

Wiley Finance Series

Corporate Financial Distress, Restructuring, and Bankruptcy

FOURTH EDITION

*Analyze Leveraged Finance,
Distressed Debt, and Bankruptcy*

EDWARD I. ALTMAN
EDITH HOTCHKISS
WEI WANG

Corporate Financial Distress, Restructuring, and Bankruptcy

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Corporate Financial Distress, Restructuring, and Bankruptcy

*Analyze Leveraged Finance,
Distressed Debt, and Bankruptcy*

Fourth Edition

**EDWARD I. ALTMAN
EDITH HOTCHKISS
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WILEY

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Ed Altman dedicates this book to his wife and partner for over 50 years, Dr. Elaine Altman, whose support and advice have sustained him and helped in crafting these four editions over 35 years.

Edie Hotchkiss dedicates this book to her husband Steven and daughter Jenny for their constant support.

Wei Wang dedicates this book to his wife Ella and children Andrea, Mia, Julia, and Ethan for their endless love and inspiration.

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Professor Altman was inducted into the Fixed Income Analysts Society Hall of Fame in 2001 and elected President of the Financial Management Association (2003) and a Fellow of the FMA in 2004, and was among the inaugural inductees into the Turnaround Management Association's Hall of Fame in 2008.

In 2005, Dr. Altman was named one of the "100 Most Influential People in Finance" by *Treasury & Risk Management* magazine and is frequently quoted in the popular press and on network TV.

Dr. Altman has been an advisor to many financial institutions including Merrill Lynch, Salomon Brothers, Citigroup, Concordia Advisors, Investcorp, Paulson & Co., S&P Global Market Intelligence and the RiskMetrics Group (MSCI, Inc.). He is currently (2018) Advisor to Golub Capital, Classis Capital (Italy), Wiserefunding in London, Clearing Bid, Inc., S-Cube Capital (Singapore), ESG Portfolio Management (Frankfurt) and AlphaFixe (Montreal). He serves on the Board of Franklin Mutual Series and Alternative Investments Funds. He is also Chairman of the Academic Advisory Council of the Turnaround Management Association. Dr. Altman was a Founding Trustee of the Museum of American Finance and was Chairman of the Board of the International Schools Orchestras of New York.

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Preface

In looking back over the first three editions of *Corporate Financial Distress and Bankruptcy* (1983, 1993, 2006), we note that with each publication, the incidence and importance of corporate bankruptcy in the United States had risen to ever more prominence. The number of professionals dealing with the uniqueness of corporate death in this country was increasing so much that it could have perhaps been called a “bankruptcy industry.” There is absolutely no question in 2019 that we can now call it an industry. The field has become even more significant in the past 15 years, accompanied by an increase of academics specializing in the area of corporate financial distress. Indeed, there is nothing more important in attracting rigorous and thoughtful research than data! With this increased theoretical and especially empirical interest, Wei Wang, has joined the original author (Altman) of the first three editions and Edith Hotchkiss (from the third edition) to produce this volume.

It is now quite obvious that the bankruptcy business is big-business. While no one has done an extensive analysis of the number of people who deal with corporate distress on a regular basis, we would venture a guess that it is at least 45,000 globally, with the vast majority in the United States but a growing number abroad. We include turnaround managers (mostly consultants); bankruptcy and restructuring lawyers; bankruptcy judges and other court personnel; accountants, bankers, and other financial advisers who specialize in working with distressed debtors; distressed debt investors, sometimes referred to as “vultures”; and, of course, researchers. Indeed, the prestigious Turnaround Management Association (www.tumaround.org) total members numbered more than 9,000 in 2018.

The reason for the large number of professionals working with organizations in various stages of financial distress is the increasing number of large and complex bankruptcy cases. Despite the fact that the United States has been in a benign credit cycle since 2010, during the six-year period of 2012–2018, 130 companies with liabilities greater than \$1 billion filed for protection under Chapter 11 of the Bankruptcy Code. Over the past 47 years (1971–2018), there have been at least 450 of these large, mega-bankruptcies in the United States. Just before finishing our first draft of this book, one of the nation’s largest retailers, Sears, Roebuck and Company, filed for Chapter 11 with over \$11 billion of liabilities! And the number of mega-bankruptcies, as well as the total of all filings, will spike dramatically when the next financial crisis hits, especially due to the enormous build-up of corporate debt in recent years.

