



Business Failure Pathways: Environmental Stress and Organizational Response

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This paper compares the failure of 73 firms that declared bankruptcy from 1980 to 1986 with the behavior of 73 matching firms that had not failed over the same period. We contrast the relative importance of environmental stress, measured by industry growth/decline, with organizational response, measured by asset and debt growth/decline. Firm effects dominate industry effects in explaining failure. Four distinctive business failure pathways based on firm and industry growth patterns are described. In particular, we conclude that debt-funded, forced-growth strategies create a high risk of failure regardless of industry growth rate.

A dramatic economic development of the past 15 years has been the increasing number of business failures and bankruptcies of large previously-profitable firms. In 1979 (the last year under the old Bankruptcy code), there were 28 failures per 10,000 firms, with average liabilities of \$352,639. By 1986, the rate had increased to 120 bankruptcies per 10,000 with average liabilities of \$725,850. The rate has declined since then but remains much higher than prior to 1980 (data from the Dun & Bradstreet *Failure Record*, 1991).

This study centers on why firms fail and whether consistent patterns of failure can be identified. In particular, we examine the relationships between external business conditions and internal responses to those conditions, expressed in variables that are concrete and financial. There is an extensive literature, particularly in the work of D'Aveni (1989) and Hambrick and D'Aveni (1988), and more generally in the organizational decline literature (Cameron, Sutton & Whetten, 1988) that has investigated the human and organizational factors in decline and failure. Our focus on financial firm-level and industry-level variables keeps the present study within reasonable bounds, simplifies the interpretation of results,

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and makes the results more directly useful to practitioners. To accomplish these objectives, we studied the failures of 73 firms that declared bankruptcy from 1980 to 1986 and 73 matching firms that did not fail during that period.

Determinism, Choice and Time

There has been a long-standing debate in strategy and economics about the relative importance of environmental determinism and managerial choice as explanations of organizational adaptation and survival (e.g., Rumelt, 1991; Schmalensee, 1985). The population ecology school (e.g., Hannan & Freeman, 1989) has emphasized environmental determinism; the economists' emphasis on industry factors represents another environmental perspective. This point of view is well represented by Harrigan's (1982) work on declining businesses. The environmental perspective is also imbedded, for example, in much of the work on import threats to domestic industries. On the other hand, the general management school (e.g., Child, 1972; Andrews, 1971) has emphasized managerial choice. Many strategy theorists (Bourgeois, 1984; Hrebiniak & Joyce, 1985; and others) take a balanced view that organizational performance is determined by the interaction of managerial choice and the organization's environment. The extent to which managerial choice, particularly chief executive discretion, is constrained by the environment is the subject of a review by Hambrick and Finkelstein (1987). In the more narrowly defined field of business failure, Bibeault (1982) devotes three chapters of his book on turnarounds to the interaction between external and internal factors. We too subscribe to the view that free will exists but managers are not omnipotent. A belief in the interaction between managerial choice and the firm's environment seems central to the notion of strategy itself. If we assume that most firm failures involve some interaction between external forces and internal responses, then it becomes important to ask whether there are consistent patterns in these interactions. This paper extends the exploration of the relationships and interactions between the organizational environment and firm behavior in failure and decline. It also provides some new insights on failure patterns.

Environmental factors are complex (Castrogiovanni, 1991; Dess & Rasheed, 1991), especially for a multi-industry study such as ours; certain simplifying assumptions thus were necessary. *Industry growth* has long been accepted as a simple indicator of environmental attractiveness (e.g., Henderson, 1979; Harrigan, 1982). Industry growth has continued to be used to measure industry environment (Hambrick & D'Aveni, 1988; Keats & Hitt, 1988; Wernerfelt & Montgomery, 1986; Yasai-Ardekani, 1989). With that background, we chose to use industry growth as a univariate measure of the environment. This is also consistent with a population ecology perspective, in which negative industry growth resulting from decreased consumer demand can be one cause of a reduction of niche size (Zammuto & Cameron, 1985).

The measurement of managerial choice is equally difficult. Clearly, resource acquisition and allocation are major elements of managerial choice in firms. This study uses *changes in assets and debt* (defined as total liabilities) as measures of firms' strategic behavior. Given the seemingly almost universal preference for growth, how do firms pursue it? Clearly, a primary method is to invest in produc-

tive assets. Assets tend to grow in general and, especially, when firms anticipate rising demand. For declining firms, on the other hand, decreases in assets may reflect defensive moves to meet creditor demands and to avoid bankruptcy (D'Aveni, 1989). If internal resources are insufficient to expand assets or meet creditor demands, firms may choose to acquire debt. In both asset and debt growth the firm undertakes a significant amount of risk, a critical factor in managerial choice. From a research perspective, asset and debt growth are attractive measures of firm behavior because they are clearly relevant to performance and bankruptcy, objective, and readily available. Also, the use of other surrogates (such as R&D investment or advertising intensity) for managerial choice is difficult given the diversity of industries in our study (Phillips, 1976).

To measure performance, sales growth and return on assets were used, while decline was defined as a decrease in net income. Consideration of more subjective human-resource oriented decline measures would have been interesting, but was outside the scope of the study. Further, since bankruptcy is a rather specific financial indicator of decline, we sought strategic and performance variables of the same type.

Since time is an important issue in decline and failure, it is also relevant to inquire whether firms decline and die slowly, or whether they suffer rapid collapses. The literature does record some attempts to describe failure patterns. Most of these descriptions have focused on a single pattern, although there have been some attempts to categorize failure patterns (Argenti, 1976; Platt, 1985). More recently, D'Aveni (1989) and Hambrick and D'Aveni (1988) have published more rigorous studies of decline patterns, using a mix of financial and managerial variables, with primary emphasis on firm factors in slow declines. The rapid decline of once-successful firms has been studied both in strategy (e.g., Argenti, 1976; Miller, 1990, Starbuck & Hedberg, 1977) and in finance literature (Altman, 1983; Donaldson, 1985; Higgins, 1977). Both literatures highlight the dangers of excessive growth and leverage in prompting failure. Two factors which distinguish the current paper are our emphasis on the behavior of firms prior to decline (particularly the impact of debt and asset growth) and our focus on bankruptcies occurring after the major overhaul of the Bankruptcy Code in 1979 (after which there was a substantial increase in both the number and size of bankruptcies).

Failure Pathways

Given the two dimensions of industry growth and firm growth, there are four failure possibilities as shown in Figure 1. Each cell in the matrix represents a different pattern of interaction—a *failure pathway*—between the firm and its environment:

Market Deterioration Pathway. Firms in this pathway have *declining* sales in *declining* industries. As industries decline, competition increases, and weaker firms are forced out of the market. This pathway is similar to Hambrick and D'Aveni's (1988) "downward spirals" and Argenti's (1976) "Type 3 trajectories." In population ecology terms, the population exceeds the carrying capacity of the niche (Zammuto & Cameron, 1985).

