Fundamentals of Valuation

How much is a business worth?

TBC New Member Education 2020—Week 3

Agenda

- Intrinsic Value vs. Relative Value

- Equity Value vs. Enterprise Value

- Free Cash Flow

- Cost of Capital (WACC)

- Terminal Value

- Putting it All Together

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Valuation Overview

Enterprise Value vs Equity Value

When valuing a company, we can choose to value the entire firm (enterprise value) or only the equity in the firm

We can convert back and forth between enterprise value and equity value…

$$\text{Enterprise Value} = \underbrace{\text{Market Cap}}_{\text{Equity Value}} + \underbrace{(\text{Total Debt} - \text{Cash and Investments})}_{\text{Net Debt}}$$

Equity Value:
> The value of the <u>residual claim on the company's assets</u>
> The value of <u>only the equity in the firm</u>

Enterprise Value:
> The value of <u>all of the company's operating assets</u>
> The value of <u>the entire firm</u> (what an acquirer would have to pay to buy the business)

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Intrinsic Valuation vs Relative Valuation

When valuing a company, we can either perform an intrinsic valuation or a relative valuation

Intrinsic Valuation

> Values an asset based on the **present value of all of its future cash flows**

> **Theoretically correct** way of valuing an asset

> When done properly, can provide a fuller picture of what drives the value of an asset than you would get with a relative valuation

> E.g. The value of an apartment is the present value of the amount you can earn by renting it out

Relative Valuation

> Values an asset based on how the market prices other similar assets

> Can sometimes provide a more realistic/tractable estimate of an asset's value

> Can be used to make bets on the relative performance of different assets

> E.g. The value of an apartment is based on what similar apartments have recently sold for

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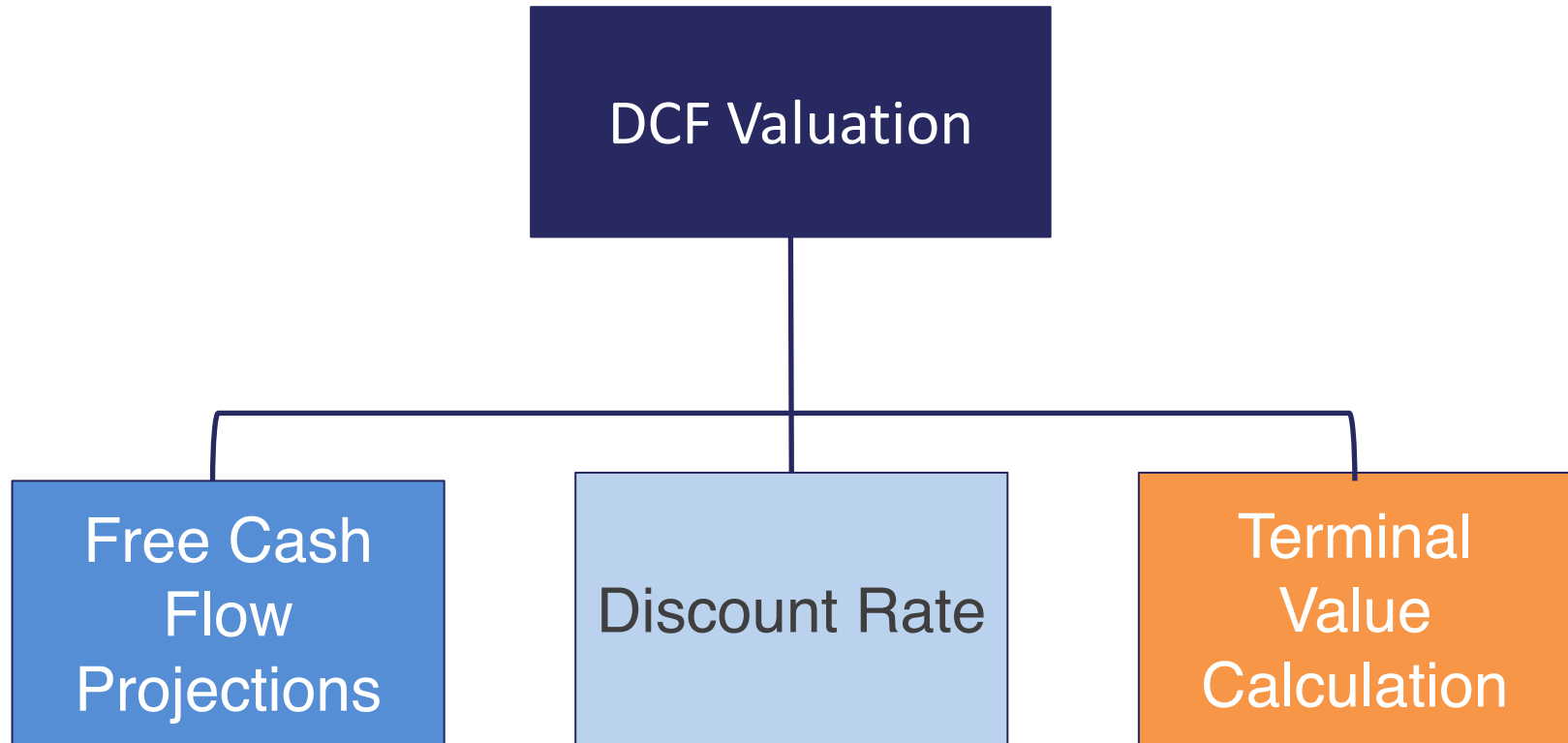UNIVERSITY OF CHICAGO INVESTMENT CLUB

