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A Further Empirical Investigation of the Bankruptcy Cost Question

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ABSTRACT

In this paper, empirical evidence with respect to both the direct and indirect costs of bankruptcy is assessed. This should be of interest for three related reasons. First, there is a need to provide further evidence as to the size of bankruptcy costs. Second, for the first time a proxy methodology for measuring indirect costs of bankruptcy is presented and actually measured. Third, a simple format for measuring the present value of expected bankruptcy costs is compared with the present value of expected tax benefits from interest payments on leverage. This comparison has important implications for the continuing debate as to whether or not an optimum capital structure exists for corporations.

THIS PAPER PRESENTS an empirical investigation of the costs of bankruptcy. The relevance of bankruptcy costs remains as one of the major unresolved issues of financial theory. Empirical evidence, especially as to the amount of the *expected* bankruptcy costs and its consequent impact on optimum corporate capital structure is extremely sparse. If bankruptcy costs are relatively significant then it may be argued that at some point the expected value of these costs outweighs the tax benefit derived from increasing leverage and the firm will have reached its optimum capital structure point. An alternative view is that bankruptcy costs are relatively trivial and probably cannot explain capital structure decisions. At the extreme, one might argue that these costs are not even relevant to the cost of capital and capital structure decision and therefore should not be considered seriously.

This study assumes that the expected bankruptcy cost issue is relevant and that firms do recognize the probability of bankruptcy as an important ingredient when making operating and financial decisions. A simple model is presented for identifying and measuring the expected bankruptcy costs and, then, for a sample of retail and industrial firm failures in the U.S., the following items are investigated: (1) *direct bankruptcy costs* including legal, accounting, filing and other administrative costs; (2) *indirect bankruptcy costs*, namely the lost profits that a firm can be expected to suffer due to significant bankruptcy potential; and (3)

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the *probability of bankruptcy* for the sample firms. These items are combined to estimate the expected present value of bankruptcy costs which is compared with the expected present value of tax benefits from leverage.

I will attempt to measure the indirect costs using two related models, both of which estimate the abnormal or unexpected profit (loss) of bankrupt firms as the failure date becomes more imminent. It should be pointed out that indirect costs of bankruptcy, identified as relevant by many theorists, have never been measured. This is due to its opportunity cost nature and the difficulty in specifying and empirically measuring such costs.

I. Conceptual Issues

The bankruptcy issue and its impact on capital structure can be traced back to the original Modigliani and Miller [21] work which did not explicitly consider bankruptcy costs in their formal model. They did, however, (footnote 18) consider the possibility of temporary insolvency and they implicitly, at least, realized that bankruptcy is a reality which could be relevant. One component of bankruptcy costs which obviously can impact the firm's value and its cost of capital is the fact that payments must be made to third parties other than bondholders or owners. These direct costs of bankruptcy, e.g., filing fees, trustee expenses, legal and accounting fees, and other costs of reorganization or liquidation are deducted from the net asset value of the bankrupt firm in a liquidation or from the value of securities in a reorganization arrangement. These "dead-weight" costs can consequently cause the value of the firm in bankruptcy to be less than the capitalized value of the expected cash flows of a continuing entity.

A number of researchers have attempted to specify the bankruptcy cost issue within the framework of capital structure and cost of capital assessment. An early discussion was provided by Baxter [4] and more sophisticated treatments have been offered by Stiglitz [30], Kraus and Litzenberger [18], Scott [26], and Kim [17]. Textbooks, such as Copeland and Weston [8, pp. 305–307], Brealey and Myers [5, pp. 384–389], and Brigham [6, pp. 659–664] have summarized these arguments.

There is by no means a consensus of opinion with respect to the theoretical relevancy of bankruptcy costs to firm valuation. Miller [20] introduces personal income taxes as well as corporate taxes as relevant and then analyzes, again, how leverage affects value. He attempts to show that the corporate tax rate, the personal tax rate on interest, and the personal tax rate on equity (dividends and capital gains) interact in such a way that the personal tax advantage of equity probably offsets the corporate tax advantages of debt. Hence, he concludes that there is an optimal capital structure for all firms in the aggregate but that one capital structure is as good as any other for an individual firm.

Other analysts have extended Miller's framework and have concluded that while there is still some tax advantage to the use of corporate debt, the advantages are less than were implied in the original Modigliani and Miller [22] tax treatment. For example, DeAngelo and Masulis [10, p. 4] argue that there does exist a unique interior optimum capital structure whereby the "market prices will capitalize personal and corporate taxes in such a way as to make bankruptcy costs a significant consideration in a tax benefit-leverage cost tradeoff." They

argue that regardless of the size of bankruptcy costs, the market's relative prices of debt and equity will adjust so that the net tax advantage of debt is of the same magnitude as expected marginal default costs. Miller had argued that traditional models, which extol the bankruptcy costs argument, require unrealistically large expected marginal bankruptcy costs to offset the expected marginal corporate tax savings of debt.

A different line of reasoning is presented by Haugen and Senbet [15], who argue that the only relevant bankruptcy costs are attributable to liquidation, which is a capital budgeting decision that should be considered independent from the event of bankruptcy and therefore do not impact capital structure decisions. Titman [33], on the other hand, presents an analysis which shows that capital structure choice affects stockholder incentives to liquidate and also determines in which state the liquidation decision is transferred to bondholder's control, i.e., in bankruptcy. He also agrees that the liquidation decision can impose costs on customers, workers, and suppliers and that the agency relationship between these individuals and the firm can result in bankruptcy costs. Morris [23] attempts to develop the conditions under which an optimum capital structure would exist. He presents a model which includes the marginal expected bankruptcy costs which he claims strengthens the argument for the existence of an optimal structure but which are not absolutely necessary. His approach is to develop an expression for the present value of expected tax savings and bankruptcy costs and to analyze the first-order conditions for an optimum. I will also investigate the tradeoff between the expected bankruptcy costs and the expected tax benefit from interest on debt securities.

I will argue that, in addition to the costs of liquidation, there are other relevant costs including those which arise due to the process of bankruptcy (either liquidation or reorganization) and those due to the perceived significant potential of bankruptcy (lost opportunities and abnormal loss of sales and profits).

Despite arguments that bankruptcy costs are either immaterial, irrelevant, or unnecessary, many theorists and practitioners remain unconvinced. Brealey and Myers [5, p. 395] state this issue simply and clearly: "We do not know what the sum of direct and indirect costs of bankruptcy amounts to. We suspect it is a significant number particularly for large firms for which proceedings would be lengthy and complex."

When discussing the empirical evidence of bankruptcy costs, the work of Warner [34] is often cited. He concluded that the direct bankruptcy costs are insignificant. As I will discuss in the next section of this paper, Warner's conclusions are based on a narrow and incomplete definition of bankruptcy costs and examined for a very small and specialized sample. One of the primary purposes of this paper is to add to the empirical evidence on the size of bankruptcy costs in order to add insight for evaluating the bankruptcy cost/triviality argument.

