The Evolution of the Altman Z-Score Models & Their Applications to Financial Markets

Dr. Edward Altman NYU Stern School of Business

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Scoring Systems

- Qualitative (Subjective)
- Univariate (Accounting/Market Measures)
- Multivariate (Accounting/Market Measures)
 - Discriminant, Logit, Probit Models (Linear, Quadratic)
 - Non-Linear Models (e.g., RPA, NN)
- Discriminant and Logit Models in Use
 - Consumer Models Fair Isaacs
 - Z-Score (5) Manufacturing
 - ZETA Score (7) Industrials
 - Private Firm Models (eg. Risk Calc (Moody's), Z" Score)
 - EM Score (4) Emerging Markets, Industrial
 - Other Bank Specialized Systems



Scoring Systems (continued)

- Artificial Intelligence Systems
 - Expert Systems
 - Neural Networks (eg. Credit Model (S&P), CBI (Italy))
- Option/Contingent Claims Models
 - Risk of Ruin
 - KMV Credit Monitor Model
- Blended Ratio/Market Value Models
 - Moody's Risk Cal
 - Bond Score (Credit Sights)
 - Z-Score (Market Value Model)
- Z-Metrics (MSCI)
 - Blended and Macro Approach

Major Agencies Bond Rating Categories

Moody's		<u>S</u> 8	<u>&P/Fitch</u>
Aaa	1		AAA
Aa1			AA+
Aa2			AA
Aa3			AA-
A1			\mathbf{A} +
A2			Α
A3			А-
Baa1			BBB+
Baa2	Inves	tment	BBB
Baa3	Gr	ade	BBB-
Ba1	High	Yield	$\mathbf{BB}+$
Ba2	("Ju	ınk'')	BB
Ba3			BB-
B1			$\mathbf{B}+$
B2			В
B3			В-
Caa1			CCC+
Caa			CCC
Caa3			CCC-
Ca			CC
		Ļ	С
С			D



Size of the US High-Yield Bond Market

1978 – 2016 (Mid-year US\$ billions)



Source: NYU Salomon Center estimates using Credit Suisse, S&P and Citi data.

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Key Industrial Financial Ratios (U.S. Industrial Long-term Debt)

Medians of Three- Year (2009-2011) Averages	AAA	AA	Α	BBB	BB	В	CCC*
EBITDA margin (%)	27.9	27.6	20.4	19.7	17.6	16.6	
Return on Capital (%)	30.6	23.6	20.7	13.2	10.9	7.8	2.7
EBIT Interest Coverage(x)	33.4	14.2	11.6	5.9	3.0	1.3	0.4
EBITDA Interest Coverage (x)	38.1	19.6	15.3	8.2	4.8	2.3	1.1
Funds from Operations/Total Debt (%)	252.6	64.7	52.6	33.7	24.9	11.7	2.5
Free Operating Cash Flow/Total Debt (%)	208.2	51.3	35.7	19.0	11.1	3.9	(3.6)
Disc. Cash Flow/Debt (%)	142.8	32.0	26.1	13.9	8.8	3.1	
Total Debt/EBITDA (x)	0.4	1.2	1.5	2.3	3.2	5.5	8.6
Total Debt/Total Debt + Equity (%)	14.7	29.2	33.8	43.5	52.2	75.2	98.9
No. of Companies	4	14	93	227	260	287	

* 2005-2007

Source: Standard & Poor's, CreditStats: 2011 Industrial Comparative Ratio Analysis, Long-Term Debt – US (RatingsDirect, August 2012).



Key Industrial Financial Ratios (Europe, Middle East & Africa Industrial Long-term Debt)

Medians of Three- Year (2008-2010) Averages	AA	Α	BBB	BB	В
EBITDA margin (%)	24.9	16.6	15.5	17.6	16.3
Return on Capital (%)	20.0	15.3	11.2	9.3	6.7
EBIT Interest Coverage(x)	15.7	7.0	3.9	3.1	1.0
EBITDA Interest Coverage (x)	18.5	9.5	5.7	4.6	2.0
Funds from Operations/Total Debt (%)	83.4	45.7	32.3	22.7	10.5
Free Operating Cash Flow/Total Debt (%)	57.8	23.2	16.0	7.1	1.3
Disc. Cash Flow/Debt (%)	30.5	12.5	8.0	3.4	0.8
Total Debt/EBITDA (x)	0.9	1.6	2.6	3.2	5.8
Total Debt/Total Debt + Equity (%)	25.7	33.8	44.4	51.9	75.8
No. of Companies	8	55	104	58	55

Source: Standard & Poor's, CreditStats: 2010 Adjusted Key US & European Industrial and Utility Financial Ratios (RatingsDirect, August 2011).