Intrinsic Value

The intrinsic value of a business is the present value of its cash flows in perpetuity

$$\text{DCF Value} = \sum_{t=1}^{\infty} \frac{\text{CF}_t}{(1+r)^t}$$

$$= \underbrace{\left[\sum_{t=1}^{n} \frac{\text{CF}_t}{(1+r)^t} \right]}_{\text{Forecasted Cash Flows}} + \underbrace{\frac{\text{CF}_n(1+g)}{(1+r)^n(r-g)}}_{\text{Terminal Value}}$$

- CF_t = Cash Flow in Year t
- r = Discount Rate (cost of capital)
- g = Terminal growth rate
- n = Last year of projections

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DCF: The Basic Components

There are three major components to doing a DCF

DCF Valuation

Free Cash Flow Projections

Discount Rate

Terminal Value Calculation

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Free Cash Flow

Free Cash Flow - Formula

<u>Two types of free cash flow</u>

1. Unlevered Free Cash Flow ("Free Cash Flow to Firm" = FCFF)
   - Measures free cash available to all stakeholders (debt + equity) in a business
2. Levered Free Cash Flow ("Free Cash Flow to Equity" = FCFE)
   - Measures free cash available to equity holders in a business

Because we're interested in valuing the entire firm, **we focus on Unlevered FCF (FCFF)**. Areas of interest:
   - Earnings available to all stakeholders in the firm (EBIT)
   - Tax Rate (t)
   - Depreciation & Amortization (D&A)
   - Capital Expenditures (Capex)
   - Change in Net Working Capital (ΔNWC)

$$\text{Unlevered FCF (FCFF)} = \text{EBIT} \cdot (1 - t) + \text{D\&A} - \text{Capex} - \Delta \text{NWC}$$

Free Cash Flow - Intuition

1. Start with **EBIT**, which measures earnings available to all stakeholders in the business

2. Subtract **taxes**, the government's claim on the business; remainder is available to bondholders and stockholders.

3. Add back **Depreciation & Amortization (D&A)** because D&A is recorded as an expense in the income statement (decreasing EBIT) but *it is not a real cash expense*

4. Subtract **Capital Expenditures (CapEx)**, which is cash reinvested in the business, because *CapEx is a real cash expense* that was not accounted for on the income statement (in EBIT)

5. Subtract out **<u>Increases</u> in Net Working Capital (ΔNWC)**

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Working Capital (Simple Explanation)

Net working capital is comprised of the short-term net assets a company needs to continue to operate smoothly

> Increases in working capital assets tie up cash -> lower FCF
  – E.g. If a company pays cash for inventory, the cash paid for that inventory needs to be subtracted from free cash flow

> Increases in working capital liabilities represent a source of cash -> higher FCF
  – E.g. If a company receives payment for a service before providing that service to a customer ("deferred revenue"), the cash received for that service needs to be added to free cash flow

We subtract <u>increases</u> in net working capital
  – Higher net working capital means more cash tied up in running the business' operations

$$\text{Net Working Capital} = (\text{Current Assets} - \text{Cash} - \text{ST Marketable Securities}) - (\text{Current Liabilities} - \text{ST Debt})$$

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Working Capital (Actual Explanation)

The previous definition is a simple and will generally get you to the correct answer for what counts as working capital; however, it is not actually correct

Questions

1. A company has to have cash on hand to pay suppliers in a couple of months. It invests that cash into an S&P 500 index fund. Clearly, this is cash that is 'tied up' in the operations of the business and isn't available to be distributed to stakeholders in the business. Yet we don't include it as a working capital asset. Why?