This book is a completely updated volume that includes updated key statistics and surveys the most recent academic studies. Newly added chapters include those on leveraged finance, out-of-court restructurings, and international insolvency codes, as well as a review of the Altman Z-Score family of models and their applications to celebrate the 50th birthday of the original Z-Score model. The 16 chapters in this new edition cover the most important aspects of leveraged finance, high-yield markets, corporate restructuring, bankruptcy, and credit risk modeling.

Starting with Chapter 1, we define corporate distress and present the statistical background for corporate defaults and bankruptcies over the past few decades. The chapter also discusses the common reasons for corporate failures and presents the organization theory that guides practice. In addition, the chapter introduces the key industry players in distressed restructuring and investing.

The leveraged finance market experienced an unprecedented boom in the past two decades, the total issuance of leveraged loans and high yield bonds reaching close to \$1 trillion in 2017. The markets have been quite creative at producing new financial instruments (e.g. second-lien, covenant-lite) as the markets have grown. These instruments are attractive to not only traditional commercial lenders but also alternative investors due to their high yield and high fee structure. Chapter 2 provides an overview of the two major categories of debt instruments in this space and discusses typical features of these instruments, lender protections, default and remedies, as well as debt subordination issues. This material is particularly necessary to understanding the priority of debt claims and their relative bargaining position in distressed restructuring.

Chapter 3 provides an overview of the U.S. bankruptcy system. We begin by briefly illustrating the evolution of the U.S. bankruptcy law since the equity receiverships of 1898. We provide a primer on Chapter 11 by introducing the key provisions of the U.S. Bankruptcy Code after the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA). Our summary and interpretation of important sections of the Code is written to be accessible to students and practitioners in finance as well as a legal audience. We review the many relevant academic studies, and also provide examples from recent cases to help readers gain an in-depth understanding of the bankruptcy process. The conclusion to this chapter summarizes the ABI Commission Report of 2014 advocating revisions to the existing code.

Firms suffer large costs of financial distress, and bankruptcy restructuring can be even costlier. These costs include not only direct costs such as out-of-pocket expenses for lawyers and finance professionals, but also a wide range of opportunity costs known as indirect costs. Firms generally have strong incentives to avoid these costs by conducting private negotiations and restructuring out-of-court. When and how can firms successfully restructuring out of court? Why do others restructure in court? Chapter 4 attempts to answer these questions.

Chapter 5 explores the analytics and process for distressed firm valuation. We provide a careful discussion of valuation models, and consider why we observe

wide disagreements over firm value between different stakeholders in the negotiation process. We describe in depth best practices in valuation methods, using the example of Cumulus Media which filed for Chapter 11 in November 2017.

Virtually every aspect of a firm's governance can change in some way when a firm becomes financially distressed. Management turnover increases, board size declines, and boards often change in their entirety at reorganization. A substantial number of restructurings lead to a change in control of the company. Chapter 6 discusses key corporate governance issues for distressed firms, including fiduciary duties of managers and boards, complexities in providing compensation, and the value of creditor control rights. We wrap up the chapter by discussing managerial labor markets and labor issues.

In Chapter 7, we explore the success of the bankruptcy reorganization process, especially with respect to the postbankruptcy performance of firms emerging from Chapter 11. In numerous instances, emerging firms suffer from continued operating and financial problems, sometimes resulting in a second filing, unofficially called a Chapter 22. Indeed, we are aware of at least 290 of these two-time filers over the period 1984-2017 (see Chapter 1), and 18 three-time filers (Chapter 33s). There are even three Chapter 44s and at least one Chapter 55! Despite the numbers of bankruptcy repeaters, there are also some spectacular success stories upon emergence from bankruptcy, at least from the perspective of equity holders in the reorganized company.

Chapter 8 provides a brief summary on international insolvency regimes, paying particular attention to countries including France, Germany, Japan, Sweden, UK, China, and India. We focus on these representative countries because of the distinct nature in their legal procedures, significant growth in their restructuring industry in recent years, and the availability of related empirical academic research. Our brief discussions for these countries highlight the most important features of their legal systems for restructuring as well as ongoing issues and reforms.

