

Week 7 – Intrinsic Valuation

Investment Banking Recruiting

October 15, 2024



Midterm Explanation

- No DCF quiz this week, will be combined with the Relative Valuation quiz next week
- Opens today after class and closes on Tuesday (October 22) at midnight
- Will submit a video recording, answering 14 questions (both technical and behavioral)
- Worth 10% of your grade

The midterm will be out of 50 points based on the following rubric

Each out of 10 points
Timely - are answers between 1-2 minutes, with no answers lasting longer than 3 minutes
Delivery - are answers confident, non-robotic and well articulated (meaning not lots of fluff)
Story - is it delivered with confidence, personality, memorable stories and flows logically
Technicals - are the answers correct and is the rationale well articulated
Behaviorals - are answers driven by STAR stories and demonstrate the candidates personality

Midterm Explanation

BYU

LEARNING SUITE

FALL 2024 FIN 487R – Investment Banking Recruiting ▾

Thomas Foulger ▾

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Midterm Instructions and Link

Final Exam Study Guide

Student View

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Midterm Instructions and Link

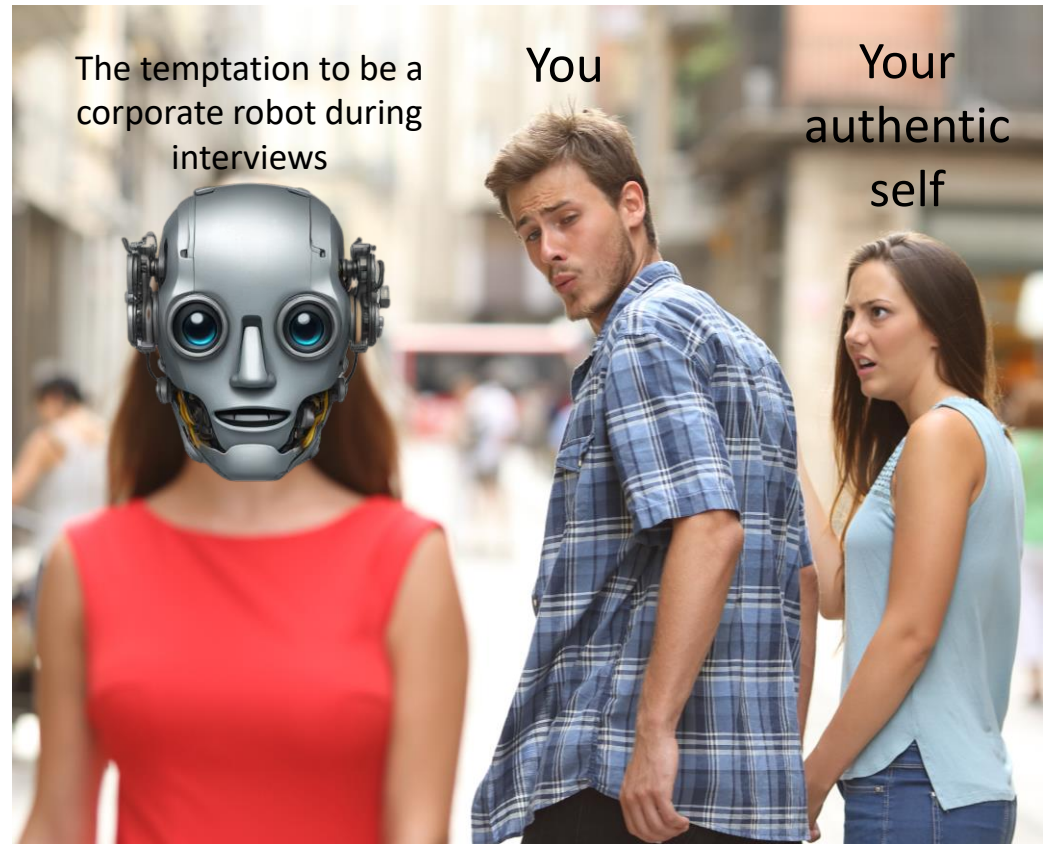
Midterm Instructions.pdf [Download](#)



Advice for how to tell your story

Common themes

- Lacking in story
- Lacking in cohesiveness
- Lacking in **your** personality



Reminders about your story

Advice

- While you want to sound professional, you want to sound like **yourself**
- Be specific about why IB interests you and don't list reasons that are applicable to any industry (fast paced work environment, high stakes)
- While talking about your internships is important, don't bore your audience summarizing every role that you had, highlight the most recent and most interesting

Double clicking on Brandon's advice

- Being able to list specific, relevant and not easy found reasons why you want to join XYZ bank will be a major differentiator
- Find this information through your coffee chats
- Keep a detailed record of these gems that you find



Who would you rather hire?

Candidate 1

I am interested in Rothschild and Co because:

1. They have a global footprint that would allow me to work on deals across the globe
2. I have spoken with Daniel, Jamie and Megan and they have been really great. They are the kind of people I want to work with.
3. I have heard there is a very open-door policy with the senior bankers, so I feel confident that I would be able to receive mentoring during my early years.