II. Prior Empirical Findings

Unlike the frequent *conceptual* issues and debate surrounding the bankruptcy cost controversy, there is almost a total lack of empirical investigation.[1] The one

[1] Titman [32] does present some evidence that the collateral effect discussed by Scott [27] is perhaps more important than the tax shield effect in explaining capital structure differences.

exception to this dearth of information is the often cited work by Warner [34]. As such, his study has perhaps been overemphasized by others. Warner admits that his results are based on a narrowly defined bankruptcy cost definition and his small sample of railroad bankrupts is not necessarily indicative of the population of all firms. Still, his work is an important first step in setting out a methodology for measuring and evaluating bankruptcy-related costs.

Warner's study involved 11 railroads and investigated the so-called direct costs of bankruptcy. These process-related costs are documented by the railroad's regulatory agency (ICC) and are compared to the firm's total market value (debt and equity) for up to seven years prior to the bankruptcy petition date. Warner finds that the direct costs of bankruptcy averaged about 1% of market value seven years prior and rose to 5.3% of market value just prior to the petition date. He infers that these percentages are relatively small and that the expected direct bankruptcy cost argument is not very helpful in assessing optimum capital structure decisions. Warner cautions that the costs are not small enough to be neglected completely in discussions of capital structure policy. But it would not seem unreasonable to conclude that for firms of the size under consideration "the expected direct costs of bankruptcy are unambiguously lower than the tax savings on debt to be expected at present tax rates in standard valuation models" [34, p. 345].

There are numerous problems with Warner's analysis and these are important given the degree to which others rely upon the study. Most important, is the total lack of specification and measurement of indirect costs (see below). In addition, his work essentially avoids the *expected* aspect of bankruptcy costs, although he does present a hypothetical example. He also finds that the average market value of his small, restricted sample of railroads falls continuously as bankruptcy approaches—from as much as seven years prior. This may be true for railroads, which take an excruciatingly long time to "die," but it is certainly not necessarily true for the vast majority of failing firms. This will be shown clearly in the following investigation of industrial failures. Understandably, Warner's empirical work does not specifically address the marginal character of the cost/benefit analysis of the capital structure decision and does not carefully consider time value elements.

Castanias [7] examines the relationship between failure rates and leverage measures for smaller firms in numerous lines of business and concludes that the capital structure irrelevance hypothesis is not consistent with his results. Based on nonparametric cross-sectional tests of bankruptcy risk and leverage, Castanias finds that firms that tend to have "high" failure rates also tend to have less debt. More important, his results are stated to be consistent with the thesis that "ex ante" default costs are large enough to induce the typical firm to hold an optimum mix of debt and equity, i.e., to influence debt policy. Like several other studies, Castanias concentrates on industry data and does not attempt to measure unique firm characteristics, nor indirect bankruptcy costs. Yet, he acknowledges that the indirect costs could be significant.

Indirect Bankruptcy Costs

Most important is the decision by Warner not to attempt measurement of the *indirect* costs of bankruptcy. Under this heading, I would include the opportunity

costs of lost managerial energies. Warner lists managerial opportunity costs as a *direct* cost of bankruptcy but does not attempt to measure this illusive category. As such, Warner's measurement of direct costs underestimates his own definition. I have included lost managerial opportunities as part of the indirect costs. The latter usually are thought to include lost sales, lost profits, the higher cost of credit, or possibly the inability of the enterprise to obtain credit or issue securities to finance new opportunities. Robichek and Myers [25] referred to the lost investment opportunities as potentially sizeable and Myers [24] notes that a firm may pass up seemingly profitable investments if the benefits are perceived to accure only to the bondholders. Indeed, Green and Shoven [13, p. 50] show that "the prospect of bankruptcy may make debt finance so expensive that it results in the premature termination of socially beneficial ventures." This underinvestment by the firm has nothing to do with the excessive cost of credit. The potential for stockholder-bondholder-banker conflicts of interest and the attendant agency costs will further increase the indirect costs of bankruptcy. Stone [31], in his critique of Warner's work, called for a more definitive accounting of indirect costs and suggested alternative bases of measurement.

An aspect of indirect costs that has received a good deal of publicity of late is the lost sales and profits resulting when potential buyers of a product or service perceive that default is likely. This no doubt occurred in the recent Chrysler Corporations's near bankruptcy, the Franklin National Bank receivership, and the Braniff International failure.[2] Indeed, Chrysler's management spent a great deal of time as well as expense in order to shore up the public's confidence in Chrysler as a continuing entity! Similar efforts have been observed regularly from the managements of Manville Corporation and Wickes Companies.

Indirect costs occur as well after the firm has declared bankruptcy and is attempting to operate and manage a return to financial health. A current example illustrates this clearly. In November, 1983, the President and Chief Executive Officer, Mr. Joe B. Freeman, of AM International, a manufacturer and supplier of duplicating equipment, was quoted as claiming that "The company is still feeling (since the petition date of April, 1982; *ed. note*) the stigma of Chapter 11 in the marketplace. For example, I suspect that the bankruptcy proceedings were a factor when the company recently lost out in bidding for a distribution contract with a foreign manufacturer" (Dow Jones, interview, November 15, 1983).

Indirect bankruptcy costs are not limited to firms which actually do fail. Firms which have high probabilities of bankruptcy, whether they eventually fail or not, still can incur these costs. For example, the current International Harvester case illustrates this clearly. Recent journalistic quotes infer significant costs attributable to customer wariness, dealer problems, and managerial opportunity costs.[3]

[2] A recent commentary in *Business Week* (Dubin [11]) documents passengers' "fear of flying" on potentially insolvent and bankrupt carriers.

[3] For example, "Harvester's Financial Problems Test Loyalty of Customers and Dealers." (*Wall Street Journal* (*WSJ*), October 11, 1982, p. 23) and the costs due to management's preoccupation with staying alive; "the whole financial fiasco has drained alot of company management time ... its got to have an impact on their ability to tend the store" (*WSJ*, October 12, 1982, p. 2). With respect to Chrysler, its President was quoted as saying that "its share of new car sales dropped nearly two percentage points because potential buyers feared the company would go bankrupt," (*WSJ*, July 23, 1981).

In addition, suppliers of materials may be reluctant to continue to sell to the high risk candidates except under fairly significant restrictions and higher costs, e.g., cash on delivery.[4] Baxter [4], Jensen and Meckling [16], and Titman [33] also point to these conditions. The two latter references argue that agency costs, i.e., the costs of negotiations, security precautions and monitoring of debt covenants, and other debt-related agency costs that are incurred to protect the priority of creditors, may offset the tax advantage of debt and lead to a choice of an optimal capital structure.

The Chrysler near bankruptcy, the current International Harvester crisis, and the Braniff bankruptcy are examples of where the indirect costs of a potential bankruptcy could be sizeable. Even if the perception by the market of eventual failure is imperfect, bankruptcy potential conveys information about the risks to firm perpetuity and its ability to provide service and replacement parts. In the case of Braniff, there was even the uncertainty as to whether discount coupons would be honored by competitors. Further, Warner [34] points out that, to the extent a bankruptcy trustee makes nonoptimal decisions from the standpoint of the firm's claimholders, the firm incurs an opportunity loss vis-à-vis management decisions under normal circumstances.

