



FINAL REVIEW

It's over...

Beta measures market risk

Top-down: Regress stock returns against market return

Slope coefficient is the beta ←

Bottom up:

1. Determine businesses that your firm operates in
2. Get weights for each (based upon estimated value)
3. Estimate unlevered betas by business
 - Find comparable publicly traded firms
 - Obtain regression betas and D/E ratio
 - Estimate unlevered beta

To clean up a top-down

beta, when there has

been a change in leverage:

1. Unlever the top-down beta using the average D/E ratio during the regression period.
2. Re-estimate levered beta using today's D/E ratio

Betas are weighted averages
- Weights based upon market value

Betas yield costs of equity

Acquisitions

1. Unlevered betas for firms involved
2. Weighted average (weights based on firm values)
3. Compute debt to equity ratio for combined firm based upon how acquisition was financed
4. Compute a levered beta using (2) and (3)

Divestitures

1. Estimate unlevered beta before divestiture
2. Obtain unlevered beta of divested asset
3. Based upon how the cash from the divestiture is used, estimate unlevered beta of the firm after divestiture
4. Compute the debt to equity ratio after divestiture
5. Estimate new levered beta

Cost of Equity =
Riskfree Rate
+ Beta
* Risk Premium

Beta Calculation: An Example (Spring 1999)

- The following is the beta calculation for PepsiCo, using monthly return data from the last 5 years:
- $\text{Return}_{\text{Pepsico}} = 0.23\% + 1.20 (\text{Return}_{\text{S\&P 500}})$
- You are given the following additional information:
 - The current market value of equity at Pepsi is \$ 40 billion and the firm has \$ 10 billion in debt outstanding.
 - During the last 5 years, Pepsi had an average market value debt to equity ratio of 10%. The firm's marginal tax rate is 40%.

Adjusting Top-down Beta

- Using the raw beta estimate from the regression above, and the information provided, estimate Pepsi's current beta.

- ▣ Unlevered Beta for Pepsi = $1.2 / (1 + 0.6*(0.1)) = 1.13$

- ▣ Current Levered Beta = $1.13 (1 + 0.6*(10/40)) = 1.30$

The Effect of a Spin-off

- Now assume that Pepsi will be divesting its bottling operations for \$ 10 billion, borrowing an additional \$ 2 billion and buying back \$ 12 billion worth of stock. Estimate Pepsi's new beta. (The unlevered beta of firms involved in just bottling operations is 1.35)

