Valuing Equity in Firms in Distress

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The Going Concern Assumption

■ 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.

Valuing a Firm

■ The value of the firm is obtained by discounting expected cashflows to the firm, i.e., the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.
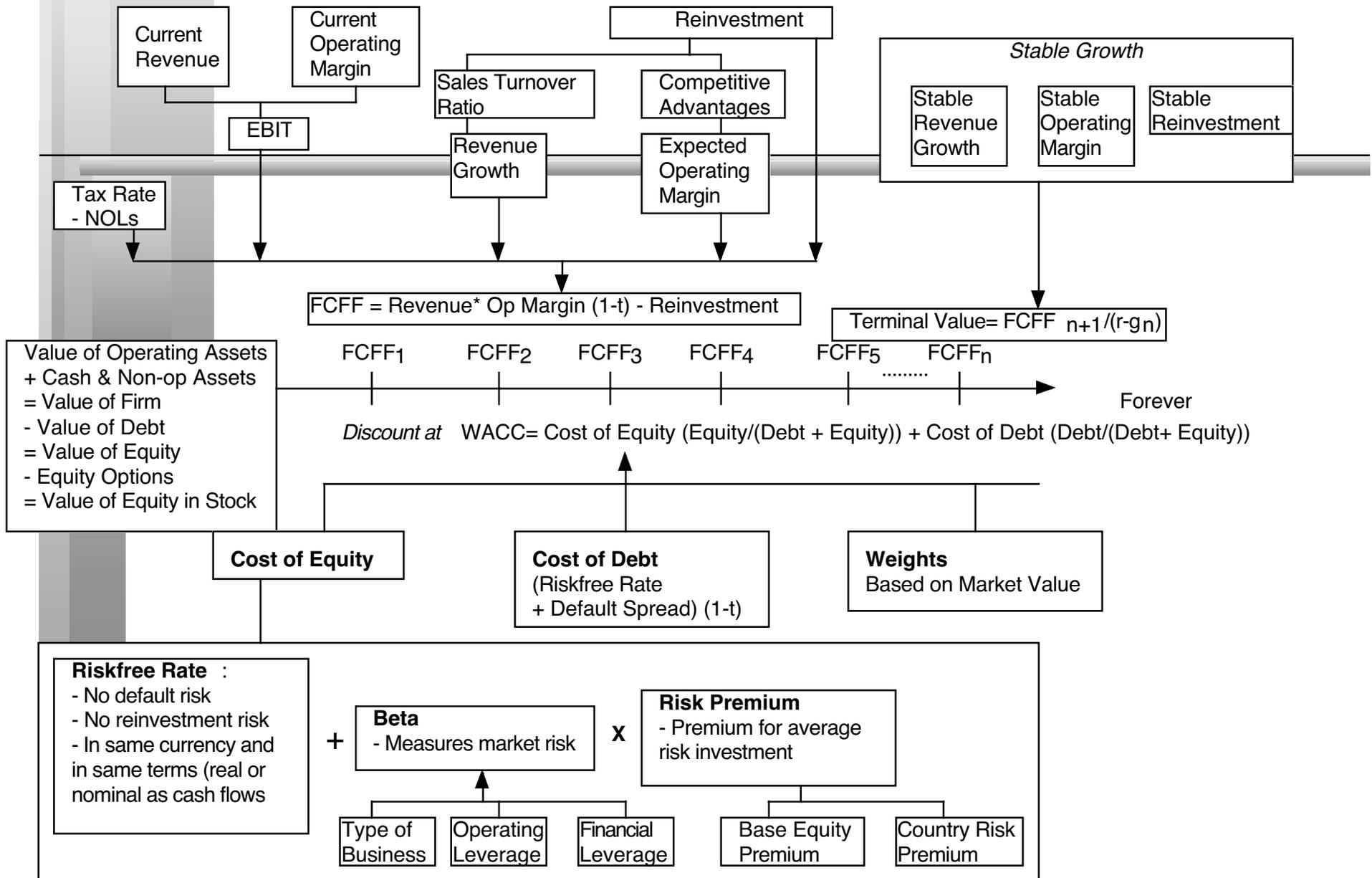
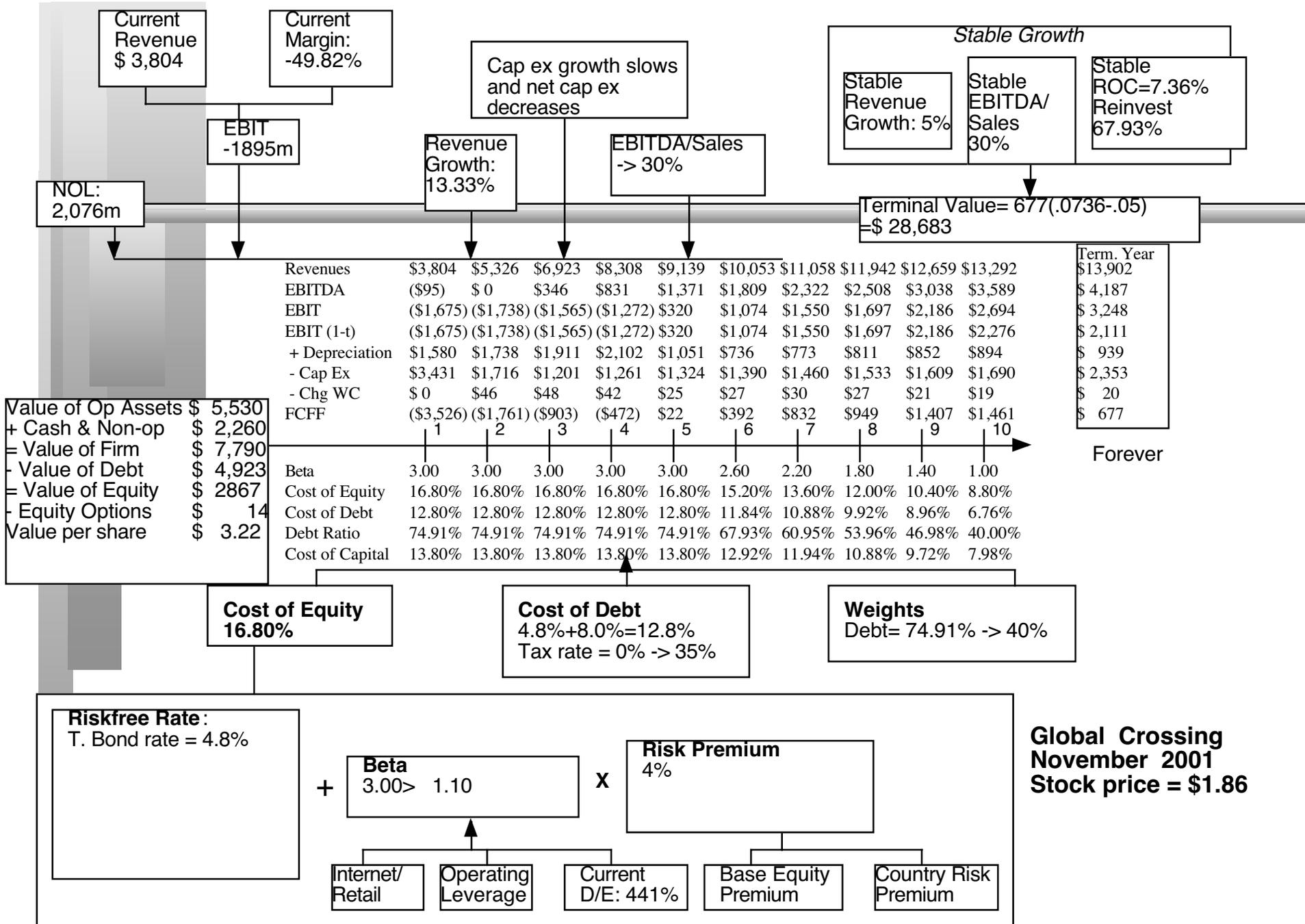$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