A controversial aspect of the indirect cost issue is the argument which attests to the ability of owners and claimants to diversify their investments and reap the gains that competitor firms realize when, for example, potential customers of Chrysler buy instead from Ford. This implies that there will be a perfect substitution of goods and services and that the loss from one firm is fully compensated for by the gain to others. Also, prices will reflect these shifts such that investors will be equally as well off. Costs to society, it is argued, are zero despite the bankruptcy possibility. Of course, this assumes that markets are perfect and information is available and unambiguous. And, it assumes that securities from firms that benefit are in fact available to the owners of those endangered firms.[5] But, markets are not perfect nor are investments always available in competitor firms—especially when the market is as internationally competitive as automobiles, tractors, and airlines, and alternative investments in foreign firms are not easily transacted, available, or deemed significant enough to alter international diversification strategies.

Despite all of these arguments for including indirect costs in the calculation of overall bankruptcy costs, no study has attempted to empirically measure them. The reason is fairly obvious, it is extremely difficult to do so. By its nature, indirect costs are illusive and difficult to specify, let alone measure. For sure, one needs to specify a proxy measure for the indirect costs discussed above. This is one of the major purposes of this study.

[4] This is currently the case for several large bankruptcies, e.g., Wickes & Co.—a $2 billion failure in 1982. In a letter to Wickes' stockholders, Mr. Sanford Sigaloff, the new Chairman and President of the company stated on April 26, 1982: "Our company has been plagued by serious business problems, including mounting pressures from a reduction of trade credit, that have become increasingly debilitating to Wickes' future."

[5] A possible way to assess competitor gains from bankruptcies is to observe abnormal returns for competitors around the bankruptcy petition date. This has not been assessed here. I thank Walter Holman for pointing this out.

III. Measuring Bankruptcy Costs

Measurement of bankruptcy costs (BC) includes both direct (BCD) and indirect (BCI) costs. Direct costs are those explicit costs paid by the debtor in the reorganization/liquidation process. These costs are documented in the bankruptcy records of individual firms. Unfortunately, no aggregate records are kept and it is necessary to go through the files (usually voluminous and ill-kept) in the U.S. District Bankruptcy Courts. This has been done for a sample of 12 retailers and seven other industrial firms (Tables I and II).

Measures of indirect bankruptcy costs are based on the foregone sales and profits concept. A methodology is specified for estimating expected profits for the period up to three years prior to bankruptcy and then expected profits with actual profits (losses) are compared to determine the amount of bankruptcy costs (unanticipated profits or losses). Profits are estimated in two ways: (1) a regression procedure and (2) security analyst forecasts.

Regression Technique

First, the bankrupt firm's sales are regressed on the appropriate industry sales figure for the 10-year period prior to the forecasted year. For example, if one is estimating indirect costs for the third year prior to failure, sales of the firm are regressed on industry sales for the period t-13 to t-4. Industry sales are then inserted for the period t-3 and firm sales are estimated. Applying the average profit margin on sales over that 10-year period to the expected sales figure, one arrives at expected profits. Expected profits are then compared with actual profits to determine that year's indirect costs and those costs compared with the total value of the firm for up to three years prior to bankruptcy. The steps, again, are as follows:

(1) Regress:

$S_{i,t} = a + b\, S_{I,t}$, $\quad t = 10$ years, e.g., t-13 $\rightarrow$ t-4; t-12 $\rightarrow$ t-3, etc.

$S_{i,t}$ = Sales of firm i in period t

$S_{I,t}$ = Aggregate sales of industry I in period t

(2) Insert $S_{I,t}$ and estimate:

$$\hat{S}_{i,t} = a + b\, S_{I,t}, \qquad t = -3, -2, -1, 0$$

$$\hat{P}_{i,t} = \hat{S}_{i,t} \cdot \overline{PM}$$

where

$\hat{S}_{i,t}$ = Estimated sales
$\hat{P}_{i,t}$ = Estimated profits
$\overline{PM}$ = Average historical profit margin

(3) Observe:

$$\Delta P_{it} = P_{i,t} - \hat{P}_{i,t}, \qquad t = -3, -2, -1, 0$$

$\Delta P_{i,t}$ = Unexpected profits (losses)

Table I

Absolute and Relative Bankruptcy Costs—Retailing Industry

Bankrupt Company (Year)	Bankruptcy Costs Direct (BCD) ($000)	Bankruptcy Costs Indirect (BCI) ($000)	R^2	Value of Firm (V) ($000,000)				BCD + BCI/Value				BCD/Value					
				t-3	t-2	t-1	t	t-3	t-2	t-1	t	t-5	t-4	t-3	t-2	t-1	t
Abercrombie & Fitch (76)	471	2312	0.31	10.7	12.5	13.3	10.5	0.260	0.222	0.210	0.265	0.049	0.042	0.044	0.038	0.036	0.044
Ancorp Nat'l Service (75)	523	2383	0.60	104.2	104.3	110.5	49.8	0.028	0.028	0.026	0.058	0.005	0.004	0.005	0.005	0.005	0.011
Beck Industries (70)	650	—	0.73	47.7	114.4	145.6	108.4	0.014	0.006	0.005	0.006	0.020	0.016	0.014	0.006	0.005	0.006
Fishman, M. H. (74)	703	1267	0.98	41.2	36.5	40.6	8.6	0.048	0.054	0.048	0.051	0.016	0.009	0.017	0.019	0.017	0.018
Food Fair (78)	n.a.	6058	0.94	376.2	387.7	466.8	416.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Grant, W. T. (75)	2000	2703	0.98	1393.0	1269.7	1076.0	917.0	0.003	0.004	0.004	0.005	0.002	0.001	0.002	0.002	0.003	0.003
Interstate Stores (74)	1664	22294	0.68	269.1	249.9	202.6	98.2	0.089	0.096	0.118	0.244	0.005	0.006	0.006	0.007	0.008	0.017
Kenton (74)	950	7029	0.90	47.0	47.5	34.6	29.7	0.170	0.170	0.231	0.268	0.014	0.023	0.020	0.020	0.028	0.032
Mangel Stores (74)	9019	587	0.83	47.5	52.3	60.0	38.6	0.202	0.184	0.161	0.249	0.155	0.206	0.190	0.173	0.151	0.234
National Bellas Hess (72)	255	2269	0.59	42.7	41.0	45.5	40.0	0.069	0.072	0.065	0.074	0.004	0.005	0.006	0.006	0.006	0.006
Neisner Bros. (77)	1630	415	0.89	86.9	99.1	94.2	91.0	0.024	0.021	0.022	0.023	0.017	0.020	0.019	0.016	0.017	0.018
United Merchants & Mfg. (77)	9513	9652	0.96	407.6	433.5	306.0	203.6	0.047	0.044	0.063	0.094	0.020	0.021	0.023	0.022	0.031	0.047
Average	2489	4747	0.78	239.5	237.4	216.3	167.7	0.087	0.082	0.087	0.122	0.028	0.032	0.031	0.030	0.027	0.040
Median	950	2543	0.86	67.3	101.7	102.1	70.4	0.048	0.044	0.063	0.074	0.016	0.016	0.017	0.016	0.017	0.017

Note: n.a. = not available; V = Market Value Equity + Book Value Debt + Market Value Debt + Capitalized Leases.