$1.13 = X (40/50) + 1.35(10/50)$, where X = Unlevered Beta after divestiture

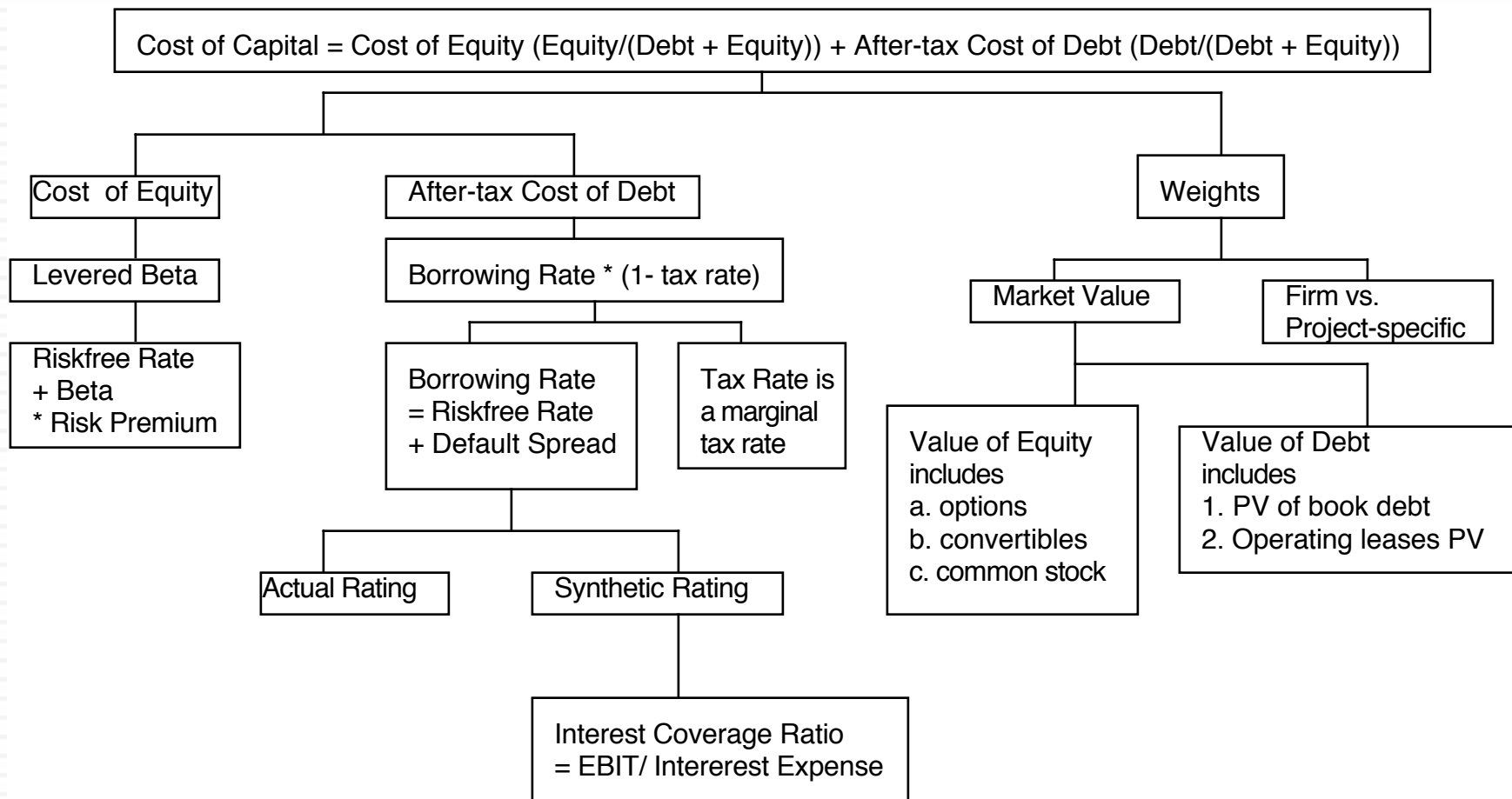
Unlevered Beta of the firm after divestiture

$$= (1.13 - 1.35*(10/50))/(40/50) = 1.0750$$

$$\text{New Debt} = 10 + 2 = 12$$

$$\text{New Equity} = 40 - 12 = 28$$

$$\text{Levered Beta} = 1.075(1 + 0.6*(12/28)) = 1.35$$



1. Jackson-Presley Inc. is a small company in the business of producing and selling musical CDs and cassettes and it is also involved in promoting concerts. The company last two reported income statements indicate that the company has done very well in the last two years –

	<i>Last Year</i>	<i>Current Year</i>
Revenues	\$ 100 million	\$150 million
- Cost of Goods Sold	\$ 40 million	\$ 60 million
- Depreciation & Amortization	\$ 10 million	\$ 13 million
Earnings before interest and taxes	\$ 50 million	\$ 85 million
Interest Expenses	\$ 0	\$ 5 million
Taxable Income	\$ 50 million	\$ 80 million
Taxes	\$ 20 million	\$ 32 million
Net Income	\$ 30 million	\$ 48 million

The company's current balance sheet also provides an indication of the company's health:

<i>Assets</i>		<i>Liabilities</i>	
Property, Plant & Equipment	\$ 100 million	Current Liabilities	\$ 20 million
Land and Buildings	\$ 50 million	Debt	\$ 60 million
Current Assets	\$ 50 million	Equity	\$120 million
Total	\$ 200 million	Total	\$200 million

