INSOL INTERNATIONAL

VALUATION FOR **INSOL**VENCY PRACTITIONERS

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PRESIDENT'S INTRODUCTION

In the complex landscape of insolvency and restructuring, where financial instability is the norm, the role of valuation is critical. It can act as an important foundation stone, whether charting the course through the complex dance of restructuring negotiations or unlocking value from distressed assets.

This book details the pivotal significance of valuation for practitioners worldwide. From the boardrooms of struggling enterprises to the courtrooms of bankruptcy proceedings, it delves into the core of valuation methodologies, theories, and, importantly, how they are applied in practice.

We recognise that valuation in insolvency and restructuring transcends mere number - crunching; it encompasses the nuanced interplay of financial expertise, legal acumen, and strategic vision and is an area which many say is more art than science. The book, therefore, goes beyond the surface, delving into the strategic subtleties, ethical quandaries, and tactical manoeuvres inherent in the use of valuation analysis within distressed environments.

Furthermore, in an era marked by economic unpredictability and a tumultuous global environment, the importance of understanding valuation within insolvency and restructuring contexts has never been more critical. As businesses navigate the fallout of crises, investors seek opportunities amid chaos, and policymakers confront systemic risks, it is clear that the detailed insights contained within these pages should be considered invaluable.

Publications like this don't happen without hard work and real effort and I would like to thank the project leaders for their unwavering dedication, time, and expertise in bringing this project to fruition. INSOL International also extends its gratitude to each contributor for giving their time and generously sharing their knowledge and wisdom in crafting the respective chapters.

I trust that you will find this publication both enlightening and practical and that it will help you navigate the intricacies of our ecosystem.

Alastair Beveridge
President, INSOL International

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FOREWORD

In the complex and ever-evolving landscape of business, the intersection of business valuation and law is a critical juncture where the fate of companies often hangs in the balance. This book, "Valuation for INSOLvency Practitioners," aims to bridge the gap between these two disciplines, providing a comprehensive guide for practitioners who may not have a deep background in finance and valuation.

The impetus for this book arose from the recognition that practitioners play a pivotal role in restructuring and insolvency proceedings. Yet, many find themselves navigating the intricate waters of business valuations with limited in-depth financial expertise. This can lead to challenges in understanding the true value of distressed companies, negotiating fair settlements, and ultimately, achieving successful outcomes for their clients.

To address this need, we have brought together a diverse group of contributors, each an expert in their respective fields. These contributors include seasoned valuation professionals, academics, restructuring advisors, and legal professionals. Their collective insights provide a multifaceted perspective on the valuation issues that arise in the context of restructuring and insolvency.

The chapters in this book cover a wide range of topics, from some fundamental principles of business valuation to the specific methodologies used in distressed scenarios. We delve into the frameworks that govern insolvency proceedings, explore case examples that illustrate real-world applications, and offer practical guidance on how to approach valuation challenges in restructurings with confidence.

Our goal is to equip practitioners with the knowledge and tools they need to effectively engage with valuers, make informed decisions, and advocate for their clients' best interests. Whether you are a seasoned practitioner or new to the field, we hope this book serves as a valuable resource that enhances your understanding of business valuations in the context of restructuring and insolvency.

We extend our deepest gratitude to all the contributors for their invaluable input and dedication to this project, including the staff of INSOL International. Their expertise, commitment and patience have made this book possible. We also thank you as readers for embarking on this journey with us. It is our hope that this book will not only inform but also inspire you to approach your work with renewed insight.

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VALUATION IN INSOLVENCY PRACTICE: CAPITAL SELECTA

COST OF CAPITAL FOR COMPANIES IN DISTRESS

By Carla S. Nunes, CFA, Anas Aboulamer, PhD, and Molly Jennerman

Introduction

The cost of capital is a fundamental concept in finance that plays a crucial role in the decision-making process of firms across different stages of their life cycle. A firm's life cycle represents its various phases of development, from inception to growth, maturity, and eventually decline. Understanding the relationship between the cost of capital and the firm's life cycle is essential for businesses to make informed strategic and operational decisions, such as capital allocation investment options (e.g. capacity expansion, mergers & acquisitions, divestitures, etc.), capital structure financing strategies, and even compensation policies. It also has a direct bearing on the valuation of a firm. Distress can happen in any of these phases, although it will often occur when a company is experiencing a sustained decline in demand for its goods or services, or the industry where it operates is in a declining stage.

Distress affects not only debtholders, but also the holders of other instruments in a firm's capital structure (e.g. preferred stockholders, common shareholders, etc.), as well as a broader group of stakeholders (e.g. employees, suppliers, customers, etc.). Distress can represent a major cost to the firm and has a considerable impact on its value and future survival. Hence, it is important to consider these costs thoroughly and how they affect not only the cost of debt but also the cost of equity when estimating the value of the firm. In this chapter, an overview of the potential magnitude of distress costs and how they can be measured is provided. Methodologies to determine if a company is getting closer to distress are also discussed. An outline of some of the methodologies used to value firms in distress and how to adjust for their cost of capital is also provided.

The focus of this chapter is on estimating cost of capital and how it would be used in a discounted cash flow (DCF) method. It does not address other valuation approaches or methodologies that can be used to value companies in distress, such as the market approach (guideline public company method and guideline transaction method), as well as methods based on option pricing models (e.g. Black-Scholes contingent claims analysis).

1. Cost of capital and firm's life cycles

1.1 The initial / startup phase

In the early stage of a firm's life, the cost of capital can be relatively high. This is because start-up firms often have a limited operating history, higher business risk, and limited funding options. They may need to rely exclusively on equity financing, which can be expensive due to the high level of uncertainty (and therefore, perceived risk) related to the firm's ability to generate positive cash flows and even its viability as a going-concern. During this phase, firms rely primarily on contributions from founders and perhaps angel or venture capital investors. These investors expect substantial returns to be compensated for the risks incurred.

In theory, one should be incorporating this high level of uncertainty directly into the projected cash flows, since the uncertainty stems primarily from idiosyncratic (company-specific) risks. Asset pricing models created by academic researchers presume that only systematic risk factors (e.g. market, size, growth, momentum, etc.) are to be captured directly in the cost of capital, since those are the risks that investors cannot diversify away. The estimated cost of capital is the expected rate of return that will be used to discount expected cash flows generated by a security into present value terms. However, at this stage of firm development, management may have limited knowledge on how to appropriately account for risk in business plans, and the resulting cash flow projections tend to be highly optimistic. Moreover, these projections (if they exist beyond a single budget year) will often assume a going-concern premise and will ignore the significant failure risk of the business.

Given the upward bias and / or the highly speculative nature of many of these business plans, this would require investors to use techniques such as scenario analysis or Monte Carlo simulations to arrive at an expected set of cash flow projections. In practice, however, investors rarely go through this exercise. Instead, they use the concept of hurdle rates, by requiring much higher

rates of return as the means to select or eliminate investment opportunities, taking into account that failure risk is very significant. These rates, often labelled as venture capital (VC) rates of return, will vary depending on the sub-stage of development within the start-up phase. As the firm approaches a later stage of development, and an initial public offering (IPO) is in the horizon, failure risk diminishes, and the required rates of return also decrease.[1]

On the other hand, debt financing tends to be very limited during the startup phase, as companies lack a track record of financial performance and sufficient assets to secure loans. Consequently, the cost of debt may not play a significant role in financing during this period.

1.2 The growth phase

As a firm begins to grow, it starts generating revenue and potentially positive cash flows, while its business plan becomes more reliable. During this phase, the firm may be experiencing significant revenue growth and prospects for profitability are also improving. There is a greater level of predictability (compared to the startup phase), and access to equity and debt capital becomes more available to the firm.

As the firm demonstrates growth potential and attracts new types of investors, the investors' perceived risk decreases, thereby lowering their required rate of return. Firms in the growth stage may become more open to using debt financing as they build a credit history and generate more consistent cash flows, which may provide access to lower borrowing rates. Debt financing may become a more significant component of the capital structure, although equity financing will continue to be the primary source of funding, since new growth projects still carry a lower probability of success (and thus higher risk) than existing ones.

The transition into mixed financing (instead of equity-only financing) lowers the overall cost of capital (i.e. the weighted average cost of capital, or WACC) by design, since the pre-tax cost of debt will be lower than the cost of equity. In addition, firms may start taking advantage of the interest tax shields generated by having debt in their financing mix, to the extent that accumulated net operating losses (NOLs) do not preclude them from deducting interest expenses for tax purposes (and assuming that interest expense is deductible for tax purposes in the jurisdiction where the company is based).

A firm's efficient management of its cost of capital becomes crucial during the growth stage. The firm undergoes major expansion that needs to be financed. Hence, lowering the overall WACC, without burdening the firm with debt through a balanced capital structure can enhance investment opportunities.

1.3 The mature phase

During the mature phase, firms' cash flows are more stable and growth rates are typically lower. During this period, firms establish their credit worthiness and develop a track record of cash-flow-producing ability. This usually leads to a stable capital structure and a mix of equity and debt that aligns with the firm's long-term financial goals and industry benchmarks. This stability can lead to a more predictable (and therefore lower) cost of capital.

