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# The Indirect Costs of Financial Distress

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Preliminary Comments Welcome

# THE INDIRECT COSTS OF FINANCIAL DISTRESS

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# The Indirect Costs of Financial Distress


## Abstract

The indirect costs of financial distress which arise from breakdowns of explicit and implicit contracts are potentially one of the most important determinants of capital structure choice. Nonetheless, the magnitude of these costs is not well documented in the literature. This paper applies an empirical technique to measure these costs across a broad cross-section of publicly traded firms in the 1972-1991 period. Our main results show that highly levered firms in industries experiencing poor performance suffer larger declines in sales and market value of equity than their less levered competitors. This supports the idea that leverage has real costs in periods of economic distress. Consistent with the theory that firms with unique products which need future servicing are especially vulnerable to financial distress, we find that highly leveraged firms which 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. This supports models which argue that leverage can be particularly costly when well-funded rivals have market power.

# THE INDIRECT COSTS OF FINANCIAL DISTRESS

Most theories of optimal capital structure describe trade-offs between the costs and the benefits of debt financing. The benefits of debt include a reduction in corporate taxes [Modigliani and Miller (1963)], improvements in management incentives [Jensen (1986, 1989)] and gains from signalling [Ross (1976)]. Because high leverage can force a firm to default in business downturns, the offsetting costs of debt include the expected direct and indirect costs of financial distress. The direct costs of financial distress involve the legal and administrative costs of bankruptcy proceedings while the indirect costs of financial distress come from incentive problems that arise as a firm's financial condition deteriorates. These incentive problems may arise between borrowers and lenders [Jensen and Meckling (1976), Myers (1977) and Stulz (1990)]; between firms and their non-financial stakeholders [Baxter (1967) and Titman (1984)] and between shareholders and managers [Gilson and Vetsuypens (1993)]. 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 [Bolton and Scharfstein (1990)].

A number of studies have concluded that direct bankruptcy costs are fairly low for large corporations [e.g. Warner (1976) and Weiss (1990)]. Although anecdotal evidence suggests that financial distress can cause significant losses in firm value, these indirect costs are more difficult to measure and, as a result, have received less attention in the empirical literature.[1] Perhaps the best known attempt to measure the indirect costs of financial distress is that of Edward Altman. Altman (1984) estimates the financial distress costs of firms that went bankrupt from estimates of the decline in their sales and from the deviation between their actual earnings and forecasts of their earnings over the three years prior to filing for bankruptcy. Although the estimates indicate that financial distress costs are substantial, there is a likely bias in Altman's sample selection criteria. Specifically, part of the observed drop in sales from

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

Altman's sample of financially distressed firms 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 sales drops and financial distress may be opposite of that assumed by Altman.[2]

The purpose of this paper is to measure the indirect costs of financial distress in a way that avoids the problem of reverse causality and considers firm performance during periods of economic distress. We investigate whether financial leverage disproportionately affects performance in industry-wide economic downturns. If financial distress is costly then more highly levered firms will have the greatest operating difficulties in a downturn. Alternatively, if financial distress benefits firms by forcing efficient operating changes as suggested by Jensen (1989) then more highly levered firms may perform better than less levered firms. Because our research design selects economically distressed industries rather than distressed firms, the reverse causality problem present in earlier research is avoided.

Most of the analysis in this paper examines the effect of leverage on the sales of firms in distressed industries. Of course, managers can reduce sales while increasing efficiency by raising prices, closing costly accounts, etc. At the same time, sales also depend on customer and competitor reactions to a firm's financial condition. Unlike manager-driven reductions in sales that can be interpreted as a benefit as well as a cost of financial distress, customer-driven and competitor-driven sales losses are

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[2]Another study of the indirect costs of financial distress by Lang and Stulz (1992) avoids this reverse causality problem. They show that bankruptcy announcements normally reduce the value of rival firms. However, bankruptcies in highly concentrated industries with low average leverage raise the value of rivals. The Lang and Stulz study thus suggests that loss of business to rivals can be a significant cost of financial distress. Their results, however, may mask even greater costs of financial distress that result when one firm's loss of business does not go to rivals because of the specificity of its customer relations or its technology. Several other studies have also examined what happens to leveraged firms after periods of economic distress. Brown, James and Ryngaert (1992) show that highly levered firms perform better after periods of economic distress than less levered firms. Similarly, Ofek (1992) finds that highly levered firms are more likely to undertake operational actions to correct problems in periods of poor performance. These findings suggest that financial distress may not be a costly event for firms; and, in fact may be beneficial. [See Jensen (1989) and Wruck (1990)]. However, because these studies examine changes taking place *after* periods of economic distress they do not rule out the possibility that financial leverage is costly during periods of economic distress.

clearly costly. The main purpose of this paper is to devise tests that allow us to measure the significance of these externally-driven reductions of a distressed firm's sales.

