



QUIZ 2: REVIEW SESSION

Aswath Damodaran

This quiz will cover...

- The last two ingredients into DCF valuation
 - ▣ Expected Growth: Historical, analyst & particularly fundamental growth (to EPS, net income, operating income and when margins are changing)
 - ▣ Terminal value
- The loose ends of DCF valuation
 - ▣ Cash and cross holdings
 - ▣ Assets that have not been counted yet
 - ▣ Debt and other potential liabilities
 - ▣ Employee options and restricted stock
- The mechanics of DCF valuation
 - ▣ Estimating FCFF and FCFE
 - ▣ Dealing with changing discount rates
 - ▣ Checking inputs for consistency

Fundamental Growth

Earnings Measure	Reinvestment Measure	Return Measure
Earnings per share	Retention Ratio = % of net income retained by the company = $1 - \text{Payout ratio}$	Return on Equity = $\text{Net Income} / \text{Book Value of Equity}$
Net Income from non-cash assets	Equity reinvestment Rate = $(\text{Net Cap Ex} + \text{Change in non-cash WC} - \text{Change in Debt}) / (\text{Net Income})$	Non-cash ROE = $\text{Net Income from non-cash assets} / (\text{Book value of equity} - \text{Cash})$
Operating Income	Reinvestment Rate = $(\text{Net Cap Ex} + \text{Change in non-cash WC}) / \text{After-tax Operating Income}$	Return on Capital or ROIC = $\text{After-tax Operating Income} / (\text{Book value of equity} + \text{Book value of debt} - \text{Cash})$

Terminal Value: The Cardinal Rules

1. Obey the cap: Don't let the growth rate exceed the growth rate in the economy (and use the risk free rate as your proxy)
2. Adjust the cost of capital to reflect "stability): Move betas towards one, debt ratios towards stable firm levels)
3. Think about the return on capital in perpetuity and where it will be, relative to the cost of capital.
4. And use the return on capital to back into a reinvestment rate:

$$\text{Reinvestment rate} = g / \text{ROIC}$$

Example: Terminal value calculation

Problem 1, part a: Fall 2011

- Limroth Enterprises is a family-run, publicly traded company that expects to generate \$ 60 million in after-tax operating income next year on capital invested of \$ 1 billion. The firm has a cost of capital of 10% and expects to maintain its current return on capital, while growing 2% a year in perpetuity. What is the value of the operating assets?

Solution

- Expected EBIT (1-t) = 60
- Capital invested = 1000
- Return on capital = $60/1000 = 6\%$
- Cost of capital = 10%
- Expected growth rate = 2%
- Expected Reinvestment rate = $2\%/6\% = 33.33\%$
- Value of operating assets = $60 (1-.33) / (.10-.02) = 500$

Loose End 1: Cash

- Cash, by itself, is usually a neutral asset, earning a low but fair rate of return.
- However, the market may discount the cash holdings of a company, if it feels that the managers will waste the cash (by investing at less than the cost of capital).
- Conversely, the market may attach a premium to the cash in some companies, if it feels that cash is a strategic weapon that can help the company make it through hard times or buy distressed company assets.

Example: Part b of problem 1, Fall 2011

- Assume that Limroth Enterprises has \$ 100 million in cash and marketable securities and that you believe that there is a 60% chance that management will reinvest this cash to generate returns to similar to what they are earning on their existing operating assets (in investments with a similar risk profile); there is a 40% probability that the cash will remain invested in commercial paper and T.Bills, earning 1%. How much value would you attach to the cash?

Solution

Assuming that the cash does not get wasted

Probability of happening = 40%

Value of cash = \$100 = 100

Assuming that cash gets wasted on projects making 6% (cost of capital of 10%)

Probability of happening = 60%

Value of cash = $100 * .06 / .10 = 60$

Expected value of cash = 76

Loose End 2: Cross Holdings

- Cross holdings can broadly be classified into “minority” holdings in other companies and “majority” holdings.
- With minority holdings, the operating income will generally not include the income from the holdings and you should be adding the value of these holdings to a conventional DCF
- With majority holdings, the analysis will depend upon whether you are using the consolidated financials or the parent only financials.
 - With consolidated financials, the financials will reflect 100% of the subsidiary’s revenues & operating income. If you do your DCF valuation with these numbers, you have to subtract out the value of the portion of the subsidiary that does not belong to you.
 - With parent financials, you have not valued any of the subsidiary. You have to add the portion of the subsidiary that belongs to you to your DCF value.