where,

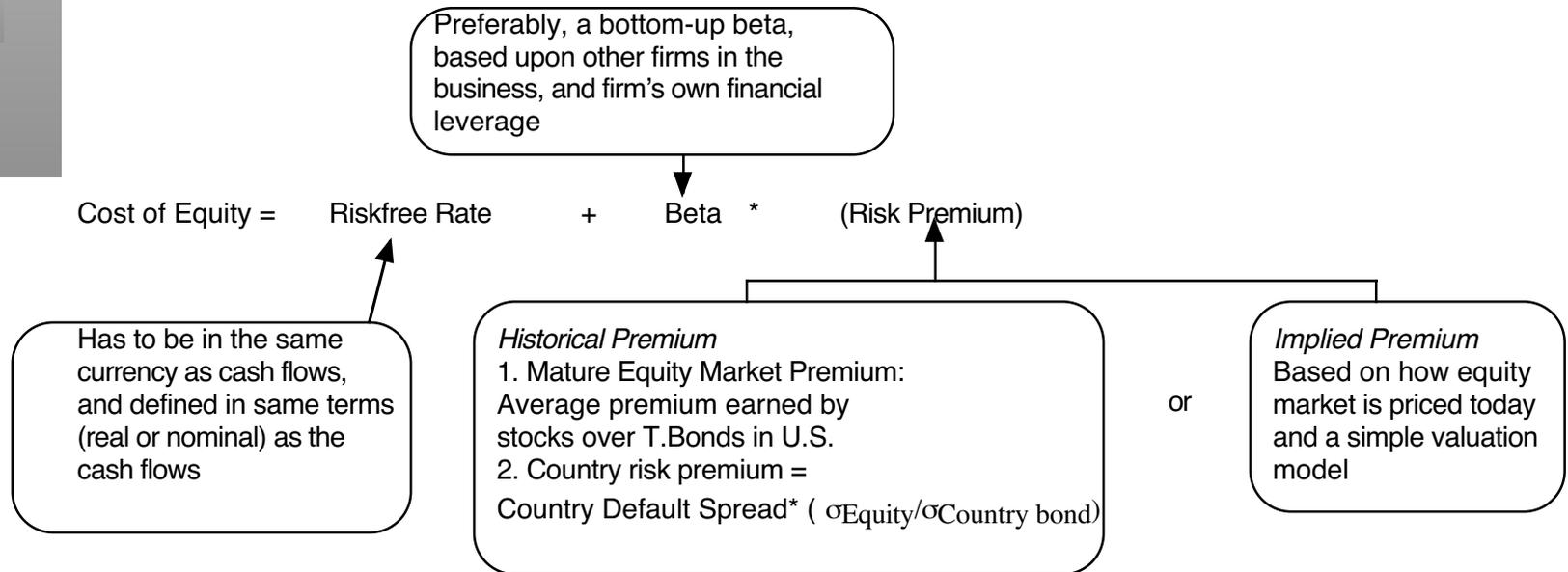CF to Firm_t = Expected Cashflow to Firm in period t

