



# Valuing Firms in Distress

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# The Going Concern Assumption

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- Traditional valuation techniques are built on the assumption of a going concern, I.e., a firm that has continuing operations and there is no significant threat to these operations.
  - In discounted cashflow valuation, this going concern assumption finds its place most prominently in the terminal value calculation, which usually is based upon an infinite life and ever-growing cashflows.
  - In relative valuation, this going concern assumption often shows up implicitly because a firm is valued based upon how other firms - most of which are healthy - are priced by the market today.
- When there is a significant likelihood that a firm will not survive the immediate future (next few years), traditional valuation models may yield an over-optimistic estimate of value.

# Why distress matters...

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- Some firms are clearly exposed to possible distress, though the source of the distress may vary across firms.
  - For some firms, it is too much debt that creates the potential for failure to make debt payments and its consequences (bankruptcy, liquidation, reorganization)
  - For other firms, distress may arise from the inability to meet operating expenses.
- When distress occurs, the firm's life is terminated leading to a potential loss of all cashflows beyond that point in time.
  - In a DCF valuation, distress can essentially truncate the cashflows well before you reach "nirvana" (terminal value).
  - A multiple based upon comparable firms may be set higher for firms that have continuing earnings than for one where there is a significant chance that these earnings will end (as a consequence of bankruptcy).

# The Purist DCF Defense: You do not need to consider distress in valuation

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- If we assume that there is unrestricted access to capital, no firm that is worth more as a going concern will ever be forced into liquidation.
  - Response: But access to capital is not unrestricted, especially for firms that are viewed as troubled and in depressed financial markets.
- The firms we value are large market-cap firms that are traded on major exchanges. The chances of these firms defaulting is minimal...
  - Response: Enron and Kmart....
- Firms that default will be able to sell their assets (both in-place and growth opportunities) for a fair market value, which should be equal to the expected operating cashflows on these assets.
  - Response: Unlikely, even for assets-in-place, because of the need to liquidate quickly.

# The Adapted DCF Defense: It is already in the valuation

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- The expected cashflows can be adjusted to reflect the likelihood of distress. For firms with a significant likelihood of distress, the expected cashflows should be much lower.
  - Response: Easier said than done. Most DCF valuations do not consider the likelihood in any systematic way. Even if it is done, you are implicitly assuming that in the event of distress, the distress sale proceeds will be equal to the present value of the expected cash flows.
- The discount rate (costs of equity and capital) can be adjusted for the likelihood of distress. In particular, the beta (or betas) used to estimate the cost of equity can be estimated using the updated debt to equity ratio, and the cost of debt can be increased to reflect the current default risk of the firm.
  - Response: This adjusts for the additional volatility in the cashflows but not for the truncation of the cashflows.

# Dealing with Distress in DCF Valuation

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- *Simulations*: You can use probability distributions for the inputs into DCF valuation, run simulations and allow for the possibility that a string of negative outcomes can push the firm into distress.
- *Modified Discounted Cashflow Valuation*: You can use probability distributions to estimate expected cashflows that reflect the likelihood of distress.
- *Going concern DCF value with adjustment for distress*: You can value the distressed firm on the assumption that the firm will be a going concern, and then adjust for the probability of distress and its consequences.
- *Adjusted Present Value*: You can value the firm as an unlevered firm and then consider both the benefits (tax) and costs (bankruptcy) of debt.

# I. Monte Carlo Simulations

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- Preliminary Step: Define the circumstances under which you would expect a firm to be pushed into distress.
- Step 1: Choose the variables in the DCF valuation that you want estimate probability distributions on.
- Steps 2 & 3: Define the distributions (type and parameters) for each of these variables.
- Step 4: Run a simulation, where you draw one outcome from each distribution and compute the value of the firm. If the firm hits the “distress conditions”, value it as a distressed firm.
- Step 5: Repeat step 4 as many times as you can.
- Step 6: Estimate the expected value across repeated simulations.