At this stage, firms focus on optimising their capital allocation and prioritising projects that generate consistent cash flows and contribute to shareholder value. Some firms may try to increase their growth rates through the acquisition of new businesses, by using the excess cash generated by their existing businesses, or by tapping into their debt capacity created by their existing asset base and cash flow generating ability. Other firms may decide to distribute the excess cash generated by existing business back to shareholders. Depending on their financial strategy, mature firms may adopt dividend policies to distribute cash to shareholders, which becomes an important component of the investor types that these firms attract.

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[1] Cochrane, John H. "The risk and return of venture capital." *Journal of Financial Economics* 75, no. 1 (2005): 3-52.

In theory, the WACC of a firm is based on its optimal capital structure. The optimal capital structure estimates the mix of debt and equity that maximises the value of the firm and minimises the WACC. In a perfect world, where there are no bankruptcy costs, increasing the weight of debt financing would theoretically decrease the WACC, due to the lower cost of debt (relative to cost of equity) and increased benefit of interest tax shields. In reality, as the debt proportion increases in the capital structure, the probability of default also rises, leading to a higher cost of debt. At relatively low levels of debt financing, the increase in cost of debt may not be significant, but at high levels of debt, the probability of bankruptcy becomes material, and debtholders will demand a significantly higher return in order to lend more funds to the firm.

Getting to the optimal mix of debt and equity is one of the main tasks that the treasury departments of mature firms tend to be focused on (or at least on what management will deem as optimal). While WACC changes are typically modest for mature firms, at times situations of overleverage will be seen, which may lead to distress.

An interesting example was observed in the aftermath of the 2008-2009 global financial crisis in the casino industry. Prior to the crisis, several casino properties decided to increase their financial leverage significantly, or were taken private in leveraged buyout transactions sponsored by private equity (PE) firms. The rationale was that casinos were mature, stable businesses, with a track record of generating steady cash flows through various business cycles. Such businesses, the logic continued, had significant debt capacity and the ability to continue to generate enough income to pay for the heavy interest expense burden, because casino players would continue to gamble in all economic scenarios. The reality set in after the crisis: the U.S. saw its longest recession (from December 2007 to June 2009) since World War II, which was also the deepest one.[2] Casino revenues declined significantly, and several entered into distress territory. Debt restructuring and bankruptcies ensued, not just in the U.S., but elsewhere in the world (e.g. Atlantis, Paradise Island, Bahamas).[3]

The bottom line is that cash flow stability and debt capacity can lead some mature firms to incur high levels of debt that may seem reasonable during benign economic cycles, but turn out to be excessive during recessionary environments. This excessive level of debt often leads to distress.

1.4 The decline or distress phase

When a firm enters a decline phase or faces financial distress, its cost of capital increases significantly. Equity investors and creditors demand a higher return, due to (1) higher risk of loss of their investment if a default occurs; and (2) the increased probability of additional costs related to distress (indirect distress costs) being incurred. In addition, during this phase, firms encounter challenges in attracting external financing due to deteriorating financial performance. The cost of equity capital may become prohibitively high.

Some firms may consider selling non-core assets, or divisions, to generate cash and reduce the debt burden. The cost of capital is a crucial factor in assessing the financial viability of such actions. Others may seek specialised financing options, such as distressed debt investors, or hire the help of restructuring firms, especially if there are valuable intellectual property or other assets that can be monetised with a sale.

The cost of capital and valuation techniques used when dealing with distress can be significantly different than traditional ones.

2. Distressed companies and the cost of capital

Failure, in an economic sense, means that the realised rate of return on invested capital, when adjusted for risk, is significantly lower than prevailing rates on similar investments. Somewhat different economic criteria have also been used, including insufficient revenues to cover costs, or

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2 Rich, Robert, "The Great Recession", Federal Reserve History, November 22, 2013. Available here: https://www.federalreservehistory.org/essays/great-recession-of-200709.

3 See for example, Schwartz, D. G., Christiansen, E. M. (2012). "Financial Stability and Casino Debt." *Gaming Law Review and Economics*, 16(4), 193-205. https://digitalscholarship.unlv.edu/lib_articles/429.

an average return on investment that is continually below the firm's cost of capital.

As the discussion above shows, the cost of capital is at the heart of every firm's decision-making and the bedrock of investment. Financial markets work as capital allocators through raising or lowering the cost of capital and allowing more innovative firms to take over.

The concept of creative destruction was introduced by Joseph Schumpeter in 1942 to show how innovation leads to the demise of old (existing) innovations and structures, by rendering them obsolete and replacing them with new technologies. New technologies replace or disrupt existing products, industries, and economic structures. It is the essence of economic progress and dynamism. Schumpeter argued that economic development and growth are not smooth and incremental, but rather marked by cycles of innovation.[4]

When faced with distress, firms tend to pursue financial restructuring to lower their cost of capital. If the firm has an "expensive" capital structure, it restructures its debt to deleverage to a level that is sustainable in the long-term. If this is not achieved in time, attracting funds will become prohibitively expensive and investors will turn to companies with better prospects.

3. Type of distress

When talking about a firm's distress, it is important to differentiate between two types of distress: financial and operational.

3.1 Financial distress

A firm whose equity and debt values reflect the potential or probability of default or liquidation scenarios is considered to be operating under financial distress. Financial distress is typically a result of a high debt burden coupled with difficulties in accessing capital markets. The equity and debt market values should reflect analysts' views and weighting of the going-concern and default scenarios. Default scenarios could include, for example, the inability to pay current interest expense obligations, or inability to refinance current debt obligations, resulting in the need to sell a portion of operating assets or even liquidate. Rating downgrades, non-investment grade debt, or high market yields on traded debt are all indicators that the market is weighing the potential impact of distress scenarios. A company does not need to be in or near bankruptcy to be considered under financial distress. Financial distress can also lead to operational distress.

3.2 Operational (or economic) distress

Operational distress will typically occur in periods of significant economic downturn. Financial distress can also lead to operational distress. Other non-recurring events may also lead to operational distress, such as the loss of a major lawsuit or a regulatory injunction. While this is not an exhaustive list, the presence of some of the following situations may be indicators of operational distress:

- The company is unable to pay its suppliers on a timely basis, potentially leading to supply shortages or disruptions.
- The refusal by certain suppliers to service the company, again causing supply disruptions.
- Manufacturing facilities operating at a significantly low level of capacity utilisation.
- High employee turnover, leading to operational disruptions; or

[4] See for example, Alm, Richard and W. Michael Cox "Creative Destruction", Econlib CEE – Basic Concepts, Economic Regulation, International Economics, The Marketplace. Available here: https://www.econlib.org/library/Enc/CreativeDestruction.html. Counter to this view, see for example the views of economist Ricardo Caballero on creative destruction. He argues that contrary to conventional wisdom, restructuring typically declines during recessions, adding a significant cost to downturns, as zombie companies are allowed to survive. Caballero, Ricardo J. "Creative destruction." *The New Palgrave Dictionary of Economics*, Second Edition, 2008.

- The loss of key customers due to concerns about supply reliability, both in terms of quality and delivery times.

It is noted that operational distress may be eliminated upon the sale of the firm or some of its underlying businesses.

4. Bankruptcy costs

The costs of financial distress and bankruptcy are usually divided into direct or indirect costs. Direct costs are out-of-pocket expenses for lawyers, accountants, restructuring advisors, turnaround specialists, expert witnesses, and other types of professional services. Indirect costs include a wide range of directly observable opportunity costs. For example, it can include lost sales and profits caused by customers who decide not to buy products (or services) from a firm undergoing bankruptcy or distress, higher debt costs, worse supplier payment terms, loss of key employees, missed investment opportunities due to management's attention on the restructuring process rather than on running the day-to-day business. In addition, if management is forced to conduct a fire sale of some of its businesses or assets, typically they will be sold at a discount.[5]

4.1 Direct costs

Direct costs are defined as out-of-pocket expenses incurred by the firm facing bankruptcy. Even though these costs are supposed to be well defined, there have been issues with correctly measuring them. One of the earliest attempts to measure direct costs involved a sample of eleven bankrupt railroads in the U.S. between 1933 and 1955, and found that the costs represented 4% of the firms' market value one year prior to default.[6] Subsequent studies found that these costs can vary considerably with the time period, the size of the firm, the location of filing, and how the value of the firm is measured.[7] What is clear is that small privately-held firms will incur much higher direct costs than large companies. Some researchers found that the direct cost was 43% of the firm value at filing under Chapter 7, compared to 22% under Chapter 11.[8]

In recent years, the dollar magnitude of professional fees has caught the attention of the public, particularly in many of the multibillion-dollar Chapter 11 cases. For example, fees paid to advisors in the Lehman Brothers case – the largest bankruptcy case in U.S. history – were nearly USD 6 billion, and fees in the Enron case hit USD 1 billion.[9] However, on a relative basis, smaller companies are more likely to struggle to service such costs, given the magnitude of fees as proportion of their asset value.

4.2 Indirect costs

Indirect costs are not directly observable and difficult to identify and measure empirically. Researchers who tried to estimate these costs came up with very diverging estimates. First, it is important to differentiate between the source of firm's poor performance and the causality

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5 This section summarises the analysis found in Chapter 4 of Altman, Edward I., Edith Hotchkiss, and Wei Wang (2019). Corporate Financial Distress, Restructuring, and Bankruptcy: Analyze Leveraged Finance, Distressed Debt, and Bankruptcy." John Wiley & Sons.