WACC = Weighted Average Cost of Capital

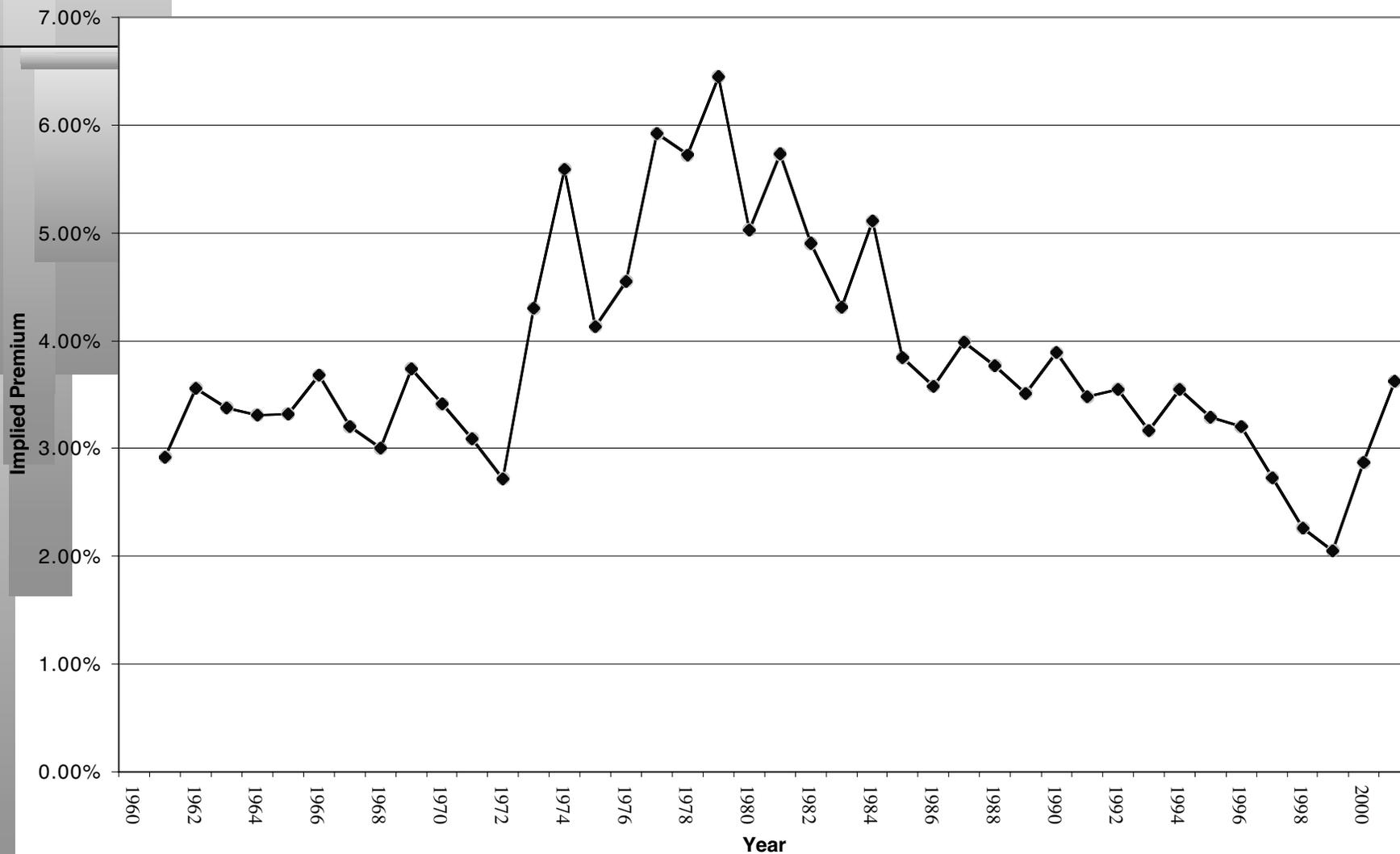## Discounted Cash Flow Valuation: High Growth with Negative Earnings

Current Revenue	Current Operating Margin		Reinvestment			Stable Growth		

Current Revenue

Current Operating Margin

Reinvestment

Stable Growth

EBIT

Sales Turnover Ratio

Competitive Advantages

Stable Revenue Growth

Stable Operating Margin

Stable Reinvestment

Revenue Growth

Expected Operating Margin

Tax Rate - NOLs

FCFF = Revenue* Op Margin (1-t) - Reinvestment

Terminal Value= $FCFF_{n+1}/(r-g_n)$

Value of Operating Assets
+ Cash & Non-op Assets
= Value of Firm
- Value of Debt
= Value of Equity
- Equity Options
= Value of Equity in Stock

$FCFF_1$　$FCFF_2$　$FCFF_3$　$FCFF_4$　$FCFF_5$　$FCFF_n$　.........

