# Valuation: Lecture Note Packet 1
# Intrinsic Valuation

Aswath Damodaran

Updated: January 2023

# The essence of intrinsic value



- In intrinsic valuation, you value an asset based upon its fundamentals (or intrinsic characteristics.
- For cash flow generating assets, the intrinsic value will be a function of the magnitude of the expected cash flows on the asset over its lifetime and the uncertainty about receiving those cash flows.
  - Discounted cash flow (DCF) valuation is a tool for estimating intrinsic value, where the expected value of an asset is written as the present value of the expected cash flows on the asset, with either the cash flows or the discount rate adjusted to reflect the risk.
  - Intrinsic valuation models predate the modern DCF model, since investors through the ages have found ways to weight in expected cash flows into value.

# The two faces of discounted cash flow valuation



- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \ldots\ldots + \frac{E(CF_n)}{(1+r)^n}$$

where the asset has an n-year life, $E(CF_t)$ is the expected cash flow in period t and r is a discount rate that reflects the risk of the cash flows.

- Alternatively, we can replace the expected cash flows with the guaranteed cash flows we would have accepted as an alternative (certainty equivalents) and discount these at the riskfree rate:

$$\text{Value of asset} = \frac{CE(CF_1)}{(1+r_f)} + \frac{CE(CF_2)}{(1+r_f)^2} + \frac{CE(CF_3)}{(1+r_f)^3} \ldots\ldots + \frac{CE(CF_n)}{(1+r_f)^n}$$

where CE(CFt) is the certainty equivalent of $E(CF_t)$ and $r_f$ is the riskfree rate.

# Risk Adjusted Value: Two Basic Propositions



- The value of an asset is the risk-adjusted present value of the cash flows:

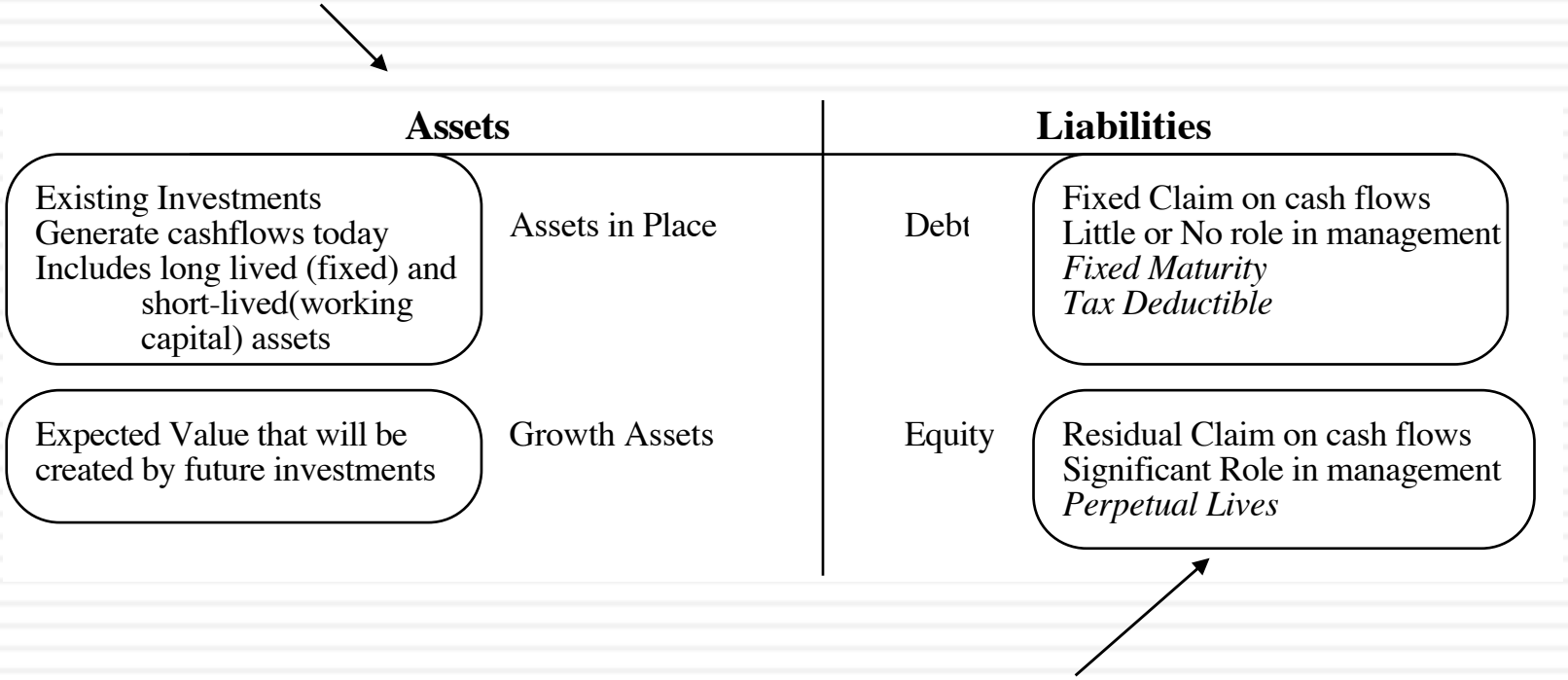
$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \ldots\ldots + \frac{E(CF_n)}{(1+r)^n}$$

