we briefly analyzed how a firm's financial condition affects decisions regarding asset sales, investment, and employment; however, we did not examine executive turnover. The important difference between these studies and ours is that the samples of firms used in the previous studies were selected based on the fact that they were financially distressed. While this creates a clean sample that illumi-

nates what happens in periods of financial distress, it does not lead to strong conclusions about appropriate ex ante financial decisions, because financial distress may arise either from bad luck or from poor management decisions. To illustrate this issue, consider the Gilson (1989) study that finds that executives in financially distressed firms are more likely to lose their jobs than their counterparts in firms that are not financially distressed. While this result is clearly of interest, it does not imply that an executive who chooses to increase his firm's leverage, thus increasing the chances of financial distress, would thereby increase his chances of losing his job. Since financial distress in Gilson's sample can arise because of poor management performance as well as because of high leverage, his methodology cannot be used to determine the extent to which managers are personally at risk when they increase their leverage ratio.

The research design suggested in this article does allow one to examine how corporate decisions, like executive dismissals, are related to the financing choice. However, since the analysis requires large samples of firms in both distressed and nondistressed industries, data limitations may make it difficult to apply to an analysis of those variables that are not included on databases like COMPUSTAT. A second weakness of our research design is that our sample of firms that are likely to be financially distressed, i.e., highly leveraged firms in distressed industries, probably include a substantial number of firms that are not really financially distressed and exclude substantial numbers that are financially distressed. As a result, empirical tests using this procedure will not be as powerful as those that simply examine samples of financially distressed firms. The first shortcoming of our research design will probably become less important over time as more reliable and comprehensive data bases become available. To minimize the effect of the second shortcoming better instruments for economic distress are needed.

REFERENCES

Altman, Edward, 1984, A further investigation of the bankruptcy cost question, *Journal of Finance* 39, 1067–1089.

Asquith, Paul, Robert Gertner, and David Scharfstein, 1991, Anatomy of financial distress: An examination of junk-bond issuers, Unpublished manuscript, University of Chicago.

Baldwin, Carliss Y., and Scott P. Mason, 1983, The resolution of claims in financial distress: The case of Massey Ferguson, *Journal of Finance* 38, 505–516.

Baxter, N., 1967, Leverage, risk of ruin and the cost of capital, *Journal of Finance* 22, 395–403.

Bolton, Patrick, and David S. Scharfstein, 1990, A theory of predation based on agency problems in financial contracting, *American Economic Review* 80, 93–106.

Bronars, Stephen, and Donald Deere, 1991, The threat of unionization, the use of debt, and the preservation of shareholder wealth, *Quarterly Journal of Economics* 106, 231–254.

Brown, David, Christopher James, and Mike Ryngaert, 1992, The effects of leverage on operating performance: An analysis of firms' responses to poor performance, Working paper 92–9, The University of Florida.

Chevalier, Judith, 1993, Debt and product market competition: Local market entry, exit, and expansion decisions of supermarket chains, Unpublished manuscript, Massachusetts Institute of Technology.

Cutler, David, and Lawrence Summers, 1988, The costs of conflict resolution and financial distress: Evidence from the Texaco-Pennzoil litigation, *Rand Journal of Economics* 19, 157–172.

Dasgupta, Sudipto, and Kunal Sengupta, 1993, Sunk Investment, Bargaining and Choice of Capital Structure, *International Economic Review* 34, 203–220.

Fama, Eugene, and Kenneth French, 1992, The cross-section of expected stock returns, *Journal of Finance* 47, 427–465.

Fudenberg, Drew, and Jean Tirole, 1986, A 'signal-jamming' theory of predation, *Rand Journal of Economics* 17, 366–376.

Gilson, Stuart C., 1989, Management turnover and financial distress, *Journal of Financial Economics* 25, 241–262.

———, and Michael Vetsuypens, 1993, CEO compensation in financially distressed firms: An empirical analysis, *Journal of Finance* 48, 425–458.

Hoshi, Takeo, Anil Kashyap, and David Scharfstein, 1990, The role of banks in reducing the costs of financial distress in Japan, *Journal of Financial Economics* 27, 67–88.

Jensen, Michael C., 1989, The eclipse of the public corporation, *Harvard Business Review* 5, 61–74.

———, and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 11, 5–50.

Lang, Larry H. P., and René M. Stulz, 1992, Contagion and intra-industry effects of bankruptcy announcements: An empirical analysis, *Journal of Financial Economics* 32, 45–60.

Maksimovic, Vojislav, and Sheridan Titman, 1991, Financial policy and a firm's reputation for product quality, *Review of Financial Studies* 4, 175–200.