Our main results show that highly levered firms suffer larger declines in sales than do other firms in poorly performing industries. To test the extent to which the decline in sales is customer-driven and competitor-driven, we undertake two additional tests. First, we examine the impact of leverage on stock prices in distressed industries. If declines in sales growth are in shareholder's interest (i.e. manager-driven) then we would expect to find that stock prices would rise. In fact, we find that stock prices decline significantly, suggesting that drops in sales represent real costs of financial distress. Second, we estimate the impact of leverage in various subsets of our data. We find that the relation between sales growth and leverage is much stronger for firms with research and development programs. This supports the idea that firms with more specialized products that are likely to need future servicing are most affected by financial distress [Titman and Wessels (1988)]. We also find that the impact of leverage is more pronounced in concentrated industries. This is consistent with the idea that financially healthy firms move aggressively to take market share from their financially distressed rivals in oligopolistic industries.

## I. Research Design

Our basic approach is to identify firms which are likely to become financially troubled in periods of economic distress. We define periods of economic distress using information at the industry level, and then determine which firms in economically distressed industries are the most likely to be financially distressed given their leverage before the distressed period.[3]

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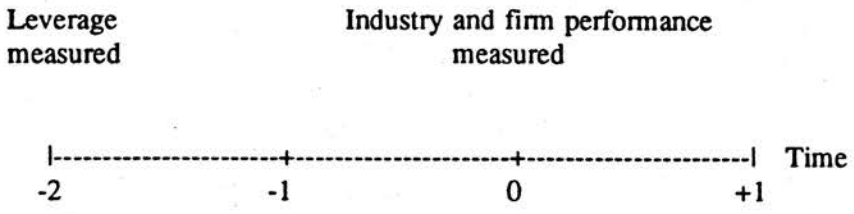
[3]An important requirement for this approach to have power is that changes in sales growth and stock returns have common industry-wide components. In an unreported variance components analysis we regressed sales growth on 3-digit SIC industry dummy variables and found that approximately 8 percent of the variance of sales growth can be explained purely by industry. This fraction rose substantially when we interacted industry dummies with year dummies.




A time line illustrating our empirical method is given above. We measure financial leverage two years prior to the base year (year -2) and observe industry-adjusted sales growth and industry performance from a year before until a year after the base year (year -1 to year +1). We adjust for industry effects by subtracting the 3-digit SIC industry median of performance from firm-level performance in each period. The one year lag between measurement of financial vulnerability and 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. We define an industry as being economically distressed when its median sales growth is negative and when it experiences median stock returns below -30%.[4] Financial leverage is defined as the book value of debt plus the redemption value of preferred stock divided by the book value of assets.

A number of additional considerations influenced our research design. First, a distressed firm may lose sales because it has sold off a division. Asquith, Gertner and Scharfstein (1991) and others have noted that troubled firms often sell off assets when they face financial difficulties. If assets are liquidated efficiently then the sales drop associated with an asset sale will imply a net gain rather than a loss. Because of this, we also examine the impact of debt on performance in a subset of firms that chose not to sell off a major portion of their assets.

A second potential bias arises because capital structures are endogenous. In particular, firms which face the highest potential financial distress costs are the least likely to be levered. This will cause our

[4]Later, we explore the sensitivity of our results to how industry-level economic distress is defined.

results to understate the adverse impact of leverage because highly levered firms should be the least vulnerable when in financial distress. For this reason we stratify our sample by proxies for various costs of financial distress (e.g. research and development intensity). In this way, we can study the impact of leverage on firms with high potential financial distress costs.

It is also possible that highly levered firms may be the least efficient in their industries and thus the least able to withstand an industry downturn. Indeed, Titman and Wessels (1988) and others have noted that there is a negative relation between past profitability and leverage. To lessen this potential bias we test whether the effect of leverage in distressed industries changes after controlling for firm profitability. This potential bias is further minimized when we measure leverage in terms of book rather than market values.