Table II

Absolute and Relative Bankruptcy Costs—Industrial Company Sample

Bankrupt Company (Year)	Bankruptcy Costs Direct (BCD) ($000)	Bankruptcy Costs Indirect (BCI) ($000)	R^2	Value of Firm (V) ($000,000)				BCD + BCI/Value				BCD/Value					
				t-3	t-2	t-1	t	t-3	t-2	t-1	t	t-5	t-4	t-3	t-2	t-1	t
Bowmar Instruments (75)	1,950	—	0.47	35.7	67.3	29.2	11.3	0.055	0.029	0.067	0.173	0.278	0.170	0.055	0.029	0.067	0.173
Drew National (75)	2,278	2,018	0.74	32.5	16.5	12.7	11.1	0.132	0.250	0.338	0.387	0.135	0.099	0.070	0.138	0.179	0.205
Frier Industries (78)	297	816	0.39	6.3	9.0	9.1	6.9	0.175	0.124	0.122	0.161	0.028	0.046	0.047	0.033	0.033	0.043
Precision Polymers (76)	468	117	0.88	13.9	8.1	6.1	3.6	0.042	0.073	0.096	0.161	0.123	0.121	0.034	0.058	0.077	0.129
Universal Container (78)	500	243	0.20	11.7	14.7	14.8	16.0	0.064	0.051	0.050	0.046	0.029	0.042	0.043	0.034	0.039	0.031
Valley Fair (77)	541	—	0.31	8.4	9.5	7.4	17.7	0.147	0.192	0.089	0.064	0.160	0.133	0.147	0.192	0.089	0.064
Winston Mills (78)	335	5,131	0.21	9.1	11.2	18.8	8.2	0.604	0.487	0.291	0.669	0.024	0.041	0.037	0.030	0.038	0.041
Average ($N = 7$)			0.46	16.8	19.5	14.0	10.7	0.174	0.172	0.150	0.237	0.111	0.093	0.062	0.073	0.075	0.098
Median			0.39	11.7	11.2	12.7	11.1	0.132	0.124	0.096	0.161	0.123	0.099	0.047	0.034	0.067	0.064

For the sample of 12 retailers, the appropriate (department store, food store, discount store) series were used to estimate industry sales. For the industrial firm sample, seven different industries are represented. An aggregated industry sales figure was utilized, comprised of the largest 10 firms in each sector. Also, a four-year as well as a 10-year average profit margin was applied with similar results.

A rather simple, linear association was specified between firm and industry sales over time. In most cases, however, the fit was a rather good one with the average R^2 of the entire 18-firm sample equal to $\bar{R}^2 = 0.784$ for the retailers and 0.465 for the industrial sample (Tables I and II). Note that some of the fits were excellent, i.e., $R^2 > 0.9$, with a small number of poorer fits ($R^2 < 0.5$). Perhaps the latter could have possibly been improved upon by using a different functional form, e.g., quadratic.

(4) The total value of the firm was measured by adding the market value of equity (preferred and common) to the market value of debt (where available) plus the book value of other debt plus the capitalized value of financial leases. Since financial leases are an alternative to debt financing and are estimated to have involved close to 20% of the value of total assets (Altman et al. [3]) during periods when leases were not capitalized, i.e., prior to 1980, it is important to include those values. This is especially relevant for retailers who lease a good deal of their premises. Capitalized leases comprised 35% of total value of our retailer sample and 25% of the industrials.
(5) The indirect plus direct costs of bankruptcy were compared to the total value of the firm for up to three years prior to failure.

Note that this measure of firm total value is potentially considerably higher than Warner's which only considered the *market value* of securities. Of course, there is a higher percentage of marketable securities relative to total permanent capital for railroads than most other firms. Still, this measure of total value will certainly bias the cost/value ratio *downward* relative to Warner's method.

While my assumption is that the prospect of bankruptcy will often lead to lower than expected earnings, it should be pointed out that lower than expected earnings could cause the firm's management to declare bankruptcy. In my opinion, both series of events can and, in most cases, will be occurring at the same time. This does not impact the measure of indirect costs, although it could affect the timing of the direct bankruptcy costs which are petition-date determined. Still, the complexity of factors occurring at the same time makes it clear that it is extremely difficult to isolate completely the indirect bankruptcy costs with these current empirical methodological techniques.

IV. Results

A. *Direct Costs*

Tables I and II present the findings for the retailer and industrial firm samples, respectively. The absolute direct bankruptcy costs (BCD) are listed in the second column and are compared with firm values for the five years prior to bankruptcy

(in the last columns). The average BCD/Value percentages for the retailer sample are similar to those Warner reported in his earlier study. I find that five years prior this percentage averaged 2.8% (compared with 1.4% for Warner's railroads) and was 4.0% (compared with 5.3% for Warner) just prior to bankruptcy (Table I). Some of the difference is due to my somewhat higher measure of firm value. My percentages are slightly lower if median results instead of averages are used.

The results for the industrial sample (Table II) are somewhat higher. The average BCD/Value ratio was fairly stable for the entire five-year period prior to failure and varied between 6.2% and 11.1%. These are not trivial percentages. In some cases, e.g., Bowmar Instruments (17.3%), Drew National (20.5%), Precision Polymers (12.9%), and Mangel Stores (23.4%), the latter a retailer, the direct costs account for a very high percentage of the firm's value just prior to the bankruptcy. In Bowmar's case, as well as Valley Fair, the percentage is even greater when measured five years prior to the bankruptcy date.

The overall average of the BCD/Value was 6.0% measured just prior to bankruptcy and also 6.0% five years prior. These results are higher than Warner's and cannot, even without inclusion of indirect costs, be dismissed as trivial.

Note that the average value of the bankrupt retailers remained fairly steady from t-3 to t-1 and only fell noticeably in the year just prior to failure. The mean retailer's value was \$239.5 million in year t-3, fell slightly to \$237.4 and \$216.3 million at two and one years prior, and was \$167.7 million at the bankruptcy date. The industrial sample's average value actually increased between the third and second years prior and then proceeded to fall. I do not find, therefore, as Warner did, that bankrupt firm values fall consistently as failure approaches but the decrease is very moderate. Of course my samples are different, especially since Warner's bankrupt railroads had a significant amount of publicly traded debt, whereas my firms did not. Since market values reflect economic values more closely than do book values, my results are somewhat biased. Therefore, these BCD/Value percentages would have been even higher if only market values on the firms' outstanding debt were included.