Maksimovic, Vojislav, and Josef Zechner, 1991, Debt, agency costs and industry equilibrium, *Journal of Finance* 46, 1619–1643.

Myers, Stewart C., 1977, Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147–175.

———, and Nicholas Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187–221.

Novaes, Walter, and Luigi Zingales, 1993, Financial distress as a collapse of incentive schemes, Unpublished manuscript, University of Chicago.

Ofek, Eli, 1993, Capital structure and firm response to poor performance: An empirical analysis, *Journal of Financial Economics* 34, 3–30.

Opler, Tim, and Sheridan Titman, 1993, The determinants of leveraged buyout activity: Free cash flow vs. financial distress costs, *Journal of Finance* 48, 1985–1999.

Perotti, Enrico C., and Kathleen E. Spier, 1993, Capital structure as a bargaining tool: The role of leverage in contract renegotiation, *American Economic Review* 83, 1131–1141.

Phillips, Gordon M., 1993, Increased debt and product market competition, Unpublished manuscript, Purdue University.

Poitevin, Michel, 1989, Financial signalling and the "deep-pocket" argument, *Rand Journal of Economics* 20, 26–40.

Ross, Steven, 1977, The determination of financial structure: The incentive-signalling approach, *Bell Journal of Economics* 8, 23–40.

Rumelt, Richard P., Donald Hatfield, and Carl Voigt, 1993, The uses and structure of the TRINET database for business strategy research, Unpublished manuscript, University of California, Los Angeles.

Sharpe, Steven A., 1994, Financial market imperfections, firm leverage and the cyclicality of employment, *American Economic Review*, Forthcoming.

Shleifer, Andrei, and Robert Vishny, 1992, Liquidation values and debt capacity: A market equilibrium approach, *Journal of Finance* 47, 1343–1366.

Stiglitz, Joseph, 1972, Some aspects of the pure theory of corporate finance: Bankruptcies and take-overs, *Bell Journal of Economics and Management Science* 3, 458–472.

Stulz, René, 1990, Managerial discretion and optimal financing policies, *Journal of Financial Economics* 26, 3–27.

Titman, Sheridan, 1984, The effect of capital structure on a firm's liquidation decision, *Journal of Financial Economics* 13, 137–151.

———, and Roberto Wessels, 1988, The determination of capital structure choice, *Journal of Finance* 43, 1–19.

Wruck, Karen, 1990, Financial distress, reorganization and organizational efficiency, *Journal of Financial Economics* 27, 419–444.

[Footnotes]

[1] **Leverage, Risk of Ruin and the Cost of Capital**

Nevins D. Baxter

The Journal of Finance, Vol. 22, No. 3. (Sep., 1967), pp. 395-403.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28196709%2922%3A3%3C395%3ALRORAT%3E2.0.CO%3B2-4

[1] **CEO Compensation in Financially Distressed Firms: An Empirical Analysis**

Stuart C. Gilson; Michael R. Vetsuypens

The Journal of Finance, Vol. 48, No. 2. (Jun., 1993), pp. 425-458.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28199306%2948%3A2%3C425%3ACCIFDF%3E2.0.CO%3B2-I

[2] **A Theory of Predation Based on Agency Problems in Financial Contracting**

Patrick Bolton; David S. Scharfstein

The American Economic Review, Vol. 80, No. 1. (Mar., 1990), pp. 93-106.

Stable URL:

http://links.jstor.org/sici?sici=0002-8282%28199003%2980%3A1%3C93%3AATOPBO%3E2.0.CO%3B2-5

LINKED CITATIONS

[2] **A "Signal-Jamming" Theory of Predation**
Drew Fudenberg; Jean Tirole
The RAND Journal of Economics, Vol. 17, No. 3. (Autumn, 1986), pp. 366-376.
Stable URL:
http://links.jstor.org/sici?sici=0741-6261%28198623%2917%3A3%3C366%3AA%22TOP%3E2.0.CO%3B2-O

[2] **Financial Signalling and the "Deep-Pocket" Argument**
Michel Poitevin
The RAND Journal of Economics, Vol. 20, No. 1. (Spring, 1989), pp. 26-40.
Stable URL:
http://links.jstor.org/sici?sici=0741-6261%28198921%2920%3A1%3C26%3AFSAT%22A%3E2.0.CO%3B2-P