Forever

Discount at WACC= Cost of Equity (Equity/(Debt + Equity)) + Cost of Debt (Debt/(Debt+ Equity))

Cost of Equity

Cost of Debt
(Riskfree Rate
+ Default Spread) (1-t)

Weights
Based on Market Value

Riskfree Rate :
- No default risk
- No reinvestment risk
- In same currency and in same terms (real or nominal as cash flows

+

Beta
- Measures market risk

X

Risk Premium
- Premium for average risk investment

Type of Business

Operating Leverage

Financial Leverage

Base Equity Premium

Country Risk Premium

											Term. Year

Current Revenue $ 3,804

Current Margin: -49.82%

Cap ex growth slows and net cap ex decreases

Stable Growth

Stable Revenue Growth: 5%

Stable EBITDA/ Sales 30%

Stable ROC=7.36% Reinvest 67.93%

EBIT -1895m

Revenue Growth: 13.33%

EBITDA/Sales -> 30%

NOL: 2,076m

Terminal Value= 677(.0736-.05) =$ 28,683

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenues	$3,804	$5,326	$6,923	$8,308	$9,139	$10,053	$11,058	$11,942	$12,659	$13,292	$13,902
EBITDA	($95)	$ 0	$346	$831	$1,371	$1,809	$2,322	$2,508	$3,038	$3,589	$ 4,187
EBIT	($1,675)	($1,738)	($1,565)	($1,272)	$320	$1,074	$1,550	$1,697	$2,186	$2,694	$ 3,248
EBIT (1-t)	($1,675)	($1,738)	($1,565)	($1,272)	$320	$1,074	$1,550	$1,697	$2,186	$2,276	$ 2,111
+ Depreciation	$1,580	$1,738	$1,911	$2,102	$1,051	$736	$773	$811	$852	$894	$ 939
- Cap Ex	$3,431	$1,716	$1,201	$1,261	$1,324	$1,390	$1,460	$1,533	$1,609	$1,690	$ 2,353
- Chg WC	$ 0	$46	$48	$42	$25	$27	$30	$27	$21	$19	$ 20
FCFF	($3,526)	($1,761)	($903)	($472)	$22	$392	$832	$949	$1,407	$1,461	$ 677

Value of Op Assets	$ 5,530
+ Cash & Non-op	$ 2,260
= Value of Firm	$ 7,790
- Value of Debt	$ 4,923
= Value of Equity	$ 2867
- Equity Options	$ 14
Value per share	$ 3.22

Forever

	1	2	3	4	5	6	7	8	9	10
Beta	3.00	3.00	3.00	3.00	3.00	2.60	2.20	1.80	1.40	1.00
Cost of Equity	16.80%	16.80%	16.80%	16.80%	16.80%	15.20%	13.60%	12.00%	10.40%	8.80%
Cost of Debt	12.80%	12.80%	12.80%	12.80%	12.80%	11.84%	10.88%	9.92%	8.96%	6.76%
Debt Ratio	74.91%	74.91%	74.91%	74.91%	74.91%	67.93%	60.95%	53.96%	46.98%	40.00%
Cost of Capital	13.80%	13.80%	13.80%	13.80%	13.80%	12.92%	11.94%	10.88%	9.72%	7.98%

Cost of Equity 16.80%

Cost of Debt
4.8%+8.0%=12.8%
Tax rate = 0% -> 35%

Weights
Debt= 74.91% -> 40%

Riskfree Rate:
T. Bond rate = 4.8%

Global Crossing November 2001 Stock price = $1.86

+

Beta
3.00> 1.10

X

Risk Premium
4%

Internet/ Retail

Operating Leverage

Current D/E: 441%

Base Equity Premium

Country Risk Premium

I. Discount Rates:Cost of Equity

Preferably, a bottom-up beta, based upon other firms in the business, and firm's own financial leverage

Cost of Equity =   Riskfree Rate   +   Beta *   (Risk Premium)

Has to be in the same currency as cash flows, and defined in same terms (real or nominal) as the cash flows

Historical Premium
1. Mature Equity Market Premium: Average premium earned by stocks over T.Bonds in U.S.
2. Country risk premium =
Country Default Spread* ($\sigma_{Equity}/\sigma_{Country\ bond}$)

or

Implied Premium
Based on how equity market is priced today and a simple valuation model

Implied Premium for US Equity Market

Beta Estimation: Global Crossing

The Solution: Bottom-up Betas

- ■ The bottom up beta can be estimated by :
  - Taking a weighted (by sales or operating income) average of the unlevered betas of the different businesses a firm is in.

$$\sum_{j=1}^{j=k} \beta_j \left[\frac{\text{Operating Income}_j}{\text{Operating Income}_{\text{Firm}}} \right]$$

  (The unlevered beta of a business can be estimated by looking at other firms in the same business)
  - Lever up using the firm's debt/equity ratio

$$\beta_{\text{levered}} = \beta_{\text{unlevered}}\left[1 + (1 - \text{tax rate}) \, (\text{Current Debt/Equity Ratio})\right]$$

- ■ The bottom up beta will give you a better estimate of the true beta when
  - It has lower standard error ($\text{SE}_{\text{average}} = \text{SE}_{\text{firm}} / \sqrt{n}$ (n = number of firms)
  - It reflects the firm's current business mix and financial leverage
  - It can be estimated for divisions and private firms.