Problems With Traditional Financial Ratio Analysis

- 1 Univariate Technique 1-at-a-time
- 2 No "Bottom Line"
- 3 Subjective Weightings
- 4 Ambiguous
- 5 Misleading



Forecasting Distress With Discriminant Analysis

Linear Form

 $Z = a_1 x_1 + a_2 x_2 + a_3 x_3 + \dots + a_n x_n$

Z = Discriminant Score (Z Score) $a_1 \xrightarrow{} a_n$ = Discriminant Coefficients (Weights) $x_1 \xrightarrow{} x_n$ = Discriminant Variables (e.g. Ratios)



Z-Score Component Definitions and Weightings

Variable	Definition	Weighting Factor
X_1	Working Capital	1.2
	Total Assets	
X ₂ ====	Retained Earnings	1.4
	Total Assets	
X ₃ ====	EBIT	3.3
	Total Assets	
X ₄	Market Value of Equity	0.6
	Book Value of Total Liabilit	ies
X ₅ 	Sales	1.0
	Total Assets	10

Z Score Bankruptcy Model

 $Z = .012X_1 + .014X_2 + .033X_3 + .006X_4 + .999X_5$

e.g. 20.0%

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + .6X_4 + .999X_5$$

e.g. 0.20

 $X_1 = \underline{\text{Current Assets - Current Liabilities}}_{\text{Total Assets}}$ $X_4 = \underline{\text{Market Value of Equity}}_{\text{Total Liabilities}}$ $X_2 = \underline{\text{Retained Earnings}}_{\text{Total Assets}}$ $X_5 = \underline{\text{Sales}}_{\text{Total Assets}}$ $(= \# \text{ of Times})_{\text{e.g. 2.0x}}$

 X_3 = Earnings Before Interest and Taxes

Total Assets



Zones of Discrimination: Original Z - Score Model (1968)



Time Series Impact On Corporate Z-Scores

- Credit Risk Migration
 - Greater Use of Leverage
 - Impact of HY Bond & LL Markets
 - Global Competition
 - More and Larger Bankruptcies
- Increased Type II Error



Estimating Probability of Default (PD) and Probability of Loss Given Defaults (LGD)

Method #1

- Credit scores on new or existing debt
- Bond rating equivalents on new issues (Mortality) or existing issues (Rating Agency Cumulative Defaults)
- Utilizing mortality or cumulative default rates to estimate marginal and cumulative defaults
- Estimating Default Recoveries and Probability of Loss

or

Method #2

- Credit scores on new or existing debt
- Direct estimation of the probability of default
- Based on PDs, assign a rating



Median Z-Score by S&P Bond Rating for U.S. Manufacturing Firms: 1992 - 2013

Rating	2013 (No.)	2004-2010	1996-2001	1992-1995
AAA/AA	4.13 (15)	4.18	6.20*	4.80*
Α	4.00 (64)	3.71	4.22	3.87
BBB	3.01 (131)	3.26	3.74	2.75
BB	2.69 (119)	2.48	2.81	2.25
В	1.66 (80)	1.74	1.80	1.87
CCC/CC	0.23 (3)	0.46	0.33	0.40
D	0.01 (33)	-0.04	-0.20	0.05

*AAA Only.

Sources: Compustat Database, mainly S&P 500 firms, compilation by NYU Salomon Center, Stern School of Business.



Marginal and Cumulative Mortality Rate Actuarial Approach

 $\mathbf{MMR}_{(\mathbf{r},\mathbf{t})} \quad \frac{total \ value \ of \ defaulting \ debt \ from \ rating \ (r) \ in \ year \ (t)}{total \ value \ of \ the \ population \ at \ the \ start \ of \ the \ year \ (t)}$ $\overline{\mathbf{M}}\mathbf{MR} = \mathbf{M} \mathbf{arginal} \ \mathbf{M} \mathbf{ortality} \ \mathbf{R} \mathbf{ate}$