Measuring leverage using book rather than market values also mitigates a problem due to the fact that leverage ratios may forecast as well as determine 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. For example, firms that expect to grow in the future may choose less debt relative to assets measured either at book or market value. In addition, more highly levered firms may have the best prospects given the signalling arguments put forth by Ross (1976) and others. In any case, the above arguments do not apply exclusively to economically distressed periods. Therefore, we control for these effects by estimating the relation between leverage ratios and subsequent sales growth in non-distressed periods.

## II. Sample Selection

Firm level data is obtained from the 1992 Standard and 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

1972-1991 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; (3) firms which list two or more industry segments in their annual report to maximize the power of our research design which identifies economically distressed industries and (4) firms for which data on leverage before the base period was not available. After applying these selection criteria we retained 52,475 firm-years of data for our empirical analysis. Segment data used to trim the sample were obtained from the COMPUSTAT business segment tape. Data on industry structure are constructed using the TRINET Large Establishment Database.[5] Financial ratios, stock returns and sales growth rates are measured with Compustat data. Stock returns are defined using calendar year end prices and are adjusted for the effects of splits and dividends.[6]

Roughly three percent of all firm-years in the sample were in industries defined as troubled. Table I shows the number of firms in troubled industries and the number of troubled industries by year. The number of firms in troubled rises in the early 1980s and in 1990 (reflecting the 1990-91 recession). The large cluster of firms in troubled industries in 1982-1985 is attributable to poor performance in various parts of the heavily populated oil & gas sector.[7] Other sectors which are heavily represented in the troubled industry subsample include silver mining, special machinery, real estate development and steel.

Table II gives descriptive information on the main variables analyzed in the empirical section. Panel A of the table describes firms in industries experiencing poor performance while Panel B describes

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[5]This database and its uses are described by Rumelt, Hatfield and Voigt (1993).

[6]Using December price data may lower the power of our tests for firms with fiscal year ends distant from the calendar year ends. In unreported analyses we used CRSP data to define annual returns beginning two months after firm's fiscal year ends and obtained results with similar economic significance but smaller cell sizes. For this reason, and because of the high correlation found between CRSP and Compustat December to December returns ($\rho > 0.97$) we used Compustat data to compute returns.

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

all other firms in the sample. Both sets of firms exhibit considerable cross-sectional variation in their leverage ratios. For example, the interquartile range of the debt/assets ratio prior to the base year is 36.4%. Firms in industries experiencing poor performance were much smaller, on average, than their counterparts in other industries. The average base year sales of firms in poor performer industries was $184 million--less than half of the average in other industries. The rate of sales growth for firms in troubled industries averages (-8.2%) is, of course, lower than it is for firms in other industries (23.5%).[8] Stock returns also differ significantly in the two groups (mean of -39.3% in troubled industries versus a mean of 18.2% in non-troubled industries). The variability of equity returns is substantial since the interquartile range of stock returns is roughly one and a half times that of sales growth.[9]

## III. Empirical Results

### *A. Leverage and Firm Performance*

Table III reports mean industry-adjusted sales growth and stock returns by industry condition and firm financial leverage. The main question addressed in this table is whether the impact of leverage on firm performance is greater when industries experience poor performance. The question is answered in the last two rows of the table which shows the additional impact of leverage in poorly performing industries.[10]

In poorly performing industries, firms with high leverage (debt/assets deciles 8-10) have a mean

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[8]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%. The economic significance of our results does not depend on this cut.

[9]In our subsequent empirical analyses we find stronger statistical significance of differences in sales growth than in stock returns. This reflects (1) the higher standard errors on difference estimates due to the high dispersion of stock returns and (2) the smaller number of firms for which stock returns were available.

[10]Statistical significance of the incremental impact of leverage in industries with poor performance is assessed using an F-test based on the change in the explanatory power of a multiple regression from adding a joint leverage and industry performance effect after controlling for the main leverage and industry performance effects.

industry-adjusted sales growth rate which is 12.2 percent lower than do firms not in high leverage (debt/assets deciles 1-7). Because there is also a leverage effect in normal performance industries of -3.9 percent, we find that the incremental impact of high leverage in poorly performing industries is -8.3 percent. This shows a substantial effect of leverage on sales in economic downturns. We find an even stronger effect of leverage when contrasting sales growth in the highest leverage decile to sales growth in the lowest leverage decile (a difference of 11.1 percent).[11] The mean sales drop in the high leverage groups is statistically distinguishable from that in less levered groups at the 1% level.

