Input	Equation	Examples from notes
Riskfree Rate	Long term, default free, currency-matched rate. *If government is default free*, use long term government bond rate *If government is not AAA rated*, adjust the long term government bond rate for default risk. Riskfree rate = LT government bond rate – Default spread	For Amgen, US T.Bond rate = 4.78% For Hyundai Heavy, Korean government bond rate = 5.8% but Korean government has A2 rating, with default spread of 0.80% Won riskfree rate = 5.8% -0.8% = 5%
Equity Risk Premium (ERP) (Mature market)	Can be estimated from a. Historical data: Difference between geometric average return on stocks and geometric average return on treasuries over very long time periods. b. Current stock prices: Compute the implied expected return based upon index level now and expected cash flows (dividends and stock buybacks) in future.	Geometric average ERP for US = 3.88% (see page 23) Implied premium = 6.43% (see page 23) (You will not be asked to compute the implied premium but you should be able to explain what it is and why it may change over time)
Country Risk premium (CRP) (and total risk premium)	Step 1: Get default spread for country, based upon its sovereign rating. Step 2: Adjust the default spread for the relative volatility of equity to government bond in that market. ➔ Country Risk Premium = Default spread*(Standard deviation of equity/ Standard deviation of bond) ➔ Total Risk Premium = Mature market premium + Country risk premium	For Korea Default spread for Korea = 0.80% *Relative equity market volatility:* Standard deviation of KOSPI = 18% Standard deviation of bond = 12% CRP for Korea = 0.8% (18/12) = 1.2% Total risk premium = 4% + 1.2% = 5.2%
Beta	Can be estimated from a. Regression of stock returns against market index, but that estimate will be backward-looking and have significant standard error. b. A bottom-up beta, computed by looking at the businesses that the firm operates in and the	Amgen: Single business company (Pg 22) Unlevered beta = 1.59 Levered beta = 1.59 (1+(1-.35)(.11)) = 1.73 Hyundai Heavy (see page 22) Unlevered beta = 1.49 Levered beta = 1.49 (1+(1-.275)(.007))=1.50

	unlevered betas of other firms in the business. Beta for company = $\sum_{j=1}^{j=K} \beta_{Unlevered,j} W_j$ where w_j = Weight of business j As a final step, you can lever betas: $Beta_{Lev} = Beta_{Unlev}(1+(1-t)\ (Debt/Equity))$	
Lambda	Measures company exposure to country risk. Easiest way to estimate it is to use revenue exposure: λ = % of revenues $domestically_{firm}$/ % of revenues $domestically_{avg\ firm\ in\ market}$	Hyundai Heavy (Page 30) Hyundai's revenues in Korea = 20% Average firm's revenues in Korea= 80% $Lambda_{Hyundai,\ Korea}$ = 20%/80% = 0.25
Expected Return (Cost of equity)	*If enough information provided for estimating lambda* Cost of equity = Riskfree Rate+ β (Mature market premium) + λ (CRP) *If not enough information provided for lambda* Cost of equity = Riskfree Rate + β (Mature market premium + CRP)	For Amgen Cost of Equity = 4.78%+1.73 (4%) = 11.7% Lambda approach for Hyundai Heavy: Cost of equity = 5% + 1.5 (4%) + 0.25 (1.2%) =11.30% If Lambda could not be estimated: Cost of equity = 5%+1.5 (5%+1.2%)=14.3%
Pre-tax Cost of Debt	If mature market company Riskfree Rate + Default spread for company If emerging market company Riskfree Rate + Default spread for country + Default spread for company	For Amgen in 2007 4.78% + 0.85% = 5.63% For Hyundai Heavy in 2008 5% + 0.80% + 0.75% = 6.55%
Debt	For computing the cost of capital, debt should include: a. Market value of interest bearing debt, short term as well as long term. b. Present value of all lease commitments, discounted back at the current pre-tax cost of	For Amgen in 2007 (See page 14) MV of interest bearing debt = $7,402 PV of leases @ 5.63% = $870 Total debt =$8,272 million