Global Crossing's Bottom-up Beta

Unlevered beta for firms in telecommunications equiipment =   0.752

Current market debt to equity ratio = 298.56%

Levered beta for Global Crossing = 0.752 (1+ (1-0) (2.9856)) = 3.00

- Global Crossing's current market values of debt and equity are used to compute the market debt to equity ratio.
    - Market value of equity = Price/share * # shares = $ 1.86 * 886.47 = $1,649 million
    - Market value of debt = 415 (PV of Annuity, 12.80%, 8 years) + 7647/1.128^8 = $4,923 million

  ($ 407 million = Interest expenses; $7,647 = Book value of debt; 8 years = Average debt maturity and 12.8% is the pre-tax cost of debt)

- Global Crossing pays no taxes and is not expected to pay taxes for 9 years…

From Cost of Equity to Cost of Capital

Cost of borrowing should be based upon
(1) synthetic or actual bond rating
(2) default spread
Cost of Borrowing = Riskfree rate + Default spread

Marginal tax rate, reflecting tax benefits of debt

Cost of Capital =   Cost of Equity (Equity/(Debt + Equity))   +   Cost of Borrowing   (1-t)   (Debt/(Debt + Equity))

Cost of equity based upon bottom-up beta

Weights should be market value weights
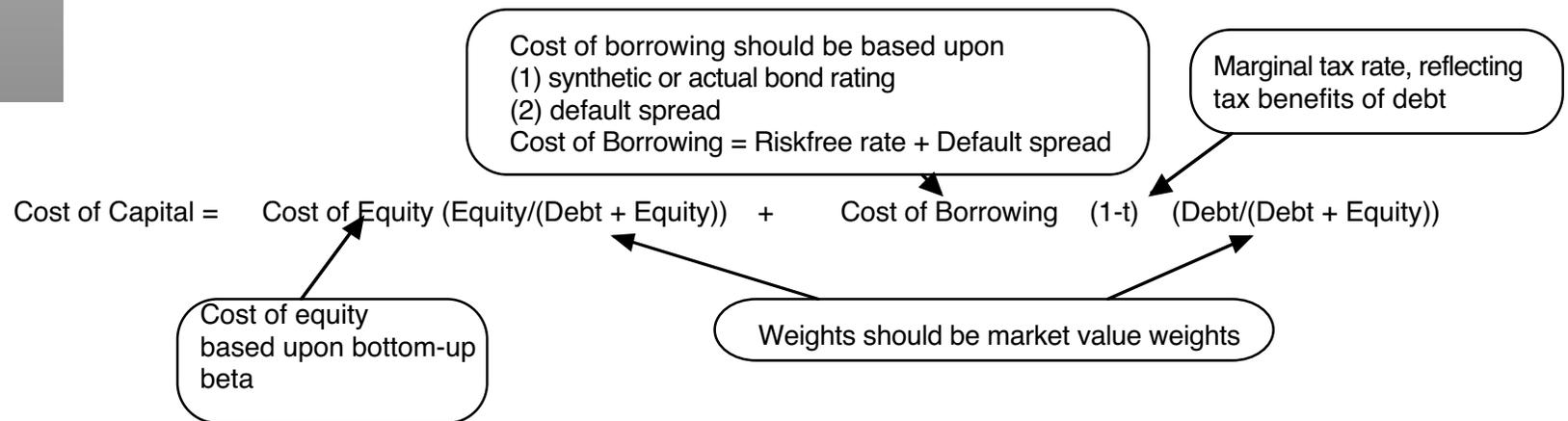
Interest Coverage Ratios, Ratings and Default Spreads

If Interest Coverage Ratio is	Estimated Bond Rating	Default Spread(1/01)
> 8.50	AAA	0.75%
6.50 - 8.50	AA	1.00%
5.50 - 6.50	A+	1.50%
4.25 - 5.50	A	1.80%
3.00 - 4.25	A−	2.00%
2.50 - 3.00	BBB	2.25%
2.00 - 2.50	BB	3.50%
1.75 - 2.00	B+	4.75%
1.50 - 1.75	B	6.50%
1.25 - 1.50	B −	8.00%
0.80 - 1.25	CCC	10.00%
0.65 - 0.80	CC	11.50%
0.20 - 0.65	C	12.70%
< 0.20	D	15.00%

Estimating the cost of debt for a firm

■ The rating for Global Crossing is B- and the default spread is 8%. Adding this to the T.Bond rate in November 2001 of 4.8%

Pre-tax cost of debt = Riskfree Rate + Default spread

$$= 4.8\% + 8.00\% = 12.80\%$$

■ After-tax cost of debt = 12.80% (1- 0) = 12.80%: The firm is paying no taxes currently. As the firm's tax rate changes and its cost of debt changes, the after tax cost of debt will change as well.