It is possible that the declines in sales associated with high leverage in troubled industries reflect efficient downsizing in response to poor economic prospects. From this perspective, the drop in sales could be a benefit rather than a cost of financial distress. To investigate this possibility we also examine changes in the market value of equity following the onset of economic distress. We find a substantial impact of high leverage on stock returns in poorly performing industries. The incremental impact of being in leverage deciles 8-10 vs. leverage deciles 1-7 on returns is -5.6 percent. This impact increases to -13.1 percent when contrasting the highest leverage decile group with the lowest leverage decile group. The drop in market value for firms with high debt in troubled times supports the hypothesis that firms can experience significant indirect costs of financial distress.

As we mentioned earlier, a potential objection to this interpretation arises from the the possibility that leverage proxies for other factors which predict performance. For example, less profitable firms tend to be more highly leveraged and may have difficulty achieving sales growth and unexpected increases in cash flows in the future. To minimize this possibility we also control for the impact of pre-base year

[11]Firms in the bottom leverage decile had debt/assets ratios ranging between zero and 1.2%. Those in the top leverage decile had debt/assets of at least 59.6%. Those in leverage deciles 8-10 had debt/assets of at least 39.2%.

profitability when computing the incremental impact of leverage.[12] Leverage effects after controlling for profitability are shown in parentheses and differ little from those obtained without the control.

### *B. Sources of Indirect Financial Distress Costs*

In the last subsection we presented evidence that leverage has a disproportionate negative effect on a firm's sales and its stock price in periods of economic distress. This subsection provides evidence concerning the source of these losses by investigating cross-sectional differences in the effect of leverage on lost sales and stock returns. In other words, we 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 in economic distress.

The variables we examine are R&D intensity, firm size and industry concentration. Smaller firms may suffer more in financial distress given their increased likelihood of actually being forced out of business. Small, distressed firms may have greater difficulty accessing needed capital because of problems of informational asymmetry between insiders and outsiders. On the other hand, smaller firms may be better able to avoid problems of financial distress because of their less complicated internal contractual arrangements. Novaes and Zingales (1993), for example, show that contracting problems in periods of financial distress will be more severe in large firms because of the larger number of layers in managerial hierarchies and the larger number of operating units.

As discussed in Titman and Wessels (1988), R&D expenditures can proxy for the degree of specialization of products.[13] We expect customers to be more reluctant to purchase products from a

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[12]We add profitability as an indepedendent variable in a regression predicting industry-adjusted performance. Profitability is defined as earnings before interest, depreciation and amortization divided by sales (Compustat items: (13-16)/12). The results do not change when size and investment intensity are added as controls.

[13]R&D may also be related to future growth opportunities and the level of non-debt tax shields.

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 a R&D intensity dummy which takes the value one when a firm has a R&D/sales ratio two years before the base year above 0.1%, and zero otherwise. The concentration ratio of the industry proxies for the gains associated with removing a weakened competitor discussed by Bolton and Scharfstein (1990), Poitevin (1989) and Fudenberg and Tirole (1986). We classify industries with a four-firm concentration ratio greater than 40% as highly concentrated.

Tables IV shows three partitions of the data based on R&D intensity, firm size and industry concentration. Highly levered 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 which is 5.7 percent greater than that experienced by other firms. This effect is statistically significant at the 1 percent level. This R&D intensity effect is economically larger in stock returns. Here we find that leverage drives returns down by 13.4 percent more in industries with poor performance (significant at the 1 percent level). These findings are consistent with the story that leverage is especially costly for firms with specialized products that may require future servicing.[14]

We also observe much larger drops in sales and market value of equity among firms in concentrated industries (-22.7 and -11.9 percent, respectively). This supports the idea that debt is more costly when well-funded rivals can exercise market power. These findings are also consistent with results of Lang and Stulz (1992) who show that bankruptcies in highly concentrated industries with low average leverage raise the value of rivals who may be able to exercise market power to gain business from the

[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 illiquity, the sharper decline in stock returns in firms with R&D/sales over 0.1% 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.

financial weak.

The third partition in Panel C divides firms into those with sales greater than $100 million and those with sales less than $100 million. The results are mixed. Big firms experience larger drops in sales but smaller drops in market value of equity. One interpretation of this finding is that larger firms have fewer problems in recovering from financial distress because of superior access to capital. Thus their market value drops less despite a greater loss of business.

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

### *C Asset Sales and Leverage*

Perhaps the largest source of management-driven sales losses relates to decisions to sell off assets. Table V documents the average asset sale rate by leverage group and by whether or not a firm was in a troubled industry.[15] The table shows that highly levered firms in distressed industries sold off a significant portion of their assets (5.7% of assets in the two year distressed period). Less levered firms also sell off a large amount of assets in economically distressed periods (5% of assets). To our surprise, there is not a greater tendency to liquidate investments made in other companies in periods of financial distress.