		<i>Industry Sales</i>	
		Declining	Growing
F I R M S A L E S	Declining	Marketing Deterioration (MD)	Marketing Maladaptation (MM)
	Growing	Fight for Market Share (FMS)	Loss of Control (LC)

Figure 1. Firm and Industry Growth Matrix: Failure Pathways

Market Maladaptation Pathway. Firms in this pathway have *declining* sales in *growing* industries. This may reflect shakeouts and industry consolidations, which are common phenomena in growing industries as they approach maturity (Porter, 1980). In other cases, firms' competitive advantages may erode due to industry evolution, competitor innovations, or powerful new entrants. Even in established industries, new technologies or a change in the dominant product design may drive previously profitable firms out of the market (Utterback & Suarez, 1993). In population ecology terms, the organization becomes less well adapted to a changing niche shape (Zammuto & Cameron, 1985).

Fight for Market Share Pathway. Firms in this pathway have *growing* sales in *declining* industries. Intense price competition is common in declining industries, especially if exit barriers are high. Sales growth driven excessive price cutting may lead to failure. This pathway is similar to those previously described by Harrigan (1982) and Fruhan (1972).

Loss of Control Pathway. Firms in this pathway have *growing* sales in *growing* industries. On the surface, this might appear to be the least likely failure pathway. However, in growing industries firms may let costs get out of control, experience growth-driven cash flow problems or drive sales growth by excessive price cutting. On the investment side, firms in growing industries may overestimate future demand and build excess capacity. This pathway echoes the "success breeds failure scenario" of Starbuck & Hedberg (1977), the "Icarus scenario" of Miller (1990), and Argenti's (1976) "Type 2 Trajectories."

The discussion section of this paper contains more extensive pathway descriptions based on the quantitative analyses.

Hypotheses

To explore the relationships between industry and firm growth, firms in each cell of the matrix were compared with firms in other cells and with groups of matching firms over the five-year period preceding bankruptcy. To frame that exploration, we developed the set of hypotheses summarized in Table 1. The hypotheses are designed to provide tests of alternative conclusions, rather than following the more traditional null hypothesis model, with the alternatives

Table 1. Summary of Research Hypotheses and Results

<i>Hypotheses</i>	<i>Results</i>
1. More failing firms will be in declining industries than in growing industries.	1. Not Supported, nss.
2. More failing firms will have declining sales than growing sales.	2. Supported, nss.
3. Failing firms will increase their assets and debt more rapidly than comparable nonfailing firms.	3. Supported, nss. for assets, ss. for debt.
4. Failing firms in growing industries will increase their assets and debt more rapidly than failing firms in declining industries.	4. Supported, nss.
5. Failing firms with growing sales will increase their assets and debt more rapidly than failing firms with declining sales.	5. Supported, ss.
6a. For failing firms in growing industries, increases in debt for the five-year period prior to bankruptcy will be determined more by increases in assets than by declines in income.	6a. Supported, ss.
6b. For failing firms in declining industries, increases in debt for the five year period prior to bankruptcy will be determined more by declines in income than by increases in assets.	6b. Not Supported
7a. For failing firms with growing sales, increases in debt for the five-year period prior to bankruptcy will be determined more by increases in assets than by declines in income.	7a. Supported, ss.
7b. For failing firms with declining sales, increases in debt for the five-year period prior to bankruptcy will be determined more by declines in income than by increases in assets.	7b. Not Supported
8. Failing firms in growing industries will decline in profitability more rapidly than failing firms in declining industries.	8. Supported, nss.
9. Failing firms with growing sales will decline in profitability more rapidly than failing firms with declining sales.	9. Supported, ss.

Notes: ss = statistically significant, $p < 0.05$; nss = not statistically significant.

selected as logical consequences of our research questions and the model of failure pathways shown in Figure 1. Consistent with that strategy, we reference prior work that supports both alternatives, which naturally leads to contradictory evidence in many cases.

The hypotheses are organized in three sets. Numbers 1 and 2 consider the relationship between bankruptcy and the *growth of the firm and industry*. This provides a test of the relative importance of industry and firm effects in business failure.

Numbers 3 through 7 introduce the element of *risk* in the form of growth in firms' assets and growth in firms' debt, again contrasting industry and firm effects. Numbers 8 and 9 address the *rate of decline* by relating the rate of decline to firm and industry factors.

This approach provides a basis for the concurrent exploration of two important issues. The first of these is the search for distinctive patterns and processes of business failure. The second is the search for evidence about the relative impact of managerial choice and environmental determinism on firm performance, particularly performance in the face of imminent failure.

Relationships Between Environmental and Organizational Factors

H1: *More failing firms will be in declining industries than in growing industries.*

This hypothesis is logical and is consistent with Harrigan's (1982) work on declining industries. As one reviewer commented, it also seems quite obvious—*ceteris paribus*, attractive environments (growing industries) should make survival easier. However, there are interesting counter-arguments. For example, industry life-cycle theory postulates that growing industries will undergo a shakeout phase, and that industry concentration will increase as an industry matures (Klepper & Graddy, 1990). Standardization may force some firms out of business (Utterback & Suarez, 1993), and powerful firms may use their market power to force weaker competitors out of the industry. In other cases, industry leadership may rotate among competitors (Henderson & Clark, 1990). The exits of firms from either growing or declining industries do not necessarily imply business failure, but the possibility of bankruptcy-driven exits is present in both types of industries.

H2: *More failing firms will have declining sales than growing sales.*

This is the popular (and seemingly obvious) view of business failure—firms slowly wither away as their sales decline. Hambrick & D'Aveni (1988) provide an extended study of this "downward spirals" pattern. However, there are other views in popular and academic literature about the effects of growth. Much like the Japanese "bubble" economy of the late 1980s, firms that grow too rapidly may become bursting bubbles (Miller's 1990 "Icarus paradox"). Academic finance literature is rich with warnings about excessive growth, particularly debt-financed growth (Higgins, 1977; Donaldson, 1985). The high rate of defaults on junk bonds used to fund leveraged buyouts clearly demonstrates this risk (Altman, 1992).

In terms of Figure 1, in the Market Deterioration and Loss of Control pathways, Hypotheses 1 and 2 lead to the same conclusions. In those two pathways, industry and firm growth are in the same direction. However, in the Marketing Maladaptation and Fight for Market Share pathways, in which industry and firm growth directions differ, the conclusions will be contradictory; this provides a test of the relative importance of industry and firm effects in failure situations.