2. A company takes out a short-term loan from a bank and uses this loan to pay a dividend to equity holders. Clearly, the money from the loan is available to be distributed to stakeholders in the company, yet we don't include the loan as a working capital liability. Why?

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Working Capital (Actual Explanation)

> The defining feature of whether something counts as working capital is whether it's earning/yielding a fair rate of return

Working Capital Assets

> Assets which aren't earning a fair rate of return and which aren't included in Capex[1]
> "Wasting assets"
> E.g. Inventory, accounts receivable, deferred tax assets, etc.

Working Capital Liabilities

> Liabilities which the company isn't paying a fair rate of interest for
> "Interest-free loans"
> E.g. Deferred revenue, accounts payable, deferred tax liabilities, etc.

$$\text{Net Working Capital} = \text{Working Capital Assets} - \text{Working Capital Liabilities}$$

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1 Fixed assets like factories fit the definition of a wasting asset, but we don't include them in working capital because we've already accounted for their effects on free cash flow by subtracting Capex and adding back D&A. Moreover, they tend to be different conceptually from "traditional" working capital assets, so it helps to treat them differently.

Projecting Free Cash Flow

$$\text{Unlevered FCF (FCFF)} = \text{EBIT} \cdot (1 - t) + \text{D\&A} - \text{Capex} - \Delta\text{NWC}$$

Income Statement	> EBIT = Revenue x EBIT Margin > Taxes (only to figure out the tax rate)	Estimate earnings of the firm

Balance Sheet	> Working Capital
	   – Current Assets
	   – Current Liabilities
	   – Cash & Short Term Investments
	   – Short-Term Debt
		Consider how much the firm invested to create future growth

Cash Flow Statement	> Depreciation and Amortization > Capital Expenditures	

Why Unlevered Free Cash Flow?

Advantages

> True "cash" basis makes it more difficult to manipulate through aggressive accounting
> Calculates the amount available to all stakeholders (debt + equity holders) in the company, which creates an apples-to-apples comparison for companies with different capital structures

Disadvantages

> Large fluctuations due to changes in capital expenditures and net working capital
> Hard to accurately project working capital

Why Not Use Net Income ?

> Does not give apples-to-apples comparison for companies with different capital structures
> Earnings can be manipulated more easily than cash flows

Why Not Use CFO?

> Does not include reinvestment spending such as capital expenditures
> Measures cash flows to equity, not the firm

Why Not Use Δ Cash?

> Double-counts interest tax shield
> Corner cases make things complicated (i.e. asset divestitures)

Output of FCF

The value of a business is the present value of its discounted free cash flows

Who has potential claims on a company's unlevered free cash flows?

> **All stakeholders** of the company (debt + equity holders)
> Don't confuse unlevered free cash flow (FCFF) with levered free cash flow (FCFE)

The present value of all of a company's unlevered free cash flows is equal to its **Enterprise Value**

> Intuition: Since the individual free cash flows are available to all stakeholders of a business, the sum of these cash flows should be the value that is available to all stakeholders—this is the company's enterprise value

Cost of Capital (WACC)

Weighted Average Cost of Capital - Intuition

WACC represents the cost of funding all of a company's operations, assuming its capital structure remains the same over time

As previously discussed, unlevered free cash flows are available to **all stakeholders** (debt + equity holders) in a firm:

> Consequently, the discount factor must represent the opportunity cost of tying up capital in the firm incurred by (or equivalently, the expected return required by) **all stakeholders**

WACC blends the rates of return required by debt holders and equity holders

> Weighted to capture mix of debtholders and stockholders

A company's cost of capital must match the company's "risk profile"