The second part of the book provides comprehensive coverage of high yield bond markets, default prediction models and their applications, and distressed investing. We explore in depth the estimation of default probabilities for issuers in the United States (Chapter 10) and for sovereign issuers (Chapter 13) and the loss given default or recovery rates (Chapter 16). Chapters 11 and 12 demonstrate applications of these models for many different scenarios, including credit risk management, distressed debt investing, turnaround management and other advisory capacities, and legal issues. Chapters 14 and 15 go on to examine the size and development of the distressed and defaulted debt market.

Chapter 9 explores risk-return aspects of the U.S. high-yield bond and bank loan markets, most important to highly levered and distressed firms. Since high-yield or "junk" bonds are the raw material for future possible distress situations, it is important to investigate their properties. Among the most relevant statistics to investors in this market are default rates, as well as recovery rates for firms that default. The U.S. high-yield corporate bond market reached more than

\$1.6 trillion outstanding in 2017, a 60% increase since the year of publication of the previous edition of this book. Globally, the high-yield bond market reached approximately \$2.5 trillion.

It has been 50 years since the seminal work by Professor Altman developing the first family of default prediction models. With advancements in financial research such as the Black-Scholes-Merton framework, we have gained substantially greater understanding of methods for predicting and pricing default risk. Yet the Altman Z-score remains one of the most popular models in this domain, due to not only its high predictive power but also its simplicity. In Chapter 10, Professor Altman provides a 50-year retrospective on the evaluation and applications of the Z-score family of models and other credit risk models. The three chapters that follow present applications of the Z-score models. Chapter 11 focuses on applications performed by analysts who are external to the distressed firm in order to improve their position or to exploit profitable opportunities presented by distressed firms and their securities. With respect to the turnaround management arena, Chapter 12 further explores the possibility of using distressed firm predictive models to assist in the management of the distressed firm itself in order to manage a return to financial health. We illustrate this via an actual case study - the GTI Corporation -and its rise from near extinction. Finally, in Chapter 13, we apply our updated distress prediction model, called Z-Metrics, in a bottom-up analysis of the default assessment of sovereign debt.

The distressed and defaulted debt market has grown tremendously over the past two decades. As of 2017, the publically traded and private issued market was about \$747 billion (face value) and \$414 billion (market value). This substantial market is poised to grow considerably when the next credit crisis hits. Debt market investors, particularly hedge funds, recognize distressed debt as an important and unique asset class. In Chapters 14 and 15, we explore the size, growth, risk-reward dimensions, and investment strategies in distressed debt. Last, in Chapter 16, we provide a comprehensive survey of studies devoted to modeling and estimating debt recovery rates.

As the restructuring industry and the high yield and distressed markets continue to evolve, we hope readers will find this book a valuable reference to understanding the state of the market and prepare for the next downturn. We hope that the framework, methodologies, research findings, and statistics we present will be useful to *practitioners* who seek a deep understanding of the practice and the state-of-the-art academic research, *academic researchers* who continue to explore and create knowledge to guide restructuring practices, *policy makers* who pay close attention to the design of bankruptcy law and market regulation, and *students* who aspire to learn about exciting opportunities in the world of distress!

Edward I. Altman
Edith Hotchkiss
Wei Wang

Corporate Financial Distress, Restructuring, and Bankruptcy

PART

One

The Economic and Legal Framework of Corporate Restructuring and Bankruptcy

Corporate Financial Distress

Introduction and Statistical Background

Corporate financial distress, and the legal processes of corporate bankruptcy reorganization (Chapter 11 of the Bankruptcy Code) and liquidation (Chapter 7 of the Bankruptcy Code), has become a familiar economic reality to many U.S. corporations. The business failure phenomenon received some exposure during the 1970s, more during the recession years of 1980–1982 and 1989–1991, heightened attention during the explosion of defaults and large firm bankruptcies in the 2001–2003 post-dotcom period, and unprecedented interest in the 2008–2009 financial and economic crisis period. Between 1989 and 1991, 34 corporations with liabilities greater than \$1 billion filed for protection under Chapter 11 of the Bankruptcy Code; in the three-year period from 2001 to 2003, 102 of these “billion-dollar-babies” with liabilities totaling \$580 billion filed for bankruptcy protection; and from 2008 to 2009, 74 such companies filed for bankruptcy with an unprecedented amount of liabilities totaling over \$1.2 trillion.