Risk Factors

Since organizational and financial elements are inextricably linked in business failure, it is appropriate to look to both finance and organizational theory for contributions to a theory of business failure. Financial leverage and bankruptcy risks are cornerstones of financial theory (Altman, 1983; Gordon, 1971; Stiglitz,

1972). Increasing the debt component of the capital structure excessively is a risky strategy. High-growth strategies, motivated by the desire for increased revenues and implemented by asset growth, are risky for the pressures they place on cash flows (Donaldson, 1985; Higgins, 1977; Hurdle, 1974). Since leverage and growth risk are firm-specific, risk is clearly related to managerial choice and strategies, which may result in firm decline. For example, leveraged growth may enable the pursuit of faster growth, or it may be undertaken deliberately in pursuit of higher but riskier rates of return. Once failing firms suffer sufficient losses, managers may be forced to choose between additional debt and dissolving the firm.

The following hypotheses regarding the link between asset and debt growth and business failure are based on two assumptions: asset and debt growth increase risk, and assets and debts will grow in parallel.

H3: *Failing firms will increase their assets and debt more rapidly than comparable nonfailing firms.*

If excessive growth in assets and debt increases the risk of bankruptcy, failing firms would be expected to take more risks than nonfailing firms. We test this logic by comparing failing firms with matching nonfailing firms.

H4: *Failing firms in growing industries will increase their assets and debt more rapidly than failing firms in declining industries.*

H5: *Failing firms with growing sales will increase their assets and debt more rapidly than failing firms with declining sales.*

Assuming that firms value sales growth, firms that have growing sales, or have the potential for growing sales in growing industries, should be more motivated to increase assets, and if necessary debt, than firms which have declining sales or are in declining industries. If either firm or industry sales are declining, firms may choose to sell assets to increase cash flow or to downsize (D'Aveni, 1989). As in the case of Hypotheses 1 and 2, Hypotheses 4 and 5 lead to the same conclusions for firms in which industry growth and firm growth are in the same direction. However, they lead to contradictory conclusions for firms in which the growth rates are in opposite directions, thus providing another opportunity to test the relative importance of firm and industry effects in firm failure.

While the preceding discussion assumes that debt growth would be driven by asset growth, it is possible that failing firms might be forced to increase debt to cover income losses. The following hypotheses test that possibility:

H6a: *For failing firms in growing industries, increases in debt will be determined more by increases in assets than by declines in income.*

H6b: *For failing firms in declining industries, increases in debt will be determined more by declines in income than by increases in assets.*

H7a: *For failing firms with growing sales, increases in debt will be determined more by increases in assets than by declines in income.*

H7b: *For failing firms with declining sales, increases in debt will be determined more by declines in income than by increases in assets.*

The underlying assumption for these four hypotheses is that if either industry or firm sales are growing, managers will be inclined to increase their assets, even if it requires increased debt; however, they will avoid asset and debt growth if either firm or industry sales are declining. However, some failing firms may assume more debt just to survive. As in the previous sets of hypotheses, the predictions are consistent for two of the four subsets of firms and contradictory for the other two subsets.

Rates of Decline

Previous discussions of business failure have tended to focus on either slow declines or rapid collapses. In contrast, we worked on the basis that paths to failure are complex and that the rates of decline would vary substantially depending on both industry and firm factors. To help understand the variation in the rates of decline, the following hypotheses were developed:

H8: *Failing firms in growing industries will decline in profitability more rapidly than failing firms in declining industries.*

H9: *Failing firms with growing sales will decline in profitability more rapidly than failing firms with declining sales.*

The basic assumption is that the most favorable circumstance for a firm is to have growing sales in a growing industry; the least favorable is to have declining sales in a declining industry. Failure in favorable circumstances would be like accidental death, and failure in unfavorable circumstances would be like a lingering disease. At the firm level, this logic contrasts Miller's (1990) "Icarus paradox" with Hambrick and D'Aveni's (1988) "downward spirals." At the industry level, we draw on Zammuto & Cameron's (1985) propositions that declines will be slow in continuous niche erosions, but rapid in discontinuous niche changes. As in the previous sets of hypotheses, these taken individually are consistent with conventional wisdom and prior studies. However, as before, when industry and firm growth are not moving in the same direction the predictions are not consistent, thus providing more tests of the relative importance of industry and firm effects.

Methods

Bankruptcy Firm Sample Selection

The study was based on 73 firms that filed for bankruptcy in 1980 through 1986 and 73 matching firms that were not bankrupt during the same period, but that were in the same industries and comparable in size. The two primary requirements for the bankrupt firm sample were that the firm was on the Compustat files with complete data for six years prior to filing for bankruptcy and that the firm had entered formal bankruptcy proceedings after January 1, 1980, the first full

year in which the relaxed standards of the Bankruptcy Reform Act of 1978 were effective.¹ Collecting data for six years for each firm allowed for analysis of performance for five years, a common time frame for failure studies (Altman, 1983; Hambrick & D'Aveni, 1988). The last full year before bankruptcy was designated year 1, the year before that, year 2, and so forth back to year 6. All of the firms were at least ten years old when they failed, which should have greatly reduced the well-known risks of failure for start-up firms and the liabilities of newness (Stinchcombe, 1965).

Each firm was assigned a single four-digit SIC industry code using data from Standard and Poor's Corporate Register and Compustat. Since a key assumption of the study was that industry membership defined the external environment, membership in multiple industries because of diversification was a potential confounding factor (Sheppard, 1994, discusses this issue). Therefore, the firms in the sample were classified by diversification strategy using the four Wrigley diversification categories and the Rumelt classification rules (Rumelt, 1986). Of the 73 firms in the sample, 61 were classified as either single businesses or dominant businesses, 11 as related diversifiers, and only one as an unrelated diversifier (LTV Corp.).² For the diversified firms, the SIC classification was determined by the firm's business segment most directly responsible for the firm's bankruptcy (which, except for UNR Industries, was also the firm's largest segment). Based on this decision rule, the industry distribution of the firms in the study was eight in petroleum production, ten in textiles and clothing, eight in miscellaneous processing, 12 in metals and mining, 16 in manufacturing, six in transportation, and 13 in wholesale or retail distribution. Detailed case studies of eight firms, two from each pathway, were prepared to enrich the quantitative data and to help interpret the results.³

Matching Nonbankrupt Firm Sample Selection

After the sample of bankrupt firms was established, a comparison sample of nonbankrupt firms, matched for time frame, four-digit-SIC industry, and size was selected from the Compustat Industrial tapes.⁴ Statistical tests for differences in sample means showed no significant differences in sales or total assets in any of the six years for which data were collected. It should be noted that the matching firms, like the bankrupt firms, were smaller than the general population from which they were drawn.⁵

A list of the bankrupt firms, their failure pathways, and the matching firms are provided in Table 2. Table 3 provides some key data on the failing firms and their matching counterparts six years before and in the year immediately preceding bankruptcy. Table 3 demonstrates a key finding of our study—the extent to which failing firms grew during the pre-bankruptcy period.