> Riskier companies should have higher WACCs

WACC - Formula

$$\text{WACC} = R_d \cdot \frac{D}{D+E} \cdot (1-t) + R_e \cdot \frac{E}{D+E}$$

- E   =   <u>Market Value</u> of Equity
- D   =   <u>Market Value</u> of Debt
- R_e =   Cost of Equity
- R_d =   Cost of Debt
- t   =   Tax Rate

Cost of Equity - Intuition

A company's cost of equity is a simply the **expected return** we would need to be indifferent between investing in that company and a (risk-free) government bond

> If you would be indifferent between earning a 10% expected return by investing in Facebook and investing in a government bond, then Facebook's cost of equity (to you at least) is 10%

Three basic principles governing cost of equity

1. **Cost of equity should be higher when yields on government bonds (the "risk-free rate") are higher**
   - Alternative investments are more attractive/opportunity cost is higher
2. **Cost of equity should be higher for companies which are riskier**
   - Risk-averse investors need compensation for taking on extra risk
3. **Cost of equity should be higher when market participants are more risk averse**
   - The compensation needed for taking on extra risk depends not just on how risky the company is but also how risk-averse investors are

Cost of Equity – Using CAPM

Cost of equity is the theoretical hurdle-rate needed to entice you to invest in a risky asset; CAPM provides a formula for what cost of equity *should be* in market equilibrium (under certain assumptions)

$$\text{Cost of Equity} = R_f + \beta \cdot (R_m - R_f)$$

Capital Asset Pricing Model (CAPM)

> **R_f = Risk-free rate**
  – The yield on a (risk-free) government bond

> **$R_m - R_f$ = Equity risk premium**
  – The excess expected return from investing in the market as a whole

> **ß = Beta to market return[1]**
  – The non-diversifiable risk associated with investing in an equity
  – Will be higher for stocks which are 1) more correlated to the market, and 2) more volatile
  – E.g. A beta of 2 means that if the equity market goes up by 10% and the risk-free rate is 2%, then the specific equity tends to go up by 2% + 2*(10% - 2%) = 18%

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1 Formally calculated as the slope of a regression of excess returns from an individual equity on excess market returns

CAPM - Intuition

$$\text{Cost of Equity} = R_f + \beta \cdot (R_m - R_f)$$

How does CAPM incorporate each of the three basic principles governing cost of equity?

1. Cost of equity should be higher when yields on government bonds (the "risk-free rate") are higher
   - **Higher risk-free rate (R_f) leads to higher cost of equity**
2. Cost of equity should be higher for companies which are riskier
   - **Higher beta (ß) leads to higher cost of equity**
3. Cost of equity should be higher when market participants are more risk averse
   - **Higher equity risk premium ($R_m - R_f$) leads to higher cost of equity**

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Problems with CAPM

Although CAPM is widely used to calculate cost of equity, there are a number of problems with its application

1. Volatility is an incomplete measure of risk
   - CAPM assumes that the entirety of a stock's risk can be measured by its contribution to portfolio volatility
2. CAPM looks only at non-diversifiable risk (beta ignores diversifiable risk)
   - This is valid for an efficiently-diversified portfolio, but we don't necessarily hold that
3. Estimating beta is hard
   - E.g. If you look a company's historical beta and it's 0, does that really mean that the company's cost of equity is the same as the risk-free rate?
4. Estimating the equity risk premium is hard
   - Equity risk premiums vary through time, yet historical estimates are only statistically valid over long time horizons (50+ years)
   - E.g. What is the expected return of the U.S. equity market over the next decade?
5. Empirically, CAPM doesn't do a very good job of explaining historical equity returns (not to mention predicting forward returns)
   - Low beta stocks tend to outperform on a risk-adjusted basis
6. And more…

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Cost of Debt - Rigorous Approach

In theory, calculating cost of debt is similar to calculating cost of equity…

$$\text{Cost of Debt} \approx \underbrace{\text{Risk-Free Rate}}_{\text{Govt. Bond Yield}} + \underbrace{\text{``Credit Premium''} + \text{Risk Premium}}_{\text{Credit Spread}}$$

> **Risk-Free Rate-** The opportunity cost of not just investing capital in a (risk-free) government bond

> **"Credit Premium"-** The extra yield needed to compensate a <u>risk neutral</u> investor for the expected losses due to defaults
  - Depends on likelihood of default and expected recoveries in the event of default

> **Risk Premium-** The extra yield needed to compensate a <u>risk-averse</u> investor for the additional risk taken by investing in the company's debt
  - The extra expected return earned by investing in a riskier asset than treasuries
  - Depends on how risky the company is, market price of risk, correlations, etc.