The line-up of major corporate bankruptcies was capped by the mammoth filings of Lehman Brothers (\$613 billion in liabilities), General Motors (\$173 billion in liabilities), CIT Group (\$65 billion in liabilities), and Chrysler (\$55 billion in liabilities) during the 2008–2009 financial crisis. In fact, the total amount of liabilities of these four mega cases accounted for 75% of the liabilities of all billion-dollar firms filing for bankruptcy from 2008 to 2009. Three other mega cases from the 2001–2003 period also make the list of the top 10 largest filings, including Conoco (\$56.6 billion in liabilities), WorldCom (\$46.0 billion) and Enron (\$31.2 billion—or, almost double this amount if one adds in Enron’s enormous off-balance liabilities, making it the fourth “largest” bankruptcy in the United States). We note that it is most relevant to discuss the size of bankruptcies in terms of liabilities at filing rather than assets. For example, WorldCom had approximately \$104 billion in book value of assets, but its market value at the

time of filing was probably less than one fifth of that number. General Motors had \$91 billion in book value of assets, but liabilities amounting to \$172 billion. It is the claims against the bankruptcy estate, as well as the going-concern value of the assets, that are most relevant in a bankrupt company. Firm size is no longer a proxy for corporate health and safety. Figure 1.1 shows the number of Chapter 11

Year	Number of Filings	Prepetition Liabilities (\$ millions)	Number of Filings ≥ \$1B	≥\$1B/Total Filings (%)
1989	23	34,516	10	43
1990	35	41,115	10	29
1991	53	82,424	12	23
1992	38	64,677	14	37
1993	37	17,701	5	14
1994	24	8,396	1	4
1995	32	27,153	7	22
1996	33	11,949	1	3
1997	36	18,866	5	14
1998	55	31,913	6	11
1999	107	70,516	19	18
2000	137	99,091	23	17
2001	170	229,861	39	23
2002	136	338,176	41	30
2003	102	115,172	26	25
2004	45	40,100	11	24
2005	36	142,950	11	31
2006	34	22,775	4	12
2007	38	72,338	8	21
2008	146	724,222	24	16
2009	233	603,120	49	21
2010	114	56,835	14	12
2011	84	109,119	7	8
2012	69	71,613	14	20
2013	66	39,480	11	17
2014	59	91,992	14	24
2015	70	79,841	19	27
2016	98	125,305	37	38
2017	91	121,079	24	26
Mean No. of Filings, 1989–2017			16	21
Median No. of Filings, 1989–2017			12	21
Median No. of Filings, 1998–2017			17	
Mean Liabilities, 1989–2017		\$120,424		
Median Liabilities, 1989–2017		\$71,613		

FIGURE 1.1 Chapter 11 Filing Statistics (1989–2017)

Source: Altman and Kuehne (2018b) and Salomon Center.

filings and prepetition liabilities of firms with at least \$100 million in liabilities from 1989 to 2017 (the mega cases). Figure 1.2 lists the top 40 largest bankruptcy filings of all time by the total amount of liabilities. Figure 1.3 lists the top 40 largest bankruptcy filings of all time by Consumer Price Index adjusted total amount of liabilities (in constant 2017 dollars).

Company	Liabilities	Filing Date
Lehman Brothers Holdings, Inc.	613,000	9/15/2008
General Motors Corp.	172,810	6/1/2009
CIT Group, Inc.	64,901	11/1/2009
Conseco, Inc.	56,639	12/2/2002
Chrysler, LLC	55,200	4/30/2009
Energy Future Holdings Corp.	49,701	4/29/2014
WorldCom, Inc.	45,984	7/21/2002
MF Global Holdings Ltd.	39,684	10/31/2011
Refco, Inc.	33,300	10/5/2005
Enron Corp.	31,237	12/2/2001
AMR Corp.	29,552	11/29/2011
Delta Air Lines, Inc.	28,546	9/5/2005
General Growth Properties, Inc.	27,294	4/22/2009
Pacific Gas & Electric Co.	25,717	4/6/2001
Thornburg Mortgage, Inc.	24,700	5/1/2009
Charter Communications, Inc.	24,186	3/27/2009
Calpine Corp.	23,358	12/5/2005
New Century Financial Corp.	23,000	4/2/2007
UAL Corp.	22,164	12/2/2002
Texaco, Inc.	21,603	4/1/1987
Capmark Financial Group, Inc.	21,000	10/25/2009
Delphi Corp.	20,903	10/5/2005
Conseco Finance Corp.	20,279	12/2/2002
Caesars Entertainment Operating Co., Inc.	19,869	1/15/2015
Olympia & York Realty Corp.	19,800	5/15/1992
Lyondell Chemical Co.	19,337	1/6/2009
American Home Mortgage Investment Corp.	19,330	8/6/2007
Adelphia Communications Corp.	18,605	6/1/2002
Northwest Airlines Corp.	17,915	9/5/2005
Mirant Corp.	16,460	7/14/2003
SunEdison, Inc.	16,141	4/21/2016
Residential Capital, LLC	15,276	5/14/2012
Walter Investment Management Corp.	15,216	11/30/2017
Global Crossing, Ltd.	14,639	1/28/2002
Executive Life Insurance Co.	14,577	4/1/1991
NTL, Inc.	14,134	5/2/2002
Mutual Benefit Life Insurance Co.	13,500	7/1/1991
Tribune Co.	12,973	12/8/2008
Reliance Group Holdings, Inc.	12,877	6/12/2001
R.H. Donnelley Corp.	12,374	5/28/2009