6 Warner, Jerold B. "Bankruptcy costs: Some evidence." *The Journal of Finance* 32, no. 2 (1977): 337-347.

7 Weiss (1990) found that the mean (median) of direct costs was 3.1% (2.6%) of the firm's value one year before filing. Bris, Welch, and Zhu (2006) found that the mean (median) of direct costs was 8.1% (2.5%) for Chapter 7 filers and a mean (median) of 16.9% (1.9%) for Chapter 11 filers of prebankruptcy assets. Even the location of the filing affects direct costs. LoPucki and Doherty (2004) found that the mean of direct costs of 48 bankruptcies filed in Delaware and the Southern District of New York was 1.4% of prebankruptcy assets. While using another sample of 74 filings in different courts, the same authors found that the mean of direct costs was 1.1% of prebankruptcy assets (LoPucki and Doherty, 2008).

8 Lawless, Robert M., Stephen P. Ferris, Narayanan Jayaraman, and Anil K. Makhija. "A glimpse at professional fees and other direct costs in small firm bankruptcies." U. Ill. L. Rev. (1994): 847. The objective is not to discuss the various options for bankruptcy protection under U.S. law. In very simple terms, companies filing under Chapter 7 proceedings will liquidate the business, whereas under Chapter 11, the business will be reorganised.

9 Stech-Fetek, Katy. "Fed Says Lehman Brothers Chapter 11 Case Is Costliest in History." *The Wall Street Journal*, January 16, 2019.

between distress and poor performance. If the poor performance is a direct cause of financial distress, the underperformance would be considered part of indirect costs. However, if the poor performance is due to other factors that led to financial distress, the underperformance is not considered an indirect cost. Moreover, these studies employ unique samples over different time periods which makes reaching a clear conclusion difficult.

Edward Altman was the first to provide a methodology to identify the indirect costs of distress.[10] He defined indirect costs as lost sales and profits caused by customers choosing not to deal with a firm that has a high likelihood of bankruptcy, as well as the increased costs of doing business (e.g. higher debt costs and worse terms with suppliers) while in a financially vulnerable condition.[11] He found that indirect costs average 10.5% of firm value measured just before the bankruptcy. He estimated that the combined direct and indirect costs average 16.7% of firm value, highlighting the importance that total bankruptcy costs have on erasing firm value.

Many other researchers followed suit and used different proxies. However, it is important to note that every estimate is dependent on the sample chosen and the economic conditions during the study period, as well as the focus of the study. They generally focus on the negative effect in:[12]

- Attracting qualified job applicants
- Product quality and pricing
- Effect on operations
- Loss of market share

5. Probability of distress

5.1 Altman Z - score

The Altman Z-Score is a financial metric developed by Edward Altman in 1968.[13] It is a tool used to assess the financial health and the potential bankruptcy risk of a company. The original Z-score is calculated using a formula that takes into account various financial ratios for publicly-traded firms in the manufacturing sector. Despite having been created over 50 years ago, the model has retained remarkable accuracy for manufacturing firms in subsequent sample periods.[14] Over the years, Altman introduced variations to his Z-Score model to accommodate other types of companies and other industries.

Original Z - score

The original Z-Score formula was developed for publicly traded manufacturing firms using a sample of 66 (33 distressed and 33 non-distressed) firms with assets under USD 25 million. Even though the sample was small, the Z-score has proven to be a reliable measure over the past 50 years for predicting bankruptcy of all firm sizes, including large capitalisation firms. The formula was designed to predict the likelihood of a firm going bankrupt within one year. The original Z-score formula is shown in Exhibit 1.

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[10] Edward I. Altman is a Professor of Finance, Emeritus, at New York University's Stern School of Business.

[11] Altman, Edward I. "A further empirical investigation of the bankruptcy cost question." *The Journal of Finance* 39, no. 4 (1984): 1067-1089.

[12] A more extensive literature review can be found in found in Chapter 4 of Altman, Edward I., Edith Hotchkiss, and Wei Wang (2019). Corporate Financial Distress, Restructuring, and Bankruptcy: Analyze Leveraged Finance, Distressed Debt, and Bankruptcy." John Wiley & Sons.

[13] Altman, Edward I. "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy." *The Journal of Finance* 23, no. 4 (1968): 589-609.

[14] See chapter 10in Altman, Edward I., Edith Hotchkiss, and Wei Wang (2019). Corporate Financial Distress, Restructuring, and Bankruptcy: Analyze Leveraged Finance, Distressed Debt, and Bankruptcy." John Wiley & Sons.

Exhibit 1: Altman's Original Z-Score Model for Publicly - Traded Manufacturing Firms

$$Z = 1.2 \times X_1 + 1.4 \times X_2 + 3.3 \times X_3 + 0.6 \times X_4 + 1.0 \times X_5$$

Where:

$$X_1 = \frac{\text{Working Capital}}{\text{Total Assets}}$$

$$X_2 = \frac{\text{Retained Earnings}}{\text{Total Assets}}$$

$$X_3 = \frac{\text{EBIT}}{\text{Total Assets}}$$

$$X_4 = \frac{\text{Market Value of Equity}}{\text{Book Value of Total Liability}}$$

$$X_5 = \frac{\text{Sales}}{\text{Total Assets}}$$

Working Capital = Current Assets – Current Liabilities
EBIT = Earnings Before Interest and Taxes

The score obtained from applying the equation above to the subject company is then classified according to the following cutoff scores, which Altman calls zones of discrimination:

$Z > 2.99$	"Safe" Zone
$1.81 < Z < 2.99$	"Grey" Zone
$Z < 1.81$	"Distress" Zone

A firm whose score is less than 1.81 is considered to be in the "distress" zone and likely to go bankrupt within the next year, whereas a firm whose score is greater than 2.99 is considered "safe", with an intermediate zone (between those scores) called "grey". These scores were established based on the original sample of companies.

Altman later developed an iteration on his model to allow for its use by private companies. The revised score is called Z' (or z-prime) and the revised equation is displayed in Exhibit 2.

Exhibit 2: Altman's Z'-Score Model for Private Firms

$$Z' = 0.717 \times X_1 + 0.847 \times X_2 + 3.107 \times X_3 + 0.420 \times X_4 + 0.998 \times X_5$$

Where:

All variables are defined as before in Exhibit 1, except for X_4

$$X_4 = \frac{\text{Book Value of Equity}}{\text{Book Value of Total Liability}}$$

The only difference between the revised model and the original model is the substitution of equity market value for book value in X_4. However, because the model saw changes in the coefficients and the X_4 variable definition, there are also changes in the distress cutoff scores:[15]

[15] For more details on different Z-score models and their respective cutoffs, please visit: https://pages.stern.nyu.edu/~ealtman/zscorepresentation.pdf

$Z' > 2.90$	"Safe" Zone
$1.23 < Z' < 2.90$	"Grey" Zone
$Z' < 1.23$	"Distress" Zone

In order to adapt the model to non-manufacturing industries, Altman and his co-authors dropped X_5 and re-estimated the model to yield a new model dubbed Z″-model.[16] Altman noted that for services and retail industries, the X_5 yielded unreasonable results. Similar to the Z′-model, the variable X_4 used book value of equity rather than market value as in the original model. The modified formula included coefficients tailored to the specific characteristics of non-manufacturing firms and is illustrated in Exhibit 3.

Exhibit 3: Altman's *Z″-Score Model for Manufacturing, Non-manufacturing Industrials; Developed and Emerging Markets*

$$Z'' = 3.25 + 6.56 \times X_1 + 3.26 \times X_2 + 6.72 \times X_3 + 1.05 \times X_4$$

Notably, this new formula includes a constant term of 3.25, which standardises the analysis so that a defaulted bond (rating of D) is consistent with a Z″-Score below zero. The cutoff points also changed to reflect the new sample characteristics. Using the formula above, the new cutoff scores became:

$Z'' > 5.85$	$"Safe"\ Zone$
$4.35 < Z'' < 5.85$	$"Grey"\ Zone$
$Z'' < 4.35$	$"Distress"\ Zone$

However, the formula in Exhibit 3 is sometimes used by omitting the constant term (3.25). If that term is omitted, the cutoff points become:

$Z'' > 2.60$	$"Safe"\ Zone$
$1.1 < Z'' < 2.60$	$"Grey"\ Zone$
$Z'' < 1.1$	$"Distress"\ Zone$

This Z″-Score model can be applied to both manufacturing and non-manufacturing firms, to privately-owned firms and to countries outside the U.S., including developed and emerging market companies. Altman noted that this model outperforms the original Z-Score model when the data includes both manufacturing and non-manufacturing firms.

It is important to note that while the Altman Z-score remains a valuable tool for assessing financial risk and distress, it's not infallible, and its predictive power can vary across different industries and economic conditions. Moreover, the specific components and weights in the formula may change over time to adapt to changes in accounting standards, financial reporting practices, and business environments. In his book, Altman argues that the cutoff points do change over time, and he recommends using what he calls Bond-Rating-Equivalents (BREs) which are based on the most recent median Z-scores and mapping them to bond ratings issued by the three main rating agencies: S&P Global Ratings, Moody's and Fitch Ratings.[17]

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[16] Altman, E. I., Hartzell, J., & Peck, M. (1995). "Emerging markets corporate bonds: A scoring system." New York: Salomon Brothers Inc. Also, see Altman, E. "Corporate Credit Scoring Models for U.S. and Global Credit Markets", *Corporate Bankruptcy & Reorganization – Class Notes*, Fall 2016, NYU Stern School of Business. Available here: https://pages.stern.nyu.edu/~ealtman/CorpCrScoringModels.pdf.