As we mentioned earlier, it is possible that the previously documented effect of leverage on sales growth primarily reflects the asset sales of highly levered firm in troubled industries. However, we have

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[15]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 #107) over assets measured one year before the base year. (Compustat item #6). Compustat item #107 is taken from firm's 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.

found that leverage effects remain even after omitting firms with high asset sale activity. Panel A of Table VI shows that there is a substantial incremental decline in sales growth and stock returns among firms with asset sales/assets ratios less than 5% for leveraged firms relative to less leveraged firms, after controlling for industry performance.

### *D. Sensitivity of Results to Key Parameters*

The preceding analyses required us to operationalize the meaning of high leverage. We explore the impact of our choice of leverage measure in Panel B of Table VI which shows the incremental impact of high leverage in distressed industries using other definitions. We obtain results which are similar in their economic and statistical significance when defining leverage using (assets-shareholder equity)/assets at book. This is a comprehensive definition of financial leverage which accounts for the role of debt, trade credit, capital leases and deferred charges in the balance sheet. The results become somewhat weaker when defininig leverage as [book value of debt / (the book value of debt plus the market value of equity)]. As we argued before, however, there are several reasons why market-value definitions of financial leverage are inappropriate given the design of this study.

Panel C of Table VI also shows the sensitivity of our findings to the definition of industry economic distress. The results given earlier in Table III are comparable to those obtained when distressed industries are selected based on a decline in the median profit margin from above 5% to below 5%. When industries are selected purely on the basis of having median stock returns below -30% we find results that are slightly weaker. This may be because equity values can fall dramatically when firms lose growth opportunities but do not experience serious economic distress.

### *E. Is Their a Leverage Bias in the Stock Returns Results?*

One potential problem in interpreting our results is that stock returns may decline in leveraged industries

because the elasticitiy of share prices with respect to cash flow rises with leverage [Bhandari (1988)]. However, we strongly doubt that this phenomenon explains the incremental effect of leverage on stock returns observed in distressed instustries. First, to our knowledge, no leverage effect has been documented in the literature. Bhandari (1988) and Fama and French (1992) show that stock returns are higher in firms where [(debt at book) / (debt at book plus equity at market)]. But, Fama and French (1992) further show that after removing a strong book to market value of equity effect, the "leverage effect" goes in the wrong direction. Firms with more debt/assets at book actually experience lower average stock returns. In unreported regressions in our sample, we have observed a similar phenomenon, even after controlling for a variety of potentially intervening factors. Second, we have found that leveraged firms experience a decline in stock returns even in good times. This is illustrated in Table III which shows that industry-adjusted returns decline as leverage rises among firms that are not in industries that we have defined as troubled.[16] Third, and finally, it would be difficult to account for the difference in stock returns among subsamples based on R&D intensity and industry concentration with a leverage effect story.[17]

## IV. Concluding Discussion

The evidence in this paper indicates that there is an inverse relation between a firm's financial leverage and its performance in periods of economic distress. This is consistent with the idea that financial distress has significant deadweight private costs. Because we look at distressed industries rather than distressed firms and look at sales growth relative to industry averages, our tests minimize the reverse causality problem that made it difficult to interpret previous work.

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[16]In unreported regressions we have also found that firm-level stock returns are negatively related to leverage even when firms experience sharp declines in profitability. This is strongly inconsistent with the existence of a leverage effect in stock returns.

[17]We have found that high and low R&D subgroups in economically distressed industries after splitting by leverage deciles have similar mean debt/assets ratios.

This work is related to some recent studies that examine how operating choices are affected by financial distress. [See Hoshi, Kashap, and Scharfstein (1990), Asquith, Gertner and Scharfstein (1991), Sharpe (1991) and Ofek (1992)]. The main finding of these studies is that financially distressed firms have a greater tendency to cut investment, sell assets and reduce employment than their non-leveraged counterparts. Depending on your outlook, these events either show that financial distress is costly, since it forces firms to forgo valuable investments or that financial distress can create value by forcing managers to make tough decisions that they would otherwise avoid.