FIGURE 1.2 List of 40 Largest Bankruptcy Filings of All Time

Company	Liabilities in 2017 \$	Filing Date
Lehman Brothers Holdings, Inc.	697,846	9/15/2008
General Motors Corp.	197,426	6/1/2009
Conseco, Inc.	77,167	12/2/2002
CIT Group, Inc.	74,146	11/1/2009
Chrysler, LLC	63,063	4/30/2009
WorldCom, Inc.	62,650	7/21/2002
Energy Future Holdings Corp.	51,456	4/29/2014
Texaco, Inc. (incl. subsidiaries)	46,610	4/1/1987
MF Global Holdings Ltd.	43,241	10/31/2011
Enron Corp.	43,231	12/2/2001
Refco, Inc.	41,791	10/5/2005
Delta Air Lines, Inc.	35,825	9/5/2005
Pacific Gas & Electric Co.	35,591	4/6/2001
Olympia & York Realty Corp.	34,590	5/15/1992
AMR Corp.	32,201	11/29/2011
General Growth Properties, Inc.	31,182	4/22/2009
UAL Corp.	30,197	12/2/2002
Calpine Corp.	29,314	12/5/2005
Thornburg Mortgage, Inc.	28,218	5/1/2009
Charter Communications, Inc.	27,631	3/27/2009
Conseco Finance Corp.	27,628	12/2/2002
New Century Financial Corp.	27,189	4/2/2007
Delphi Corp.	26,233	10/5/2005
Executive Life Insurance Co.	26,232	4/1/1991
Adelphia Communications Corp.	25,348	6/1/2002
Mutual Benefit Life Insurance Co.	24,294	7/1/1991
Capmark Financial Group, Inc.	23,991	10/25/2009
American Home Mortgage Investment Corp.	22,851	8/6/2007
Northwest Airlines Corp.	22,483	9/5/2005
Baldwin United Corp.	22,148	9/1/1983
Lyondell Chemical Co.	22,091	1/6/2009
Mirant Corp.	21,926	7/14/2003
Penn Central Transportation	20,846	6/1/1970
Caesars Entertainment Operating Co., Inc.	20,546	1/15/2015
Global Crossing, Ltd.	19,945	1/28/2002
Southeast Banking Corp.	19,574	9/20/1991
NTL, Inc.	19,256	5/2/2002
Campeau Corp. (Allied & Federated)	18,653	1/1/1990
Reliance Group Holdings, Inc.	17,822	6/12/2001
First City Banc. of Texas	16,830	10/31/1992

FIGURE 1.3 List of 40 Largest Bankruptcy Filings of All Time in 2017 Dollars

A variety of terms are used in practice to depict the condition and formal process confronting the distressed firm and characterize the economic problem involved. Four generic terms commonly found in the literature are *failure*, *insolvency*, *default*, and *bankruptcy*. Although these terms are sometimes used interchangeably, they are distinctly different in their meanings and formal usage.

Failure, in an economic sense, means that the realized rate of return on invested capital, with allowances for risk consideration, is significantly lower than prevailing rates on similar investments. Somewhat different economic criteria have also been used, including insufficient revenues to cover costs, or an average return on investment that is continually below the firm's cost of capital. These definitions make no statement about whether to discontinue operations. The term *business failure* was adopted by *Dun & Bradstreet* (D&B), which for many years provided statistics on various business conditions, including exits. D&B defined business failures to include "businesses that cease operation following assignment or bankruptcy; those that cease with loss to creditors after such actions or execution, foreclosure, or attachment; those that voluntarily withdraw, leaving unpaid obligations, or those that have been involved in court actions such as receivership, bankruptcy reorganization, or arrangement; and those that voluntarily compromise with creditors."