1. The "IT" proposition: If IT does not affect the expected cash flows or the riskiness of the cash flows, IT cannot affect value.
2. The "DON'T BE A WUSS" proposition: Valuation requires that you make estimates of expected cash flows in the future, not that you be right about those cashflows. So, uncertainty is not an excuse for not making estimates.
3. The "DUH" proposition: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.
4. The "DON'T FREAK OUT" proposition: Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.

# DCF Choices: Equity Valuation versus Firm Valuation



**Firm Valuation**: Value the entire business

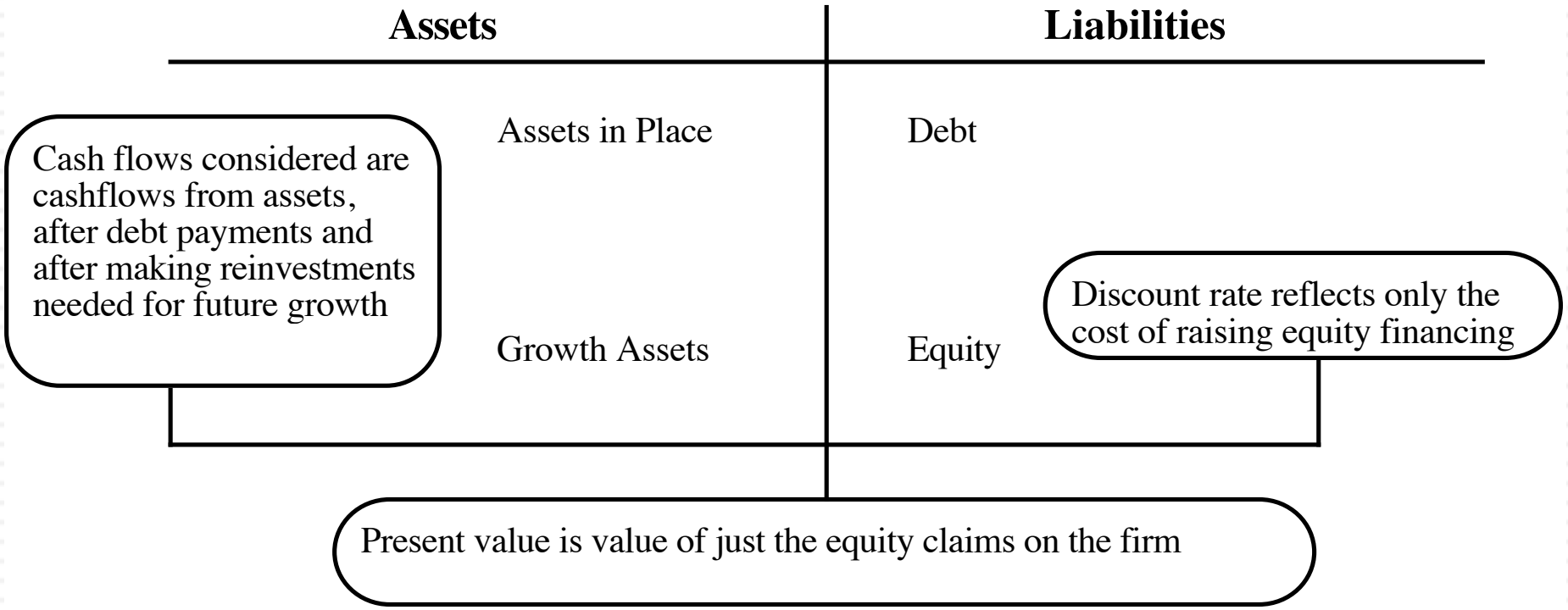



**Equity valuation**: Value just the equity claim in the business

# 1. Equity Valuation



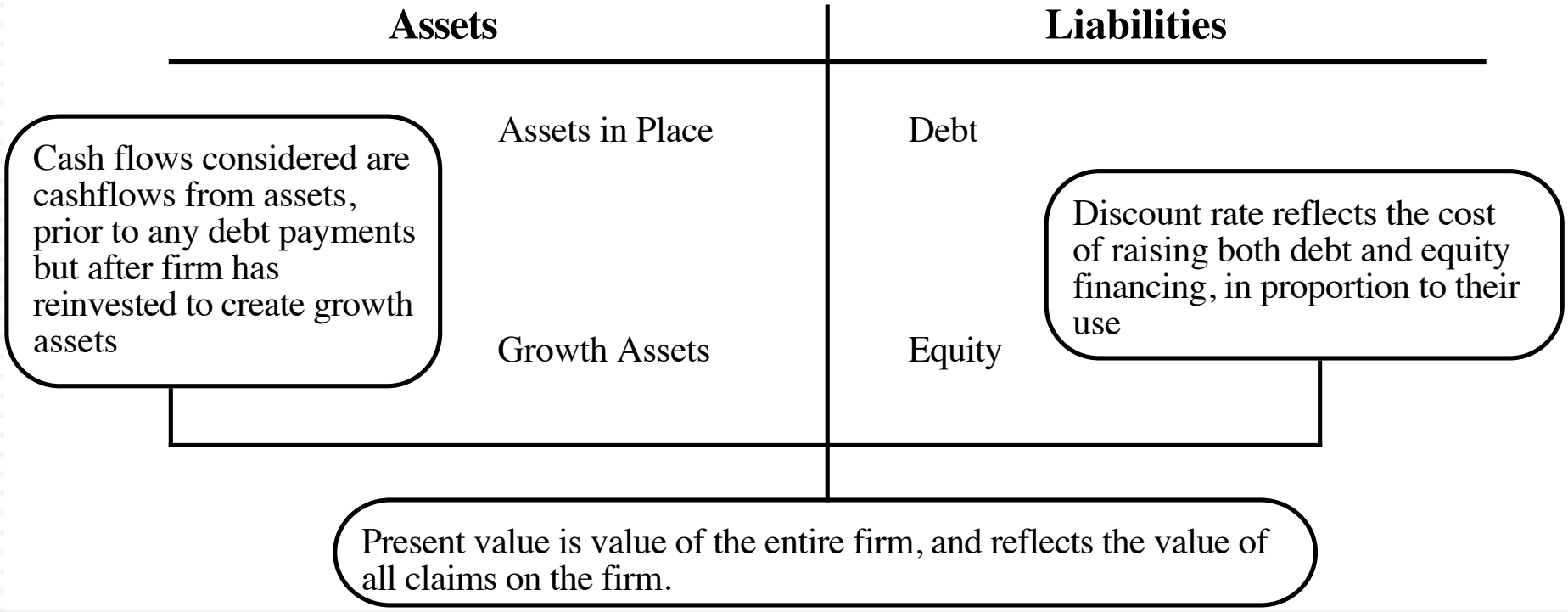
*Figure 5.5: Equity Valuation*



# 2. Firm or Business Valuation



*Figure 5.6: Firm Valuation*



# Firm Value and Equity Value



- To get from firm value to equity value, which of the following would you need to do?
  a. Subtract out the value of long-term debt
  b. Subtract out the value of all debt
  c. Subtract the value of any debt that was included in the cost of capital calculation
  d. Subtract out the value of all liabilities in the firm
- Doing so, will give you a value for the equity which is
  a. greater than the value you would have got in an equity valuation
  b. lesser than the value you would have got in an equity valuation
  c. equal to the value you would have got in an equity valuation

# Cash Flows and Discount Rates



- Assume that you are analyzing a company with the following cashflows for the next five years.