More on Jackson-Presley

- Jackson-Presley's stock has been listed on the NASDAQ for the last two years and is trading at twice the book value (of equity). There are 12 million shares outstanding. Jackson-Presley derives 75% of its total market value from its record/CD business and 25% from the concert business. While the price data on the company is insufficient to estimate a beta, the betas of comparable firms in these businesses is as follows –

Comparable Firms		
Business	Average Beta	Average D/E Ratio
Record/CD Business	1.15	50.00%
Concert Business	1.20	10.00%

(You can assume that these companies have 40% tax rates)

- The debt is composed of ten-year bonds, and is rated A (Typical A rated bonds are yielding 10% currently in the market).
- The riskfree rate is 8% and the market risk premium is 5.5%.

The Solution

□ Market Value of debt = $5 \text{ (PVA, 10\%, 10)} + 60/1.1^{10} = \$ 53.86$

Business	Beta	D/E	Unlev Beta
Record/CD	1.15	50%	0.88
Concert	1.2	10%	1.13

■ Unlevered Beta for JP = $0.88 (.75) + 1.13 (0.25) = 0.9425$

■ Levered Beta for JP = $0.9425 (1 + (1 - .4)(53.86/240)) = 1.07$

■ Cost of Equity = $8\% + 1.07 (5.5\%) = 13.89\%$

■ Cost of Capital = $13.89\% (240/293.86) + 10\% (1 - .4)(53.86/293.86) = 12.44\%$

□ If the treasury bond rate rises to 9%,

■ New Market Value of Debt = $5 \text{ (PVA, 11\%, 10)} + 60/1.11^{10} = \$ 50.58$

■ Cost of Equity = $9\% + 1.07 (5.5\%) = 14.89\%$

■ Cost of Debt = 11%

■ Cost of Capital = $14.89\% (240/290.58) + 11\% (1 - .4) (50.58/290.58) = 13.45\%$

Is this a good project

Cash Flows

Cash Flow to Firm
= $EBIT(1-t)$
+ Deprecn & Amort
- Capital Maintenance
- Change in Non-cash WC

NPV
= PV of Cash flow to Firm
at the Cost of Capital
- Investment in Project
Accept if >0

IRR
: Discount rate that makes
PV of cash flow to firm equal
to the Investment in project
Compare to Cost of Capital

Cash Flow to Equity
= Net Income
+ Deprecn & Amort
- Capital Maintenance
- Change in Non-cash WC
- Principal Repaid
+ New Debt Issues

NPV
= PV of Cash flow to Equity
at the Cost of Equity
- Equity Investment in
Project
Accept if >0

IRR
: Discount rate that makes
PV of cash flow to equity
equal to the Equity
Investment in project
Compare to Cost of Equity

Earnings

After-tax Operating
Earnings ($EBIT(1-t)$)