Growth Rates

Inflation-adjusted sales growth data were collected both by firm and by industry. Industry data were collected at the four-digit-SIC code level. The inflation adjustments were made by dividing the firm or industry data for the year preceding the bankruptcy by a five year GNP deflator (*Economic Report of the President*,

Table 2. List of Bankrupt and Matching Firms

<i>Bankrupt Firms</i>	<i>Matching Firms</i>
A. Market Deterioration Pathway: declining industry, declining firm (n = 19)	
Altec Corp.	Wells-Gardner Electronics
Auto Train Corp.	Florida East Coast Inds.
Beker Industries	First Mississippi Corp.
Berven Carpets	Masland, C. H. and Sons
Branch Industries	Mayflower Group Inc.
Cook United Inc.	Jamesway Corp.
Cooper-Jarret Inc.	Tri-State Motor Transit
Crompton Co. Inc.	Crown Crafts Inc.
Eastmet Corp.	Foote Mineral Co.
Garland Corp.	Raven Industries Inc.
K-tel International	Electrosound Group Inc.
LTV Corp.	Bethlehem Steel
Magic Marker Corp.	Hunt Mfg.
Mobile Home Industries	Conner Corp.
Richton International Corp.	Lazare Kaplan Intl.
Smith International Inc.	Cameron Ironworks
Tacoma Boatbuilding Inc.	American Ship Building
Transcontinental Energy	Helmerich & Payne
Wheeling-Pittsburgh Steel	Carpenter Technology
B. Market Maladaptation Pathway: growing industry, declining firm (n = 21)	
AM International Inc.	Compugraphic Corp.
Barclay's Industries	SMD Industries Inc.
Bobbie Brooks Inc.	Movie Star Inc.
Continental Steel Corp-Del.	Athlone Industries
Glover Inc.	Cagle's Inc.
Good, L. S. Co.	Crowley Milner Co.
Leisure Dynamics Inc.	Hasbro Inc.
Lynnwear Corp.	Pioneer Systems Inc.
Mego International	Woodstream Corp.
Mesta Machine Co.	Monarch Machine Tool Co.
Morton Shoes Cos. Inc.	Spencer Cos. Inc.
National Shoes Inc.	Morse Shoe Co.
Pathcom Inc.	Trans-Lux Corp.
Poloron Products	Vintage Enterprises Inc.
Robintech Inc.	Panatasonte Inc.
Rusco Industries Inc.	Intl. Aluminum
Salant Corp.	Garan Inc.
Stevcoknit Inc.	Adams-Millis Corp.
Tobin Packing Co. Inc.	Seaboard Corp.
Upton Co.	Lydall Inc.
White Motor Corp.	Paccar Inc.

<i>Bankrupt Firms</i>	<i>Matching Firms</i>
<i>C. Fight for Market Share Pathway: declining industry, growing firm (n = 10)</i>	
Amfesco Industries, Inc.	West Co. Inc.
Berry Industries Corp.	Trico Industries
Commodore Corp.	Oakwood Homes
Flame Industries, Inc.	Camco Inc.
Global Marine Inc.	Zapata Inc.
Lionel Corp.	General Host Corp.
Phoenix Steel Corp.	Bundy Corp.
Revere Copper and Brass Inc.	Handy & Harman
Solomon, Sam Inc.	Frigitronics Inc.
Towle Manufacturing Co.	Oneida Ltd.
<i>D. Loss of Control Pathway: growing industry, growing firm (n = 123)</i>	
Advent Corp.	Cetec Corp.
Anglo Energy Ltd.	Purolator Courier Corp.
Argo Petroleum	Galaxy Oil Co.
Braniff International Corp.	Republic Airlines Inc.
Capitol Air Inc.	Aloha Inc.
Charter Co.	National Intergroup Inc.
Continental Airlines Inc.	Western Airlines Inc.
CS Group Inc.	Barco of California
Data Access Systems Inc.	Anderson Jacobson Inc.
Gilman Services Inc.	Ketchum & Co.
KDT Industries Inc.	Heck's Inc.
Manville Corp.	Owens-Corning Fiberglas
Marion Corp.	Pauley Petroleum Co.
McLouth Steel Corp.	Cyclops Corp.
MGF Oil Corp.	Parker Drilling Co.
Nucorp Energy Inc.	Big Three Industries
Robins, A. H. Co.	Bausch & Lomb Inc.
Sambo's Restaurants	Church's Fried Chicken
Saxon Industries	Federal Paper Board Co.
Steelmet Inc.	Ogden Corp.
Storage Technology Corp.	Dataram Corp.
UNR Industries Inc.	Keystone Cons. Industries
Wickes Cos. Inc.	Lowe's Cos.

1987) before making the growth rate calculations. The growth rate was defined as the compound growth rate for the five year pre-bankruptcy period using only the beginning and ending data. The firm sales data were taken from Compustat. Growth rates were based on total firm sales since most of the firms were single businesses, and business segment data were not available for most of the other firms. Firm growth rates ranged from +90.68 to -31.30 percent per year with a mean of 0.31 percent and a standard deviation of 15.42 percent. An industry growth rate was calculated for each firm over the same years used for calculating the firm's

Table 3. Initial and Final Sales, Assets and Debt—Bankrupt and Matching Firms by Pathway
(to nearest \$ million)

		All	Market Deterioration	Market Maladaptation	Fight for Market Share	Loss of Control
A. Bankrupt Firms Pathways						
	n	73	19	21	10	23
	Sales, year 6 before bankruptcy	350	621	183	132	374
	Sales, year 1 before bankruptcy	522	625	175	24	876
	Total assets, year 6 before bankruptcy	224	361	110	137	254
	Total assets, year 1 before bankruptcy	380	518	99	275	569
	Total liabilities, year 6 before bankruptcy	128	215	64	91	129
	Total liabilities, year 1 before bankruptcy	271	363	73	216	398
B. Matching Firms						
	n	73	19	21	10	23
	Sales, year 6 before bankruptcy	348	492	129	246	474
	Sales, year 1 before bankruptcy	444	442	222	242	735
	Total assets, year 6 before bankruptcy	264	393	65	187	363
	Total assets, year 1 before bankruptcy	354	429	104	257	562
	Total liabilities, year 6 before bankruptcy	118	152	33	108	171
	Total liabilities, year 1 before bankruptcy	181	205	44	137	303

growth or decline. The source data for calculating industry growth rates were taken from the *Predicast Base Books* (1980-1987). Industry growth rates ranged from +22.45 to -15.92 percent per year with a mean of 1.32 percent and a standard deviation of 6.77 percent. It should be noted that inflation-adjusted sales data were adopted in the classification of firms, but the data in the tables and figures throughout this paper have not been inflation adjusted. Inflation adjustments for variables other than sales presented serious difficulties, especially since the time periods were different for various pairs of firms. Further, since many of the comparisons were between the failing and nonfailing firms, inflation adjustments have only applied the same multiplier to the data for each member of the matching pairs. For comparative purposes the mean GNP deflator for the five year periods was 1.42; thus a nominal growth of 42 percent can be taken as no real growth.