One can measure the cumulative mortality rate (CMR) over a specific time period (1,2,..., T years) by subtracting the product of the surviving populations of each of the previous years from one (1.0), that is,

$$CMR_{(r,t)} = 1 - \Pi SR_{(r,t)},$$

$$t = 1 \rightarrow N$$

$$r = AAA \rightarrow CCC$$

here $CMR_{(r,t)} = Cumulative Mortality Rate of (r) in (t),$

SR $_{(r,t)}$ = Survival Rate in $_{(r,t)}$, 1 - MMR $_{(r,t)}$



Mortality Rate Concept (Illustrative Calculation)

For BB Rated Issues

Security No.	Issued Amount	Year 1 Default	Call	SF	Year 2 Default	Call	SF	
1	50			5			5	
2	50	50			NE	NE	NĔ	
3	100		100		NE	NE	NE	
4	100				100			
5	150						15	
6	150							
7	200			20			20	
8	200					200		
9	250							
10	250							
Total	1,500	50	100	25	100	200	40	
Amount								
Start of Period	1,500	-	175	-	- 1,325	- 340	=	985
		Year 1			Year 2			
Marginal								
Mortality Rate		50/1,500 =	= 3.3%		100/1,325	= 7.5%		
					1 - (SR1	x SR2)	= CMR2	
Cumulative R	ate	3.3%			1 - (96.7%	x 92.5%)	= 10.55%	6

NE = No longer in existence SF = Sinking fund



Mortality Rates by Original Rating

All Rated Corporate Bonds* 1971-2015

		1	2	3	4	5	6	7	8	9	10
AAA	Marginal	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.01%	0.00%	0.00%	0.00%
	Cumulative	0.00%	0.00%	0.00%	0.00%	0.01%	0.03%	0.04%	0.04%	0.04%	0.04%
٩A	Marginal	0.00%	0.00%	0.21%	0.07%	0.02%	0.01%	0.01%	0.01%	0.02%	0.01%
	Cumulative	0.00%	0.00%	0.21%	0.28%	0.30%	0.31%	0.32%	0.33%	0.35%	0.36%
		0.040/	0.000/	0.40%	0.400/	0.400/	0.000/	0.000/	0.05%	0.000/	0.05%
4	Marginal	0.01%	0.03%	0.12%	0.13%	0.10%	0.06%	0.02%	0.25%	0.08%	0.05%
	Cumulative	0.01%	0.04%	0.16%	0.29%	0.39%	0.45%	0.47%	0.72%	0.80%	0.85%
RR	Marginal	0 33%	2 36%	1 26%	1 00%	0 50%	0 22%	0.26%	0 15%	0 15%	0 34%
	Cumulative	0.33%	2.68%	3.91%	4.87%	5.34%	5.55%	5.80%	5.94%	6.08%	6.40%
3B	Marginal	0.94%	2.02%	3.88%	1.97%	2.34%	1.51%	1.45%	1.12%	1.43%	3.13%
	Cumulative	0.94%	2.94%	6.71%	8.54%	10.68%	12.03%	13.31%	14.28%	15.51%	18.15%
<u> </u>	Marginal	2 959/	7 720/	7 959/	7 000/	5 700/	A A00/	2 500/	2 000/	1 769/	0 770/
2		2.03%	1.12%	1.03%	7.00%	5.70%	4.40%	3.30%	2.00%	1.70%	U.11%
	Cumulative	2.85%	10.35%	17.39%	23.83%	20.17%	51.59%	33.83%	35.22%	30.30%	30.83%
222	Marginal	8.13%	12.43%	17.89%	16.32%	4.85%	11.65%	5.44%	4.84%	0.66%	4.28%
	Cumulative	8.13%	19.55%	33.94%	44.72%	47.40%	53.53%	56.06%	58.19%	58.46%	60.24%