Return on Capital
= $EBIT(1-t) / \text{Capital Invested}$

Return Spread
= $ROC - \text{Cost of Capital}$

EVA
= $\text{Return Spread} * \text{Capital Invested}$

Net income

Return on Equity
= $\text{Net Income} / \text{Equity Invested}$

Return Spread
= $ROE - \text{Cost of Equity}$

Equity EVA
= $\text{Return Spread} * \text{Equity Invested}$

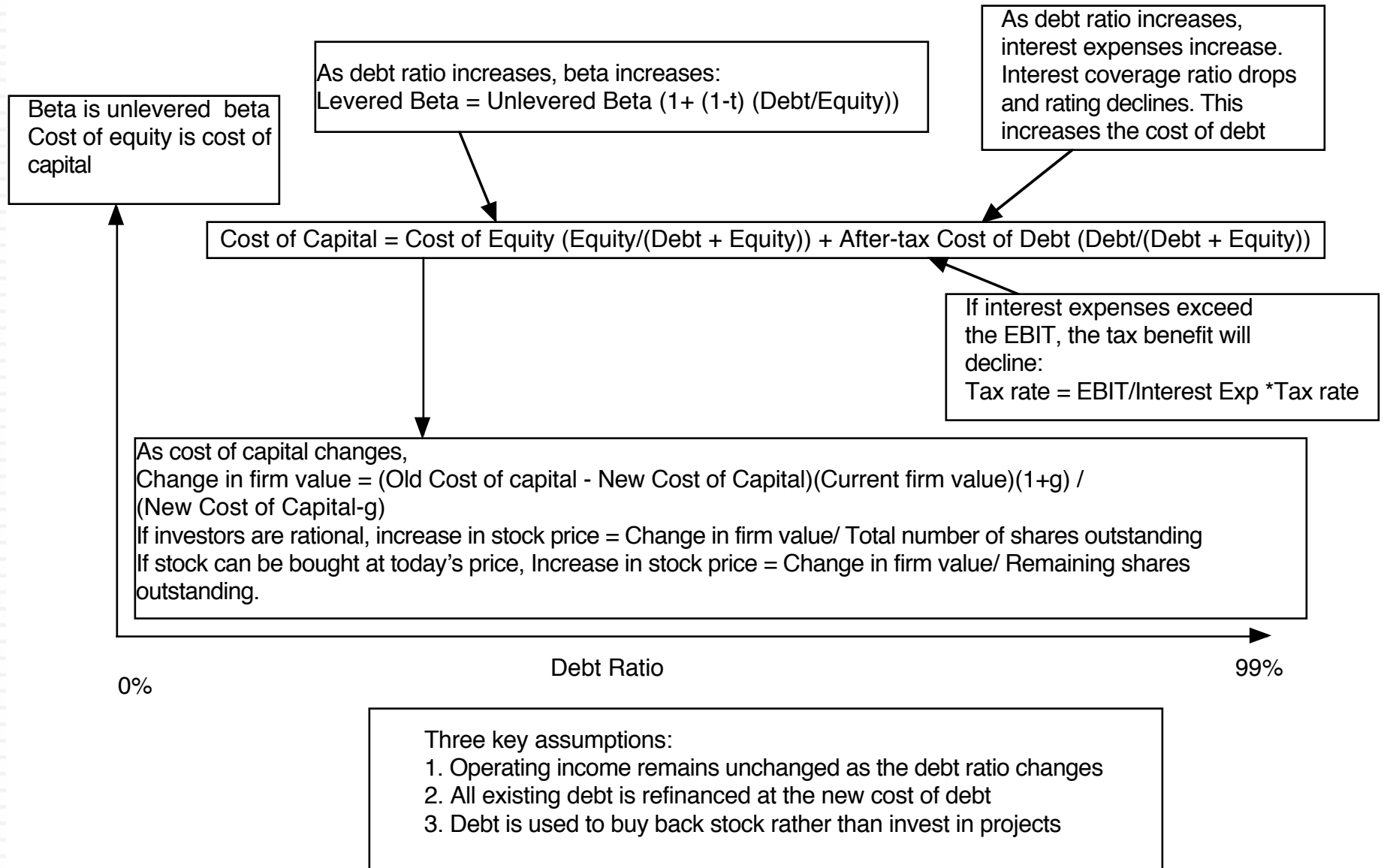
An Example: Spring 1997

- Solo Corporation, a manufacturer of surf boards, has asked for your advice on whether to invest \$ 40 million in a new line of beach products:
 - The investment will yield earnings before interest and taxes of \$ 10 million a year, and any depreciation on the project will be invested back into the project as capital maintenance expenditure. There will be no working capital investments.
 - The project is expected to have an infinite life.
 - The company has a beta of 1.2, but this project is expected to have a beta of 1.5. The firm will maintain its existing financing mix of 60% equity and 40% debt. The cost of borrowing is 10%.
 - The tax rate for the company, including California State taxes, is 40%. The ten-year treasury bond rate is 7%.
- Calculate the NPV of this project.