[3] **The Threat of Unionization, the Use of Debt, and the Preservation of Shareholder Wealth**
Stephen G. Bronars; Donald R. Deere
The Quarterly Journal of Economics, Vol. 106, No. 1. (Feb., 1991), pp. 231-254.
Stable URL:
http://links.jstor.org/sici?sici=0033-5533%28199102%29106%3A1%3C231%3ATTOUTU%3E2.0.CO%3B2-K

[3] **Capital Structure as a Bargaining Tool: The Role of Leverage in Contract Renegotiation**
Enrico C. Perotti; Kathryn E. Spier
The American Economic Review, Vol. 83, No. 5. (Dec., 1993), pp. 1131-1141.
Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28199312%2983%3A5%3C1131%3ACSAABT%3E2.0.CO%3B2-3

[3] **Sunk Investment, Bargaining and Choice of Capital Structure**
Sudipto Dasgupta; Kunal Sengupta
International Economic Review, Vol. 34, No. 1. (Feb., 1993), pp. 203-220.
Stable URL:
http://links.jstor.org/sici?sici=0020-6598%28199302%2934%3A1%3C203%3ASIBACO%3E2.0.CO%3B2-O

[4] **The Resolution of Claims in Financial Distress the Case of Massey Ferguson**
Carliss Y. Baldwin; Scott P. Mason
The Journal of Finance, Vol. 38, No. 2, Papers and Proceedings Forty-First Annual Meeting American Finance Association New York, N.Y. December 28-30, 1982. (May, 1983), pp. 505-516.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28198305%2938%3A2%3C505%3ATROCIF%3E2.0.CO%3B2-3

LINKED CITATIONS

[4] **The Costs of Conflict Resolution and Financial Distress: Evidence from the Texaco-Pennzoil Litigation**
David M. Cutler; Lawrence H. Summers
The RAND Journal of Economics, Vol. 19, No. 2. (Summer, 1988), pp. 157-172.
Stable URL:
http://links.jstor.org/sici?sici=0741-6261%28198822%2919%3A2%3C157%3ATCOCRA%3E2.0.CO%3B2-8

[5] **Financial Market Imperfections, Firm Leverage, and the Cyclicality of Employment**
Steven A. Sharpe
The American Economic Review, Vol. 84, No. 4. (Sep., 1994), pp. 1060-1074.
Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28199409%2984%3A4%3C1060%3AFMIFLA%3E2.0.CO%3B2-U

[12] **The Cross-Section of Expected Stock Returns**
Eugene F. Fama; Kenneth R. French
The Journal of Finance, Vol. 47, No. 2. (Jun., 1992), pp. 427-465.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199206%2947%3A2%3C427%3ATCOESR%3E2.0.CO%3B2-N

[14] **Liquidation Values and Debt Capacity: A Market Equilibrium Approach**
Andrei Shleifer; Robert W. Vishny
The Journal of Finance, Vol. 47, No. 4. (Sep., 1992), pp. 1343-1366.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199209%2947%3A4%3C1343%3ALVADCA%3E2.0.CO%3B2-O

References

A Further Empirical Investigation of the Bankruptcy Cost Question
Edward I. Altman
The Journal of Finance, Vol. 39, No. 4. (Sep., 1984), pp. 1067-1089.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28198409%2939%3A4%3C1067%3AAFEIOT%3E2.0.CO%3B2-L

LINKED CITATIONS

The Resolution of Claims in Financial Distress the Case of Massey Ferguson
Carliss Y. Baldwin; Scott P. Mason
The Journal of Finance, Vol. 38, No. 2, Papers and Proceedings Forty-First Annual Meeting American Finance Association New York, N.Y. December 28-30, 1982. (May, 1983), pp. 505-516.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28198305%2938%3A2%3C505%3ATROCIF%3E2.0.CO%3B2-3

Leverage, Risk of Ruin and the Cost of Capital
Nevins D. Baxter
The Journal of Finance, Vol. 22, No. 3. (Sep., 1967), pp. 395-403.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28196709%2922%3A3%3C395%3ALRORAT%3E2.0.CO%3B2-4

A Theory of Predation Based on Agency Problems in Financial Contracting
Patrick Bolton; David S. Scharfstein
The American Economic Review, Vol. 80, No. 1. (Mar., 1990), pp. 93-106.
Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28199003%2980%3A1%3C93%3AATOPBO%3E2.0.CO%3B2-5

The Threat of Unionization, the Use of Debt, and the Preservation of Shareholder Wealth
Stephen G. Bronars; Donald R. Deere
The Quarterly Journal of Economics, Vol. 106, No. 1. (Feb., 1991), pp. 231-254.
Stable URL:
http://links.jstor.org/sici?sici=0033-5533%28199102%29106%3A1%3C231%3ATTOUTU%3E2.0.CO%3B2-K