[17] For a more detailed discussion on the BRE approach, see chapter 10 in Altman, Edward I., Edith Hotchkiss, and Wei Wang (2019). *Corporate Financial Distress, Restructuring, and Bankruptcy: Analyze Leveraged Finance, Distressed Debt, and Bankruptcy*. John Wiley & Sons.

5.2 Ohlson's score

Another model to predict firms' likelihood of distress is based on the Ohlson O-Score, developed by James Ohlson.[18] While some Altman models can be applied to private firms, the O-score only provides a probability of financial distress/bankruptcy for publicly traded companies. The O-Score is calculated using a combination of financial ratios and accounting variables. Unlike the Altman Z-Score, which focuses on predicting bankruptcy within one year, the O-Score is designed to predict distress over a longer time horizon, typically two to three years, and it used a larger dataset comprised of over 2,000 companies when originally derived.

Olson tested three variations of a logit model based on nine variables, with the original O-Score (which he called Model 1) achieving a predictability accuracy of more than 96%. Exhibit 4 lays out the original O-Score model specification and the list of variables considered in this model.

Exhibit 4: Ohlson's Original O-Score Model

$$O-Score = -1.32 - 0.407 \times Size + 6.03 \times TLTA - 1.43 \times WCTA + 0.0757 \times CLCA - 2.37 \times NITA - 1.83 \times FUTL + 0.285 \times INTWO - 1.72 \times OENEG - 0.521 \times CHIN$$

Where:

$$Size = \log\left(\frac{Total\ Assets}{GNP\ Price\ Level\ Index}\right)$$

$$TLTA = \frac{Total\ Liabilities}{Total\ Assets}$$

$$WCTA = \frac{Working\ Capital}{Total\ Assets}$$

$$CLCA = \frac{Current\ Liabilities}{Current\ Assets}$$

$$OENEG = 1\ (one)\ if\ Total\ Liabilities\ exceeds\ Total\ Assets, 0\ (zero)\ otherwise$$

$$NITA = \frac{Net\ Income}{Total\ Assets}$$

$$FUTL = \frac{Funds\ From\ Operations}{Total\ Liabilities}$$

$$INTWO = 1\ (one)\ if\ Net\ Income\ was\ negative\ in\ the\ last\ two\ years, 0\ (zero)\ otherwise$$

$$CHIN = \frac{(NI_t - NI_{t-1})}{ABS(NI_t) + ABS(NI_{t-1})}$$

GNP = Gross Domestic Product
NI = Net Income, where "ABS" stands for the absolute value of the variable
Funds from operations = approximately equivalent to cash flows from operations

In order to convert the O-Score into a probability of default, the following formula should be applied:

$$Probability\ (failure) = \frac{e^{O-Score}}{1 + e^{O-Score}}$$

Since the O-Score results in a probability estimate (i.e. between 0 and 1), Ohlson considers that a probability higher (lower) than 50% indicates that the firm in question is in the distress (safe) zone.

[18] Ohlson, James A. "Financial Ratios and the Probabilistic Prediction of Bankruptcy." *Journal of Accounting Research* (1980): 109-131.

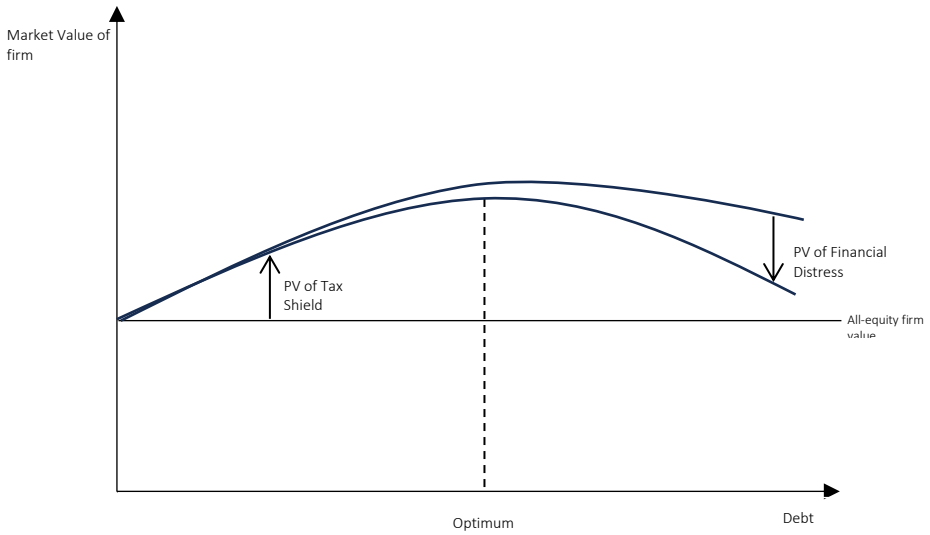
Unlike Altman, Ohlson does not argue for the use of the same coefficients as in his original model, but in practice those coefficients still appear to be used.

6. Expected bankruptcy costs and firm value

Under the "trade-off theory" of capital structure, when expected distress costs are significant, the optimal leverage for a company may be lower.[19] The expected costs of distress are also significant drivers of a firm's restructuring choices. The two major components of the expected distress cost: the total cost of the distress itself and the probability of being in distress, have been discussed.

Exhibit 5 shows the impact of debt levels on the value of the firm. As the company increases its level of debt, its value increases due to the benefits of the tax shield. However, too much debt leads to a decrease in the value of the firm, as the present value of distress cost increases. In order to estimate the present value of the distress cost, it is important to understand the probability and the amount of these costs at each level of the capital structure. In the previous two sections, both of these components and the uncertainty around these estimates were discussed.

Exhibit 5: A Representation of The Trade-off Between Tax Shield and Financial Distress



7. Issues in valuing distressed companies

It is important to understand that valuing distressed companies is different than valuing healthier companies in the same line of business. Distressed companies have debt ratios that are usually higher than their respective industry averages, which are not sustainable in the long term or compatible with a going concern. If dealing with a highly-levered firm (e.g. debt-to-total capitalisation ratio is 70% or greater), using a single WACC and relying on current leverage ratios as the basis to estimate the discount rate for the entire projection period (including the terminal year) is unlikely to be appropriate for a few reasons.

First, cost of debt estimates are often based on the yield-to-maturity observed for publicly-traded debt instruments with a rating similar to that of the subject company. However, when levels of debt are very high (usually associated with below-investment grade credit ratings), the yield-to-maturity will often be significantly higher, reflecting a high probability of default and a less-than-100% expected recovery rate.

[19] For a more comprehensive discussion on capital structure trade-off theory and application, please review: Bradley, Michael, Gregg A. Jarrell, and E. Han Kim. "On the existence of an optimal capital structure: Theory and evidence." *The Journal of Finance* 39, no. 3 (1984): 857-878. For a practical application on how to estimate optimal capital structures, please review: van Binsbergen, Jules H. and Graham, John R. and Yang, Jie. "An Empirical Model of Optimal Capital Structure". *Journal of Applied Corporate Finance*, Vol. 23, Issue 4, pp. 34-59, 2011.

Mechanically using such a yield as a proxy for the cost of debt without any upwards adjustments to the cost of equity may result in the pre-tax cost of debt exceeding the cost of equity. This would violate the corporate finance assumption that, for a given firm, the cost of equity exceeds the pre-tax cost of debt, since the residual cash flows expected by equity holders are riskier than the cash flows expected to be received by debtholders (debtholders rank higher in the capital structure and have higher priority of claims to the cash flows of the firm). Hence, using a market debt-to-capital ratio considerably higher than the industry to estimate the WACC, while assuming that the company will return to financial health, is internally inconsistent.

Second, it is important to consider the impact of the distress on the cost of equity as well. WACC does not appropriately capture bankruptcy costs or distress risk associated with high leverage, unless the cost of equity has been adjusted appropriately for high-financial risk. If WACC is computed mechanically, increasing the proportion of debt in the capital structure will result in a declining WACC, regardless of how high the debt level is – an inappropriate assumption.

Third, interest expenses are tax-deductible (in most jurisdictions) and the after-tax cost of debt for most firms is much lower than the pre-tax cost of debt. However, there is a built-in assumption that the firm generates enough operating cash to offset the interest expenses. In the case where the company is losing money, this tax advantage dissipates, and the benefit disappears. It is important to be able to separate the effect of the contribution of the tax shield when valuing a distressed company that is losing money.

If using an income approach to value a company, the DCF method is the workhorse of valuation. It is a highly flexible model that allow an analyst to answer "what if" questions and test scenarios. However, there are a few assumptions within this approach that make valuing distressed companies problematic unless they are explicitly addressed.