Years After Issuance

*Rated by S&P at Issuance Based on 2,903 issues

Source: Standard & Poor's (New York) and Author's Compilation



Mortality Losses by Original Rating

All Rated Corporate Bonds* 1971-2015

		1	2	3	4	5	6	7	8	9	10
AAA	Marginal	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%
	Cumulative	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.03%	0.03%	0.03%	0.03%
AA	Marginal	0.00%	0.00%	0.03%	0.03%	0.01%	0.01%	0.00%	0.01%	0.01%	0.01%
	Cumulative	0.00%	0.00%	0.03%	0.06%	0.07%	0.08%	0.08%	0.09%	0.10%	0.11%
Α	Marginal	0.00%	0.01%	0.05%	0.06%	0.06%	0.04%	0.02%	0.03%	0.05%	0.03%
	Cumulative	0.00%	0.01%	0.06%	0.12%	0.18%	0.22%	0.24%	0.27%	0.32%	0.35%
BBB	Marginal	0.24%	1.54%	0.76%	0.59%	0.27%	0.14%	0.16%	0.09%	0.09%	0.19%
	Cumulative	0.24%	1.78%	2.52%	3.10%	3.36%	3.49%	3.65%	3.74%	3.82%	4.01%
BB	Marginal	0.56%	1.17%	2.31%	1.12%	1.34%	0.71%	0.79%	0.49%	0.74%	1.10%
	Cumulative	0.56%	1.72%	3.99%	5.07%	6.34%	7.01%	7.74%	8.19%	8.87%	9.87%
B	Marginal	1.91%	5.40%	5.33%	5.22%	3.77%	2.46%	2.33%	1.15%	0.92%	0.54%
	Cumulative	1.91%	7.21%	12.15%	16.74%	19.88%	21.85%	23.67%	24.55%	25.24%	25.64%
<u></u>	Morginal	5 20 0/	0 700/	40 500/	44 400/	2 200/	0 600/	2 2 4 0/	2 200/	0 449/	0 700/
666		5.38%	ō.70%	12.52%	11.49%	3.39%	ð.62%	2.34%	3.39%	0.41%	2.73%
	Cumulative	5.38%	13.61%	24.43%	33.11%	35.38%	40.95%	42.33%	44.29%	44.51%	46.03%

Years After Issuance

*Rated by S&P at Issuance Based on 2,481 issues

Source: Standard & Poor's (New York) and Author's Compilation



Classification & Prediction Accuracy Z Score (1968) Failure Model*

Year Prior	Original	Holdout	1969-1975 Predictive	1976-1995 Predictive	1997-1999 Predictive
To Failure	Sample (33)	Sample (25)	Sample (86)	Sample (110)	Sample (120)
1	94% (88%)	96% (72%)	82% (75%)	85% (78%)	94% (84%)
2	72%	80%	68%	75%	74%
3	48%	-	-	-	-
4	29%	-	-	-	-
5	36%	-	-	-	-

*Using 2.67 as cutoff score (1.81 cutoff accuracy in parenthesis)



Z Score Trend - LTV Corp.





International Harvester (Navistar) Z Score (1974 – 2001)



IBM Corporation Z Score (1980 – 2001)





U.S. Automotive Industry: Z, Z''-Scores and Bond Rating Equivalents (BRE) - Ford & GM: Z and Z"-Score Tracking

	Fo	ord	G	GM		
	Z-Scores	BRE	Z-Scores	BRE		
09/30/13	1.51	В	1.44	В		
12/31/12	1.44	В	1.57	В		
12/31/11	1.66	В	1.59	В		
12/31/10	1.62	В	1.56	В		
12/31/09	1.24	B-	0.28	CCC		
03/31/09	n/a	n/a	(1.12)	D		
12/31/08	0.85	CCC	(0.63)	D		
12/31/07	1.15	B-	0.77	CCC+		
12/31/06	0.95	CCC+	1.12	B-		
12/31/05	1.25	B-	0.96	CCC+		
	Z"-Scores	BRE	Z"-Scores	BRE		
09/30/13	5.61	BB-	4.56	B+		
12/31/12	5.59	BB-	4.54	B+		
12/31/11	6.29	BB+	5.04	B+		
12/31/10	5.86	BB-	4.60	B+		
12/31/09	5.84	BB-	2.72	CCC+		
12/31/08	4.71	B+	(3.62)	D		
12/31/07	5.82	BB-	1.85	CCC-		
12/31/06	5.42	BB-	3.39	B-		
12/31/05	5.74	BB-	6.59	BBB+		

Note: Consolidated Annual Results. Data Source: Bloomberg., Edgar



Z-Score Model Applied to GM (Consolidated Data): Bond Rating Equivalents and Scores from 2005 – 2015





Additional Altman Z-Score Models: Private Firm Model Non-U.S., Emerging Markets Model for Non-Financial Industrial Firms SME Models for the U.S. & Europe Corporate Models for Latin America, China, etc.