The Costs of Conflict Resolution and Financial Distress: Evidence from the Texaco-Pennzoil Litigation
David M. Cutler; Lawrence H. Summers
The RAND Journal of Economics, Vol. 19, No. 2. (Summer, 1988), pp. 157-172.
Stable URL:
http://links.jstor.org/sici?sici=0741-6261%28198822%2919%3A2%3C157%3ATCOCRA%3E2.0.CO%3B2-8

Sunk Investment, Bargaining and Choice of Capital Structure
Sudipto Dasgupta; Kunal Sengupta
International Economic Review, Vol. 34, No. 1. (Feb., 1993), pp. 203-220.
Stable URL:
http://links.jstor.org/sici?sici=0020-6598%28199302%2934%3A1%3C203%3ASIBACO%3E2.0.CO%3B2-O

LINKED CITATIONS

The Cross-Section of Expected Stock Returns
Eugene F. Fama; Kenneth R. French
The Journal of Finance, Vol. 47, No. 2. (Jun., 1992), pp. 427-465.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199206%2947%3A2%3C427%3ATCOESR%3E2.0.CO%3B2-N

A "Signal-Jamming" Theory of Predation
Drew Fudenberg; Jean Tirole
The RAND Journal of Economics, Vol. 17, No. 3. (Autumn, 1986), pp. 366-376.
Stable URL:
http://links.jstor.org/sici?sici=0741-6261%28198623%2917%3A3%3C366%3AA%22TOP%3E2.0.CO%3B2-O

CEO Compensation in Financially Distressed Firms: An Empirical Analysis
Stuart C. Gilson; Michael R. Vetsuypens
The Journal of Finance, Vol. 48, No. 2. (Jun., 1993), pp. 425-458.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199306%2948%3A2%3C425%3ACCIFDF%3E2.0.CO%3B2-I

Financial Policy and Reputation for Product Quality
Vojislav Maksimovic; Sheridan Titman
The Review of Financial Studies, Vol. 4, No. 1. (1991), pp. 175-200.
Stable URL:
http://links.jstor.org/sici?sici=0893-9454%281991%294%3A1%3C175%3AFPARFP%3E2.0.CO%3B2-J

Debt, Agency Costs, and Industry Equilibrium
Vojislav Maksimovic; Josef Zechner
The Journal of Finance, Vol. 46, No. 5. (Dec., 1991), pp. 1619-1643.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199112%2946%3A5%3C1619%3ADACAIE%3E2.0.CO%3B2-F

The Determinants of Leveraged Buyout Activity: Free Cash Flow vs. Financial Distress Costs
Tim Opler; Sheridan Titman
The Journal of Finance, Vol. 48, No. 5. (Dec., 1993), pp. 1985-1999.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199312%2948%3A5%3C1985%3ATDOLBA%3E2.0.CO%3B2-A

LINKED CITATIONS

Capital Structure as a Bargaining Tool: The Role of Leverage in Contract Renegotiation
Enrico C. Perotti; Kathryn E. Spier
The American Economic Review, Vol. 83, No. 5. (Dec., 1993), pp. 1131-1141.
Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28199312%2983%3A5%3C1131%3ACSAABT%3E2.0.CO%3B2-3

Financial Signalling and the "Deep-Pocket" Argument
Michel Poitevin
The RAND Journal of Economics, Vol. 20, No. 1. (Spring, 1989), pp. 26-40.
Stable URL:
http://links.jstor.org/sici?sici=0741-6261%28198921%2920%3A1%3C26%3AFSAT%22A%3E2.0.CO%3B2-P

Financial Market Imperfections, Firm Leverage, and the Cyclicality of Employment
Steven A. Sharpe
The American Economic Review, Vol. 84, No. 4. (Sep., 1994), pp. 1060-1074.
Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28199409%2984%3A4%3C1060%3AFMIFLA%3E2.0.CO%3B2-U

Liquidation Values and Debt Capacity: A Market Equilibrium Approach
Andrei Shleifer; Robert W. Vishny
The Journal of Finance, Vol. 47, No. 4. (Sep., 1992), pp. 1343-1366.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199209%2947%3A4%3C1343%3ALVADCA%3E2.0.CO%3B2-O

The Determinants of Capital Structure Choice
Sheridan Titman; Roberto Wessels
The Journal of Finance, Vol. 43, No. 1. (Mar., 1988), pp. 1-19.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28198803%2943%3A1%3C1%3ATDOCSC%3E2.0.CO%3B2-A