	debt.	
Cost of capital	Cost of equity (E/(D+E)) + Cost of Debt (1- marginal tax rate) (D/(D+E))	For Amgen, 11.7%(.9) + 5.63%(1-.35) (.1) For Hyundai Heavy 11.3% (.993)+6.55%(1-.275)(.007)
EBIT	Start with the stated operating income, but adjust for: a. Leases: by adding back the current year's lease expense and subtracting out depreciation on the lease asset. b. R&D: by adding back the current year's R&D expense and subtracting out amortization on the research asset.	For Amgen, (Pge 14-15) Stated Operating Income = $5,071 + Current year lease exp = $ 69 - Deprec'n on lease asset= $ 72.5 + Current year R&D = $ 3,366 - Amortization of R&D = $,1150 Adjusted Operating inc = $ 7,336
Capital Expenditures & Net Cap Ex	Should include: a. Stated Capital Expenditures (from statement of CF) b. R&D expense for the current year c. Costs of all acquisitions, whether paid for with cash or stock. d. Current year's lease expense Net Cap ex = Cap Ex – Depreciation Depreciation should include depreciation on leased asset and R&D	For Amgen, Stated capital expenditure= 1,218 Adjusted capital expenditure= 1.218 + 3366 (R&D) + 3975 (Acquisitions) + 69 (lease exp)= 8628 Net Cap Ex = 8628-2185 = 6443
Non-cash Working Capital	Non-cash Current Assets – Non-debt Current liabilities.	For Amgen in 2007 Inventory (1903)+Accounts Rec (2124)+Other current assets(1408)-Acc Pay (555)-Other current liab (4589) = 291 Change from previous year = +37
FCFF	EBIT (1- tax rate) – (Cap Ex – Depreciation) – Change in non-cash Working Capital	For Amgen in 2007 7336 (1-.28) – 6443 – 37 = -423

Return on Capital	$\frac{\text{EBIT}(1-t)}{(\text{BV of Equity} + \text{BV of Debt} - \text{Cash})}$ where BV of Equity includes the value of the research asset BV of Debt includes the PV of lease commitments All values in denominator are from previous year.	For Amgen in 2007 $\frac{7336(1-.35)}{(28{,}347 + 4827 - 1{,}560)} = 16.71\%$
Reinvestment Rate	$\frac{\text{Capital Expenditure} - \text{Depreciation} + \Delta \text{Non-cash WC}}{\text{EBIT}\ (1 - \text{tax rate})}$	For Amgen in 2007 $\frac{8628 - 2185 + 37}{7336\ (1 - .28)} = 106.98\%$
Expected Growth	Reinvestment Rate * Return on Capital In making these estimates, you do not have to stick with current numbers but should use your best forecasts. This may require looking at the reinvestment rate over time.	For Amgen Expected Reinvestment rate = 60% (average over last 5 years) Expected ROC = 16% (trend downward continues) Expected growth = .6*.16 = .096 or 9.6% For Hyundai Heavy Expected Reinvestment rate = 50% (close to last year's number) Expected ROC = 30% (below last year's number) Expected growth = .5*.30 = .15 or 15%
Terminal value	$\text{Terminal Value}_n = \frac{\text{EBIT}_{n+1}(1-t)\left(1 - \frac{g_n}{\text{ROC}_n}\right)}{(\text{Cost of Capital}_n - g_n)}$ where g_n = Growth rate forever (< Riskfree Rate) ROC_n = Return on capital forever (should move to or towards the stable period cost of capital)	For Amgen $\frac{12{,}167(1-.35)\left(1 - \frac{.04}{.10}\right)}{(.0808 - .04)} = 179{,}099$ Note that we switch to the marginal tax rate (35%), stable period cost of capital (8.08%)

		and stable ROC (10%) For Hyundai Heavy $\frac{3{,}698(1-.275)\left(1-\frac{.05}{.0942}\right)}{(.0942-.05)}=28{,}471$ Since the ROC = Cost of capital, the value will remain the same as growth changes.
Value of Operating Assets today	$\text{Value}_0=\sum_{t=1}^{t=n}\frac{E(FCFF)_t}{(1+\text{Cost of capital})^t}+\frac{\text{Terminal Value}_n}{(1+\text{Cost of capital})^n}$	For Amgen: PV of Cash flows for next 10 years + PV of terminal value = $94,214 For Hyundai Heavy: PV of Cash flows for next 5 years + PV of terminal value = 20,211 billion Won
Value of firm today	Value of Operating Assets + Cash and Marketable Securities + Market Value of Cross holdings in other companies	For Amgen 94,214+ 183 (Cash) =95,497 For Hyundai Heavy 20,211+ 3612 (Cash) +3,937 (Cross holdings) = 27,759
Value of equity today	Value of firm today - Market value of debt outstanding - Market value of minority interests (if consolidated)	For Amgen 95,497 – 8272 (Debt) = 87,226 For Hyundai Heavy 27,759 – 186 (Debt) = 27,574
Value of equity per share	Value of Equity today - Value of Equity options granted by firm / Number of shares outstanding	For Amgen (87226 – 479 (Options))/1167.11 = $74.33 For Hyundai Heavy 27574/76 = 362,200 Won/share