B. Indirect Costs

The indirect bankruptcy costs (BCI) are given in Column 3 and the results for (BCD + BCI)/Value are listed in Tables I and II. Note that in many cases, e.g., Abercrombie & Fitch, Interstate Stores, Kenton, Drew National, Freir Industries, and Winston Mills, the indirect costs are a very high percentage of firm value. In two cases (Bowmar and Valley Fair) the indirect costs were negligible for the four periods prior to bankruptcy, indicating no unexpected losses. When I aggregate the direct and indirect costs, the average percentage relative to firm value is 8.7% at year t-3 and 12.2% at t for the retailer sample. The results for the industrial firms are considerably higher with as high as a 23.7% average (16.1% median) in period t and 17.4% in t-3 (13.2% median). Together, the two samples (18 firms) resulted in an average (BCD + BCI)/Value of 12.1% at t-3 and 16.7% at t (Table III). One cannot simply dismiss these costs as trivial. In fact, they are quite sizeable and, when combined with probability of bankruptcy estimates and presented in a present value context, the results could have considerable relevance for capital structure policy.

Table III

Average Bankruptcy Costs Relative to Firm Value for the Combined Corporate Sample ($N = 18$ Firms)

	Years Prior to Bankruptcy			
	3	2	1	0
Direct Bankruptcy Costs/Value	4.3%	4.6%	4.6%	6.2%
Indirect Bankruptcy Costs/Value	8.1%	7.1%	6.6%	10.5%
Total Bankruptcy Costs/Value	12.4%	11.7%	11.2%	16.7%

C. Indirect Costs as Measured by Security Analyst Estimates

A second attempt to measure indirect costs of bankruptcy involves the use of experts' expectations of firm profits for the years prior to bankruptcy compared with actual results. Again, I identify indirect costs as *unexpected* or *abnormal* profits whereby,

$$\begin{matrix}\text{Indirect}\\ \text{Costs}\end{matrix} = \begin{matrix}\text{Abnormal}\\ \text{Profits (losses)}\end{matrix} = \begin{matrix}\text{Analyst Earnings}\\ \text{Estimates}\end{matrix} - \begin{matrix}\text{Actual}\\ \text{Earnings}\end{matrix}$$

The I/B/E/S data base, constructed and maintained by the firm of Lynch, Jones & Ryan, was utilized to determine security analyst earnings estimates of a sample of bankrupt firms.[6] Essentially, the data, also utilized by Elton et al. [12], lists consensus estimates of earnings per share made by professional security analysts for one- and two-year horizons. Average, median, number of analysts, and other sample data are presented for these estimates. The expected earnings for any given year are the consensus median earnings expectations based on the previous year's estimates. For example, analyst estimates utilized for December 1981 were made as close as possible to December 1980. The differences between these estimates and the actual earnings are unexpected earnings. These differences are the second proxy measure for indirect bankruptcy costs.

I am aware that there are other reasons, besides bankruptcy potential, which cause firms to realize earnings which are different from expectations. The estimates of earnings, however, are unbiased to the extent that analyst expectations are without bias. It is also assumed that analysts have considered industry characteristics in their expectations.

The data base consists of analyst estimates made since 1976 and includes only those firms followed by Wall Street professionals.[7] As such, it does not include the vast majority of bankrupt companies. The sample is made up of seven recent large bankruptcies listed in Table IV.[8] Since most of these bankrupt companies are still involved in reorganization proceedings, direct bankrupt costs cannot be assessed. Hence, I restrict the analysis to the indirect costs element.

[6] I would like to thank the firm of Lynch, Jones & Ryan for providing the data, and Mustafa Gultekin for assisting in the interpretation of this data base.

[7] It is interesting to note that as a firm approaches bankruptcy, the number of analysts following the company tends to diminish. This phenomenon was observed in five of the seven cases.

[8] A few other recent bankrupts, e.g., Saxon Industries, are not included since there is some doubt as to the validity of the reported earnings.

Table IV

Security Analyst Consensus Earnings *P/S* Estimates vs. Actual Results of Recent Bankrupt Firms (Estimates Made 1 Year Prior to Result)

Firm	Date of Bankruptcy	3 Statements Prior		2 Statements Prior		1 Statement Prior	
		Estimate	Actual	Estimate	Actual	Estimate	Actual
Braniff Int'l	5/82	$0.75	($2.21)[a]	($0.70)	($6.57)	($2.00)	($8.02)
Itel Corp.	1/81	2.93	1.46	(2.47)	(38.35)	(0.50)	(5.69)
Lionel Corp.	2/82	1.26	1.08	1.08	0.93	1.25	0.93
McLouth Steel	12/81	3.47	1.58	1.05	(10.08)	(9.50)	(10.22)
Sambo's Restaurants	6/81	2.24	0.59	0.67	(6.05)	(0.66)	1.50
White Motor Co.	9/80	1.50	2.26	1.50	(0.66)	1.50	1.43
Wickes Cos.	4/82	1.43	3.49	0.89	0.50	2.80	(17.91)

Source: I/B/E/S date base, Lynch, Jones & Ryan, New York, NY.

[a] Negative earnings per share in parentheses.

The indirect bankruptcy costs estimates encompass unexpected earnings (losses) for the period up to three financial statements prior to bankruptcy. Costs have not been included for the period between one statement prior and the bankruptcy date, nor during the reorganization, since earnings estimates and results are usually not available. I continued to track, however, the change in value of the firms and assess total value of the firms up to the month prior to bankruptcy. Hence, the designation of Indirect Costs/Value at point t includes three years of indirect costs and the value just prior to bankruptcy.[9]

Table IV lists the consensus median estimate for earnings per share (eps) for statement dates 3, 2, and 1 period prior to bankruptcy and the actual earnings and results for these periods. Note that in all but two cases (both in year t-3), estimates were for higher eps than what actually occurred.

Based on the second proxy for indirect bankruptcy costs, it is observed (Table V) that the BCI/Value ratio is quite high in five of the seven recent large bankruptcies. The average ratio is close to 20% for the three annual statement dates prior to petition filing.[10] It was not possible, in most cases, to compare actual with forecasted estimates for the post-petition periods since estimates are not available. The total significance of bankruptcy costs is not assessed here since direct costs are not available. But, if the average direct bankruptcy costs are used from the prior sample (Table III), it is expected that the total bankruptcy cost to value ratio will be over 26% at three years prior and about 24% just prior to petition. The slightly lower percentage at the latter date is due to the increase in total value of debt as bankruptcy approaches.

Comparing the second proxy method with the first, bankruptcy costs are found to be even more significant (on average) for this sample of large, recently bankrupt firms, than the first method (regression) was for the retailer and industrial samples.

Measuring indirect bankruptcy costs is indeed a thorny problem. Ideally, I

[9] Actually, the value of the firm is based on the market value of debt and equity just prior to bankruptcy and the book value of other debt plus capitalized leases at the date of the last financial statement prior to petition.

[10] If the average is measured based on summation of the seven firms' costs and value, the result is even higher (ranging from 20 to 30% for the three periods).