Rates of Decline

Quantifying rates of decline can present problems for any bankruptcy research because of different patterns of firm decline. For example, consider two firms with the same net income in both year 6 and year 1: one firm might have increased its net income for four years and had a major loss in the final year before bankruptcy, and the other might have had small decreases each year. To address this issue, the measure we adopted was simply the number of years within the six-year study period in which a firm had a negative net income; this was based on the assumption that a firm that went bankrupt with fewer years of negative income had declined more rapidly than a firm with more years of losses.

Results

In this section, the quantitative results and statistical analyses of the study are reported. The primary statistical techniques used were t tests for differences between failing and nonfailing firms, ANOVA with Tukey tests for differences of means between the four pathway groups shown in Figure 1, and multiple regression for changes in debt. After analyzing the differences between failing firms and the populations from which they were drawn, we focus on the differences between the failing firms and their matching nonfailing firms. Last, we examine the differences between the firms in the four failure pathways.

Differences in Failure Rates by Population

Failing firms were found in all four cells of the pathway matrix, as shown in Table 2. Contrary to Hypothesis 1, there were more failures in growing industries than in declining industries; consistent with Hypothesis 2, there were more failures of firms with declining sales than of firms with growing sales. However, statistical tests showed that the distribution of failing firms across the four pathways exhibited no significant difference from a random distribution.⁶

Differences Between Failing and Matching Nonfailing Firms

Net sales, total assets, and debt were the three primary variables used in making comparisons between firms. Total liabilities were used as the debt measure rather than less inclusive measures, such as long-term debt, because problems with

current liabilities, as well as long-term debt, can lead to business failure. Trade creditors as well as debtholders can force a firm into bankruptcy. Also, as firms default on long-term debt obligations, creditors may invoke "due and payable" loan provisions, forcing firms to report long-term debts as current liabilities.

At neither the beginning nor the end of the study period were there significant differences between the failing and nonfailing firms on assets, sales, or debt. The data on assets, debt, and sales for the failing and nonfailing firms in total and by pathway are shown in Table 3. The lack of significant differences in overall sales and asset growth was the result of conflicting trends among subgroups. Compared with matching firms, failing firms tended to exhibit exaggerated behavior. Compared to the failing firms with declining sales, matching firms had growing sales and their assets grew more rapidly; but compared to the failing firms with growing sales, the matching firms grew more slowly in both sales and assets. In every pathway, failing firms increased their debt more rapidly than the matching nonfailing firms, but overall the differences were not statistically significant.

However, a different rate pattern was observed when rates of change were analyzed, rather than absolute dollar amounts of assets, debt, and sales, as shown in Table 4 and Figure 2. As postulated in Hypothesis 3, the failing firms increased their sales, assets, and debt more rapidly than nonfailing firms, although only the change in debt was significantly higher ($p < .01$). In all cases, the variances for the failing firms were much higher than those for the matching firms. Change in debt was significantly higher ($p < .01$). In all cases, the variances for the failing firms were much higher than those for the matching firms. In general, small firms exhibited higher than average growth rates, as evidenced by the observation that growth rates measured on a size-weighted basis (measured by group averages) were lower than those measured on the equal-weighted basis (measured by averaging individual firm rates) used elsewhere throughout this report.

Differences Between Failing Firms by Pathway

The differences in rates of change in assets, sales, and debt between the four pathway groups of failing firms are shown in Table 4. There were two significant differences ($p < .05$) between bankrupt firms in different pathway groups. First, asset growth for failing firms in the Loss of Control pathway was higher than for firms in the Market Maladaptation pathway. Second, debt growth for failing firms in the Loss of Control pathway was higher than for firms in the Market Maladaptation and Market Deterioration pathways.

To compare industry and firm effects, the failing firms were grouped by industry growth and by firm growth. There were no significant differences in sales, asset, or debt growth between growing and declining industry subsets, but for each variable firms in growing industries grew more rapidly than those in declining industries, as postulated in Hypothesis 4. However, firms with growing sales had significantly higher asset and debt growth than firms with declining sales (assets as $p < .001$, and debt at $p < .01$); these results support Hypothesis 5.

After comparing differences among failing firms by pathways, firms in each pathway were compared with their matching subgroups. In considering the differences between the failing and the matching nonfailing firms, it should be noted

		Industry Sales		
		Declining	Growing	Totals
F I R M	Declining	MD Pathway (n = 19) SG = -3.2 (91.7) AG = 43.5 (74.4) DG = 91.8 (79.0)	MM Pathway (n = 21) SG = -5.5 (70.2) AG = -2.8 (54.7) DG = 92.0 (49.1)	(n = 40) SG = -4.4 (80.4) AG = 19.2 (64.1) DG = 91.9 (63.3)
	Growing	FMS Pathway (n = 10) SG = 118.5 (54.2) AG = 168.3 (90.1) DG = 217.7 (96.0)	LC Pathway (n = 23) SG = 292.1 (104.2) AG = 194.1 (97.7) DG = 393.3 (126.9)	(n = 30) SG = 239.5 (89.1) AG = 186.3 (95.4) DG = 341.3 (117.6)
Totals		(n = 29) SG = 36.9 (78.8) AG = 85.0 (79.8) DG = 144.7 (84.8)	(n = 44) SG = 151.3 (88.0) AG = 101.1 (77.2) DG = 244.1 (89.8)	(n = 73) SG = 105.9 (84.3) AG = 94.7 (78.2) DG = 204.7 (87.8)

Notes: SG = Sales Growth in %, AG = Asset Growth in %, DG = Debt Growth in %. (Growth rates shown in this figure have not been adjusted for inflation).
 MD = Market Deterioration Pathway, MM = Market Maladaptation Pathway,
 FMS = Fight for Market Share Pathway, LC = Loss of Control Pathway

Figure 2. Asset and Debt Growth by Pathway
 (Matching nonfailing firms in parentheses)

that not only were the firms matched on size and four-digit SIC code, but the data were for the same years for each pair. Therefore, the matched firms were exposed to not only the same industry growth rates, but also to such factors as industry turbulence, import pressure, and government regulation. The obvious differences observed were that while failing firms in the Market Deterioration and Market Maladaptation pathways were experiencing low or negative growth, matching firms were growing more rapidly. However, the opposite was true for failing firms in the Fight for Market Share and Loss of Control pathways: their sales and assets were growing more rapidly than the matching firms. In all four pathways the failing firms were adding debt more rapidly than the matching firms.