The DCF method assumes that the company is a going concern with an infinite life, and thus the terminal value is usually estimated using a perpetual growth rate. Even when the terminal value is estimated using an exit multiple (e.g. revenue or EBITDA multiple), the comparable companies are usually (financially) "healthy" companies. The arguments used to support the DCF method and its assumptions stem from a few assumptions about markets themselves that often cease to hold in the real world:

- *Large publicly traded companies are very unlikely to go into distress*: Recent episodes have shown that even large publicly traded companies can be in distress. A good example is the automobile industry during the 2008-2009 financial crisis and airline industry after the terrorist attacks of 11 September 2001.[20,21]

- *Access to capital is unconstrained*: Even large companies with well-established histories can see their access to capital being restricted during market dislocations. For example, General Electric saw its access to capital frozen during the financial crisis of 2008.[22]

- *In the case of a distressed sale, the company will receive fair market value*: The recent fire sale of Credit Suisse to rival UBS and the shareholders lawsuit against the Swiss government shows that even large, well-established companies can be sold at lower market values, when distress is preset.[23]

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20 Emery, Chelsea. "U.S. auto industry seen as most distressed in 2009". December 29, 2008, Reuters.com. Available here: https://www.reuters.com/article/business-distress-idUSN2931651520081229

21 Isidore, Chris. "Economy down in the air", Money.cnn.com, September 21, 2001. Available here: https://money.cnn.com/2001/09/21/news/toll_transportation/

22 Bennett, Drake. "How GE Went from American Icon to Astonishing Mess", February 1, 2018, Bloomberg.com. Available here: https://www.bloomberg.com/news/features/2018-02-01/how-ge-went-from-american-icon-to-astonishing-mess?leadSource=uverify%20wall

23 Levine, Matt., "UBS Got Credit Suisse for Almost Nothing", bloomberg.com, March 20, 2023. https://www.bloomberg.com/opinion/articles/2023-03-20/ubs-got-credit-suisse-for-almost-nothing#xj4y7vzkg

If one of these conditions exists, using the DCF method without further adjustments would most likely lead to an overstatement of the value of the distressed firm.

8. Valuation of distressed companies using the discounted cash flow method

There are two views on reflecting distress in a valuation using a DCF:

- The "McKinsey" Integrated-Scenario Approach: under this approach, all the distress risks are captured in the projected cash flows for each scenario and the probability of occurrence associated with each scenario. The discount rate is based on a distress-free WACC.[24]

- The "Damodaran" Modified DCF Valuation: under this approach adjustments for distress are reflected in a scenario analysis, but the discount rate is also adjusted by a distress premium.

Using Prof. Aswath Damodaran's suggestion could result in double counting of risk. In addition, his approach to cash flows adjustments may be overcomplicated and easily lead to errors.

8.1 Distress is reflected in the expected cash flows

In order to arrive at expected cash flows that reflect the potential failure of the firm, a scenario-based approach should be applied. In its simplest form, this could entail two scenarios: (1) going concern scenario, where management succeeds in steering the business back to health; and (2) distress scenario, where management fails to turn around the business, leading to a bad outcome (e.g. distressed sale, bankruptcy, liquidation). Probabilities are then assigned to each of these scenarios to arrive at an expected case.

According to McKinsey, when applying this method, the face value of debt (rather than market value) would be deducted from the enterprise value in each of the two scenarios, to arrive at an indicated equity value. This could result in a zero-equity value for the scenario where the company fails. The equity value under each scenario would be multiplied by the respective probability of occurrence, to arrive at the expected value of the company.

In its most complete form, the two-scenario approached would be expanded to consider all possible scenarios, from the most optimistic to the most pessimistic. According to Prof. Damodaran, this would entail assigning probabilities for each scenario and (at the extreme), to the individual cash flow streams under each scenario. This would result in the calculation of the expected cash flow for each year as follows:[25]

$$Expected\ Cash\ Flow\ _t = \sum_{i=1}^{n} \pi_{i,t} \times CF_{i,t}$$

Where $\pi_{i,t}$ is the probability of scenario (i) in year (t) and $CF_{i,t}$ is the cash flow under that scenario (i) in year (t).

These inputs would be calculated each year and would reflect the conditional probability of each scenario for each year. For example, if the firm ceases to exist in period one (1) with a certain probability, there will be no cash flows in subsequent years. This should be reflected on all scenarios going forward.

In a two-case scenario, Prof. Damodaran would simplify the formula above to be:

$$Expected\ Cash\ Flow\ _t = \pi_{Going\ Concern,t} \times CF_{Going\ Concern,t} + (1 - \pi_{Going\ Concern,t}) \times CF_{Distress,t})$$

[24] See Chapter 16 "Moving from Enterprise Value to Value per Share" in Koller, Tim, Marc Goedhart, and David Wessels (2020), "Valuation – Measuring and Managing the Value of Companies", McKinsey & Company, Wiley. For a more detailed example using the distress-free WACC see Chapter 11 "Interpreting Results" of an earlier edition of the same book and authors published in 2005.

[25] See Chapter 17 "The Cost of Distress" in Damodaran, Aswath (2006), "Damodaran on Valuation: Security Analysis for Investment and Corporate Finance", Wiley.

Where $\pi_{Going\ Concern,t}$ is the cumulative probability that the firm will continue to exist as a going concern through period t.

The probability of distress will have to be estimated every year. See Exhibit 6 later in this chapter for an example on these probabilities might be estimated.

8.2 Distress is reflected directly in the discount rate

When estimating the cost of capital, two components are required to be considered: debt and equity.

- **Cost of debt**

  If a distressed company has publicly-traded debt instruments, they are likely to be trading at significant discount (relative to par) and the resulting yield-to-maturity is possibly too high to be used as a proxy for the cost of debt. The reason is that yield-to-maturity is reflecting the estimated recovery rate should that particular instrument default.

  The cost of debt can be estimated using default spreads. The three major rating agencies provide corporate debt ratings that reflect the creditworthiness of the firm. Based on these ratings, an analyst can estimate the default spread (i.e. risk premium) for the firm commensurate with its rating. Default spreads can be extracted from the yields-to-maturity on publicly-traded corporate bonds. Composite market yields for USD-denominated corporate bonds are available in Bloomberg for a variety of maturities under each rating category (AAA through B- as of the time of writing). Availability in other currencies (e.g. EUR, GPB) is more limited both in terms of rating categories and maturities. Some extrapolations may need to be undertaken using the USD data, in such cases.

$$Pre\text{-}Tax\ Cost\ of\ Debt = Risk\ free\ Rate + Default\ Spread$$

  Even if the company is not rated, a synthetic debt rating (sometimes called shadow rating) can be estimated using certain financial ratios for the subject company and then compare them to benchmarks published by the rating agencies. Banks tend to focus on a selection of the ratios used by rating agencies when extending credit: Debt / EBITDA, EBITDA / Interest and, to a lesser extent, Debt / [Debt + Equity]. These ratios can be afforded greater weight when selecting the appropriate synthetic rating.[26]

- **Cost of equity**

  In order to calculate the distressed firm's cost of equity, reliable estimates of beta are required. Obtaining a beta from regressing historical returns for a publicly-traded company suffering from distress may not be appropriate. During distress periods, a company's stock prices are volatile, reflecting the investors' uncertainty about the stock price and rumours of possible bankruptcy. Moreover, because of this excess (likely downward) movement, a historical beta may be too low, understating the true level of systematic risk.

  If that is the case, it is recommended to calculate betas of healthy comparable companies and use them as a proxy for the systematic risk of the firm. However, since the leverage of the distressed company is significantly different from the leverage of the guideline public companies selected for analysis, the analyst should remove the effect of that leverage from the calculated betas before using them as a proxy to estimate the beta of the subject company.

[26] Alternatively, analysts can use S&P Global Market Intelligence's CreditModel™, which assigns companies with a lower-case letter score, based solely on ratio analyses (official credit ratings use upper-case letter ratings). This may differ from the official credit rating that S&P Global Ratings would adding to that same company. The CreditModel™ also allows the user to input the subject company's data to arrive at an indicated rating.

Various authors have proposed alternative methodologies for unlevering and levering betas. These methodologies are generally functions of the risk of realising tax savings from deducting interest expense. In the simplest model, the tax shield is assumed to be risk free (i.e. the debt beta is zero). This formula was developed by Robert Hamada in 1972.[27] However, in the case of distressed companies this assumption is not applicable or appropriate. Hence, the use of the Harris-Pringle formulas shown below is recommended:[28]

Beta unlevering formula:

$$\beta_u = \frac{\beta_e + \beta_d * \frac{W_d}{W_e}}{1 + \frac{W_d}{W_e}}$$

Beta relevering formula:

$$\beta_e = \beta_u + (\beta_u - \beta_d) * \frac{W_d}{W_e}.$$

Where:
β_d = Debt Beta[29]
β_e = Levered (or Equity) Beta
β_u = Unlevered (or Asset) Beta
W_d = Debt Capital as a Percentage of the Total Invested Capital
W_e = Common Equity Capital as a Percentage of the Total Invested Capital

Once the beta of a typical healthy firm with the appropriate capital structure is calculated, an additional distress premium should be added to reflect the added risk to equity holders.

$$Cost\ of\ Equity = Risk\text{-}free\ Rate + \beta_{Healty} \times ERP + HFR\ Premium$$

The High Financial Risk (HFR) premium is calculated as the historical average return of companies identified as distressed. This is discussed in more detail in the example set out later in this chapter. However, note that a size premium should not be used in conjunction with the HFR premium, as that would represent double counting.

- **WACC**

Once the costs of equity and debt are calculated, the overall cost of capital should be calculated. When dealing with a highly-levered firm, using a single WACC as the basis to estimate the discount rate for the entire projection period (including Terminal Year) is unlikely to be appropriate. Migrating the capital structure to a more sustainable level of debt, if consistent with the valuation purpose and premise, would be a way to address the changing nature of risk over time.[30]

Migrating the capital structure to a more sustainable level (i.e. the proportion of debt over total firm value varies from year to year, or at least for some years) requires different discount rates to be estimated over time. Note that if different discount rates are used over time, they

[27] Hamada, Robert S. "The effect of the firm's capital structure on the systematic risk of common stocks." *The Journal of Finance* 27, no. 2 (1972): 435-452.