Table V

Indirect Costs of Bankrupt Firms As a Percentage of Total Value
(Costs Based on Analyst Estimates of Earnings Procedure)

Firm	Indirect Costs (BCI) ($ millions)	Firm Total Value (V)[a] t-2	t-1 ($ millions)	t^b	BCI/V (%) t-2	t-1	t^b
Braniff Int'l	297.3	917.7	1095.6	1065.8	0.271	0.271	0.279
Itel Corp.	513.8	1279.3	1880.9	1761.3	0.408	0.291	0.319
Lionel Corp.	2.0	133.2	163.4	309.1	0.015	0.012	0.006
McLouth Steel	73.3	328.3	356.2	357.4	0.223	0.206	0.205
Sambo's Restaurants	112.6	485.1	502.2	489.0	0.232	0.224	0.230
White Motor Co.	12.2	475.9	418.2	714.0	0.026	0.027	0.017
Wickes Cos.	277.4	762.8	1489.3	1507.0	0.364	0.186	0.184
		Average (1)—Average of 7 firm ratios			= 0.220	0.175	0.177
		Average (2)—Summation of IC/V			= 0.301	0.218	0.208

[a] Total Value = Market Value Equity + Market Value Debt (when available) + Book Value Other Debt + Capitalized Leases.

[b] Period t = one month prior to petition date for Total Value.

would like to capture a shift in the long-run demand and/or supply functions due to changes in a firm's risk attributes and bankruptcy probabilities. This is not possible to measure exactly since changes of this type are confounded with sales and earnings fluctuations which are possibly not associated with bankruptcy. In my specification of unexpected losses as a proxy for indirect costs, I am aware that these changes are likely to have other influences affecting their magnitude. Indeed, one could argue that a sample of bankrupt firms will usually have larger unexpected deterioration in earnings than other firms of similar ex ante risk characteristics but which do not declare bankruptcy.

In order to assess whether or not an ex post selection bias in the sampling of bankrupt firms only has been introduced, additional samples of observations are assessed. To be specific, the unexpected changes are analyzed in reported earnings for three additional groups, each group comprised of firms with very different bankruptcy probabilities. One group is comprised of very low (bad) Zeta (Altman et al. [3]) scores without stratifying by their eventual fate, i.e., bankrupt or not. A second group is comprised of high Zeta (low bankruptcy risk) firms. A final group includes firms with fairly low Zeta scores, where the probability of bankruptcy is above average but not excessive, i.e., about 50%.

These tests will also help to assess another potential critique of the measurement of bankruptcy costs. While I am convinced that public awareness of a firm's financial difficulties and bankruptcy potential will negatively impact its subsequent performance, it could also be argued that the reverse takes place; namely, that poor and unexpected earnings will add to a firm's financial vulnerability and lead to bankruptcy. If high risk (low Zeta score) firms are found to realize significant *unexpected* losses, then I have more confidence that high bankruptcy potential firms, regardless if bankruptcy occurs or not, suffer abnormally when bankruptcy is thought to be a distinct possibility. This conclusion will be further

confirmed if medium and low bankrupt potential firms do not suffer these unexpected losses.

Table VI compares the average differential between actual earnings per share results and the estimates of earnings made one year earlier for three samples of firms. Again, the I/B/E/S data base is used. The first sample is firms with very low probabilities of bankruptcy in 1978–80, i.e., firms with Zeta scores greater than +10.0. Sample two is comprised of firms in the middle bankruptcy probability area, i.e., Zetas around zero, and the final group is comprised of those firms with extremely high bankruptcy probabilities, i.e., Zetas below −3.0. The latter group's probability of bankruptcy classification is greater than 90%. Indeed, five of the 61 firms actually went bankrupt from this group.

The average differential between actual and estimated eps for the high bankruptcy probability group is ($0.98) compared to a $0.08 differential for the low probability group. The difference between these two groups (Group 1 vs. Group 3) is significantly different from zero at the 0.01 level. The middle groups' average differential is (0.12) and the low probability of bankruptcy group's differential is 0.08. Both are not significantly different from zero but are significantly different from the high probability group's average differential.

These results are offered to indicate that extreme bankrupt probability firms tended to underperform what was expected from them. It is not possible to know with absolute certainty if this less than expected earnings performance is caused by indirect bankruptcy costs. Suppose that low Zeta firms will do worse than expected due to the superior forecasting ability of the Zeta model over security analysts' estimates, then the bankruptcy costs might not be the sole element

Table VI

Actual Earnings per Share vs. Experts' Estimates for Different Bankruptcy Probability Firms

Group Number	Zeta Interval of Group	Number of Firms	Average Difference (Actual eps − Estimated eps)	Standard Deviation
1	≥ 10.0	140	$0.08	0.62
2	− 0.5 < Zeta < + 0.5	124	($0.12)	2.39
3	≤ −3.0	61	($0.98)	2.95

Tests of Significance:

Difference of Two Means[a]	Difference from Zero[b]
Group 1 vs. Group 3 = 2.78[d]	1.50 (Group 1)
Group 1 vs. Group 2 = 0.93	0.55 (Group 2)
Group 2 vs. Group 3 = 2.00[c]	2.59 (Group 3)

[a] $t = \dfrac{\bar{X}_1 - \bar{X}_2}{\sqrt{\dfrac{\sigma_1^2}{N_1} + \dfrac{\sigma_2^2}{N_2}}}$

[b] $t = \dfrac{\bar{x} - \mu}{\sigma}\sqrt{N}$

[c] Significant at 0.05 level.

[d] Significant at 0.01 level.

involved in these findings. If, however, analysts who assess the same public information as is used by Zeta can be expected to fully discount this information in their own estimates, then these firms should not demonstrate significant differences from estimated earnings unless indirect bankruptcy costs occur and these costs were not expected by professional security analysts.

The above evidence provides some confidence that the less than expected performance of firms with high bankruptcy probabilities is not restricted to those firms which actually do go bankrupt. This is consistent with the prior conclusion that indirect bankruptcy costs can be incurred by any firm, regardless of its eventual fate.

D. Post-Bankruptcy Comparison

A variation in the method of analyzing the costs of bankruptcy is to investigate the direct and indirect costs only for the period after the company has filed for protection under Chapter 11. This would probably provide a *lower bound* estimate since data on unexpected post-petition earnings might be available for one or two years at most and do not consider pre-petition consequences of potential bankruptcy. A complication is that most large firms in bankruptcy-reorganization undergo substantial asset-size and sales reductions as they attempt to divest unprofitable activities. Therefore, absolute earnings comparisons based on substantially different asset-size structure could be distorted. In addition, there are very few professional analysts who attempt to forecast earnings of firms in distress and even fewer once bankruptcy is declared. Indeed, only five firms were found where security analyst estimates and post-petition results were available, and then only for approximately one year after the petition. In only one case (Braniff), was there more than one analyst involved once the petition was filed. The alternative, regression method does not estimate percentage return on assets or sales. Since all of these estimates are somewhat arbitrary with respect to the year to commence and terminate the analysis, these issues are mentioned for those interested in further empirical tests.

Table VII compares the professional security analyst(s) estimates of earnings per share and net earnings with actual results for the subsequent fiscal year after the petition date. The average interval was slightly over eight months for the five firms. Note that in every case both the earnings per share and net earnings *estimates* were far better than actual performance. In terms of these *indirect* costs relative to total firm value, the average for this small sample was 17.3%. Note that this was for one year only and does *not* include *direct* costs.

While I hypothesize that the above method will indicate a lower bound estimate of indirect bankruptcy costs, note that the average of this five-firm sample is quite similar to the averages listed in Table V for a slightly larger but overlapping sample. In both cases, the percentage costs are quite high.