	1	2	3	4	5	6	7	8	9	10
Pre-tax	12.80%	12.80%	12.80%	12.80%	12.80%	11.84%	10.88%	9.92%	8.96%	8.00%
Tax rate	0%	0%	0%	0%	0%	0%	0%	0%	0%	16%
After-tax	12.80%	12.80%	12.80%	12.80%	12.80%	11.84%	10.88%	9.92%	8.96%	6.76%

Estimating Cost of Capital: Global Crossing

■ Equity
  • Cost of Equity = 4.80% + 3.00 (4.00%) = 16.80%
  • Market Value of Equity = $ 1.86 * 886.47 = $1,649 million (25.09%)

■ Debt
  • Cost of debt = 4.80% + 8% (default spread) = 12.80%
  • Market Value of Debt = $ 4,923 mil (74.91%)

■ Cost of Capital

Cost of Capital = 16.8 % (.2509) + 12.8% (1- 0) (.7491)) = 13.80%

II. Estimating Cash Flows to Firm

Operating leases
- Convert into debt
- Adjust operating income

R&D Expenses
- Convert into asset
- Adjust operating income

Update
- Trailing Earnings
- Unofficial numbers

Normalize
- History
- Industry

Cleanse operating items of
- Financial Expenses
- Capital Expenses
- Non-recurring expenses

Earnings before interest and taxes

Tax rate
- can be effective for near future, but move to marginal
- reflect net operating losses

- Tax rate * EBIT

= EBIT (1- tax rate)

- (Capital Expenditures - Depreciation)

Defined as
Non-cash CA
- Non-debt CL

- Change in non-cash working capital

Include
- R&D
- Acquisitions

= Free Cash flow to the firm (FCFF)

The Importance of Updating

■ The operating income and revenue that we use in valuation should be updated numbers. One of the problems with using financial statements is that they are dated.

■ As a general rule, it is better to use 12-month trailing estimates for earnings and revenues than numbers for the most recent financial year. This rule becomes even more critical when valuing companies that are evolving and growing rapidly.

	Last 10-K	*Trailing 12-month*
Revenues	$ 3,789 million	$3,804 million
EBIT	-$1,396 million	- $ 1,895 million
Depreciation	$1,381 million	$1,436 million
Interest expenses	$ 390 million	$ 415 million
Debt (Book value)	$ 7,271 million	$ 7,647 million
Cash	$ 1,477 million	$ 2,260 million

Estimating FCFF: Global Crossing

- EBIT (Trailing 2001) = -$ 1,895 million
- Tax rate used = 0% (
- Capital spending (Trailing 2001) = $4,289 million
- Depreciation (Trailing 2001) = $ 1,436 million
- Non-cash Working capital Change (2001) = - 63 million
- Estimating FCFF (Trailing 12 months)

  Current EBIT * (1 - tax rate) = - 1895 (1-0) = - $ 1,895 million

   - (Capital Spending - Depreciation)   = $ 2,853 million

   - Change in Working Capital   = -$ 63 million

  Current FCFF   = - $ 4,685 million

  Global Crossing funded a significant portion of this cashflow by selling assets (ILEC) for about $3.4 billion.

IV. Expected Growth in EBIT and Fundamentals

■ Reinvestment Rate and Return on Capital

g_{EBIT} = (Net Capital Expenditures + Change in WC)/EBIT(1-t) * ROC

= Reinvestment Rate * ROC

■ Proposition: No firm can expect its operating income to grow over time without reinvesting some of the operating income in net capital expenditures and/or working capital.

■ Proposition: The net capital expenditure needs of a firm, for a given growth rate, should be inversely proportional to the quality of its investments.

Revenue Growth and Operating Margins

■ With negative operating income and a negative return on capital, the fundamental growth equation is of little use for Global Crossing.

■ For Global Crossing, the effect of reinvestment shows up in revenue growth rates and changes in expected operating margins, but with a lagged effect.

■ We will assume that Global Crossing's cap ex growth will slow and that depreciation lags cap ex by about 3 years.