Example: Quiz from Spring 2007

- You have been asked to analyze Smithtown Works, a company with a 60% holding in Kroger Appliances (which is fully consolidated into Smithtown Works) and 10% of Haverford Steel (which is reported as a minority passive investment). All three companies are in stable growth (2% forever), have a return on capital of 10% and share a cost of capital of 8%.
 - Smithtown Works has 500 million shares outstanding, trading at \$30 a share, and the consolidated balance sheet reports debt outstanding of \$ 6 billion, a cash balance of \$ 2 billion and \$ 1 billion in minority interests. The consolidated after-tax operating income reported by the company the most recent year was \$ 1.5 billion.
 - Kroger Appliances is not publicly traded and there little information on its after-tax operating income, debt or cash balance, but appliance companies typically trade at 3 times book value.
 - Haverford Steel reported after-tax operating income of \$ 800 million in the most recent year.
- Evaluate whether the stock in Smithtown Works is fairly priced.

The solution

Reinvestment rate (for all 3 firms) = 2% / 10% =	20.00%
Value of Smithtown + Kroger = 1500 (1-.2)(1.02)/(.08-.02) =	\$20,400.00
Value of Haverford Steel = 800 (1-.2) (1.02)/(.08-.02) =	\$10,880.00
Value of Smithtown + Kroger	\$20,400.00
+ 10% of Haveford steel (Estimated value)	\$1,088.00
+ Cash (consolidated)	2000
- Debt (consolidated)	6000
- Minority Interests (Estimated market value)	3000
Value of Equity in Smithtown	\$14,488.00
Market Value of Equity in Smithtown	15000
Stock is overvalued by \$512 million	

Loose End 3: Other Assets



- Basic rule: If an asset is being used to generate the cash flows that you are discounting, you have already valued the asset. You cannot add the “estimated” or “market” value of that asset to your DCF valuation.
- If you have an unutilized or vacant asset that has value but is not contributing to cash flows, you can value it and add it to your DCF valuation.

Loose End 4: Employee Options

	Information required/provided	Approach	Bottom line
Fully Diluted Approach	Number of options outstanding	DCF value of equity/ (Number of shares + Number of options)	You will under value shares, because you are ignoring option exercise proceeds.
Treasury Stock Approach	Number of options outstanding, Exercise price	(DCF value of equity+ Exercise price*Options)/ (Number of shares + Number of options)	You will over value shares, since you are ignoring time premium on options.
Option value approach	Options characteristics needed to estimate value	(DCF value of equity – Value of options)/ Number of shares	Value per share reflects reality

Problem 2, part c: Spring 2008 Quiz

- Now assume that the firm has 10 million shares outstanding today, and has granted 2 million options to its top management; the exercise price of the options is \$ 2/share. Furthermore, analysts are predicting that they will have to issue 8 million additional shares over the next 2 years (to cover their reinvestment needs). Using the treasury stock approach, estimate the value of equity per share today.

Solution

	1	2	3
FCFE	-\$20.00	-\$10.00	\$5.00
Terminal value			\$86.67
Compounded cost of equity	1.2	1.392	1.55904
Present value	-\$16.67	-\$7.18	\$58.80
Value of equity today =	\$34.95		
Exercise proceeds =	\$4.00		
Number of shares = $10 + 2 =$	12.00		
Value per share =	\$3.25		

DCF Mechanics : Cash flows

- Cash flows: When estimating cash flows, first check on whether you are estimating cash flows to the firm or to equity.
- The cash flows should always be after
 - Taxes
 - Reinvestment needs, with information given in
 - Ingredient parts as cap ex, depreciation and working capital)
 - Return on capital and a growth rate (g/ ROC)
 - Sales to Capital ratio

DCF Mechanics 2: Discounting

- Match up the risk of the cash flow to the discount rate. Thus, if you are given a guaranteed cash flow to a risky firm, you should use the risk free rate as your discount rate.
- Match the discount rate up to the cash flow
 - ▣ In the same currency
 - ▣ If CF to equity (capital), use cost of equity (capital)
- When your cost of capital changes over time, remember that you should discount at the cumulated cost of equity/capital, not that specific year's cost of equity/capital.

Example: Problem 1a, Fall 2010

- Maple Telecom is in significant financial trouble. It reported operating losses of \$ 20 million in the most recent year on revenues of \$ 100 million. The total book value of capital invested in the firm today is \$ 190 million. Assuming that the firm will revert back to health in 3 years, you have forecast revenues, after-tax operating income and reinvestment, as well as the cost of capital:

	Year 1	Year 2	Year 3
Revenues	\$150	\$160	\$180
EBIT (1-t)	-\$15	\$15	\$25
+ Depreciation	\$15	\$20	\$25
- Cap Ex	\$5	\$25	\$40
FCFF	-\$5	+\$10	\$10
Cost of capital	14%	12%	10%

Solution: Value of operating assets

	Year 1	Year 2	Year 3
FCFF	-\$5	\$10	\$10
Cost of capital	14%	12%	10%
Cumulated Cost of capital	1.1400	1.2768	1.4045
Cash Flow	-\$5	\$10	\$10
Present Value	-\$4.39	\$7.83	\$7.12
Value of Operating Assets	\$10.57		

$(1.14 * 1.12) = 1.2768$