| Year | CF to Equity | Interest Expense (1-t) | CF to Firm |
|---|---|---|---|
| 1 | $ 50 | $ 40 | $ 90 |
| 2 | $ 60 | $ 40 | $ 100 |
| 3 | $ 68 | $ 40 | $ 108 |
| 4 | $ 76.2 | $ 40 | $ 116.2 |
| 5 | $ 83.49 | $ 40 | $ 123.49 |
| Terminal Value | $ 1603.0 | | $ 2363.008 |

- Assume also that the cost of equity is 13.625% and the firm can borrow long term at 10%. (The tax rate for the firm is 50%.)
- The current market value of equity is $1,073 and the value of debt outstanding is $800.

# Equity versus Firm Valuation



- Method 1: Discount CF to Equity at Cost of Equity to get value of equity
  - Cost of Equity = 13.625%
  - Value of Equity = $50/1.13625 + 60/1.13625^2 + 68/1.13625^3 + 76.2/1.13625^4 + (83.49+1603)/1.13625^5$ = **$1073**
- Method 2: Discount CF to Firm at Cost of Capital to get value of firm
  - Cost of Debt = Pre-tax rate (1- tax rate) = 10% (1-.5) = 5%

  Cost of Capital = 13.625% (1073/1873) + 5% (800/1873) = 9.94%
  - PV of Firm = $90/1.0994 + 100/1.0994^2 + 108/1.0994^3 + 116.2/1.0994^4 + (123.49+2363)/1.0994^5$ = $1873
  - Value of Equity = Value of Firm - Market Value of Debt

    = $ 1873 - $ 800 = **$1073**

# First Principle of Valuation



- Discounting Consistency Principle: Never mix and match cash flows and discount rates.
- The Mismatch Effect: Mismatching cash flows to discount rates is deadly.
  - Discounting cashflows after debt cash flows (equity cash flows) at the weighted average cost of capital will lead to an upwardly biased estimate of the value of equity
  - Discounting pre-debt cashflows (cash flows to the firm) at the cost of equity will yield a downward biased estimate of the value of the firm.