Cap Ex and Depreciation: Global Crossing

Year	Cap Ex	Cap Ex Growth	Depreciation	Depreciation Growth	Net Cap ex
1	$3,431	-20.00%	$1,580	10.00%	$1,852
2	$1,716	-50.00%	$1,738	10.00%	-$22
3	$1,201	-30.00%	$1,911	10.00%	-$710
4	$1,261	5.00%	$2,102	10.00%	-$841
5	$1,324	5.00%	$1,051	-50.00%	$273
6	$1,390	5.00%	$736	-30.00%	$654
7	$1,460	5.00%	$773	5.00%	$687
8	$1,533	5.00%	$811	5.00%	$721
9	$1,609	5.00%	$852	5.00%	$758
10	$1,690	5.00%	$894	5.00%	$795

V. Growth Patterns

■ A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions:

- there is no high growth, in which case the firm is already in stable growth
- there will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
- there will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate(3-stage)

Stable Growth   2-Stage Growth   3-Stage Growth
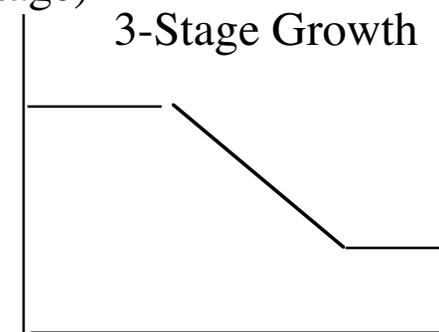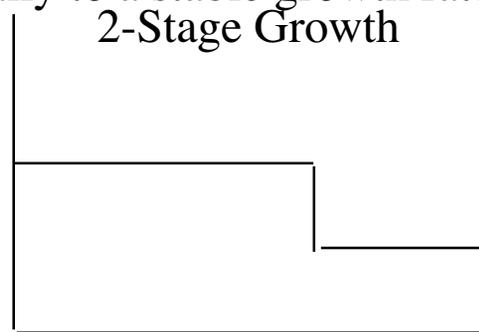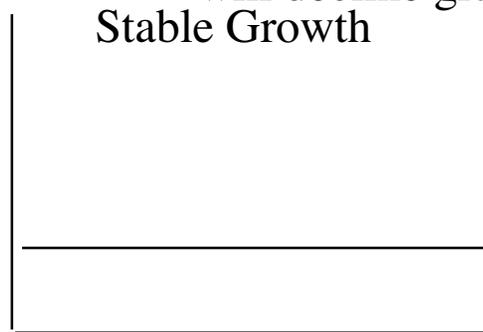
Stable Growth Characteristics

■ In stable growth, firms should have the characteristics of other stable growth firms. In particular,

- The risk of the firm, as measured by beta and ratings, should reflect that of a stable growth firm.
  - Beta should move towards one
  - The cost of debt should reflect the safety of stable firms (BBB or higher)
- The debt ratio of the firm might increase to reflect the larger and more stable earnings of these firms.
  - The debt ratio of the firm might moved to the optimal or an industry average
  - If the managers of the firm are deeply averse to debt, this may never happen
- The reinvestment rate of the firm should reflect the expected growth rate and the firm's return on capital
  - Reinvestment Rate = Expected Growth Rate / Return on Capital

Global Crossing: Stable Growth Inputs

	High Growth	Stable Growth
Global Crossing		
• Beta	3.00	1.00
• Debt Ratio	74.9%	40%
• Return on Capital	Negative	7.36%
• Cost of capital	13.80%	7.36%
• Expected Growth Rate	NMF	5%
• Reinvestment Rate	>100%	5%/7.36% = 67.93%

Why distress matters…

- 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

■ 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

- 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

■ *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

■ Preliminary Step: Define the circumstances under which you would expect a firm to be pushed into distres.

■ 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

■ 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:

Expected cashflow$_t$ = Cash flow$_t$ * (1 - Probability of distress$_t$)