The Solution

- Standpoint of the firm
- Cost of Equity for the project = $7\% + 1.5 (5.5\%) = 15.25\%$
- Cost of Capital = $15.25\% (.6) + 10\% (1-.4) (.4) = 11.55\%$
- NPV of project = $-40 + 10 (1-.4)/.1155 = \$ 11.95$

- From an equity standpoint
 - ▣ Amount borrowed = 40% of \$ 40 million = \$ 16 million
 - ▣ Interest Expense = \$16 million * 10% = \$ 1.6 million
 - ▣ Cash flows after interest = $(10 - 1.6) (1-.4) = \$ 5.04$ million
 - ▣ Equity Investment in Project = \$ 24 million
 - ▣ NPV of project = $(\$ 5.04/.1525) - \$ 24 \text{ million} = \9.05 million



An Example: Spring 1999

- Campbell Soup is planning a major restructuring. Its current debt to capital ratio is 10%, and its beta is 0.90.
 - The firm currently has a AAA rating, and a pre-tax cost of debt of 6%.
 - The optimal debt ratio for the firm is 40%, but the firm's pre-tax cost of borrowing will increase to 7%.
 - The market value of the equity in the firm is \$ 9 billion, and there are 300 million shares outstanding.
 - The treasury bond rate is 5%, the market risk premium is 6.3% and the firm's current tax rate is 40%.

The First Question

- Estimate the change in the stock price if the firm borrows money to buy stock to get to its optimal debt ratio, assuming that firm value will increase 5% a year forever and that investors are rational.

- Current Cost of Equity = $5\% + 0.9 (6.3\%) = 10.67\%$

- Current Cost of Capital = $10.67\% (.9) + 6\% (1-.4) (.1) = 9.963\%$

- Unlevered Beta = $0.9 / (1 + 0.6 * (1/9)) = 0.84375$

- New Levered Beta = $0.84375 (1 + (1-.4)(40/60)) = 1.18125$

- Cost of Equity = $5\% + 1.18 (6.3\%) = 12.43\%$

- Cost of Capital = $12.43\% (0.6) + 7\% (1-.4)(.4) = 9.138\%$

$$\begin{aligned} \text{Change in firm value} &= 10000 (.09963 - .09138) (1.05) / (.09138 - .05) \\ &= \$ 2,093 \end{aligned}$$

$$\text{Change in value per share} = 2093 / 300 = \$ 6.98$$

The Second Question

- Estimate the increase in stock price, if Campbell Soup were able to borrow money to get to its optimal and buy stock back at the current market price.
 - ▣ Number of shares bought back = $3000/30 = 100$
 - ▣ Shares remaining = $300 - 100 = 200$
 - ▣ Change in value per share = $2093/200 = \$ 10.47$

The third question

- As a final scenario, assume that Campbell Soup borrowed to get to 40%, but used the funds to finance an acquisition of Del Monte Foods. Assuming that they over pay by \$ 500 million for this acquisition, estimate the change in the stock price because of these actions. (You can assume rationality again, in this case)

Effect of overpaying on value per share

$$= 500/300 = \$ \quad (1.67)$$

How much did you pay? How much could you have paid?

Free Cash Flow to Equity

= Net Income
- (Net Cap Ex - Depreciation)
- Change in non-cash WC
- Debt Repaid
+ New Debt issued

Cash Returned

= Dividends
+ Stock Buybacks

How much do we trust the management of this company?