In particular, there are at least three possible explanations for the observed negative relation between leverage and sales growth. The first, which we refer to as the customer-driven loss in sales explanation, implies that the loss in sales arises because of a reluctance of customers to buy from firms in financial distress. The second, which we refer to as the competitor-driven explanation, implies that the loss in sales arises because of aggressive responses to a firm's financial distress by its competitors. The third explanation suggests that the loss in sales arises because of the management's decisions to cut employment, selling expenses and investment in response to economic distress. Distinguishing between these different explanations for drops in sales is crucial since either customer-driven or competitor-driven sales losses imply financial distress costs while the loss in sales that arises from asset sales and cuts in employment and selling efforts may be indicative of optimal responses to the drop in industry demand, and thus imply a benefit of financial distress.

The results in this paper suggest that a substantial fraction of the observed loss in sales is not due to managerial efforts to increase efficiency for two reasons. First, we have found that stock returns decline at the same time that sales drop in financially distressed situtations. This is not consistent with an efficiency explanation of sales declines. Second, we have found indirect evidence that sales and market value declines reflect positive financial distress costs by partitioning our results according to firm characteristics which are related to the expected magnitude of financial distress costs. In particular, the

evidence indicates that highly levered firms lose more sales when their vulnerability to a customer driven response to financial distress is high (i.e. when they invest in research and development). We also found a stronger relation between sales growth and leverage in more concentrated industries, in which competitor responses are likely to be most important. 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 (1992)]. It thus appears that financial distress can simultaneously cause substantial and costly losses of business while promoting needed changes in operations.

Our findings shed some light on the extensive literature on the determinants of capital structure reviewed by Harris and Raviv (1991). Specifically, our results suggest that some of the better known cross-sectional determinants of leverage ratios such as R&D intensity and firm size proxy for the expected costs of financial distress. However, this paper has only examined a few potentially important determinants of financial distress costs. Future researchers may find that other factors overlooked here also predict leveraged firm's experience in periods of economic distress. Moreover, we have not attempted to determine whether these costs are substantial enough to explain the observed cross-sectional variation in firm's capital structures. This important question could be addressed with simulation exercises similar to those advocated by Donaldson (1961). A further question left unanswered by this study is whether the costs of financial distress differ by type of debt. It may be that firms with capital structures that are quickly renegotiated (e.g. those who borrow only from a few sources) will experience fewer problems in periods of economic distress.

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## Table I

Distribution of firms by year. The sample consists of 52,475 publicly-traded firm-years in the 1972-91 period. Of these firm years, 1,594 (3%) were in industries with poor performance where median sales growth was negative and where median stock returns were below -30%.

| Base Year | Number of firms in industries with normal performance | Number of firms in industries with poor performance | Number of poorly performing industries |
|---|---|---|---|
| 1974 | 2,390 | 18 | 4 |
| 1975 | 2,738 | 0 | 0 |
| 1976 | 3,589 | 10 | 2 |
| 1977 | 3,495 | 0 | 0 |
| 1978 | 3,306 | 0 | 0 |
| 1979 | 3,156 | 1 | 1 |
| 1980 | 2,997 | 13 | 4 |
| 1981 | 2,888 | 65 | 13 |
| 1982 | 2,744 | 243 | 6 |
| 1983 | 2,654 | 253 | 10 |
| 1984 | 2,773 | 234 | 11 |
| 1985 | 2,805 | 214 | 14 |
| 1986 | 2,865 | 165 | 8 |
| 1987 | 3,148 | 23 | 7 |
| 1988 | 3,307 | 15 | 7 |
| 1989 | 3,251 | 146 | 23 |
| 1990 | 2,775 | 194 | 29 |

## Table II

Selected sample characteristics by whether firms are in industries experiencing poor performance. Industries which exhibited poor performance had negative median sales growth and median stock returns below -30%. The sample contains 52,475 firm-years of data in the 1972-91 period. Assets are measured at book value. Prior year leverage is measured two years before the base year. Sales growth and stock returns are measured over a two year period centered on the base year.