[28] Harris, Robert S., and John J. Pringle. "Risk-adjusted discount rates-extensions from the average-risk case." *Journal of Financial Research* 8, no. 3 (1985): 237-244.

[29] Debt betas vary by credit rating. Typically, the lower the credit rating, the higher the debt beta. For additional support on estimating debt betas by credit rating, refer to Chapter 11 "Beta: Differing Definitions and Estimates" in Pratt, Shannon P. and Roger J. Grabowski (2014) "Cost of Capital: Applications and Examples", Wiley.

[30] For further guidance and examples on how to model migrating capital structures, refer to Chapter 21 "Weighted Average Cost of Capital" in Pratt, Shannon P. and Roger J. Grabowski (2014) "Cost of Capital: Applications and Examples", Wiley.

should be applied consistently to all the years. For example, Year 3 projected cash flows would be discounted based on the following present value factor:[31]

$$\frac{1}{(1+WACC_{T_1})*(1+WACC_{T_2})*(1+WACC_{T_3})}$$

Where: T_1, T_2, T_3 represent Years 1 through 3, respectively.

8.3 Estimating the cost of equity using the Kroll high-financial-risk study

The risk profile of equities changes when a company is facing distress which requires adjusting the cost of equity to reflect this risk. The Kroll *High-Financial-Risk Study* in the *Kroll Risk Premium Report* provides data to make these adjustments.

- **History**

  In 1992, Roger Grabowski and David King began to investigate the relationship between company size and stock returns.[32] More specifically, their objective was to understand whether stock returns were predicted by fundamental risk measures of size based on accounting data, in addition to market capitalisation.

  Their research found that as size decreased or risk increased (as measured by fundamental accounting data), returns tended to increase. After publishing a series of articles sharing their results, they published a seminal article in 1996 and another in 1999, which together served as the foundation of the *Risk Premium Report*.[33]

  The original *Risk Premium Report* was primarily focused on investigating the relationship between size and returns of companies that were fundamentally healthy and for which a going-concern assumption was appropriate. In other words, the data set in the study was created by eliminating companies that were losing money, were highly levered or were in bankruptcy. The *Risk Premium Report* was then bifurcated into a *Size Study* and a *Risk Study*, both based on the financially-healthy company set.

  The *High-Financial-Risk Study* was created for the first time as an addendum to the *2009 Risk Premium Report* by using some of the companies that had been eliminated from the financially-healthy company set.

- **Methodology**

  The *Risk Premium Report – Size Study* is designed to estimate cost of equity capital for companies that are fundamentally healthy (i.e. going concerns). In contrast, the *Risk Premium Report – High-Financial-Risk Study* uses companies that are either in liquidation or considered distressed and provides premia to correctly adjust that distress risk.

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31 For additional information on how to compute present value factors when more than one WACC is used in the valuation, including when using a mid-period convention, refer to Chapter 5 "Discounting—Beyond the Basics", section "Changing Risk over Time" in Pratt, Shannon P. and Roger G. Grabowski (2014) "Cost of Capital: Applications and Examples", Wiley.

32 The research began when both were at Price Waterhouse, the predecessor of PricewaterhouseCoopers.

33 The *Risk Premium Report* was published originally as the *Price Waterhouse Risk Premium Report* and then as *PricewaterhouseCoopers Risk Premium Report* for years prior to 2002. From 2002 to 2004, it was published as the *Standard & Poor's Corporate Value Consulting Risk Premium Report*. From 2005 onwards, it was published as the *Duff & Phelps Risk Premium Report* until it was incorporated into the *Valuation Handbook – Guide to Cost of Capital* in 2014, which was co-authored by Roger J. Grabowski, James P. Harrington and Carla S. Nunes. This publication was then renamed as *Valuation Handbook – U.S. Guide to Cost of Capital* in 2015 and was published under that name through 2017. In 2018, Duff & Phelps transitioned all the content and data of this annual handbook into the Cost of Capital Navigator, an online platform. After Duff & Phelps completed its rebranding as Kroll in 2022, the platform was also rebranded as the Kroll Cost of Capital Navigator.

To understand how these premia can be used, it is important to: 1) understand the characteristics of companies included in the *High-Financial-Risk Study* and 2) how these premia are calculated. For a company to be included in the *High-Financial-Risk Study*, a two-step process is used: one is based on accounting fundamentals, the other is based on a probability prediction model, namely the Altman's Z-score.[34]

To be included in the study, a company must satisfy at least one of the following conditions:

- Be in bankruptcy or in liquidation,
- Have a "5-year average net income available to common equity" less than zero for the previous five years,
- Have a "5-year-average operating income" less than zero for the previous five years,
- Have a negative book value of equity at any one of the company's previous five fiscal year-ends,
- Have a debt-to-total capital ratio of more than 80%.

The second criterion is based on bankruptcy prediction model developed by Altman (Z-Score). A company would be included in the *High-Financial-Risk Study* in any given year if it is classified in the "grey" or "distressed" zones (i.e. scores lower than 1.80 for manufacturing companies and 1.1 for service companies, based on the Z and Z'' models, respectively) according to Altman's different cutoffs.

After the sample of distressed companies is identified, portfolios are rebalanced every year to reflect the most up-to-date information about each company's situation. The premia are calculated as the historical equally-weighted average returns of portfolios since 1963 (the year that the Standard & Poor's Compustat database was launched).[35] These portfolios' averages represent the expected return for companies under distress.

8.4 Example of how to apply the Kroll high-financial-risk study

Let us use an example to show the importance of such an adjustment. Risky Business Co. is a publicly traded manufacturing company. The company has the following financial characteristics (in USD ($) millions):

Market value of equity	$80	Sales	$250
Book value of equity	$100	Current assets	$75
Total assets	$300	Current liabilities	$50
Most recent year EBIT	-$5	Retained earnings	$75

The objective is to estimate the cost of equity as Risky Business Co. as of 31 December 2022.

The most important task is to determine if the company is in fact in distress. The decision that a company should be treated as "high-financial-risk" should be based on a detailed evaluation of the company's current financial condition and circumstances and will generally involve more than a review of historical financial statistics and ratios. This decision ("distressed" or "not distressed") is ultimately dependent on the individual analyst's professional judgment and detailed knowledge of the subject company.

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[34] The number of companies eliminated in this screen varies from year to year. These companies represented up to 25% of the data set in recent years, but less than 5% in 1963. Certain technical changes in methodology have resulted in a greater number of companies falling into the high-financial-risk database than in versions of this study published prior to 2000.

[35] Returns are based on dividend income plus capital appreciation and represents returns after corporate taxes (but before owner-level taxes). Portfolios with fewer than six companies in any given year are excluded from the averages.

It is possible to imagine companies which do have one or more of the characteristics of companies in the High-Financial-Risk (HFR) portfolios but are not distressed. Alternatively, it is also possible to imagine companies that do not have any of these characteristics but could still be classified as high-financial-risk (i.e. "distressed"). For example, a company may have a debt-to-total capital ratio greater than 80%, but this does not automatically imply that the company is distressed. Alternatively, a company may have a debt-to-total capital ratio less than 80% but could still be in a distressed state due to other factors.

Once the decision to use the *High-Financial-Risk Study* is taken the first step is to calculate the Z-score of the subject company using the appropriate Z-score equation.

Using the information provided above and the equation shown earlier for the original Altman Z-Score Model, the required inputs are calculated (X_1, X_2, X_3, X_4, and X_5):

X_1	=	Working Capital / Total assets	=	($75 Current Assets – $50 Current Liabilities)/ ($300 Total Assets)	=	0.084*
X_2	=	Retained earnings / Total Assets	=	($75 Retained Earnings) / ($300 Total Assets)	=	0.25
X_3	=	Earnings Before Interest and Taxes / Total Assets	=	(-$5 EBIT) / ($300 Total Assets)	=	-0.017
X_4	=	Market Value of Common Equity / Book Value of Total Liabilities	=	($80 Market Value of Common Equity) / ($300 Total Assets – $100 Book Value of Equity)	=	0.400
X_5	=	Sales / Total Assets	=	($250 Sales) / ($300 Total Assets)	=	0.834*

* Differences due to rounding.

By substituting these inputs into the Z-score equation, the following Z-score is obtained:

$$Z = 1.2 \times (0.084) + 1.4 \times (0.25) + 3.3 \times (-0.017) + 0.6 \times (0.400) + 1 \times (0.834)$$
$$Z = 1.47$$

Should a company be considered to be in distress based on the Z-score alone? The short answer is No. An analyst should be more diligent in understanding the situation of the subject company before drawing such conclusions.

The Z-score of the subject company does indicate which zone (Distressed or Gray) and thus the level of HFR adjustment needed. The U.S. Cost of Capital Module in the Kroll Cost of Capital Navigator identifies the corresponding (1) average the risk premium over CAPM ($RP_{s,\ HFR}$), when using the Capital Asset Pricing Model; and (2) HFR premium over the risk-free rate ($RP_{m+s,\ HFR}$) when using the build-up method.