Project Performance

Return Spreads
ROE - Cost of Equity
ROC - Cost of Capital

EVA
Equity EVA
Capital EVA

Stock Price Performance

Actual Return on Stock
= Price Appreciation
+ Dividends

Expected Return on
Stock
= Riskfree Rate
+ Beta * (Actual return on
the market - Riskfree
rate)

An Example: Spring 2007

- You have been asked to assess the dividend policy of Doralee Inc, a service company that has been in existence only 3 years. The firm has provided you with its last three years of financial data:

Year	3 years ago	2 years ago	Most recent y
Net Income	\$ 100 million	\$ 120 million	\$ 150 million
Capital Exp	\$ 80 million	\$ 110 million	\$ 125 million
Depreciation	\$ 50 million	\$ 60 million	\$ 70 million
Non-cash WC	-\$10 million	\$ 10 million	\$ 20 million
Total Debt	\$ 0	\$ 40 million	\$ 30 million

(Note: You have been given total non-cash working capital each year, not the change)

- You are also told that the firm had \$ 20 million in cash, no non-cash working capital and no debt when it started operations three years ago.

Part 1: Payout ratio?

- a. If the current cash balance is \$ 50 million, the firm bought back no stock and the firm maintained a constant dividend payout ratio over the 3 years, estimate the dividend payout ratio.

Solving...

Year	3 years ago	2 years ago	Most recent year
Net Income	\$100.00	\$120.00	\$150.00
- Net Cap ex	\$30.00	\$50.00	\$55.00
- Change in non-cash WC	-\$10.00	\$20.00	\$10.00
+ Change in debt	\$0.00	\$40.00	-\$10.00
FCFE	\$80.00	\$90.00	\$75.00

Change in cash balance over 3 years =	\$30.00
Total FCFE over 3 years =	\$245.00
Total dividends paid over 3 years =	\$215.00
Total net income over 3 years =	\$370.00
Dividend payout ratio =	58.11%

Part 2: Following up..