| Variable | N | Mean | Quartile One | Median | Quartile Three |
|---|---|---|---|---|---|
| *Panel A: Firms in industries experiencing poor performance* | | | | | |
| Prior debt/assets | 1,594 | 29.2% | 6.8% | 25.5% | 43.2% |
| Base year debt/assets | 1,594 | 36.0% | 10.6% | 31.3% | 51.4% |
| Base year sales ($ millions) | 1,594 | $184 | $1.4 | $10 | $63.1 |
| 2-year sales growth | 1,511 | -8.2% | -41% | -15% | 11.5% |
| 2-year stock return | 1,594 | -39.3% | -74.3% | -50% | -18.6% |
| R&D expense/sales | 1,592 | 0.9% | 0% | 0% | 0.02% |
| Prior earnings before interest and depreciation / assets | 1,585 | 5.7% | 0% | 7.8% | 13.9% |
| *Panel B: Firms in industries experiencing normal performance* | | | | | |
| Prior debt/assets | 50,881 | 31.1% | 11.5% | 26.8% | 42.9% |
| Base year debt/assets | 50,881 | 32.1% | 12.0% | 27.0% | 43.0% |
| Base year sales ($ millions) | 50,881 | $465 | $9 | $40 | $171 |
| 2-year sales growth | 49,735 | 23.5 | -0.4 | 19.7 | 42.2% |
| 2-year stock return | 36,885 | 18.2% | 29.9% | 9.4% | 55.0% |
| R&D expense/sales | 50,636 | 2.6% | 0% | 0.001% | 1.5% |
| Prior earnings before interest and depreciation / assets | 50,742 | 6.9% | 5.8% | 10.1% | 13.8% |

## Table III

Mean industry-adjusted growth of sales revenues and growth of market value of equity by industry performance and firm leverage in the 1972-91 period. Industry adjustment is carried out by subtracting the 3-digit SIC industry median from the firm's performance. Leverage is measured two years prior to the base year and is defined as the book value of long-term and short term-debt plus the redemption value of preferred stock divided by total assets. Stock returns are dividend and split-adjusted. Stock returns and sales growth are measured over a two year period centered on the base year. Industries which exhibited poor performance had negative median sales growth and median stock returns below -30% in the two year period centered on the base year. The difference between mean performance in industries with high leverage and low leverage in poor industries relative to the difference between high and low leverage firms in other industries is reported as the additional impact of high leverage in poorly performing industries. This difference, controlling for the firm's operating income/assets ratio two years prior to the base year, is reported in parentheses. Statistical significance of the incremental impact of leverage in industries with poor performance is assessed using an F-test on the cross effect of leverage and industry performance after controlling for the main leverage and industry performance effects. *** means significant at the 1% level; ** means significant at the 5% level; and * means significant at the 10% level.

| | | Sales growth | | Stock Return | |
|---|---|---|---|---|---|
| | | N | Mean | N | Mean |
| Poor industry | Leverage Deciles 8-10 | 473 | 1.0% | 487 | 3.3% |
| | Leverage Deciles 1-7 | 1,038 | 13.2% | 1,096 | 15.3% |
| Normal industry | Leverage Deciles 8-10 | 14,887 | 0.0% | 10,350 | 2.1% |
| | Leverage Deciles 1-7 | 34,848 | 3.9% | 27,485 | 8.5% |
| Additional impact of leverage (deciles 8-10 vs. deciles 1-7) in poorly performing industries | | -8.3%*** (-8.1%)*** | | -5.6%* (-6.7%)** | |
| Additional impact of leverage (decile 10 vs. decile 1) in poorly performing industries. | | -11.1%*** (-16.5%)*** | | -13.1%** (-16.6%)*** | |

## Table IV

Mean industry-adjusted stock returns and sales growth by industry and firm type in the 1972-91 period. Leverage is defined two years prior to the base year as the book value of long-term and short term-debt plus the redemption value of preferred stock divided by total assets. High debt firms have leverage in deciles 8-10. 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 which exhibited poor performance had negative median sales growth and median stock returns below -30% in the two year period centered on the base year. R&D intensitve firms are those with R&D/sales two years before the base year above 0.1%. High concentration industries are those with a four-firm concentration ratio above 40% in 1981. Sales are measured one year before the base year. Statistical significance of the incremental impact of leverage in industries with poor performance is assessed using an F-test on the cross effect of the firm/industry characteristic and leverage and industry performance after controlling for the main leverage and industry performance effects and the principal leverage and industry performance effect. *** means significant at the 1% level; ** means significant at the 5% level; and * means significant at the 10% level.

| | | **Poor industry performance** | | **Normal industry performance** | |
|---|---|---|---|---|---|
| | | High debt | Others | High Debt | Others |
| *Panel A: Partitioned by R&D intensive firm dummy* | | | | | |
| Sales growth | R&D-intensive firms | -3.8% | 15.4% | -0.3% | 5.0% |
| | Other firms | 1.5% | 12.8% | 0.0% | 3.1% |
| Additional impact of leverage in R&D-intensive firms with poor performance | | -5.7*** | | | |
| Stock Return | R&D-intensive firms | -0.6% | 21.5% | 4.4% | 9.3% |
| | Other firms | 3.7% | 13.9% | 1.3% | 7.7% |
| Additional impact of leverage in R&D-intensive firms with poor performance | | -13.4%*** | | | |