Debt-Asset Growth Relationships among Failing Firms

To test the relationships between asset, debt, and net income growth, increases in debt were regressed on changes in assets and net income for a five-year and a two-year period prior to bankruptcy for the pooled sample and for four subsets formed by partitioning the sample by firm growth and industry growth. The results are shown in Table 5. In all cases, the goodness of fit, R^2 , was high, ranging from .60 to .91.

For the five-year model, change in assets was the only significant predictor of the change in debt for the pooled sample and all partitions, so the differences postulated in Hypotheses 6a and 7a were supported, but not Hypotheses 6b and

Table 4. Change in Sales, Assets, Debt and Decline Rates—
Comparison of Bankrupt and Non-bankrupt Firms

<i>Variables</i>	<i>Bankrupt Firms</i>	<i>Nonbankrupt Firms</i>	<i>t-test</i>	<i>Significantly Different Subgroups Bankrupt Firms Only</i>
A. Total Sample (n = 3)				
Change in Sales	1.059	0.843	.405	
Change in Assets	0.947	0.782	.636	
Change in Debt	2.047	0.878	2.774**	
Number of Losing Years	2.301	n.a.		
B. Market Deterioration (MD) Group (n = 19)				
Change in Sales	-0.032	0.917	-2.200*	
Change in Assets	0.435	0.744	-.734	
Change in Debt	0.918	0.790	.245	LC
Number of Losing Years	3.211	n.a.		FMS,LC
C. Market Maladaptation (MM) Group (n = 21)				
Change in Sales	-0.055	0.702	4.084***	
Change in Assets	-0.028	0.547	-3.463**	LC
Change in Debt	0.920	0.491	.938	LC
Number of Losing Years	2.619	n.a.		LC
D. Fight for Market Share (FMS) Group (n = 10)				
Change in Sales	1.185	0.542	1.627	
Change in Assets	1.683	0.901	1.491	
Change in Debt	2.217	0.960	1.702	
Number of Losing Years	1.600	n.a.		MD
E. Loss of Control (LC) Group (n = 23)				
Change in Sales	2.921	1.042	1.189	
Change in Assets	1.941	0.977	1.528	MM
Change in Debt	3.933	1.269	2.531*	MD,MM
Number of Losing Years	1.565	n.a.		MD,MM

Notes: sig. = *** $p < .001$, ** $< .01$, * $< .05$

7b. We also considered the possibility that declines in income might become more important as the firm approached bankruptcy. Therefore, we ran similar tests for shorter periods prior to bankruptcy and found a change in results for the final two years. During the last two years, changes in assets and changes in income were both significant predictors of the change in debt for the pooled sample, for firms in growing industries, and for firms with declining sales. However, in every case, the change in assets was more heavily weighted than change in income.

Patterns of Business Decline

Differences in decline rate, measured as the number of losing years, were tested between subsets. Only the rates of decline across the firm growth partitions were statistically significant using either single or combined path rates. The rates of decline shown in Table 4 are based on the change from the beginning to the end of the five-year period prior to bankruptcy. The evidence supported Hypotheses 8

Table 5. Regression Results: Change in Debt Regressed on Changes in Income and Assets

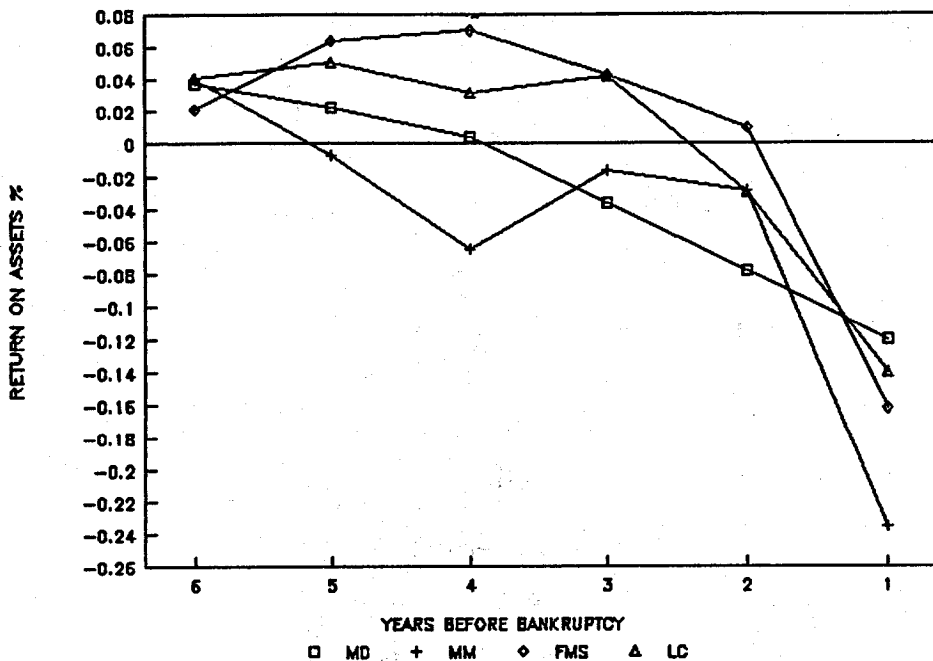
A. Pooled Sample (n = 73)				
	Five-Year Model		Two-Year Model	
	beta	t	beta	t
Change In:				
Assets	.83	10.67***	.90	21.24***
Income	-.02	-.25 n.s.	-.29	-6.73***
R ²		.67		.87
F		71.12		241.58
B. Partitioned on Industry Growth/Decline—Two-Year Model				
	Growing (n = 44)		Declining (n = 29)	
	beta	t	beta	t
Change In:				
Assets	.92	20.02***	.85	7.97***
Net Income	-.32	-6.88***	-.04	-.35 n.s.
R ²		.91		.71
F		217.53		32.02
Chow test difference not significant.				
C. Partitioned on Firm Sales Growth/Decline—Two-Year Model				
	Growing (n = 33)		Declining (n = 40)	
	beta	t	beta	t
Change In:				
Assets	.96	15.75***	.74	11.69***
Net Income	-.01	-.22 n.s.	-.61	-9.66***
R ²		.89		.85
F		124.86		106.49
Chow test difference significance $p < .05$				
Note: *** $p < .001$, * $p < .05$, n.s., $p > .05$				

and 9, but only for the firm effect of Hypothesis 9 was the support statistically significant. The patterns of decline on a year-to-year basis exhibited even greater diversity, as shown in the graph in Figure 3.