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This framework can be a helpful way of thinking about what drives a company's cost of debt, but don't worry about actually trying to apply any of it quantitatively. Fixed income math gets extremely complicated.

Cost of Debt - Practical Approaches

…but taking a rigorous approach to estimating cost of debt is completely impractical, so in practice there are two main approaches we take

1. Take a **weighted average of the yields** for all of the company's outstanding debt (weighted based on the book value of debt)
   - Advantages: Easy to calculate; reflects differences in the riskiness of the firm's different types of debt
   - Disadvantages: Doesn't account for changes in interest rates/firm riskiness since issuance (E.g. is misleading when book values of debt ≠ market values of debt)
2. Look up the **credit rating for the firm** and estimate a credit spread based off the rating
   - Cost of Debt = Risk-Free Rate + Estimated Credit Spread
   - Advantages: "Updates" in response to changes in interest rates, firm riskiness, and the market price of risk
   - Disadvantages: Credit rating may not entirely reflect the firm's default risk; company may have different types of debt which deserve different ratings; credit ratings for a firm may not exist[1] and ratings that do exist may be out of date

Cost of Debt – Credit Rating Approach

Example

> Suppose the risk-free rate is 3% and the company we're interested in estimating a cost of debt for has a 'B' credit rating

> Cost of debt = 3% + 3.57% = 6.57%

For large non-financial service companies with market cap > $ 5 billion

If interest coverage ratio is			
>	≤ to	Rating is	Spread is
-100000	0.199999	D2/D	18.60%
0.2	0.649999	C2/C	13.95%
0.65	0.799999	Ca2/CC	10.63%
0.8	1.249999	Caa/CCC	8.64%
1.25	1.499999	B3/B-	4.37%
1.5	1.749999	B2/B	3.57%
1.75	1.999999	B1/B+	2.98%
2	2.2499999	Ba2/BB	2.38%
2.25	2.49999	Ba1/BB+	1.98%
2.5	2.999999	Baa2/BBB	1.27%
3	4.249999	A3/A-	1.13%
4.25	5.499999	A2/A	0.99%
5.5	6.499999	A1/A+	0.90%
6.5	8.499999	Aa2/AA	0.72%
8.50	100000	Aaa/AAA	0.54%

Source: Aswath Damodaran (data current as of January 2018)

Recapping Cost of Capital

$$\mathrm{WACC} = R_d \cdot \frac{D}{D+E} \cdot (1-t) + R_e \cdot \frac{E}{D+E}$$