| | | | | | |
|---|---|---|---|---|---|
| *Panel B: Partitioned by industry concentration* | | | | | |
| Sales growth | High concentration | -8.2% | 21.7% | 2.8% | 3.6% |
| | Other industries | 1.5% | 12.6% | -0.6% | 4.1% |
| Additional impact of leverage in high concentration industries with poor performance | | -22.7%*** | | | |
| Stock Return | High concentration | -4.2% | 28.4% | -0.1% | 8.4% |
| | Other industries | 4.5% | 14.5% | 2.5% | 8.5% |
| Additional impact of leverage in high concentration industries with poor performance | | -11.9%* | | | |
| *Panel C: Partitioned by firm size* | | | | | |
| Sales growth | Sales > $100 million | 2.3% | 14.1% | 0.3% | 4.8% |
| | Sales < $100 million | -2.4% | 9.5% | -0.3% | 2.5% |
| Additional impact of leverage in smaller firms in industries with poor performance | | 1.8%*** | | | |
| Stock Return | Sales > $100 million | 1.3% | 12.3% | 0.3% | 7.8% |
| | Sales < $100 million | 8.4% | 28.6% | 4.7% | 9.5% |
| Additional impact of leverage in smaller firms in industries with poor performance | | -15.4%*** | | | |

## Table V

Average asset sales/assets ratio by leverage and industry performance in the 1972-91 period. Asset sales/assets is the sum of asset sales in the base year and the year after the base year divided by assets. Leverage is measured two years prior to the base year and is defined as the book value of long-term and short term-debt plus the redemption value of preferred stock divided by total assets. Industries which exhibited poor performance had negative median sales growth and median stock returns below -30% in the two year period centered on the base year. The difference between mean asset sales/assets among firms with high leverage between industries wtih poor performance and those with normal performance is reported as the additional assets sales in poor performing industries in high leverage firms. *** means significant at the 1% level; ** means significant at the 5% level; and * means significant at the 10% level.

| | | Sales of PPE/Assets | | Sales of investments/ Assets | |
|---|---|---|---|---|---|
| | | N | Mean | N | Mean |
| Poor industry | Leverage Deciles 8-10 | 489 | 5.7% | 489 | 2.4% |
| | Leverage Deciles 1-7 | 1,104 | 5.0% | 1,104 | 2.2% |
| Normal industry | Leverage Deciles 8-10 | 15,200 | 3.6% | 15,200 | 2.1% |
| | Leverage Deciles 1-7 | 35,650 | 1.9% | 35,650 | 2.3% |
| Additional asset sales in poor performing industries in high leverage firms | | 2.1%** | | 0.3% | |

## Table VI

Sensitivity of results to asset sales and alternative definitions of leverage and industry distress. Statistical significance of the incremental impact of leverage in industries with poor performance is assessed using an F-test on the cross effect of leverage and industry performance after controlling for the main leverage and industry performance effects. *** means significant at the 1% level; ** means significant at the 5% level; and * means significant at the 10% level.

*Panel A: Effect of asset sales on the incremental effect of leverage (deciles 8-10 vs. deciles 1-7) on firm performance in poor performing industries.*

| Level of assets sales | Sales growth | Stock return |
|---|---|---|
| Asset sales/assets < 5% | -7.4%*** | -6.2% |
| Asset sales/assets > 5% | -13.4%** | -5.4% |

*Panel B: Sensitivity of results to the definition of financial leverage. Incremental effect of leverage (deciles 8-10 vs. deciles 1-7) on firm performance in poor performing industries.*

| Leverage Measure | Sales growth | Stock return |
|---|---|---|
| Debt/assets at book | -8.3%*** | -5.6%* |
| (Assets-shareholder equity)/assets | -6.6%** | -3.5% |
| Book value of debt/(book value of debt + market value of equity) | -4.2% | -3.5% |
| Interest expense/earnings | -3.6% | -5.4% |

*Panel C: Sensitivity of results to the definition of industry distress. Incremental effect of debt/assets at book (deciles 8-10 vs. deciles 1-7) on firm performance in poor performing industries.*

| Industry economic distress measure | Sales growth | Stock return |
|---|---|---|
| Negative sales growth and stock returns < -30% | -8.3%*** | -5.6%* |
| Decline in income/sales from over 5% to below 5% in the base year | -6.0%*** | -9.4%*** |
| Stock returns < -40% | -1.8% | -4.8% |

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