It should be reemphasized that the interpretation of the difference between actual and estimated earnings cannot unambiguously be interpreted as a measure of indirect bankruptcy costs. It is likely that the realization of lower than expected earnings in the pre-bankruptcy petition period helps to contribute to the eventual filing. Further, the management's own expectation of earnings might differ from

Table VII

Post-Bankruptcy Comparison of Actual vs. Estimated Earnings

Company	Bankruptcy Date	Actual[a]	Estimate[b]	Actual (A) − Estimate (E)	(A) − (E) / Value
Braniff Int'l	May, 1982	($17.54)	($3.50)	($14.04)	—
		($341.9)	($60.01)	($281.0)	0.264
Lionel Corp.	February, 1982	($7.20)	$1.05	($8.25)	—
		($51.1)	$7.5	($58.61)	0.189
Sambo's Restaurants	June, 1981	($6.78)	($0.97)	($5.81)	—
		($84.5)	($12.5)	($72.0)	0.147
Saxon Industries	April, 1982	($6.69)	$0.65	($7.34)	—
		($51.9)	$5.0	($56.9)	0.114
Wickes Cos.	April, 1982	($17.12)	($0.75)	($16.37)	—
		($298.7)	($10.7)	($232.6)	0.154
				Average	0.173

[a] Earnings per share on first line and net profit (loss) on second line ($ million).

[b] Median estimate from one month after bankruptcy date for next fiscal year (8-month average).

the professional analysts', i.e., lower management prospects, which could motivate the filing. On the other hand, one could persuasively argue that management is often more optimistic than outsiders, and only when the results are unavoidable do they concede the reality of their plight. In either scenario, however, I am convinced that the situation is significantly exacerbated by what is known as indirect bankruptcy cost conditions.

V. Expected Bankruptcy Costs—Tax Benefits Tradeoff

As indicated earlier, one way of specifying the relevant decision on capital structure issues is to compare the expected present value of bankruptcy costs to the expected present value of tax benefits derived from debt capital. In an absolute sense, this comparison can be specified as:[11]

$$\frac{P_{B,t}(\mathrm{BCD}_t + \mathrm{BCI}_t)\cdot(\mathrm{PV})_t}{\mathrm{MV}_t} \text{ vs. } \frac{T_c(iD)_t(\mathrm{PV})_t\cdot(1 - P_{B,t})}{\mathrm{MV}_t}$$

where

$P_{B,t}$ = Probability of bankruptcy estimated in period t
BCD_t = Direct bankruptcy costs estimated in t
BCI_t = Indirect bankruptcy costs estimated in t
MV_t = Market value of the firm in t
T_c = Marginal tax bracket of the corporation
iD = Interest expenses from period t to infinity
PV_t = Present value adjustment back to period t

[11] I have not included an adjustment for personal taxes paid by investors on interest payments. Such an adjustment would, of course, reduce the after-tax benefits from the right-hand side of the equation. Corporate tax benefits from *direct* bankruptcy costs are also not included.

I suggest using one of the available bankruptcy prediction models to measure P_B at any point in time. The Zeta model has been utilized (first presented by Altman et al. [3] and identified by Scott [28] as being both conceptually and practically sound) to measure bankruptcy probabilities. These are given in Table VIII for the two samples of firms.

Note that the complement of P_B, i.e., the probability of nonbankruptcy, is used to adjust the tax benefits and it too is specified on a present value basis. In essence, the firm can only enjoy the tax benefits from leverage if it continues as a going concern. In liquidation, these benefits are lost completely. The interest rate, the levels of debt, and the marginal corporate tax rate (i, D, T_c) are assumed to remain constant from period t to infinity and adjust for present value by the same rate i.

A. Calculating Costs and Benefits

The tradeoff between the expected value of bankruptcy costs and the expected tax benefits from leverage has been measured for those firms in the sample where data on both direct and indirect bankruptcy costs exist for each of the periods prior to and after the bankruptcy petition. It is assumed that all of the direct

Table VIII

Bankruptcy Probabilities—Zeta® (1977) Estimates[a]

Company	Year of Bankruptcy	Probability of Bankruptcy 1 Year Prior	Probability of Bankruptcy 2 Years prior
Industrials			
Bowmar Instruments	1975	99+%	61%
Drew National	1975	79	34
Freir Industries	1976	57	27
Precision Polymers	1975	89	48
Universal Container	1976	88	72
Valley Fair	1978	97	85
Winston Mills	1978	99+	97
Retailers			
Abercrombie & Fitch	1975	78	77
Ancorp Nat'l Services	1973	95	63
Beck Industries	1970	57	14
M. H. Fishman	1974	65	32
Food Fair Inc.	1978	57	62
W. T. Grant	1975	97	72
Interstate Stores	1974	99+	89
Kenton Corp.	1974	99+	90
Mangel Stores	1974	98	27
National Bellas Hess	1974	78	78
Neisner Bros.	1977	54	33
United Merchants & Mfg.	1977	73	48

[a] Based on Altman et al. [3].

Table IX

Comparison of the Present Value of Bankruptcy Costs vs. Present Value of Tax Benefits from Interest on Debt and Capitalized Leases (At Period t-2 Prior to Bankruptcy)

(1) Company	(2) Probability of Bankruptcy (t-2)	(3) Expected Present Value of Bankruptcy Costs ($000)	(4) Expected Present Value of Tax Benefit from Debt ($000)	(5) Expected Present Value of Tax Benefit from Debt & Capitalized Leases ($000)	(6) (3)/(4)	(7) (3)/(5)
Abercrombie & Fitch	0.77	1,749	559	1,328	3.13	1.32
Ancorp Nat'l Services	0.63	1,618	1,769	32,120	0.91	0.05
Bowmar Instruments	0.61	1,628	673	1,073	2.42	1.52
Drew National	0.34	519	959	959	0.54	0.54
Fishman, M. H.	0.32	547	468	8,241	1.17	0.07
Freir Industries	0.27	262	1,577	1,577	0.17	0.17
Interstate Stores	0.89	19,179	3,104	11,495	6.18	1.67
Kenton Corp.	0.90	6,279	1,406	1,406	4.47	4.47
Mangel Stores	0.27	2,075	10,722	14,137	0.19	0.15
National Bellas Hess	0.63	1,360	428	3,865	3.18	0.35
Neisner Bros.	0.33	609	7,240	30,780	0.08	0.02
Precision Polymers	0.48	206	95	182	2.17	1.13
United Merchants & Mfg.	0.48	7,680	50,400	88,730	0.15	0.09
Winston Mills	0.97	818	84	179	9.73	4.57

costs take place during the 12-month period after the petition.[12] In addition, the expected present value of tax benefits is calculated on interest bearing debt alone as well as on the combined total of interest bearing debt and capitalized leases. The latter are an important financial mechanism for many firms, especially for the retailer sample.

The comparison of expected present values of bankruptcy costs vs. tax benefits from leverage is listed in Tables IX and X. Table IX measures the tradeoff for the sample of bankrupt firms from two financial statements prior to petition. Table X repeats the process but the reference date is one financial statement date prior to petition. The indirect costs, therefore, are for the periods t-2, t-1, and t in Table IX and t-1 and t in Table X.