- E = <u>Market Value</u> of Equity
- D = <u>Market Value</u> of Debt
- R_e = Cost of Equity
- R_d = Cost of Debt
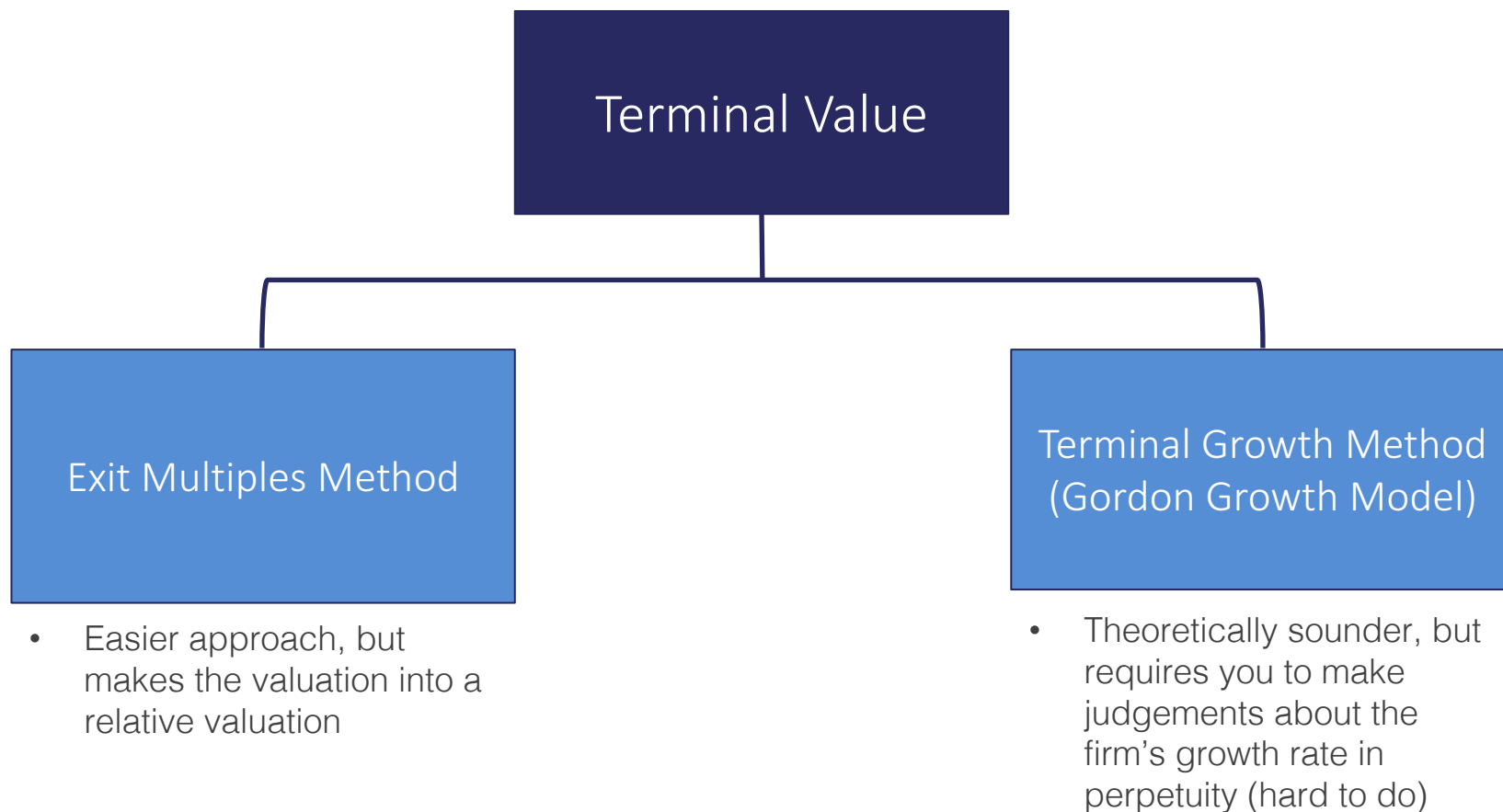- t = Tax Rate

Terminal Value

Getting Closure in Valuation

> A firm potentially has an infinite life. The value is therefore the present value of cash flows in perpetuity:

$$\text{DCF Value} = \sum_{t=1}^{\infty} \frac{\text{CF}_t}{(1+r)^t}$$

> Since we cannot estimate cash flows forever as it is unrealistic to project out exact free cash flows for a period greater than 5 or 10 years, we calculate a **terminal value** for the business:

$$\text{DCF Value} = \underbrace{\left[\sum_{t=1}^{n} \frac{\text{CF}_t}{(1+r)^t} \right]}_{\text{PV of Forecasted CFs}} + \underbrace{\frac{\text{Terminal Value}}{(1+r)^n}}_{\text{PV of Terminal Value}}$$

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Two Ways of Estimating Terminal Value

Terminal Value

Exit Multiples Method

Terminal Growth Method (Gordon Growth Model)

- Easier approach, but makes the valuation into a relative valuation

- Theoretically sounder, but requires you to make judgements about the firm's growth rate in perpetuity (hard to do)

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Exit Multiples Method

After forecasting company performance to year n, apply an appropriate multiple to a projected financial metric in year n to get an estimate of the company's value in year n

> E.g. Take projected EBITDA in year n and multiply by a chosen EV/EBITDA multiple to determine enterprise value in year n

Pros

> Less subjective than terminal growth rate – can use industry standard multiples or historical multiples for the company

– We'll talk more about what drives the multiple a company should trade at in a future week

Cons

> If the multiple is chosen based on what comparable companies are trading at, turns what should be an intrinsic valuation into a relative valuation