Insolvency is another term depicting negative firm performance and is generally used in a more technical fashion. Technical insolvency exists when a firm is unable to meet its debts as they come due. This may, however, be a symptom of a cash flow or liquidity shortfall, which may be viewed as a temporary, rather than a chronic, condition. Balance sheet insolvency is especially critical and refers to when total liabilities exceed a fair valuation of total assets. The real net worth of the firm is, therefore, negative. This condition has implications for how and whether the firm will restructure, and requires a comprehensive analysis of both a going concern and liquidation value. In some countries (but not the United States), a determination of insolvency may be needed for a court to commence formal bankruptcy proceedings.

Default refers to a borrower violating an agreement with a creditor, as specified in the contract with the lender. Technical defaults take place when the firm violates a provision other than a scheduled payment, for example, by violating a covenant such as maintaining a specified minimum current ratio or maximum debt ratio. Violating a loan covenant frequently leads to renegotiation rather than immediate demand for repayment of the loan, and typically signals deteriorating firm performance. When a firm misses a required interest or principal payment, a more formal default occurs. If the problem is not "cured" within a grace period, usually 30 days, the security is declared "in default." After this period, the creditor can exercise its contractually available remedies, such as declaring the full amount of the debt immediately due. Often, an impending payment default triggers a restructuring of debt payments or a formal bankruptcy filing.

Defaults on publicly held indebtedness peaked in the two most recent recession periods, 2001–2002 and 2008–2009. Indeed, in 2001 and 2002, over \$160 billion of publicly held corporate bonds defaulted. In 2009, defaults soared to an unbelievable level of over \$120 billion in a single year! Figure 1.4 shows the history of U.S. public bond defaults from 1971 to 2017, including the dollar amounts and the amounts as a percentage of total high-yield bonds

outstanding—the so-called “junk bond default rate.” Default rates climbed to over 10% in only four years in history (1990, 2001, 2002, and 2009).

Finally, a firm is sometimes referred to as *bankrupt* when, as described above, its liabilities exceed the going concern value of its assets. Until a firm declares bankruptcy in a federal bankruptcy court, accompanied by a petition either to liquidate its assets (Chapter 7) or to reorganize (Chapter 11), it is difficult to discern if a firm is bankrupt. In this book, we refer to firms as bankrupt when they enter court supervised proceedings. In Chapter 3 herein, we study in depth the process and evolution of bankruptcy laws for the United States.

REASONS FOR CORPORATE FAILURES

Corporate failures and bankruptcy filings are a result of financial and/or economic distress. A firm in financial distress experiences a shortfall in cash flow needed to meet its debt obligations. Its business model does not necessarily have fundamental problems and its products are often attractive. In contrast, firms in economic distress have unsustainable business models and will not be viable without asset restructuring. In practice, many distressed firms suffer from a combination of the two. Many factors contribute to the high number of corporate failures. We list the most common reasons below.

1. *Poor operating performance and high financial leverage*

A firm's poor operating performance may result from many factors, such as poorly executed acquisitions, international competition (e.g., steel, textiles), overcapacity, new channels of competition within an industry (e.g., retail), commodity price shocks (e.g., energy), and cyclical industries (e.g., airlines). High financial leverage exacerbates the effect of poor operating performance on the likelihood of corporate failure.

2. *Lack of technological innovation*

Technological innovation creates negative shocks to firms that do not innovate. The arrival of a new technology often threatens the survival of firms that possess related, yet less competitive, technologies. For example, when digital recording eventually took over dry-film technologies in the 2000s, firms focusing on the older technologies were driven out of business.

3. *Liquidity and funding shock*

A potential funding risk known as rollover risk received heightened attention from both academics and practitioners after the 2008–2009 financial crisis. In periods of weak credit supply, some firms are unable to roll over maturing debt because of illiquidity in credit markets. This concern was particularly acute following the onset of the 2008–2009 financial crisis.