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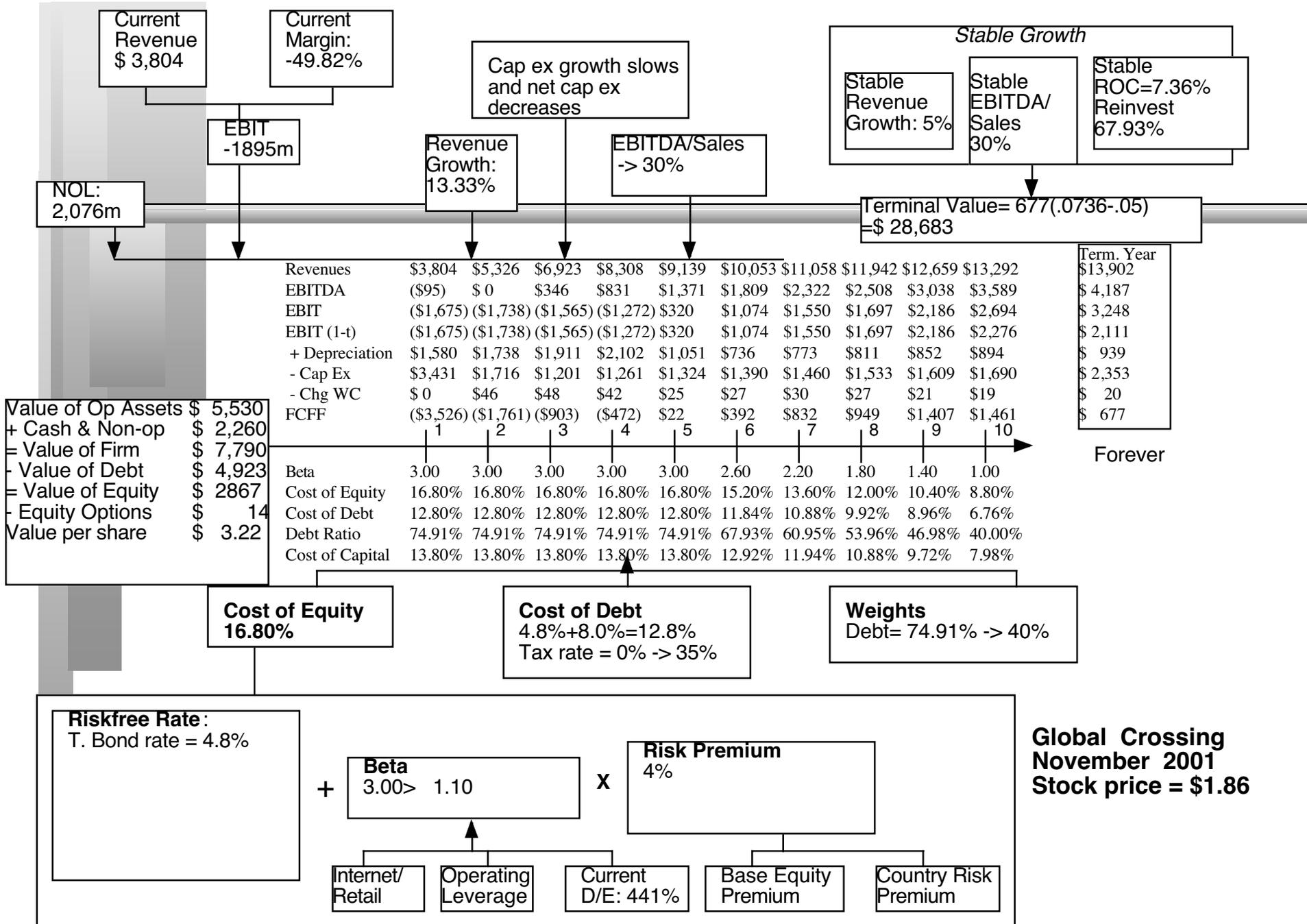
■ A DCF valuation values a firm as a going concern. If there is a significant likelihood of the firm failing before it reaches stable growth and if the assets will then be sold for a value less than the present value of the expected cashflows (a distress sale value), DCF valuations will understate the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

■ 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.

Global Crossing — November 2001 — Stock price = $1.86

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Cost of Debt	12.80%	12.80%	12.80%	12.80%	12.80%	11.84%	10.88%	9.92%	8.96%	6.76%
Debt Ratio	74.91%	74.91%	74.91%	74.91%	74.91%	67.93%	60.95%	53.96%	46.98%	40.00%
Cost of Capital	13.80%	13.80%	13.80%	13.80%	13.80%	12.92%	11.94%	10.88%	9.72%	7.98%

Cost of Equity 16.80%

Cost of Debt 4.8%+8.0%=12.8% Tax rate = 0% -> 35%

Weights Debt= 74.91% -> 40%

Riskfree Rate: T. Bond rate = 4.8%

+

Beta 3.00> 1.10

X

Risk Premium 4%

Internet/ Retail

Operating Leverage

Current D/E: 441%

Base Equity Premium

Country Risk Premium

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Step 2: Estimate the probability of distress

■ 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

Rating	Cumulative probability of distress	
	5 years	*10 years*
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):

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

- 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.

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

- 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

- 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:

  Distress Dummy = 0   for any firm that survived the period

            = 1   for any firm that went bankrupt during the period

- 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:

  Distress Dummy = a + b (Debt to Capital) + c (Operating Margin)

Step 3: Estimating Distress Sale Value

■ 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

■ 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

- 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,

    Tax Benefit = Tax rate * Debt
  - The expected bankruptcy cost can be estimated as the difference between the unlevered firm value and the distress sale value:

  Expected Bankruptcy Costs = (Unlevered firm value - Distress Sale Value)* Probability of Distress

Relative Valuation: Where is the distress factored in?

■ 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 the 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

■ 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

Company Name	Value to Book Capital	EBIT	Market Debt to Capital Ratio
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

■ 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 -

Bond Rating	Value to Book Capital Ratio
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. Forward Multiples + Distress Value

■ You could estimate the value for a firm as a going concern, assuming that it can be nursed back to health. The best way to do this is to apply a forward multiple

  • Going concern value = Forward Value discounted back to the present

■ 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.

An Example of Forward Multiples: Global Crossing

- Global Crossing lost $1.9 billion in 2001 and is expected to continue to lose money for the next 3 years. In a discounted cashflow valuation (see notes on DCF valuation) of Global Crossing, we estimated an expected EBITDA for Global Crossing in five years of $ 1,371 million.

- The average enterprise value/ EBITDA multiple for healthy telecomm firms is 7.2 currently.

- Applying this multiple to Global Crossing's EBITDA in year 5, yields a value in year 5 of
  - Enterprise Value in year 5 = 1371 * 7.2 = $9,871 million
  - Enterprise Value today = $ 9,871 million/ 1.138^5 = $5,172 million

  (The cost of capital for Global Crossing is 13.80%

Other Considerations in Valuing Distressed firms

■ 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

■ 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.