# The Effects of Mismatching Cash Flows and Discount Rates

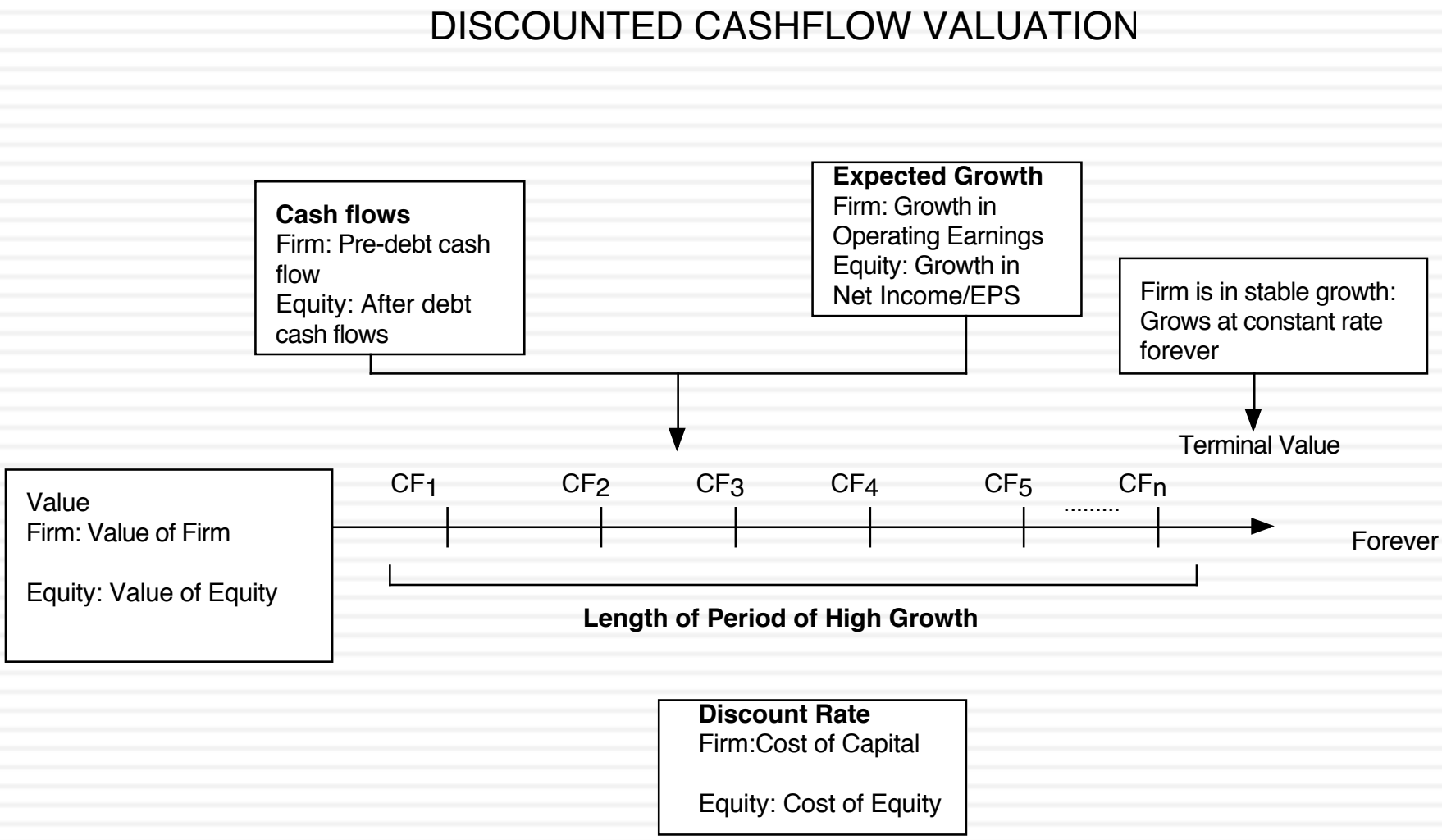


- Error 1: Discount CF to Equity at Cost of Capital to get equity value
  - PV of Equity = $50/1.0994 + 60/1.0994^2 + 68/1.09943 + 76.2/1.0994^4 + (83.49+1603)/1.0994^5 = \$1248$
  - Value of equity is **overstated by $175**.
- Error 2: Discount CF to Firm at Cost of Equity to get firm value
  - PV of Firm = $90/1.13625 + 100/1.13625^2 + 108/1.13625^3 + 116.2/1.13625^4 + (123.49+2363)/1.13625^5 = \$1613$
  - PV of Equity = $1612.86 - $800 = $813
  - Value of Equity is **understated by $ 260**.
- Error 3: Discount CF to Firm at Cost of Equity, forget to subtract out debt, and get too high a value for equity
  - Value of Equity = $ 1613
  - Value of Equity is **overstated by $ 540**