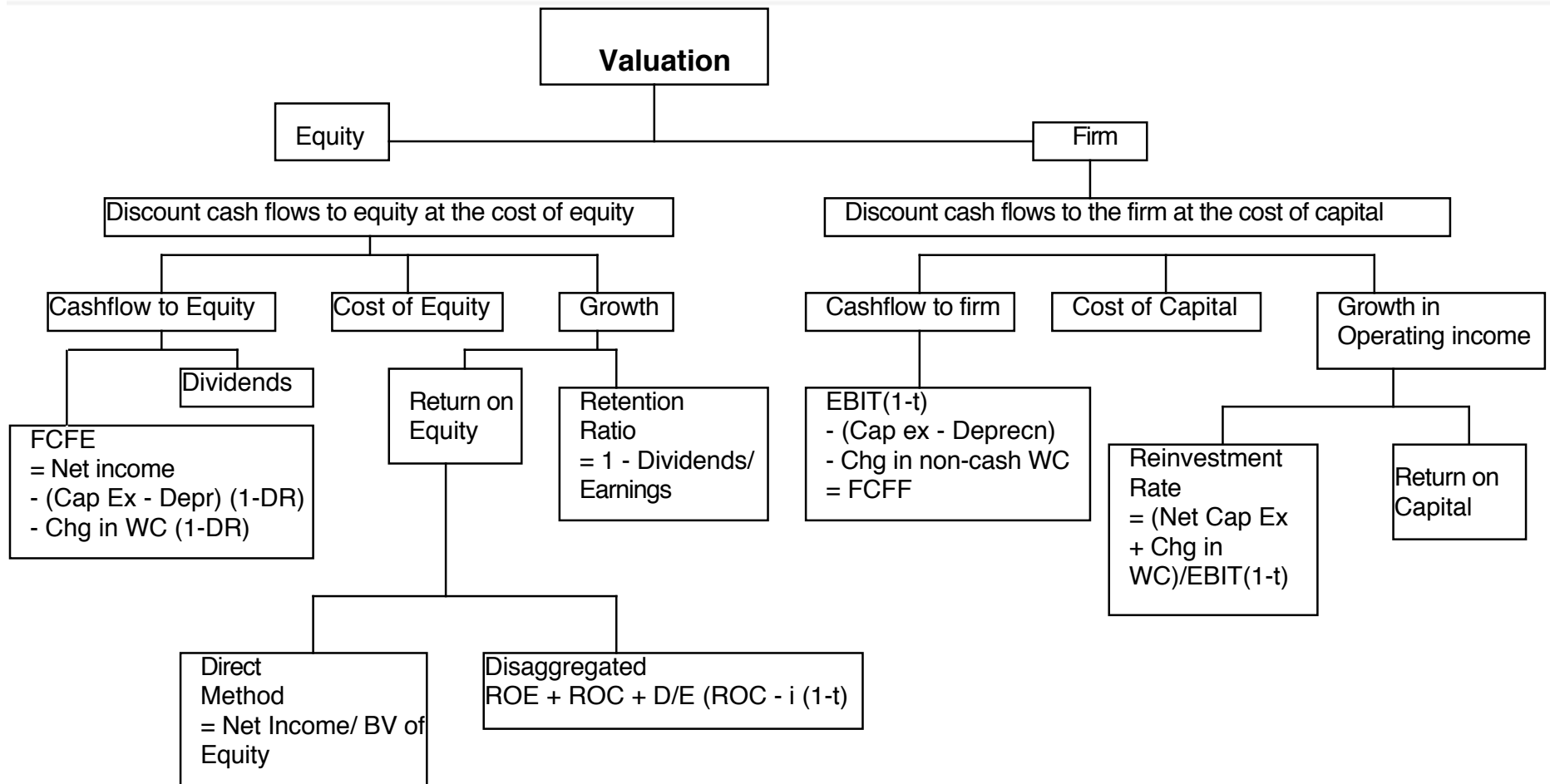


b. Now assume that the firm expects net income, net capital expenditures and non-cash working capital to grow next year by 20%, while maintaining its dollar debt level and cash balance at last year's levels, estimate how much cash the firm will have available to return to stockholders next year.

The solution...

Year	3 years ago	2 years ago	Most recent year	Next year
Net Income	\$100.00	\$120.00	\$150.00	\$180.00
- Net Cap ex	\$30.00	\$50.00	\$55.00	\$66.00
- Change in non-cash WC	-\$10.00	\$20.00	\$10.00	\$4.00
+ Change in debt	\$0.00	\$40.00	-\$10.00	\$0.00
FCFE	\$80.00	\$90.00	\$75.00	\$110.00

- Expected FCFE next year= \$110.00
- Cash available for stockholders = \$110.00




A Valuation Example: Spring 2007

- You are trying to value XGames Inc., a company that manufactures games for the XBox and Playstation. You have been provided the following information:
 - ▣ The firm generated \$ 20 million in after-tax operating income in the most recent year and the corporate tax rate is 40%.
 - ▣ The capital expenditures incurred in developing new games was \$ 15 million in the most recent year and depreciation was \$ 5 million.
 - ▣ The non-cash working capital increased by \$ 5 million during the course of the year
- a. Assuming that the after-tax operating income, capital expenditures, depreciation and non-cash working capital all are expected to grow 15% a year for the next 3 years, estimate the free cash flows to the firm each year for the three years. (2 points)

FCFF for first 3 years...

	Current	1	2	3
EBIT (1-t)	\$20.00	\$23.00	\$26.45	\$30.42
- Net Cap Ex	\$10.00	\$11.50	\$13.23	\$15.21
- Change in non-cash WC	\$5.00	\$5.75	\$6.61	\$7.60
FCFF	\$5.00	\$5.75	\$6.61	\$7.60

More...



b. After year 3, you expect the growth rate to drop to 4% but you anticipate that the return on capital will stay stable at the same level that the firm maintained during the high growth period. If the cost of capital in stable growth is anticipated to be 10%, estimate the terminal value of the firm.