For this example, the subject company is a manufacturing company with a Z-score of 1.47, placing it in the "distressed" zone (Z-Scores <1.8).

8.4.1 Estimating cost of equity capital using the "CAPM-HFR" method

As of the valuation date, the Kroll normalised risk-free rate and Recommended U.S. Equity Risk Premium (ERP) were 3.5% and 6.0%, respectively. For this example, it is assumed that a typical comparable "healthy" company in the subject industry would have a levered beta of 1.2. Hence, the only missing input is the high-financial-risk size premium ($RP_{s,\ HFR}$) and the corresponding HFR risk premium over CAPM is 6.34%.

$$K_e = R_f + \beta \times ERP + RP_{s,HFR}$$

Ke = 3.5% + (1.2 x 6.0%) + 6.34% = 17.04%

The cost of equity capital after adjusting for distress for Risky business Co. as of December 31, 2022, using CAPM-HFR method is 17.04%.

8.4.2 Estimating cost of equity capital using the "Build-up-HFR" method

The Build-up HFR method equation is:

$$K_e = R_f + RP_{m+s,HFR} + ERP_{Adj}$$

$$\text{Ke} = 3.5\% + 15.53\% + 0.41\% = 19.44\%$$

where $K_e$is the cost of capital equity, R_f is the risk-free rate, and $RP_{m+s,HFR}$ is the historical average return of companies in the "distressed" zone since the subject company is in this zone. The ERP_{Adj} is the ERP adjustment to reflect the difference between the selected ERP and the historical ERP used in the *High-Financial-Risk Study*.[36,37]

According to the Buildup HFR, the cost of capital equity of Risky Business Co. as of 31 December 2022 is 19.44%.

To illustrate the impact of distress cost on cost of equity, the cost of equity under the assumption that the firm is "healthy" is also calculated. The same inputs as earlier are used and then an incremental size premium based on the size of this company is added, using the Kroll CRSP Deciles Size Study:

$$K_e = R_f + \beta \times ERP + RP_s$$

$$K_e = 3.5\% + 1.2 \times 6.0\% + 4.83\% = 15.53\%$$

Where all the terms are defined as before and RP_s represents the size premium. Using the Kroll CRSP Deciles Size Study, the subject company was matched with Decile 10.

In this example, the differences in cost of equity between being distressed vs non-distressed ranged from 1.51% to 3.91% depending on the methodology chosen. Note that the differences could be different if different methodologies were also used to estimate the cost of equity for the "healthy" company.

8.5 Adjusted present value (APV)

As discussed earlier, adding debt to capital structure adds value to the firm, but only to the optimal level, after which adding one more dollar of debt decreases the value of the firm. By applying the APV methodology to firm valuation, all components are separated and their impact dealt with individually by estimating the present value of those components. Hence, the use of the term "adjusted present value". The process starts by valuing the firm as if it is 100% equity-financed, and the present value of interest tax shields is computed separately. This is the traditional application of the APV method. However, when the probability of default is high, deducting the cost of financial distress needs to be considered. Thus, a levered firm's value is lower by the present value of expected bankruptcy costs.

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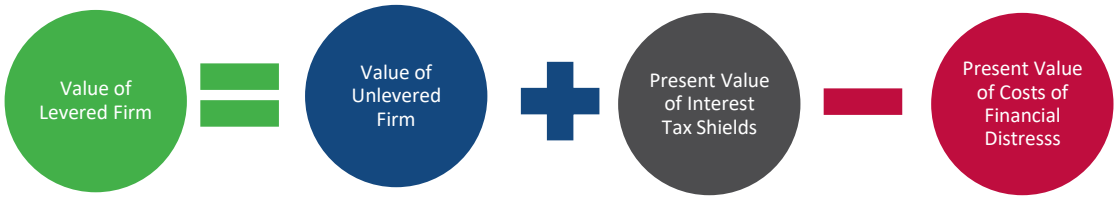
[36] For more details on the build-up model, please refer to Shannon P. Pratt and Roger J. Grabowski, *Cost of Capital: Applications and Examples*, 5th ed. (Hoboken, NJ: John Wiley & Sons, 2014).

[37] The equity risk premium (ERP) Adjustment is needed to account for the difference between the forward-looking ERP as of the valuation date that the analyst has selected in the Cost of Capital Navigator to use in his or her cost of equity capital calculations, and the historical (1963–present) ERP that was used as a convention in the calculations performed to create the RPR Study.



$$Value\ of\ Levered\ Firm = Value\ of\ Unlevered\ Firm + PV(Tax\ Shields) - PV(Financial\ Distress\ Costs)$$

When valuing an unlevered firm, the discount rate is the unlevered cost of equity (k_u), assuming that the firm is 100% financed with equity. When arriving at the unlevered cost of equity, an unlevered beta should be used.

The second component is the present value of interest tax shields. Simplifying assumptions that are used when applying to a going-concern business are not applicable here. Due to the presence of distress, the firm likely has accumulated NOLs and is possibly unable to fully deduct interest expense for tax purposes. In this case, discrete projections of interest deductibility are needed up to the point when the company returns back to a sustainable level of debt. The discount rate used for the interest tax shields, depends on the riskiness of realising such benefits. For a company faced with distress, where the usage of NOLs is tied to the ability to generate positive taxable income, the risk of realising the interest tax shields is more correlated with the cost of equity.

The last component is the hardest to estimate. As discussed earlier, the present value of expected bankruptcy cost (BC) includes both direct and indirect costs.

$$PV(BanruptcyCosts) = \pi_{BC} \times BC$$

The probability of bankruptcy (π_{BC}) can be estimated through the Altman Z-score or using the Ohlson O-Score.

8.6 Dealing with distress separately

Another methodology to consider when valuing a company in financial distress is to separate the value under each scenario and calculate an expected value. Under a certain probability, the company is assumed to improve and survive or even thrive. Under the other scenario, the company is expected to face liquidation. The value of the distressed company becomes the weighted probability of each outcome.

$$Firm\ Value = Going\ Concern\ Value \times (1 - \pi_{Distress}) + Distress\ Sale\ Value \times \pi_{Distress}$$

Where $\pi_{Distress}$ is the cumulative probability of distress over the valuation period.

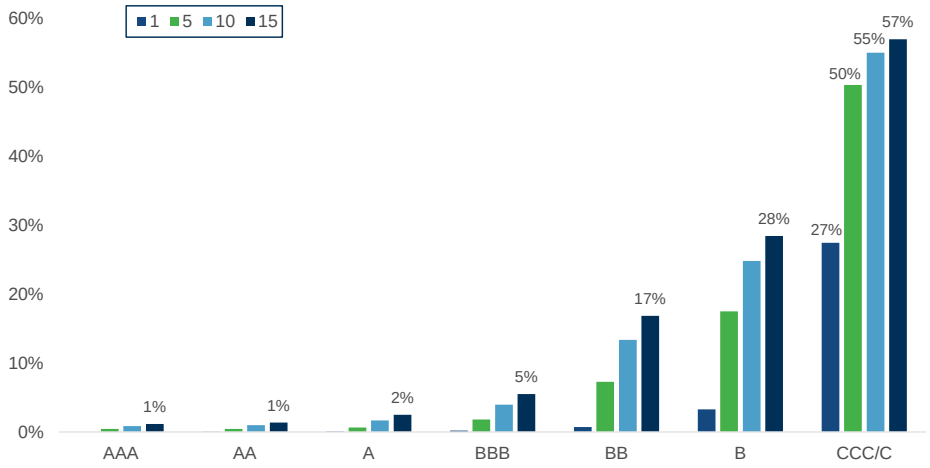
To calculate the value of the company as a going concern, a traditional DCF is used where there are no constrains to access to financial markets, no direct or indirect costs of bankruptcy and a reasonable perpetual growth to calculate the terminal value. The distressed sale value assumes a discounted price sale where the company had to liquidate itself to meet its obligations.

A key assumption in this method is estimating the cumulative probability of distress. One way that this can be accomplished is by reviewing the cumulative default rates by rating category published by S&P or Moody's. This data is available for different time horizons and different geographic regions, although U.S. data predominates.

Exhibit 6 compares the cumulative default rate (which can be used as a proxy for probability) for U.S. (Exhibit 6A) and Europe (Exhibit 6B) versus global corporate issuers (Exhibit 6C). Default rates are shown for a selection of time horizons since the rating was first assigned in graphic form. For example, a U.S. company with a debt rating of B has a cumulative 28% likelihood of defaulting in 15 years.