# DCF: First Steps

# Generic DCF Valuation Model





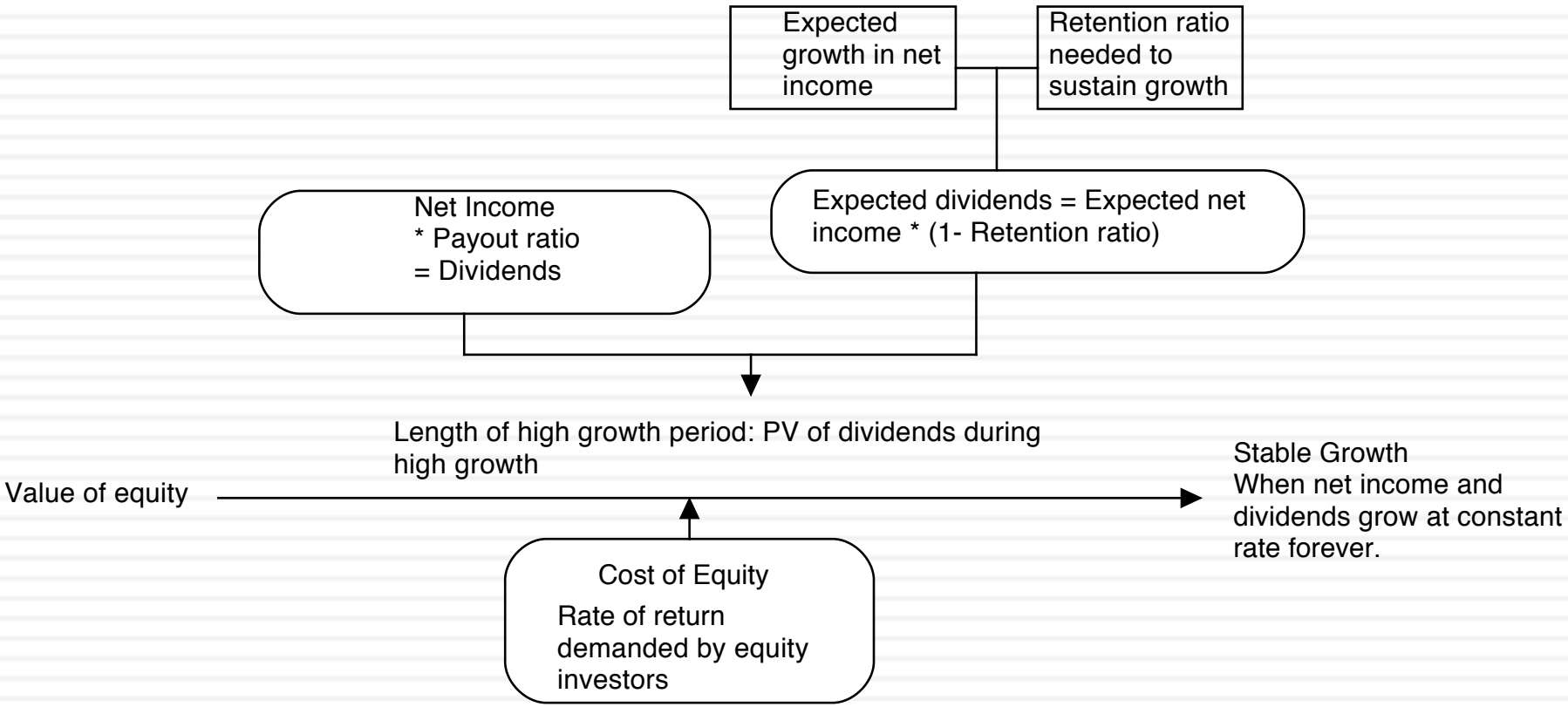
# Same ingredients, different approaches…



| Input | Dividend Discount Model | FCFE (Potential dividend) discount model | FCFF (firm) valuation model |
|---|---|---|---|
| Cash flow | Dividend | Potential dividends = FCFE = Cash flows after taxes, reinvestment needs and debt cash flows | FCFF = Cash flows before debt payments but after reinvestment needs and taxes. |
| Expected growth | In equity income and dividends | In equity income and FCFE | In operating income and FCFF |
| Discount rate | Cost of equity | Cost of equity | Cost of capital |
| Steady state | When dividends grow at constant rate forever | When FCFE grow at constant rate forever | When FCFF grow at constant rate forever |