## II. Modified Discounted Cashflow Valuation

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- If you can come up with probability distributions for the cashflows (across all possible outcomes), you can estimate the expected cash flow in each period. This expected cashflow should reflect the likelihood of default. In conjunction with these cashflow estimates, you should estimate the discount rates by
  - Using bottom-up betas and updated debt to equity ratios (rather than historical or regression betas) to estimate the cost of equity
  - Using updated measures of the default risk of the firm to estimate the cost of debt.
- If you are unable to estimate the entire distribution, you can at least estimate the probability of distress in each period and use as the expected cashflow:

$$\text{Expected cashflow}_t = \text{Cash flow}_t * (1 - \text{Probability of distress}_t)$$



### III. DCF Valuation + Distress Value

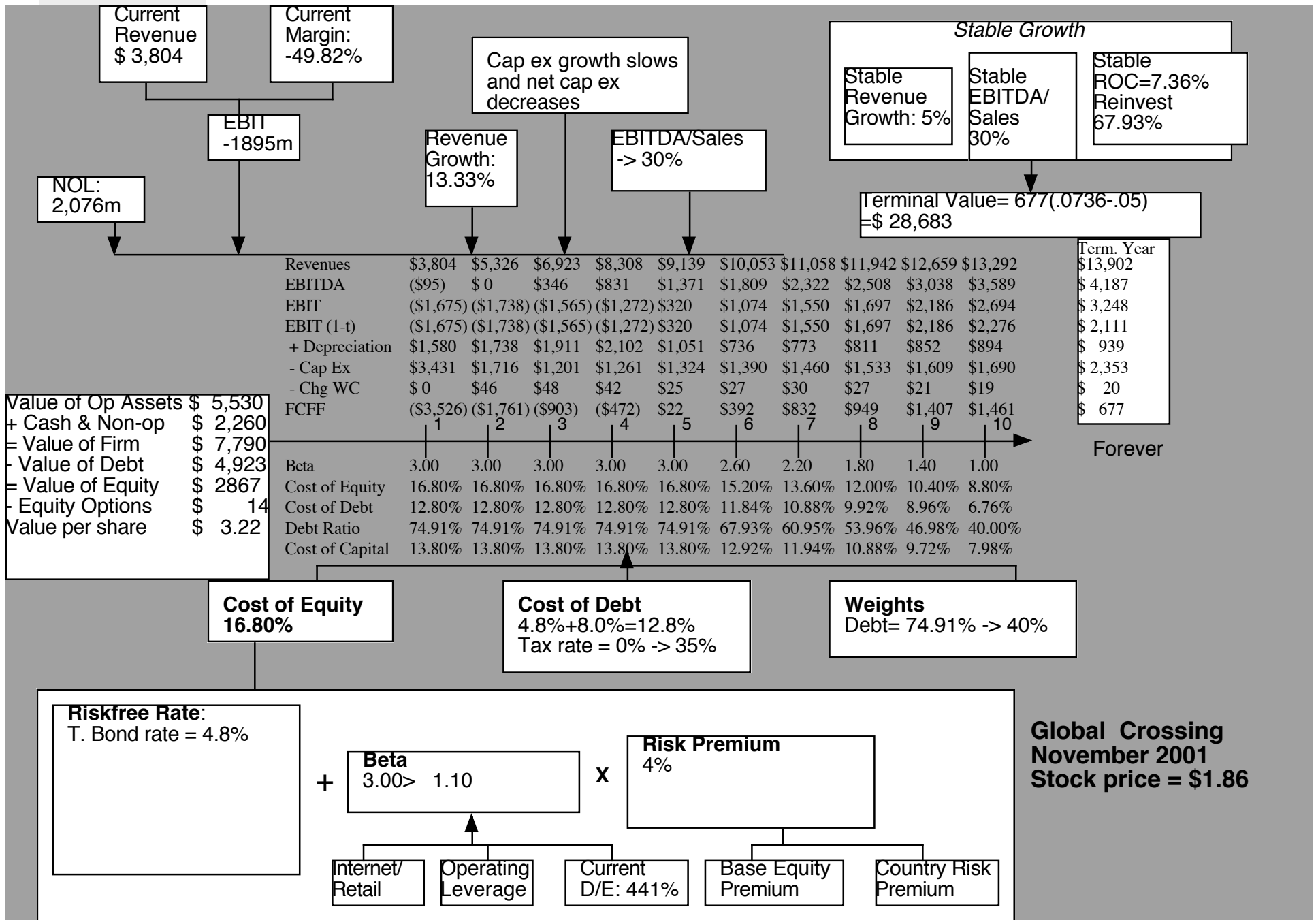
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- A DCF valuation values a firm as a going concern. If there is a significant likelihood of the firm failing before it reaches stable growth and if the assets will then be sold for a value less than the present value of the expected cashflows (a distress sale value), DCF valuations will understate the value of the firm.
- Value of Equity = DCF value of equity (1 - Probability of distress) + Distress sale value of equity (Probability of distress)

## Step 1: Value the firm as a going concern

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- You can value a firm as a going concern, by looking at the expected cashflows it will have if it follows the path back to financial health. The costs of equity and capital will also reflect this path. In particular, as the firm becomes healthier, the debt ratio (which is high at the time of the distress) will converge to more normal levels. This, in turn, will lead to lower costs of equity and debt.
- Most discounted cashflow valuations, in my view, are implicitly going concern valuations.