Terminal value

- First, back out the return on capital
 - ▣ Reinvestment rate in first 3 years = 75%
 - ▣ Growth rate during first 3 years = 15%
 - ▣ Return on capital first 3 years = 20.0%
- Next, compute the new reinvestment rate
 - ▣ Growth rate after year 3 = 4%
 - ▣ Reinvestment rate = $g / \text{ROC} = 4\% / 20\% = 20\%$
- Finally, compute the terminal value
 - ▣ EBIT (1-t) in year 4 = \$31.63
 - ▣ FCFF in year 4 = $\$31.63 (1-.20) = \25.31
 - ▣ Cost of capital in stable growth = 10%
 - ▣ Terminal value of firm = $\$25.31 / (.10-.04) = \421.79

The final piece..

- c. If the firm has \$ 80 million in debt, \$ 25 million as a cash balance and 10 million shares outstanding, estimate the value per share today. (You can assume that the cost of capital is 12% for the first 3 years)

Year	1	2	3
FCFF	\$5.75	\$6.61	\$7.60
Terminal value			\$421.79
PV (@ 12% cost of capital	\$5.13	\$5.27	\$305.63
Value of operating assets =	\$316.04		

Value of firm today =	\$316.04
+ Cash	\$25.00
- Debt	\$80.00
= Value of equity today =	\$261.04
Value per share today =	\$26.10

	Dividend Discount Model	FCFE Discount Model	Firm Valuation Model
Earnings base	Net Income	Net Income	After-tax Operating Income
Reinvestment	Whatever is not paid out as dividends	Equity portion of Net Cap ex and Change in working capital = $(1-DR) (\text{Cap Ex} - \text{Depreciation} + \text{Change in WC})$	Net cap ex and Change in Working Capital = $(\text{Cap Ex} - \text{Depreciation} + \text{Change in WC})$
Cashflow	Dividends	FCFE = Net Income - $(1-DR) (\text{Cap Ex} - \text{Depreciation} + \text{Change in WC})$	FCFF = EBIT $(1-\text{tax rate}) - (\text{Cap Ex} - \text{Depreciation} + \text{Change in WC})$
Discount Rate	Cost of equity	Cost of equity	Cost of capital
How much is invested?	Retention Ratio = $1 - (\text{Dividends}/\text{Earnings})$	Equity Reinvestment Rate (ERR) = $(1-DR) (\text{Cap Ex} - \text{Depreciation} + \text{Change in WC}) / \text{Net Income}$	Reinvestment Rate (RR) = $(\text{Cap Ex} - \text{Depreciation} + \text{Change in WC}) / \text{EBIT} (1-t)$
How well?	ROE = Net Income / BV of Equity	ROE = Net Income / BV of Equity	ROC = EBIT $(1-t) / (\text{BV of Equity} + \text{BV of Debt-Cash})$
Expected Growth	Retention Ratio * ROE	ERR * ROE	RR * ROC
In terminal year	<ol style="list-style-type: none"> 1. Adjust cost of equity 2. Estimate stable ROE 3. Compute stable payout ratio = $1 - g / \text{ROE}$ 4. Estimate terminal value of equity = Stable Payout ratio * $\text{Net Income}_{n+1} / (K_e - g)$ 	<ol style="list-style-type: none"> 1. Adjust cost of equity 2. Estimate stable ROE 3. Compute stable ERR = g / ROE 4. Estimate terminal value of equity = $(1 - \text{ERR}) * \text{Net Income}_{n+1} / (K_e - g)$ 	<ol style="list-style-type: none"> 1. Adjust cost of capital 2. Estimate stable ROC 3. Compute stable RIR = g / ROC 4. Estimate terminal value of firm = $(1 - \text{RIR}) * \text{EBIT}(1-t)_{n+1} / (K_c - g)$
To value equity	Discount dividends and terminal value of equity back at cost of equity	Discount FCFE and terminal value of equity back at cost of equity. (If interest expense from cash excluded from net income, add back cash).	Discount FCFF and terminal value of firm back at cost of capital. Add cash and non-operating assets and subtract out debt.
To value equity per share		Subtract out value of equity options and divide by number of shares outstanding.	Subtract out value of equity options and divide by number of shares outstanding.