Z" Score Private Firm Model

 $Z' = .717X_1 + .847X_2 + 3.107X_3 + .420X_4 + .998X_5$

 X_1 = Current Assets - Current Liabilities

Total Assets

 $X_2 =$ Retained Earnings

Total Assets

 X_3 = Earnings Before Interest and Taxes

Total Assets

 $X_4 =$ Book Value of Equity

Total Liabilities

 $X_{5} =$

Total Assets

Sales

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

Z" Score Model for Manufacturers, Non-Manufacturer Industrials; Developed and Emerging Market Credits

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

 X_1 = Current Assets - Current Liabilities

Total Assets

X₂ = Retained Earnings

Total Assets

X₃ = Earnings Before Interest and Taxes

Total Assets

 $X_4 =$ Book Value of Equity

Total Liabilities

Z" > 5.85 - "Safe" Zone 4.35 < Z" < 5.85 - "Grey" Zone Z" < 4.35 - "Distress" Zone





Classification & Prediction Accuracy (Type I) Z"-Score Bankruptcy Model* (Based on the Original Sample and a Sample of Recent Bankruptcies (2011-2014))

No. of Months Prior to Bankruptcy Filing	Original Sample (33)	Holdout Sample (25)	2011-2014 Predictive Sample (71)
6	94%	96%	93%
18	72%	80%	87%
30	-	-	67%

*E. Altman and J. Hartzell, "Emerging Market Corporate Bonds – A Scoring System", Salomon Brothers Corporate Bond Research, May 15, 1995, Summarized in E. Altman and E. Hotchkiss, **Corporate Financial Distress and Bankruptcy**, 3rd Edition, John Wiley & Sons, 2006.



US Bond Rating Equivalents Based on Z"-Score Model

Rating	Rating Median 1996 Z"-Score ^a Median 2006 Z"-Score ^a Median 2013 Z"-Score ^a									
AAA/AA+	8.15 (8)	7.51 (14)	8.80 (15)							
AA/AA-	7.16 (33)	7.78 (20)	8.40 (17)							
A+	6.85 (24)	7.76 (26)	8.22 (23)							
А	6.65 (42)	7.53 (61)	6.94 (48)							
A-	6.40 (38)	7.10 (65)	6.12 (52)							
BBB+	6.25 (38)	6.47 (74)	5.80 (70)							
BBB	5.85 (59)	6.41 (99)	5.75 (127)							
BBB-	5.65 (52)	6.36 (76)	5.70 (96)							
BB+	5.25 (34)	6.25 (68)	5.65 (71)							
BB	4.95 (25)	6.17 (114)	5.52 (100)							
BB-	4.75 (65)	5.65 (173)	5.07 (121)							
B+	4.50 (78)	5.05 (164)	4.81 (93)							
В	4.15 (115)	4.29 (139)	4.03 (100)							
B-	3.75 (95)	3.68 (62)	3.74 (37)							
CCC+	3.20 (23)	2.98 (16)	2.84 (13)							
CCC	2.50 (10)	2.20 (8)	2.57(3)							
CCC-	1.75 (6)	1.62 (-) ^b	1.72 (-) ^b							
CC/D	0 (14)	0.84 (120)	0.05 (94) ^c							

^aSample Size in Parantheses. ^bInterpolated between CCC and CC/D. ^cBased on 94 Chapter 11 bankruptcy filings, 2010-2013. Sources: Compustat, Company Filings and S&P.

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Classification & Prediction Accuracy (Type I) Z"-Score Bankruptcy Model*

No. of Months Prior to Bankruptcy Filing	Original Sample (33)	Holdout Sample (25)	2011-2014 Predictive Sample (69)
6	94%	96%	93%
18	72%	80%	87%

*E. Altman and J. Hartzell, "Emerging Market Corporate Bonds – A Scoring System", Salomon Brothers Corporate Bond Research, May 15, 1995, Summarized in E. Altman and E. Hotchkiss, **Corporate Financial Distress and Bankruptcy**, 3rd Edition, John Wiley & Sons, 2006.