## Step 2: Estimate the probability of distress

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- We need to estimate a cumulative probability of distress over the lifetime of the DCF analysis - often 10 years.
- There are three ways in which we can estimate the probability of distress:
  - Use the bond rating to estimate the cumulative probability of distress over 10 years
  - Estimate the probability of distress with a probit
  - Estimate the probability of distress by looking at market value of bonds.

## a. Bond Rating as indicator of probability of distress

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Rating	Cumulative probability of distress	
	<i>5 years</i>	<i>10 years</i>
AAA	0.03%	0.03%
AA	0.18%	0.25%
A+	0.19%	0.40%
A	0.20%	0.56%
A-	1.35%	2.42%
BBB	2.50%	4.27%
BB	9.27%	16.89%
B+	16.15%	24.82%
B	24.04%	32.75%
B-	31.10%	42.12%
CCC	39.15%	51.38%
CC	48.22%	60.40%
C+	59.36%	69.41%
C	69.65%	77.44%
C-	80.00%	87.16%

## b. Bond Price to estimate probability of distress

- Global Crossing has a 12% coupon bond with 8 years to maturity trading at \$ 653. To estimate the probability of default (with a treasury bond rate of 5% used as the riskfree rate):

$$653 = \sum_{t=1}^{t=8} \frac{120(1 - p_{Distress})^t}{(1.05)^t} + \frac{1000(1 - p_{Distress})^8}{(1.05)^8}$$

- Solving for the probability of bankruptcy, we get
  - With a 10-year bond, it is a process of trial and error to estimate this value. The solver function in excel accomplishes the same in far less time.

$$p_{Distress} = \text{Annual probability of default} = 13.53\%$$

- To estimate the cumulative probability of distress over 10 years:
- Cumulative probability of surviving 10 years =  $(1 - .1353)^{10} = 23.37\%$
- Cumulative probability of distress over 10 years =  $1 - .2337 = .7663$  or 76.63%

## c. Using Statistical Techniques

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- The fact that hundreds of firms go bankrupt every year provides us with a rich database that can be mined to answer both why bankruptcy occurs and how to predict the likelihood of future bankruptcy.
- In a probit, we begin with the same data that was used in linear discriminant analysis, a sample of firms that survived a specific period and firms that did not. We develop an indicator variable, that takes on a value of zero or one, as follows:

$$\begin{aligned} \text{Distress Dummy} &= 0 && \text{for any firm that survived the period} \\ &= 1 && \text{for any firm that went bankrupt during the period} \end{aligned}$$

- We then consider information that would have been available at the beginning of the period. For instance, we could look at the debt to capital ratios and operating margins of all of the firms in the sample at the start of the period. Finally, using the dummy variable as our dependent variable and the financial ratios (debt to capital and operating margin) as independent variables, we look for a relationship:

$$\text{Distress Dummy} = a + b (\text{Debt to Capital}) + c (\text{Operating Margin})$$

## Step 3: Estimating Distress Sale Value

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- If a firm can claim the present value of its expected future cashflows from assets in place and growth assets as the distress sale proceeds, there is really no reason why we would need to consider distress separately.
- The distress sale value of equity can be estimated
  - as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).
  - As a percent of the DCF value, estimated as a going concern



## Step 4: Valuing Global Crossing with Distress

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- Probability of distress
  - Cumulative probability of distress = 76.63%
- Distress sale value of equity
  - Book value of capital = \$14,531 million
  - Distress sale value = 25% of book value =  $.25 * 14531 = \$3,633$  million
  - Book value of debt = \$7,647 million
  - Distress sale value of equity = \$ 0
- Distress adjusted value of equity
  - Value of Global Crossing =  $\$3.22 (1-.7663) + \$0.00 (.7663) = \$ 0.75$