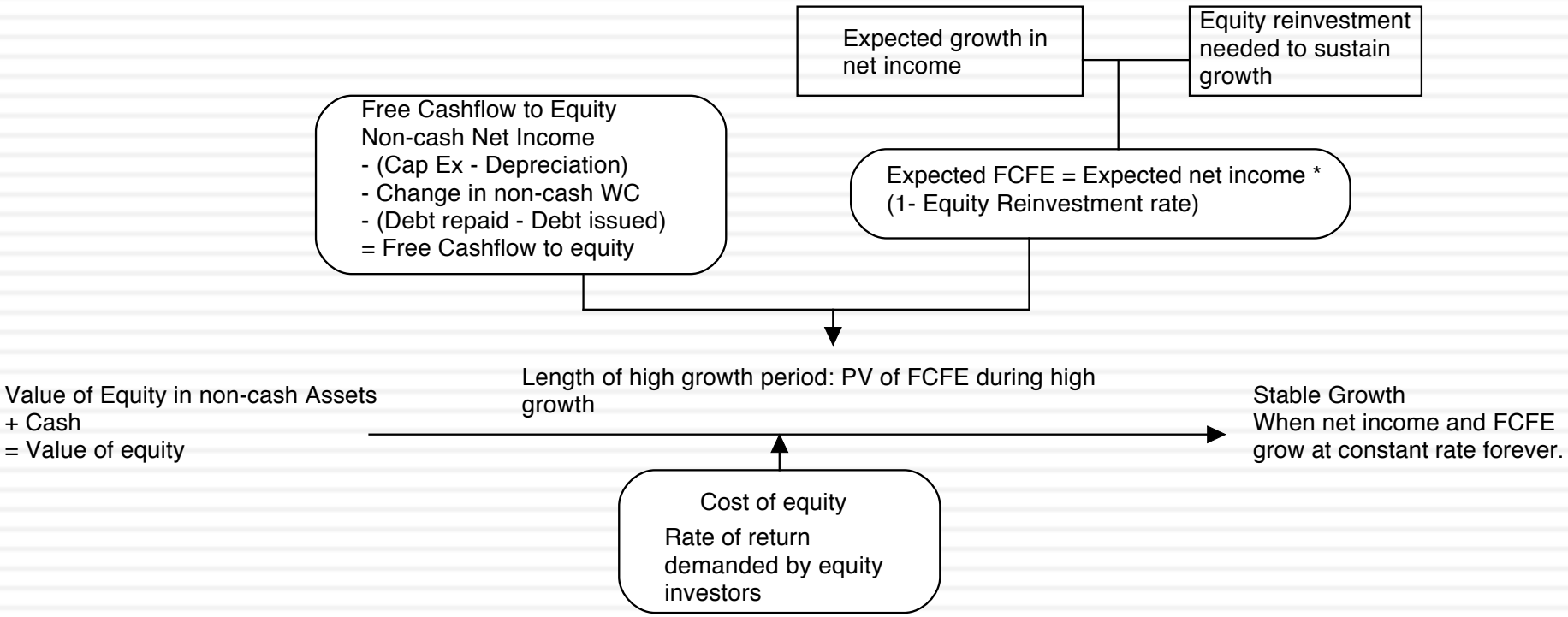
# Start easy: The Dividend Discount Model





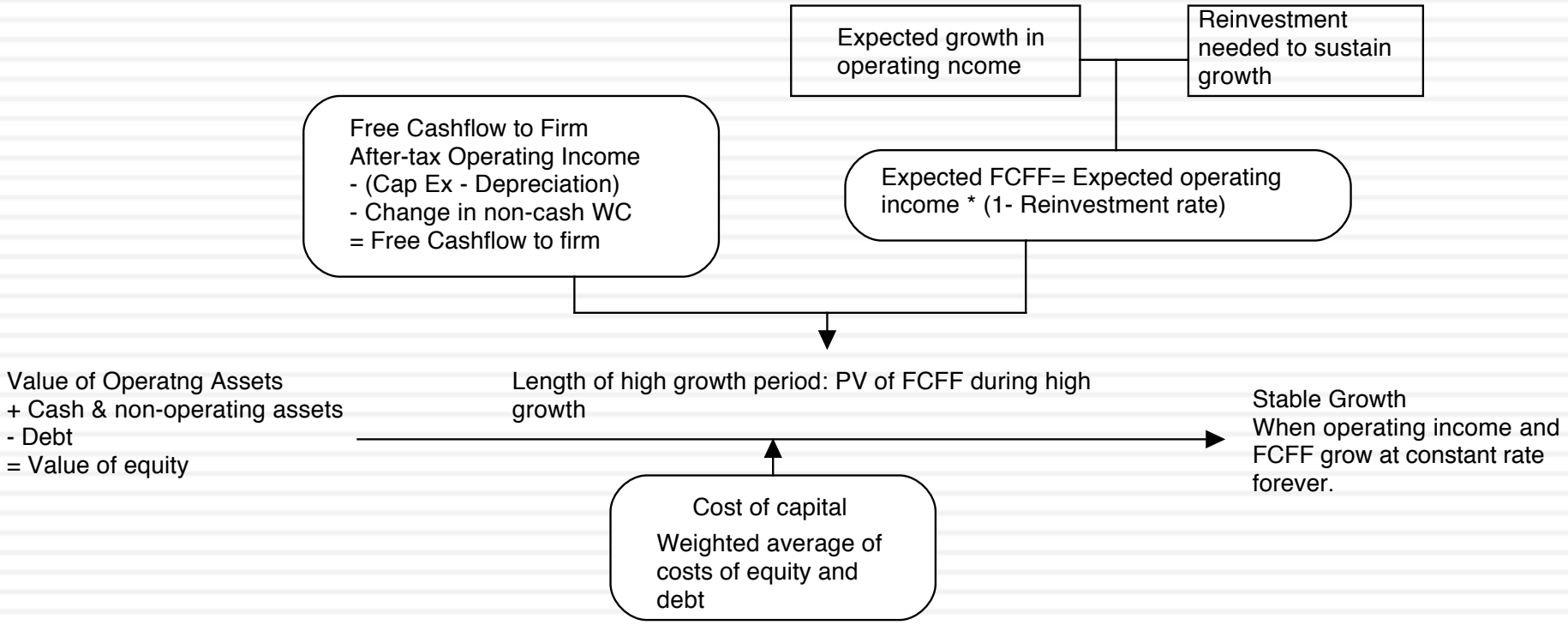
# Moving on up: The "potential dividends" or FCFE model