Discussion

More Firms Failed in Growing than Declining Industries

Although firms failed under all possible combinations of firm and industry growth or decline, this study found that more failed in growing than declining industries. On every measure, firm effects on failure patterns were stronger than industry effects, which is consistent with other data (Rumelt, 1991). The dominance of firm effects over industry effects is further supported by the observation that firm failure or bankruptcy is a relatively rare event, especially for large firms.



Notes: MD = Market Deterioration Pathway, MM = Market Maladaptation Pathway, FMS = Fight for Market Share Pathway, LC = Loss of Control Pathway

Figure 3. Return on Assets of Failing Firms by Path

Bradley & Rosenzweig (1992) report that for the period 1980-1986 the bankruptcy rate for firms listed on the NYSE and AMEX ranged from 0.46 percent to 1.01 percent. Also, it should be noted that the maximum five-year decline in aggregate industry sales for the firms in this study was less than 16 percent, and none of the industries was in danger of total extinction. Of course, industry growth is not the only measure of environmental effects. For example, increased import competition may adversely affect the environment in both growing and declining industries, but it would be expected to be most damaging if overall demand was declining.

Comparison of Failing Firms with Matching Firms

Overall, the failing firms in our study increased their sales, assets, and debt more rapidly than matching firms, but only the differences in the increases in debt were statistically significant. However, when the pathway subgroups of failing firms were compared with the matching subgroups, the differences were much greater. Subgroups of failing firms differed from each other in a number of ways, as shown in Table 4, but there were no significant differences between subgroups of matching firms. An interesting indication of the erratic behavior of failing firms

was that on almost every strategic variable examined, failing firms had wider ranges and higher variances than matching firms. As noted in the Methods section above, the firms in both groups were substantially smaller and less diversified than the population from which they were drawn. Given that both size and diversification are thought to reduce bankruptcy risk (Sheppard, 1993), it may be that both groups suffered relatively high bankruptcy risk, a possibility reinforced by the bankruptcy of several of the matching firms subsequent to the study. If that is true, the differences we observed in strategy, particularly in debt funding, should carry even greater weight than the statistical results suggest.

Evidence of Distinctive Failure Pathways

The results provide strong evidence that firms fail under the conditions described in all four of the failure pathways we proposed. In the following sections we describe the general characteristics of each pathway based on the evidence discovered here, and draw some conclusions about their failure patterns.

Market Deterioration Pathway. These firms, by definition, had *declining sales in declining industries*, yet on both absolute and inflation-adjusted bases they increased their assets and debt in the five-year period prior to bankruptcy. Firms in this pathway, and their matching counterparts, were larger than those in any other pathway. The firms in this group declined more slowly and more steadily than those in any other group. Mean return on assets declined monotonically and was negative, on average, for 3.21 years of the five years before bankruptcy. Of all the failure pathways, the Market Deterioration pathway most clearly exemplifies the withering-away notion of decline and the "downward spirals" or Hambrick & D'Aveni (1988). Many of these firms were in industries, such as steel and textiles, that were declining either as a result of declining demand or heavy import competition.

Market Maladaptation Pathway. These firms, by definition, had *declining sales in growing industries*, yet on both absolute and inflation-adjusted bases their debt grew substantially over the five years preceding bankruptcy, even as their assets declined. During the same period, the matching firms experienced both sales and asset growth, but unexpectedly they grew less rapidly than the matching firms for the *Market Deterioration* pathway in which the industries were declining. Both failing and nonfailing firms in this category were smaller than those in any other category. Although the firms were not new, the patterns for both failing and nonfailing firms are consistent with a shakeout scenario.

The failing firms in this pathway performed quite erratically, and the variances on most variables were large, producing some conflicting results. Large losses by a few firms resulted in an average negative net income in five of the six years before bankruptcy, but the average number of years firms had negative net income was only 2.62. The decline in return on assets in the final year was the greatest one-year decline of any pathway in any year. These firms typically were slow to adapt to changing markets. For example, AM International, an office and printing equipment company, continued to depend on outmoded electro-mechanical technology long after competitors switched to new electronic and xerographic technologies.

Fight for Market Share Pathway. These firms, by definition, had *growing sales in declining industries*, but their assets and debt grew much more rapidly than their sales. Sales, asset, and debt growth rates exceeded those of the matching firms, but the matching firms were able to keep their growth on these three variables in better balance. These firms improved their returns for two years before beginning their sharp descent into bankruptcy. The pattern observed is consistent with a scenario in which firms aggressively built market share in a hostile environment, but eventually succumbed to either increased competition or further decreases in demand. Moreover, the results observed are consistent with the observations of Harrigan (1982) and Fruhan (1972) on profitless fights for market share. Half the firms in this group were in metal refining and fabrication industries.

Loss of Control Pathway. These firms, by definition, had *growing sales in growing industries*. Sales, asset, and debt growth were the highest of any group, and the declines, measured by years of negative returns, the most rapid. Matching nonfailing firms in this group also grew by every measure, but at half or less than half the rates of failing firms. The limits of firm growth have long been observed and broadly discussed. Williamson (1985) describes two factors that adversely affect large firm performance: reduced managerial incentives and increased transaction costs. Similarly, Penrose (1980) suggests growth is limited by managerial capacity. The finance literature (Higgins, 1977) stresses the problems of cash flow limitations. While these sources focus on limits to growth, others have addressed more directly the case of sudden declines. Argenti (1976) and Platt (1985) have provided case studies of corporate collapses. Fraudulent pyramid schemes, which include at least one firm in this study, represent an extreme form of corporate collapse. More generally, the finance literature (Brealey & Myers, 1988) place strong emphasis on leverage and bankruptcy risk. From a managerial perspective, this pathway exemplifies the "success breeds failure" scenario of Starbuck & Hedberg (1977) or the "Icarus scenario" of Miller (1990).

Although this pathway was called Loss of Control, many of the failures were the result of unfortunate firm-specific events or decisions. Three of these firms filed for bankruptcy to protect themselves from product liability claims—Manville and UNR for asbestos claims, and A.H. Robins for the contraceptive Dalkon Shield. Smith International's bankruptcy was the result of a patent infringement case. Wickes' bankruptcy followed a poorly structured, over-priced acquisition of Gamble-Skogmo. Saxon Industries' failure largely resulted from a criminal looting of the firm by the chief executive officer.

Implications of the Study for Theory

Importance of Firm Effects. The relative importance of industry and firm effects on performance has been a major research topic in both strategy and economics. The industrial organization literature (Scherer, 1980) has stressed industry differences, while the management literature has stressed firm effects. Rumelt concludes on the basis of a large sample study that "the most important sources of economic rent are business specific; industry membership is a much

less important source and corporate parentage is quite unimportant" (1991, p. 167). Our results are consistent with Rumelt's conclusions.