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Terminal Growth Rate Method

Gordon Growth Model

> Suppose we forecast cash flows for the first n years; discount rate = r

> If we assume that cash flows grow at a constant rate (g) following this period, the terminal value of the company is given by[1]

$$\text{Terminal Value} = \frac{\text{CF}_n(1 + g)}{r - g}$$

Choosing the Terminal Growth Rate

> The DCF output is **HIGHLY sensitive** to the choice of growth rate (g)

   – Terminal growth rate is highly subjective; the choice of an exit multiple tends to be easier to defend

> Terminal growth rate normally ranges from 0.5% to 3.5% in practice

   – Bounded below by inflation (assuming the company does not shrink in real terms)

   – Bounded above by nominal GDP growth (since the company cannot grow faster than the economy forever)

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Terminal Growth Rate Method

This gives the following equation for the present value of a company valued using the the terminal growth rate method (Gordon Growth Model):

$$\text{DCF Value} = \underbrace{\left[\sum_{t=1}^{n} \frac{\text{CF}_t}{(1+r)^t} \right]}_{\text{PV of Forecasted CFs}} + \underbrace{\frac{\text{CF}_n(1+g)}{(1+r)^n(r-g)}}_{\text{PV of Terminal Value}}$$

Putting It All Together

Steps in the DCF (Unlevered)

1. Forecast **free cash flows (FCFs)** in the near term
   – Have to project: EBIT, tax rate, D&A, capex, and net working capital

2. Estimate a **terminal value**
   – Gordon growth model of exit multiple method

3. Calculate the **weighted average cost of capital (WACC)**
   – Estimate cost of debt and cost of equity

4. **Discount** all future cash flows (near term and terminal value) using WACC

5. **Add** the present value of near term and terminal FCFs to get to **Enterprise Value**

6. **Subtract Net Debt** to get the **Implied Equity Value**

7. **Divide by the # of shares outstanding** to get the **implied value per share**

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Appendix

Problems with CAPM - Empirical

CAPM doesn't do a very good job of explaining actual returns

The failure of the CAPM in empirical tests implies that most applications of the model are invalid.
 - Eugene Fama and Kenneth French

> CAPM explains approximately 70% of historical returns

> It's predictive power looking forward is even weaker

– Difficulties in calculating accurate betas

– The beta for a stock can change (unexpectedly) over time

> Stocks with low betas often produce higher returns than CAPM would predict


CAPM: Security Market Line
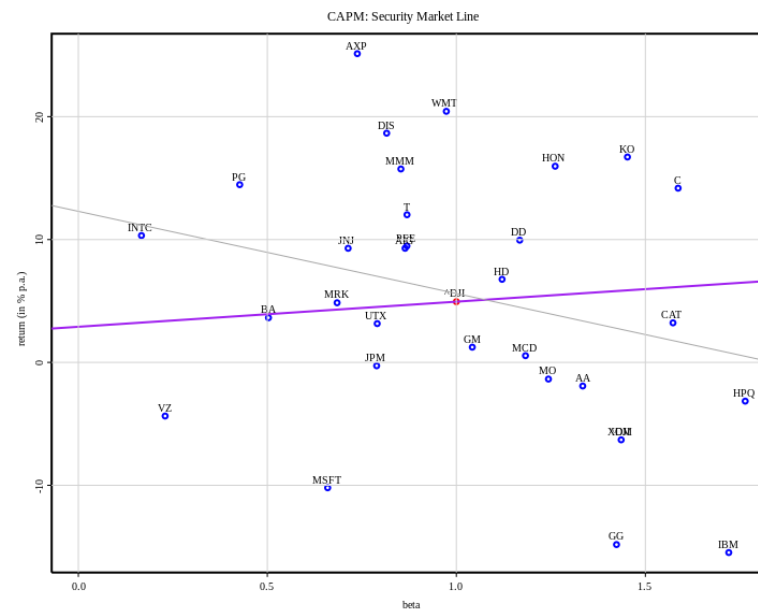
Problems with CAPM - Precision

Estimating beta is really hard

Standard errors of historical betas

> Most U.S. stocks have historical betas with standard errors of at least 0.3

– Historical beta is imprecise

> More than 1,000 U.S. companies have historical betas with standard errors of more than 0.5