Year	Par Value Outstanding ^(a)	Par Value Defaults	Default Rates
2017	\$1,622,365	\$29,301	1.806%
2016	\$1,656,176	\$68,066	4.110%
2015	\$1,595,839	\$45,122	2.827%
2014	\$1,496,814	\$31,589	2.110%
2013	\$1,392,212	\$14,539	1.044%
2012	\$1,212,362	\$19,647	1.621%
2011	\$1,354,649	\$17,963	1.326%
2010	\$1,221,569	\$13,809	1.130%
2009	\$1,152,952	\$123,878	10.744%
2008	\$1,091,000	\$50,763	4.653%
2007	\$1,075,400	\$5,473	0.509%
2006	\$993,600	\$7,559	0.761%
2005	\$1,073,000	\$36,209	3.375%
2004	\$933,100	\$11,657	1.249%
2003	\$825,000	\$38,451	4.661%
2002	\$757,000	\$96,858	12.795%
2001	\$649,000	\$63,609	9.801%
2000	\$597,200	\$30,295	5.073%
1999	\$567,400	\$23,532	4.147%
1998	\$465,500	\$7,464	1.603%
1997	\$335,400	\$4,200	1.252%
1996	\$271,000	\$3,336	1.231%
1995	\$240,000	\$4,551	1.896%
1994	\$235,000	\$3,418	1.454%
1993	\$206,907	\$2,287	1.105%
1992	\$163,000	\$5,545	3.402%
1991	\$183,600	\$18,862	10.273%
1990	\$181,000	\$18,354	10.140%
1989	\$189,258	\$8,110	4.285%
1988	\$148,187	\$3,944	2.662%
1987	\$129,557	\$7,486	5.778%
1986	\$90,243	\$3,156	3.497%
1985	\$58,088	\$992	1.708%
1984	\$40,939	\$344	0.840%
1983	\$27,492	\$301	1.095%
1982	\$18,109	\$577	3.186%
1981	\$17,115	\$27	0.158%
1980	\$14,935	\$224	1.500%
1979	\$10,356	\$20	0.193%
1978	\$8,946	\$119	1.330%
1977	\$8,157	\$381	4.671%
1976	\$7,735	\$30	0.388%
1975	\$7,471	\$204	2.731%
1974	\$10,894	\$123	1.129%
1973	\$7,824	\$49	0.626%
1972	\$6,928	\$193	2.786%
1971	\$6,602	\$82	1.242%

FIGURE 1.4 Historical Default Rates—Straight Bonds Only (Excluding Defaulted Issues from Par Value Outstanding), 1971–2017 (\$ Millions)

Source: Salomon Center at New York University Stern School of Business.

			Standard Deviation
Arithmetic Average Default Rate	1971 to 2017	3.104%	3.006%
	1978 to 2017	3.347%	3.191%
	1985 to 2017	3.759%	3.312%
Weighted Average Default Rate ^(b)	1971 to 2017	3.378%	
	1978 to 2017	3.381%	
	1985 to 2017	3.394%	
Median Annual Default Rate	1971 to 2017	1.906%	

^(a) As of mid-year.

^(b) Weighted by par value of amount outstanding for each year.

FIGURE 1.4 (Continued)

4. *Relatively high new business formation rates in certain periods*

New business formation is usually based on optimism about the future. But new businesses fail with far greater frequency than do more seasoned entities, and the failure rate can be expected to increase in the years immediately following a surge in new business activity.

5. *Deregulation of key industries*

Deregulation removes the protective cover of a regulated industry (e.g., airlines, financial services, healthcare, energy) and fosters larger numbers of entering and exiting firms. Competition is far greater in a deregulated environment. For example, after the airline industry was deregulated at the end of the 1970s, airline failures multiplied in the 1980s and have continued since then.

6. *Unexpected liabilities*

Firms may fail because off-balance sheet contingent liabilities suddenly become material on-balance sheet liabilities. For example, a number of U.S. firms failed due to litigation related to asbestos, tobacco, and silicone breast implants. Firms may also inherit uncertain liabilities through acquisitions. Energy firms and mining firms may inherit unanticipated environmental obligations via asset purchases. Financial institutions, such as Washington Mutual, inherited liabilities related to subprime mortgage related litigation in the aftermath of the 2008–2009 financial crisis.

These factors play heavily in the prediction and avoidance of financial distress and bankruptcy. Fifty years after its introduction, the Altman Z-score remains one of the most widely used credit scoring models used by practitioners and academics to indicate the probability of default. Part Two of this book is devoted to default and bankruptcy prediction models, including the Altman Z-score and its derivatives.