Exhibit 6: S&P Global Ratings Corporate Average Cumulative Default Rates by Rating Category (1981-2022)[38]

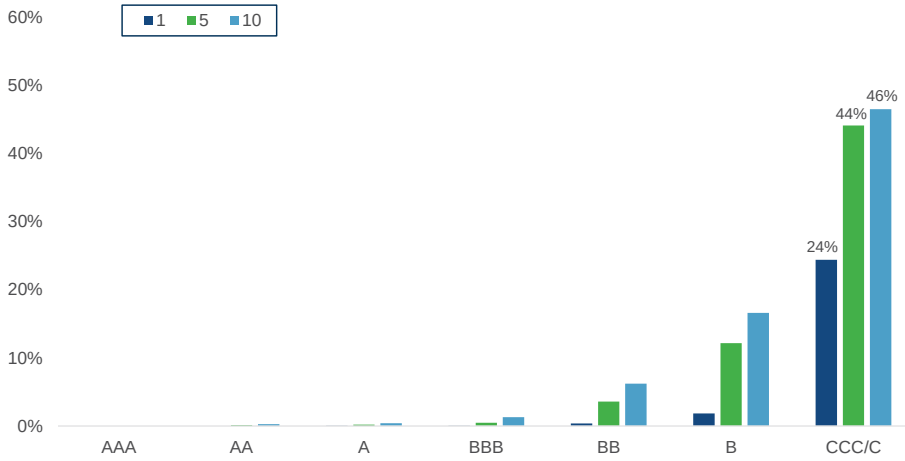
Exhibit 6A: United States



Source of Underlying Data: S&P Global Market Intelligence's CreditPro®

Europe has less information than the U.S. and may be less reliable, particularly in the lowest rating category. According to S&P Global, Europe has historically had fewer entities rated in the 'CCC'/'C' category than other regions, so the cumulative average default rate for this category may be less meaningful. The European region did not have a significant proportion of speculative-grade ratings until 1996, so European cumulative average default rates have only recently started to fall more in line with the rates elsewhere.[39]

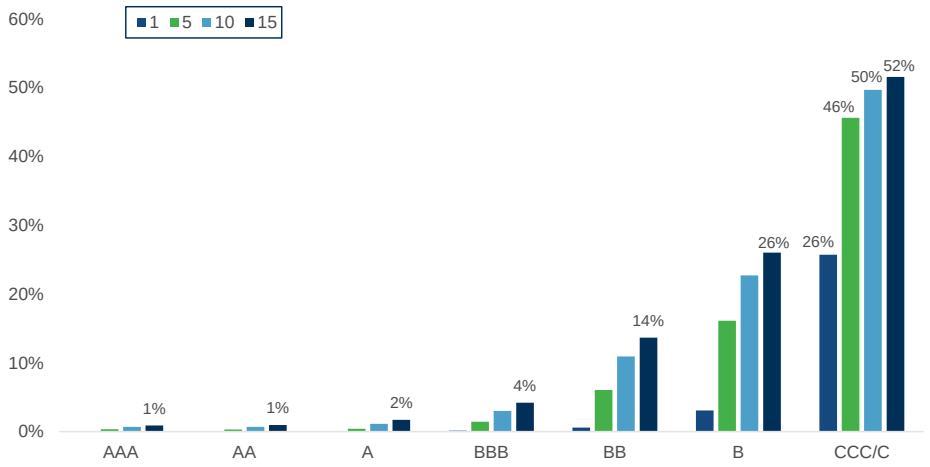
Exhibit 6B: Europe



[38] Source for U.S. and Global statistics: S&P Global Ratings, "Default, Transition, and Recovery: 2022 Annual U.S. Corporate Default and Rating Transition Study", 25 April 2023. Available here: https://www.spglobal.com/ratings/en/research/articles/230425-default-transition-and-recovery-2022-annual-global-corporate-default-and-rating-transition-study-12702145. Source for European statistics: S&P Global Ratings, "Default, Transition, and Recovery: 2022 Annual European Corporate Default and Rating Transition Study", 25 May 2023. Both reports are available in S&P Global Market Intelligence's CreditPro® platform.

[39] S&P Global Ratings, "Default, Transition, and Recovery: 2022 Annual European Corporate Default and Rating Transition Study", 25 May 2023. Available here: https://www.spglobal.com/ratings/en/research/articles/230525-default-transition-and-recovery-2022-annual-european-corporate-default-and-rating-transition-study-12736253. Report available in S&P Global Market Intelligence's CreditPro® platform.

Exhibit 6C: Global



Source of Underlying Data: S&P Global Market Intelligence's CreditPro®

When using this data, it is important to note that these statistics will differ when looking at rating modifiers (notches) within a given rating category. This is particularly relevant when dealing with below-investment grade (BB+ and below) ratings. Companies with the lowest notch (e.g. 'B-') will have meaningfully higher cumulative default rates when compared to the better/higher notches within the same rating category (e.g. 'B+', 'B').[40]

8.7 Simulations

In traditional valuation, under the expected case scenario, only input variables are used. In reality these estimates have a built-in distribution. By using the expected case scenario, the analyst assumes that all other scenarios are built in by using probability weighting. However, in the case of a higher probability of distress, it is important to consider that the firm might cease to exist. By using simulations, distress can be explicitly modelled.

First, the analyst should decide what conditions constitute distress. For example, a certain threshold of losses, a certain decrease in the book value of assets, or a certain coverage ratio for fixed costs. These parameters could differ across firms, industries and economic conditions.

The next step consists of choosing the variables for which to assign distributions. There are two types of variables: those specific to the firm or those related to the economy. The firm-specific variables are revenue growth and margins (or other critical value drivers for the specific company). The economy variables relate to the overall economy, for example, interest rates, oil prices, or inflation. Estimating the distribution for each of these variables is a tricky endeavour because it requires understanding not only how these variables behave independently but also the level of correlation between them.

Each simulation consists of drawing one outcome from each distribution of all variables under consideration to estimate the firm's earnings and cash flows. If the distress condition is reached, the firm is assumed to be under distress, and a distressed sale value is calculated. If not, the firm value is considered a going concern. The firm's value is calculated as the average of all simulated values.

There are significant limitations in using simulations (e.g. Monte Carlo) as the basis to generate the range of scenarios to value a company in distress. The most difficult task is to correctly choose the right distribution for each of the variables (e.g. revenue growth), as well as the parameters of that distribution that best reflect the relationship between variables. In the end, the added complexity of the model simulations may give the false impression of precision, but will not necessarily result in a better valuation.

[40] The more granular statistics by rating (including greater precision in numbers shown) are available in the sources referenced above, along with more detailed data by year.

9. Conclusion

The cost of capital plays an important role in the decision-making process of companies and changes as companies go through their life cycles. It is important to understand the underlying risk factors that affect the risk of companies. A company in distress should be valued differently than a healthy one because of the different headwinds that it faces. There are hidden costs that face a company in distress that are not easy to uncover. Research is still ongoing on this subject as the cost of bankruptcy has increased considerably in recent years.

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Member Associations

AAESI Asociación Argentina de Estudios Sobre la Insolvencia
ABI American Bankruptcy Institute
AKPI Asosiasi Kurator Dan Pengurus Indonesia
APACSA Asociación Profesional de Administradores Concursales Sainz de Andino
APDIR Associação Portuguesa de Direito da Insolvência e Recuperação
ARIES Association of Restructuring and Insolvency Experts (Channel Islands)
ARITA Australian Restructuring, Insolvency and Turnaround Association
ATIK Association of Turnaround and Insolvency Kenya Ltd
AUAIRE Asociación Uruguaya de Asesores en Insolvencia y Reestructuraciones Empresariales
BLRRC-CUPL Bankruptcy Law and Restructuring Research Centre, China University of Politics and Law
BRIPAN Business Recovery and Insolvency Practitioners Association of Nigeria
BRIPASL Business Recovery and Insolvency Practitioners Association of Sri Lanka
BRP Business Recovery Professionals (Mauritius) Ltd
CAIRP Canadian Association of Insolvency and Restructuring Professionals
CLLA Commercial Law League of America (Bankruptcy and Insolvency Section)
DRA Dutch Restructuring Association
EISAR Bankruptcy Commission (Saudi Arabia)
FGV Câmara de Mediação e Arbitragem / FGV Arbitration and Mediation Chamber
FILA Finnish Insolvency Law Association
GARIA Ghana Association of Restructuring and Insolvency Advisors
GDABA Guangdong Association of Bankruptcy Administrators
HKICPA Hong Kong Institute of Certified Public Accountants (Restructuring and Insolvency Faculty)
IAIR International Association of Insurance Receivers
IBR Instituto Brasileiro de Estudos de Recuperação de Empresas
IIDC Instituto Iberoamericano de Derecho Concursal
IIDC Colombia Instituto Iberoamericano de Derecho Concursal – Capitulo Colombiano
IIIPI-ICAI Indian Institute of Insolvency Professionals of the Institute of Chartered Accountants of India
INSOL Europe
INSOL India
IPAM Insolvency Practitioners Association of Malaysia
IPAS Insolvency Practitioners Association of Singapore
IWIRC International Women's Insolvency and Restructuring Confederation
JFIP Japanese Federation of Insolvency Professionals
LCA Law Council of Australia (Business Law Section)
MIA Malaysian Institute of Accountants
MICPA Malaysian Institute of Certified Public Accountants
NAFER National Association of Federal Equity Receivers
NIVD Neue Insolvenzrechtsvereinigung Deutschlands e.V.
R3 Association of Business Recovery Professionals
RISA Bahamas Restructuring and Insolvency Specialists Association (Bahamas)
RISA Bermuda Restructuring and Insolvency Specialists Association of Bermuda
RISA BVI Recovery and Insolvency Specialists Association (BVI) Ltd
RISA Cayman Recovery and Insolvency Specialists Association (Cayman) Ltd
RITANZ Restructuring Insolvency & Turnaround Association of New Zealand
SARIPA South African Restructuring and Insolvency Practitioners Association
SBLA Serbian Bankruptcy Law Association
TMA Turnaround Management Association (INSOL Special Interest Group)
TMA Brasil Turnaround Management Association Brasil
XMABA Xiamen Association of Bankruptcy Administrators

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