– Historical beta is completely useless

Distribution of Standard Errors: Beta Estimates for U.S. stocks
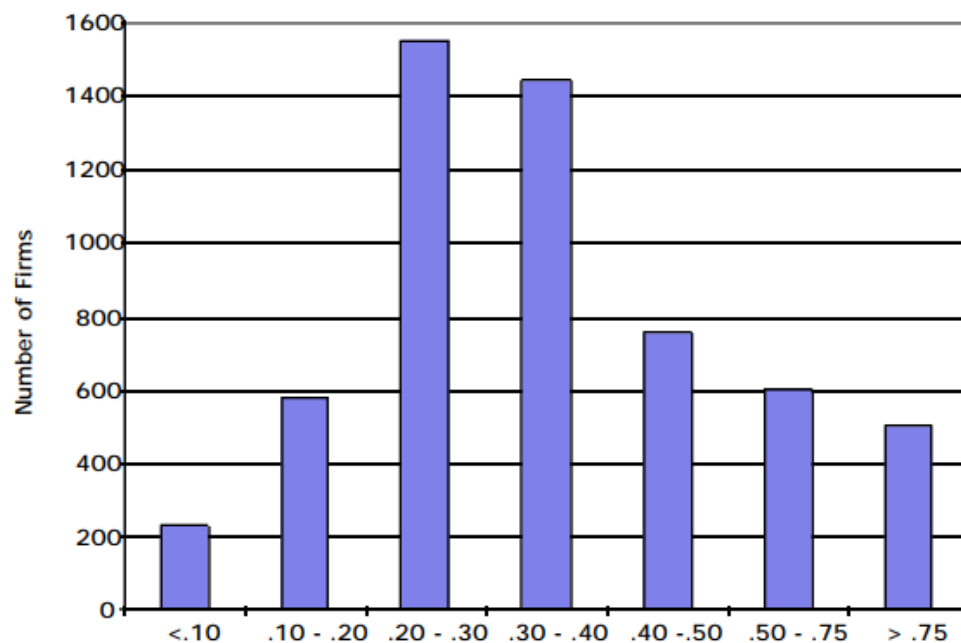
Problems with CAPM - Precision

Estimating equity risk premiums is just as hard

Historical Risk Premiums

Impossible Choice:
> Risk premiums change over time
> You have to go back 50+ years to achieve an acceptably small standard error

Implied Risk Premiums

> Based on some measure of forward earnings yield
  – Technically correct way to calculate risk premium
> What type of earnings yield to choose?
> Actual risk premiums are consistently higher than implied risk premiums

Estimation Period	Standard Error of Risk Premium Estimate
5 years	20% / √5 = 8.94%
10 years	20% / √10 = 6.32%
25 years	20% / √25 = 4.00%
50 years	20% / √50 = 2.83%
80 years	20% / √80 = 2.23%

Problems with CAPM - Conceptual

> Risk premiums arise from supply and demand
> The types of risk which give rise to risk premiums depend on the types of risk investors care about
> Investors will only be compensated for additional risk if that risk gives rise to a risk premium

CAPM assumes that all risk can be measured through volatility, but we will only earn a premium for taking on additional volatility if other investors demand a premium for taking on additional volatility

For the market to set the prices for investments such that more volatile investments will appear likely to produce higher returns, there have to be people demanding that relationship, and I haven't met them yet.

To me, "I need more upside potential because I'm afraid I could lose money" makes an awful lot more sense than "I need more upside potential because I'm afraid the price may fluctuate."

The possibility of permanent loss is the risk I worry about, Oaktree worries about and every practical investor I know worries about.

- Howard Marks

Problems with CAPM – Conceptual

> Volatility measures the extent to which market views of a security change

> Volatility doesn't necessarily measure changes in the fortunes of the underlying business

> Long-term investors aren't concerned with short-term fluctuations in market sentiment

Investors shouldn't necessarily care about short-term changes in a security's price

I find it preposterous that a single number reflecting past price fluctuations could be thought to completely describe the risk in a security. Beta views risk solely from the perspective of market prices, failing to take into consideration specific business fundamentals or economic developments.

According to modern financial theory, *"a stock that has dropped very sharply compared to the market . . . becomes 'riskier' at the lower price than it was at the higher price…"*

- Warren Buffett

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