I am primarily interested in observing whether or not the expected present value of bankruptcy costs exceeds the expected present value of tax benefits from

[12] I found (Altman [1]) that the average bankruptcy reorganization period for industrial firms is closer to two years. The *new* Bankruptcy Code (1978) requires that the debtor file a reorganization plan within 120 days. It is possible, however, to petition for extensions which are usually granted if the reorganization appears to be progressing toward a feasible plan. Recent evidence appears to indicate that even for large bankruptcies, two years is not an unreasonable time to expect a plan to be submitted and evaluated.

Table X

Comparison of the Present Value of Bankruptcy Costs vs. Present Value of Tax Benefits from Interest on Debt and Capitalized Leases (At Period t-1 Prior to Bankruptcy)

(1) Company	(2) Probability of Bankruptcy	(3) Expected Present Value of Bankruptcy Costs	(4) Expected Present Value of Tax Benefit from Debt	(5) Expected Present Value of Tax Benefit from Debt & Capitalized Leases	(6) (3)/(4)	(7) (3)/(5)
Abercrombie & Fitch	0.78	1,673	88	1,345	19.01	1.24
Ancorp Nat'l Services	0.95	2,200	271	1,867	8.12	1.18
Bowmar Instruments	0.99	2,782	75	97	37.09	28.68
Drew National	0.79	1,111	439	439	2.53	2.53
Fishman, M. H.	0.65	1,023	240	5,919	4.26	0.17
Freir Industries	0.57	530	978	978	0.54	0.54
Interstate Stores	0.99	19,257	366	889	52.61	21.66
Kenton Corp.	0.99	7,400	140	140	52.85	52.85
Mangel Stores	0.98	8,180	427	521	19.16	15.20
National Bellas Hess	0.95	2,014	398	959	5.06	2.10
Neisner Bros.	0.54	1,029	3,888	19,720	0.26	0.05
Precision Polymers	0.89	581	12	30	48.42	19.36
United Merchants & Mfg.	0.73	11,910	7,450	28,940	1.60	0.41
Winston Mills	0.99	549	37	70	14.70	7.77

leverage.[13] If bankruptcy costs exceed tax benefits, then I conclude that the firm had too much leverage in its capital structure and its optimum point, at least with respect to the bankruptcy-cost/tax benefit tradeoff, was at a lesser debt/equity ratio.

For ease of computation, the cost/benefit tradeoff has been specified in absolute terms rather than marginal analysis.[14] It should be noted, however, that the marginal increase in the present value of bankruptcy costs could exceed the marginal tax benefit from interest payments before the absolute tradeoff no longer favored increasing leverage. This is due to the fact that the probability of bankruptcy (P_B) rises at an increasing rate as debt increases beyond a certain point, while the expected tax benefit is linear or perhaps increases at a decreasing rate; e.g., if $(1 - P)$ falls at an increasing rate.

[13] Gordon and Malkiel [14] utilized statutory corporate tax rates to estimate expected bankruptcy costs when the firm balances the marginal tax advantage of debt with marginal expected bankruptcy costs. Cordes and Sheffrin [9] provide estimates of the marginal effective tax advantage to leverage. They find that the actual tax advantage to debt can be quite different from the statutory rate advantage and that there is considerable variation between firms.

[14] For marginal analysis, if the market value (MV) is factored out as the common denominator, then:

$$\frac{dp_B}{dD}\,(\mathrm{BC})\mathrm{PV} + P\,\frac{d\mathrm{BC}}{dD}\,\mathrm{PV} > \frac{di}{dD}\,T_c \cdot D \cdot \mathrm{PV} + iT_C \cdot \mathrm{PV} \cdot (1 - P_B)$$

B. Empirical Results

The results listed in Table IX show that eight of the 14 firms studied, as of period t-2, had the present value of expected bankruptcy costs (Column 3) exceeding the present value of tax benefits from debt alone (Column 4). This is shown clearly by the ratio of (3)/(4) listed in Column 6. If this ratio exceeds 1.0, then leverage appears to have been excessive. If bankruptcy costs are compared with the tax benefits from debt *and* capitalized leases (Column 7), i.e., (3)/(5), then six of 14 firms appear as overleveraged in period t-2.

In Table X, observe the bankruptcy-cost/tax benefit tradeoff as of t-1 prior to bankruptcy. As expected, the probability of bankruptcy increases (Column 2) for most firms as bankruptcy approaches, i.e., P_B increases from t-2 to t-1. For most firms, this more than compensates for the no longer calculated indirect costs from period t-2. Hence, 12 of 14 firms had ratios in Column 6 greater than 1.0 and 10 of 14 had ratios greater than 1.0 in column 7. It appears that most of the firms were overleveraged at one statement prior to their bankruptcy petition, regardless of how one measures the leverage factor. Since there are other factors, besides aggregate leverage amounts and ex ante bankruptcy factors which explain bankruptcy petititons, e.g., cash flow deficiencies, the statement about "overleveraged" conditions is most relevant to the bankruptcy cost vs. tax benefit tradeoff.

VI. Conclusion

In this paper, I investigate the empirical evidence with respect to both the direct and indirect costs of bankruptcy. This should be of interest to most analysts for three related purposes. First, there is a need to provide further evidence as to whether or not bankruptcy costs are trivial. Second, for the first time a proxy methodology for measuring indirect costs of bankruptcy is specified *and* actually measured. Finally, a simple format is specified for measuring the present value of expected bankruptcy costs and this amount is compared to the present value of expected benefits from interest payments on leverage. This comparison has important implications for the continuing debate as to whether or not an optimum capital structure exists for corporations.

The samples include 19 industrial firms which went bankrupt over the period 1970–78 and a second sample of seven recent large bankrupt companies. The results are quite strong that bankruptcy costs are not trivial. In many cases they exceed 20% of the value of the firm measured just prior to bankruptcy and even in some cases measured several years prior. On average, bankruptcy costs ranged from 11% to 17% of firm value up to three years prior to bankruptcy. These results are based on a regression method for determining indirect bankruptcy costs. Indirect costs are essentially defined as unexpected losses. A second method for measuring indirect costs is based on security analyst's expectations of earnings vs. actual earnings, and these results show even more dramatically that bankruptcy costs are significant.

The expected present value of bankruptcy costs is measured by using a reliable bankruptcy estimator technique and the aforementioned measure of bankruptcy costs. The present value of expected bankruptcy costs for many of the bankrupt

firms is found to exceed the present value of tax benefits from leverage. This implies that firms were overleveraged and that a potentially important ingredient in the discussion of optimum capital structure is indeed the bankruptcy-cost factor.

I am well aware of the arguments for and against using expectational variables to measure opportunity costs and the potential confounding flaws in my techniques. As such, the results and implications are not airtight and will be subject to debate and comment. If this paper will eventually generate more acceptable and better defined measures and estimation techniques of indirect costs of bankruptcy, this author will be most interested in them and the implications of the consequent empirical results. The potential impact of bankruptcy costs on firm valuation and capital structure issues is too important to speculate about on a conceptual basis only.

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