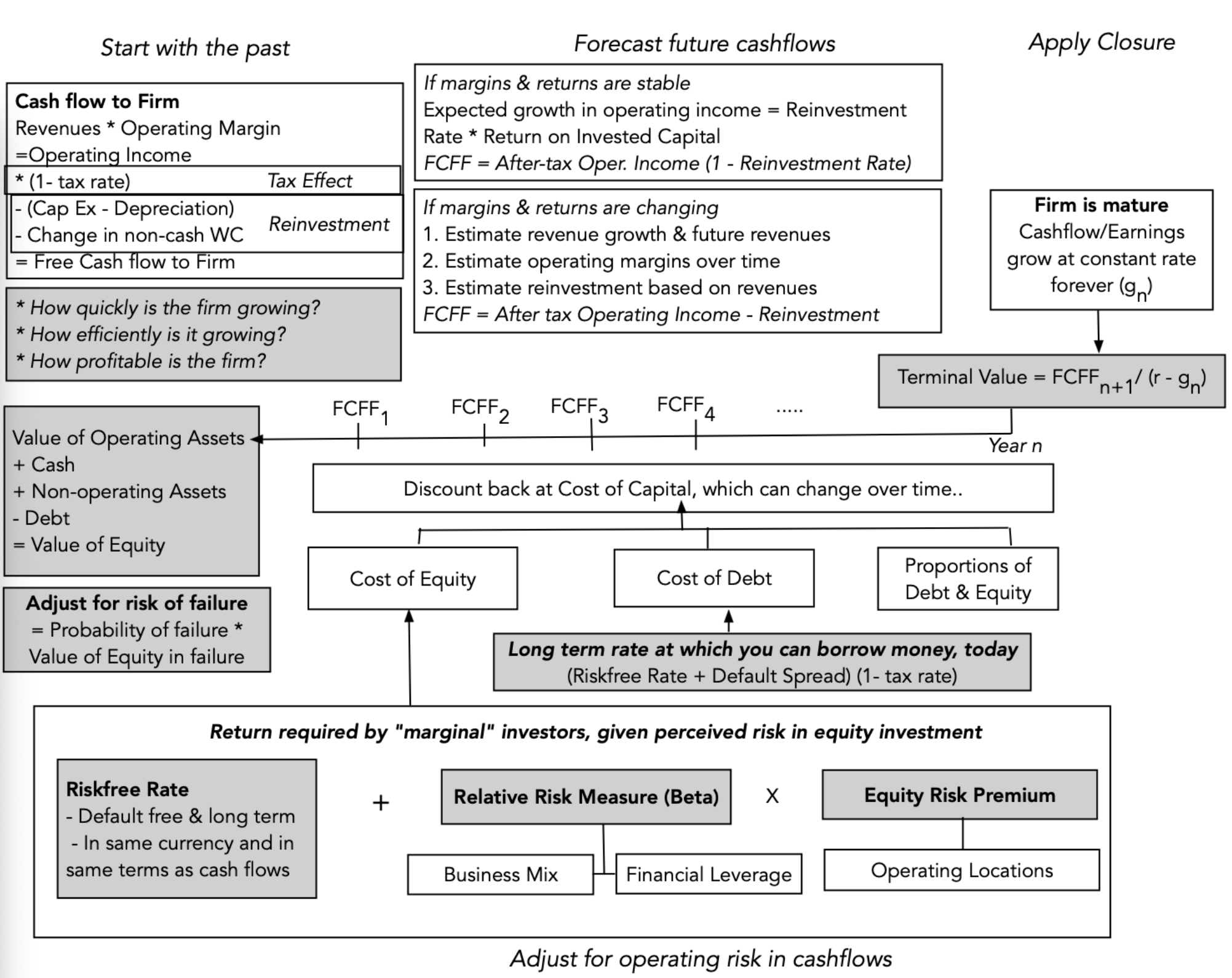


# To valuing the entire business: The FCFF model





# DCF: The Process


Start with the past
Forecast future cashflows
Apply Closure
Cash flow to Firm
Revenues * Operating Margin
=Operating Income
* (1- tax rate)
Tax Effect
- (Cap Ex - Depreciation)
- Change in non-cash WC
Reinvestment
= Free Cash flow to Firm
* How quickly is the firm growing?
* How efficiently is it growing?
* How profitable is the firm?
If margins & returns are stable
Expected growth in operating income = Reinvestment Rate * Return on Invested Capital
FCFF = After-tax Oper. Income (1 - Reinvestment Rate)
If margins & returns are changing
1. Estimate revenue growth & future revenues
2. Estimate operating margins over time
3. Estimate reinvestment based on revenues
FCFF = After tax Operating Income - Reinvestment
Firm is mature
Cashflow/Earnings grow at constant rate forever (g_n)
Terminal Value = FCFF_n+1 / (r - g_n)
FCFF_1
FCFF_2
FCFF_3
FCFF_4
.....
Year n
Value of Operating Assets
+ Cash
+ Non-operating Assets
- Debt
= Value of Equity
Discount back at Cost of Capital, which can change over time..
Cost of Equity
Cost of Debt
Proportions of Debt & Equity
Adjust for risk of failure
= Probability of failure * Value of Equity in failure
Long term rate at which you can borrow money, today
(Riskfree Rate + Default Spread) (1- tax rate)
Return required by "marginal" investors, given perceived risk in equity investment
Riskfree Rate
- Default free & long term
- In same currency and in same terms as cash flows
+
Relative Risk Measure (Beta)
X
Equity Risk Premium
Business Mix
Financial Leverage
Operating Locations
Adjust for operating risk in cashflows

# The Sequence



1. Get a handle on the past and the cross-section: While the past is the past (and should have little relevance in determining value), you can get clues about the future by looking at what your firm has done in the past, and what other companies in the business are doing now.
2. Risk and Discount Rates: Traditional financial theory (unfortunately) has put too much of a focus on risk and discount rates, but they do remain ingredients in valuing a company.
3. Estimate growth and future cash flows: This is where the rubber meets the road in valuation. Estimating future cash flows is never easy, should not be mechanical and should be built around your story.
4. Apply Closure to cash flows: Since you cannot estimate cash flows forever, you need to find a way to bring your valuation to closure.
5. Tie up loose ends: Check to see what else in your business needs to be valued or adjusted for to get to value per share.