Enron Credit Risk Measures



Source: A. Saunders and L. Allen, Credit Risk Measurement; J. Wiley, 2002



DAF Corporation Z Scores (Dutch Company Bankruptcy 1993)





Comparative Health of High-Yield Firms (2007 vs. 2012/2014/3Q 2016)



Comparing Financial Strength of High-Yield Bond Issuers in 2007& 2012/2014/3Q 2016

Number of Firms				
	Z-Score	Z"-Score		
2007	294	378		
2012	396	486		
2014	577	741		
2016 (3Q)	581	742		

Year	Average Z-Score/ (BRE)*	Median Z-Score/ (BRE)*	Average Z"-Score/ (BRE)*	Median Z"-Score/ (BRE)*
2007	1.95 (B+)	1.84 (B+)	4.68 (B+)	4.82 (B+)
2012	1.76 (B)	1.73 (B)	4.54 (B)	4.63 (B)
2014	2.03 (B+)	1.85 (B+)	4.66 (B+)	4.74 (B+)
2016 (3Q)	1.97 (B+)	1.70 (B)	4.44 (B)	4.63 (B)



AN EMERGING MARKET CORPORATE MODEL



An Emerging Market Credit Scoring System

- Step 1- Calculate the EM Score and its <u>Bond Rating Equivalent</u> (BRE) compared to the U.S. Bond Market
- Step 2 Adjust (modify) the Bond Rating Equivalent for Forex Revaluation Vulnerability
 - High vulnerability = -1 rating class (3 notches)
 - Neutral vulnerability = -1 notch
 - Low vulnerability = no change

• Step 3 - Adjust BRE for Risk of Industry in the Emerging Market vs. Risk of the Industry in the U.S.

• \pm - 1 or 2 notches



An Emerging Market Credit Scoring System

- Step 4 Adjustment of BRE for Competitive Position
 - Dominant firm in industry = +1 notch
 - Average firm in industry = no change
 - Poor competitive position = -1 notch
- Step 5 Special Collateral or Guarantees Impact on BRE
- Step 6 Assess the yield in the U.S. market on the modified BRE of the emerging Market credit, then add the sovereign yield spread. Finally, compare the resulting required yield with the yield in the market.



CAN WE PREDICT CHAPTER-22?



KMV MODEL





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KMV' S Expected Default Frequency (EDF)

Based on empirical observation of the Historical Frequency of the Number of Firms that Defaulted With Asset Values (Equity + Debt) Exceeding Face Value of Debt Service By a Certain Number of Standard (Std.) Deviations at one year prior to default.

For Example:

Current Market Value of Assets	=	\$ 910
Expected One Year Growth in Assets	=	10%
Expected One Year Asset Value	=	\$1,000
Standard Deviation	=	\$ 150
Par Value of Debt Service in One Year	=	\$ 700
Therefore:		
# Std. Deviations from Debt Service	=	2

Expected Default Frequency (EDF)

EDF = ______ Number of Firms that Defaulted With Asset Values 2 Std. Deviations from Debt Service

Total Population of Firms With 2 Std. Deviations from Debt Service

e.g.. = 50 Defaults = .05 = EDF

1,000 Population



Comparing Z-Score and KMV-EDF Bond Rating Equivalents: IBM Corporation



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MANAGING A FINANCIAL TURNAROUND: APPLICATIONS OF THE Z-SCORE MODEL IN THE US AND CHINA

THE GTI CASE



Financial Distress (Z-Score) Prediction Applications

- Lenders
- Investors (e.g. Quality Junk Portfolio)
- Long/Short Investment Strategy on Stocks and Bonds
- Baskets of Strong Balance Sheet Companies & Indexes (e.g. STOXX)
- Security Analysts
- Regulators & Gov't Agencies
- Auditors (Audit Risk Model)
- Credit Rating Agencies

- Comparative Risk Profiles Over Time
- Sovereign Default Risk Assessment
- Advisors (Assessing Your Client's Health)
- M&A (e.g. Bottom Fishing)
- Purchasers, Suppliers
- Accounts Receivable Management (e.g. NACM)
- Researchers
- Chapter 22 Reduction
- Managers
 - Managing a Financial Turnaround



QUALITY JUNK STRATEGY



Return/Risk Tradeoffs – Distressed & High-Yield Bonds

As of December 31, 2012



Z" = 3.25 + 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4 X1 = CA – CL / TA; X2 = RE / TA; X3 = EBIT / TA; X4 = BVE / TL

- **A** = Very High Return **/** Low Risk
- **B** = High Return **/** Low Risk
- **C** = Very High Return **/** High Risk
- **D** = High Return **/** High Risk



JUNK QUALITY STRATEGY OR SHORT HIGH-YIELD STRATEGY



MANAGING A FINANCIAL TURNAROUND: THE GTI CASE

CAVEATS FOR A SUCCESSFUL TURNAROUND