From this evidence, it would appear that managerial choice factors are more important than environmental factors in business failure, but that conclusion may need qualification. Environments within a given industry are not homogeneous, and firms are subject to random events over which management may have little control. As Bourgeois points out, there is "an interactive tension between the inertia of environmental and internal forces and the kinetics of strategic choice" (1984, p. 593). Nowhere is this clearer than in firm decisions about growth. Managers may choose to increase assets and leverage, but these are long-term decisions whose outcomes may be determined by as yet unknown environmental factors.

Counterpoint to Resource-Based Theory. The results also provide a counterpoint to the usual arguments for the *resource-based theory* of the firm, which emphasize profit generation by the effective utilization of inimitable resources and distinctive competences (Barney, 1986; Mahoney & Pandian, 1992). The failing firms in our study were characterized by a growth in assets in the face of declining profits; on average the firms nearly doubled their assets during the five years preceding bankruptcy, while their return on those assets was dramatically declining. Investment in resources that are not unique, or that do not enhance the distinctive competences of the firm, are unlikely to contribute to profitability. Assuming that most firms in our study were trying to make wise investments, this highlights the primary difficulty with the resource-based view of the firm—how to identify those resources or competences which are indeed critical or unique. The results also reinforce the traditional warnings about the hazards of overcapacity (Porter, 1980).

Significance of Size. The results of the study display a significant size effect. Not only were the failing firms relatively small, but the similarly-sized matching firms were less profitable than the population from which they were drawn; they also have exhibited above-normal bankruptcy rates in the years following the quantitative study. This is consistent with other research (e.g., Moulton & Thomas, 1993) which has found that larger firms are more likely than smaller ones to successfully emerge from bankruptcy.

Implications of the Study for Strategy

Riskiness of Debt-Funded Growth. From a prescriptive standpoint, the most obvious warning concerns the high risk of debt-funded forced-growth strategies, particularly for weak firms or firms under stress. This finding is consistent with both finance and management theory. In finance, the primary concern has been leverage and the funding of growth (Donaldson, 1985; Higgins, 1977), while in management the emphasis has been on the limits of managerial capacity (Penrose, 1980). Although the bankrupt firms were somewhat weaker six years before bankruptcy on most financial indicators than the firms in a matched sample, the failing firms on average undertook greater risks—both strategic growth risks and financial leverage risks—than their more successful counterparts. They also continued to pursue these risky strategies as performance

declined. Near bankruptcy, the failing firms were using debt to cover operating losses while continuing to increase their assets.

Riskiness of Extreme Behaviors. The evidence also seems to support the wisdom of adherence to industry norms. The existence of such norms has been suggested by Huff (1982), who refers to them as "borrowed experiences"; Fiegenbaum and Thomas (1988) as "firm preferences for average returns"; and Spender (1989) as "industry recipes." Failing firms, whether growing or shrinking, consistently exhibited extreme behavior compared to nonfailing matching firms.

There is little in the design of the current study to explain the motivation for the strategies followed. One explanation could be that managers misread environmental signals, either anticipating demand growth that never materialized or ignoring competitors' moves that limited their own growth. After the declines set in, managers were faced with increasingly risky choices. As Sitkin and Pablo (1992) have pointed out, determining how managers will react in the face of risk is quite complex. For firms with growing sales and high asset growth, Kahneman and Tversky's (1979) proposition that decision makers are risk-seeking in the face of imminent losses or Staw's (1981) escalating commitment propositions may have been at work. Further, as D'Aveni and MacMillan (1990) note, it is not uncommon for managers of failing firms to basically deny crises.

The behavior of firms with declining sales and low asset growth may have been deliberately risk-avoiding; however, as Bowen (1987) has noted, it is difficult to distinguish between decision dilemmas and decision errors. As Duhaime and Schwenk (1985) have emphasized, business exit or divestment decisions are particularly complex and ambiguous. These characteristics, combined with the common managerial biases toward growth and reluctance to admit failure, lead to firm persistence in the pursuit of growth in the face of adverse signals. On a more objective basis, Tang (1988) suggests that economic, as well as behavioral, considerations may lead firms to continue investment in unprofitable strategies. For example, either firm- or industry-specific exit barriers may have left some firms with few alternatives to staying in business until bankruptcy became inevitable.

Although the results of this study appear to be useful, especially the dangers of high-growth debt-financed strategies, great care needs to be taken in drawing conclusions from the experiences of failing firms. Bankruptcy is a relatively rare event that may be the result of quite idiosyncratic causes. One also needs to consider the possibility that the failing firms may have represented a truncated subset of losers from a larger set of high-risk firms that followed similar strategies, some of which may have earned abnormally high returns.

In spite of their limitations, we believe that failure studies have much to contribute to strategy research. Understanding failure is in itself important, but its greatest value lies in the contributions it can make to helping firms avoid failure and execute successful turnaround. As Williamson says in his discussion of company towns: "the study of extreme instances often helps to illuminate the essentials of a situation" (1985, p. 35). We suggest another analogy: studies of business failures may make the same kinds of contributions to business research that studies of human pathology make to medical research.

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Notes

1. The Bankruptcy Reform Act of 1978 repealed the old act and replaced it with a new Bankruptcy Code effective November 1, 1979; see King (1991) for a comprehensive digest of the new Bankruptcy Code and the changes from the prior Act.
2. The proportion of diversified firms in bankruptcy was much lower than the proportion of diversified firms in the Compustat database. This may support the common assumption that diversification reduces bankruptcy risk, but it might also be a size effect, since the bankrupt firms, on average, were significantly smaller than other firms. See Note 5.
3. The first author can provide copies of the eight case studies: AM International Inc., Braniff International Corp., Continental Airlines Inc., Crompton Co. Inc., Lionel Corp., Revere Copper and Brass Inc., Salant Corp., and Wheeling-Pittsburgh Steel.
4. Several of the matching firms did subsequently go bankrupt. Since our focus was on the time period immediately preceding bankruptcy of the members of the primary sample, the bias introduced in this way was considered less serious than their *ex post* deletion. Given the null propositions of no differences between the samples, the presence of these firms made acceptance of the null propositions more likely, the preferred error if one is to be made.
5. In several comparisons, the average assets of the firms on the Compustat tapes (1980 to 1985) from which the matching firms were drawn ranged from \$1.5 to \$2.2 billion compared to \$380 million for the bankrupt firms and \$354 million for the matching firms. In split-half samples, the larger firms had consistently higher returns on assets and equity than the smaller firms.
6. The populations of the firms in each of the four categories were not known, but in the 1980-1986 low-growth economy it seems reasonable to assume that the number of growing industries and firms approximately balanced the number of declining industries and firms.

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