# Discount Rates

The D in the DCF..

# Estimating Inputs: Discount Rates



- While discount rates obviously matter in DCF valuation, they don't matter as much as most analysts think they do.
- At an intuitive level, the discount rate used should be consistent with both the riskiness and the type of cashflow being discounted.
  - Equity versus Firm: If the cash flows being discounted are cash flows to equity, the appropriate discount rate is a cost of equity. If the cash flows are cash flows to the firm, the appropriate discount rate is the cost of capital.
  - Currency: The currency in which the cash flows are estimated should also be the currency in which the discount rate is estimated.
  - Nominal versus Real: If the cash flows being discounted are nominal cash flows (i.e., reflect expected inflation), the discount rate should be nominal

# Risk in the DCF Model



*Expectation of cash flows across all scenarios, good and bad. Incorporates all risks that affect the asset / business.*

$$\frac{\text{Expected Cash Flows}}{\text{Risk Adjusted Discount Rate}}$$

*Discount rate should reflect the risk perceived by the marginal investor in the company*

| Risk Adjusted Cost of equity | = | Risk free rate in the currency of analysis | + | Relative risk of company/equity in questiion | X | Equity Risk Premium required for average risk equity |
|---|---|---|---|---|---|---|

# Not all risk is created equal…



- Estimation versus Economic uncertainty
  - Estimation uncertainty reflects the possibility that you could have the "wrong model" or estimated inputs incorrectly within this model.
  - Economic uncertainty comes the fact that markets and economies can change over time and that even the best models will fail to capture these unexpected changes.
- Micro uncertainty versus Macro uncertainty
  - Micro uncertainty refers to uncertainty about the potential market for a firm's products, the competition it will face and the quality of its management team.
  - Macro uncertainty reflects the reality that your firm's fortunes can be affected by changes in the macro economic environment.
- Discrete versus continuous uncertainty
  - Discrete risk: Risks that lie dormant for periods but show up at points in time. (Examples: A drug working its way through the FDA pipeline may fail at some stage of the approval process or a company in Venezuela may be nationalized)
  - Continuous risk: Risks changes in interest rates or economic growth occur continuously and affect value as they happen.