## IV. Adjusted Present Value Model

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- In the adjusted present value approach, the value of the firm is written as the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value
- Firm Value = Unlevered Firm Value + (Tax Benefits of Debt - Expected Bankruptcy Cost from the Debt)
  - The unlevered firm value can be estimated by discounting the free cashflows to the firm at the unlevered cost of equity
  - The tax benefit of debt reflects the present value of the expected tax benefits. In its simplest form,
$$\text{Tax Benefit} = \text{Tax rate} * \text{Debt}$$
  - The expected bankruptcy cost can be estimated as the difference between the unlevered firm value and the distress sale value:
$$\text{Expected Bankruptcy Costs} = (\text{Unlevered firm value} - \text{Distress Sale Value}) * \text{Probability of Distress}$$

# Relative Valuation: Where is the distress factored in?

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- Revenue and EBITDA multiples are used more often to value distressed firms than healthy firms. The reasons are pragmatic. Multiple such as price earnings or price to book value often cannot even be computed for a distressed firm.
- Analysts who are aware of the possibility of distress often consider them subjectively at the point when they compare the multiple for the firm they are analyzing to the industry average. For example, assume that the average telecomm firm trades at 2 times revenues. You may adjust this multiple down to 1.25 times revenues for a distressed telecomm firm.

# Ways of dealing with distress in Relative Valuation

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- You can choose only distressed firms as comparable firms, if you are called upon to value one.
  - Response: Unless there are a large number of distressed firms in your sector, this will not work.
- Adjust the multiple for distress, using some objective criteria.
  - Response: Coming up with objective criteria that work well may be difficult to do.
- Consider the possibility of distress explicitly
  - Distress-adjusted value = Relative value based upon healthy firms (1 - Probability of distress) + Distress sale proceeds (Probability of distress)

# I. Choose Comparables

<i>Company Name</i>	<i>Value to Book Capital</i>	<i>EBIT</i>	<i>Market Debt to Capital Ratio</i>
SAVVIS Communications Corp	0.80	-83.67	75.20%
Talk America Holdings Inc	0.74	-38.39	76.56%
Choice One Comm. Inc	0.92	-154.36	76.58%
FiberNet Telecom Group Inc	1.10	-19.32	77.74%
Level 3 Communic.	0.78	-761.01	78.89%
Global Light Telecom.	0.98	-32.21	79.84%
Korea Thrunet Co. Ltd Cl A	1.06	-114.28	80.15%
Williams Communications Grp	0.98	-264.23	80.18%
RCN Corp.	1.09	-332.00	88.72%
GT Group Telecom Inc Cl B	0.59	-79.11	88.83%
Metromedia Fiber 'A'	0.59	-150.13	91.30%
Global Crossing Ltd.	0.50	-15.16	92.75%
Focal Communications Corp	0.98	-11.12	94.12%
Adelphia Business Solutions	1.05	-108.56	95.74%
Allied Riser Communications	0.42	-127.01	95.85%
CoreComm Ltd	0.94	-134.07	96.04%
Bell Canada Intl	0.84	-51.69	96.42%
Globix Corp.	1.06	-59.35	96.94%
United Pan Europe Communicatio	1.01	-240.61	97.27%
Average	0.87		

## II. Adjust the Multiple

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- In the illustration above, you can categorize the firms on the basis of an observable measure of default risk. For instance, if you divide all telecomm firms on the basis of bond ratings, you find the following -

<i>Bond Rating</i>	<i>Value to Book Capital Ratio</i>
A	1.70
BBB	1.61
BB	1.18
B	1.06
CCC	0.88
CC	0.61

- You can adjust the average value to book capital ratio for the bond rating.

### III. Multiple Valuation + Distress Value

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- You could apply the average value to book capital ratio of all telecomm firms to value Global Crossing as a going concern.
  - $\text{Going concern value} = \text{Average for telecomm firms} * \text{BV of capital for Global Crossing}$
- Once you have the going concern value, you could use the same approach you used in the DCF approach to adjust for distress sale value.

# Other Considerations in Valuing Distressed firms

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- With distressed firms, everything is in flux - the operating margins, cash balance and debt to name three. It is important that you update your valuation to reflect the most recent information that you have on the firm.
- The equity in a distressed firm can take on the characteristics of an option and it may therefore trade at a premium on the DCF value.



# Closing Thoughts

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- Distress is not restricted to a few small firms. Even large firms are exposed to default and bankruptcy risk.
- When firms are pushed into bankruptcy, the proceeds received on a distress sale are usually much lower than the value of the firm as a going concern.
- Conventional valuation models understate the impact of distress on value, by either ignoring the likelihood of distress or by using ad hoc (or subjective) adjustments for distress.
- Valuation models - both DCF and relative - have to be adapted to incorporate the effect of distress.