Candidate 2

I am interested in Rothschild and Co because:

1. The new full generalist program is perfect for the type of experience I am looking to have as an analyst. I have a deep interest in your industrials team but also want to be exposed to a wide variety of deals. Daniel told me that he loves how the program is being implemented, as it gives him the flexibility to pursue what interests him most, while also gaining experience across industries that he may have been hesitant to commit to for a full two or three years.
2. Jamie mentioned that her telecom team feels like a second family. She said they often watch sporting events together on weekends and have organized drinks for anyone leaving the team. This clearly demonstrates the kind of culture being cultivated at the firm and the camaraderie I am looking to find.
3. During my mission, I lived abroad for two years and developed a love for learning about different cultures. In the few calls I've had with the team, I've spoken with Ben from New Zealand, Daniel from London, and Megan from Taiwan. I love that the firm not only has a global presence but also fills each of its offices with people from diverse backgrounds. You really don't find this at other firms and especially not in Utah. This variety of perspectives is exactly what I am seeking in a professional environment.

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Valuation Overview

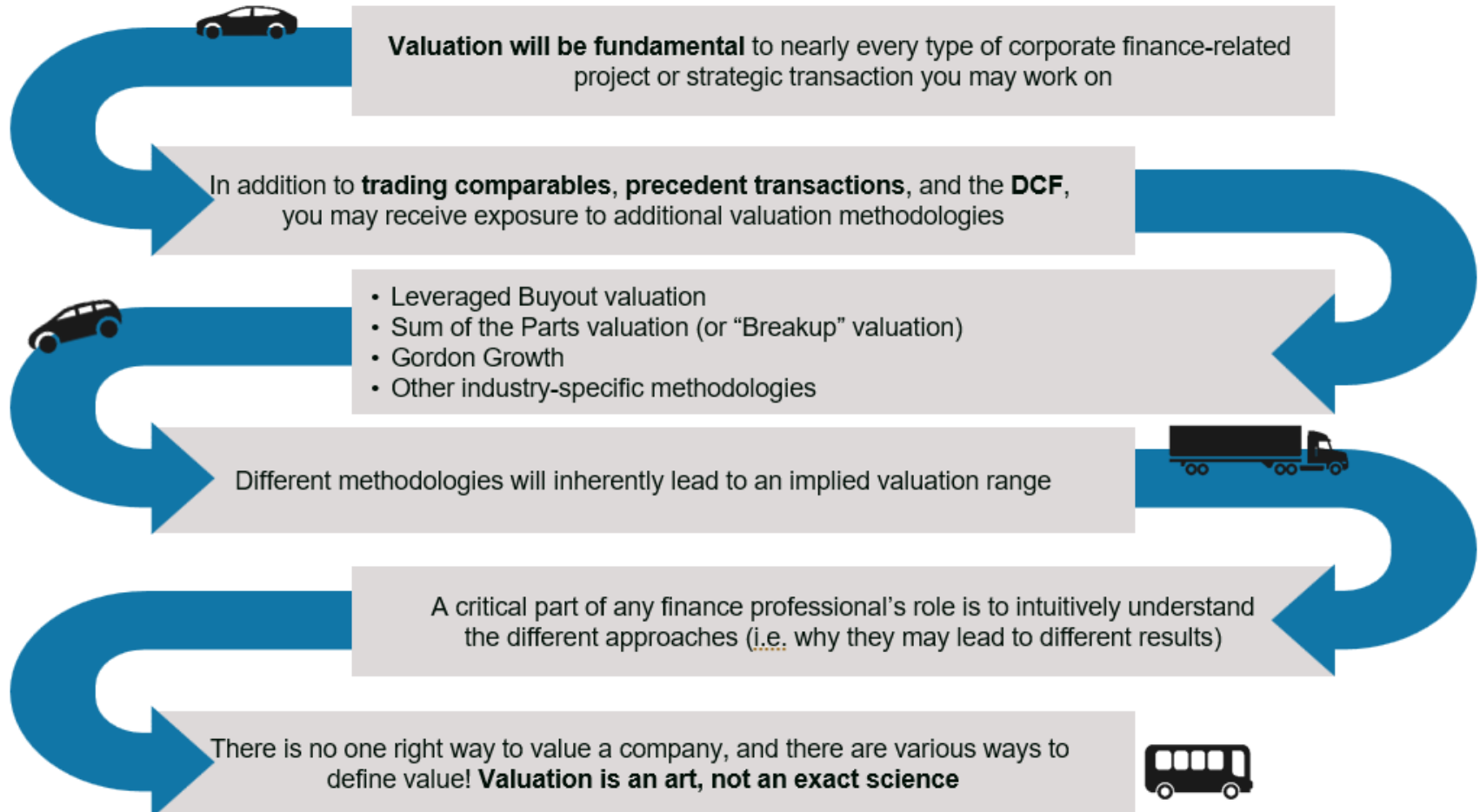
Cost of Capital

Principles of the DCF

Other DCF Techniques

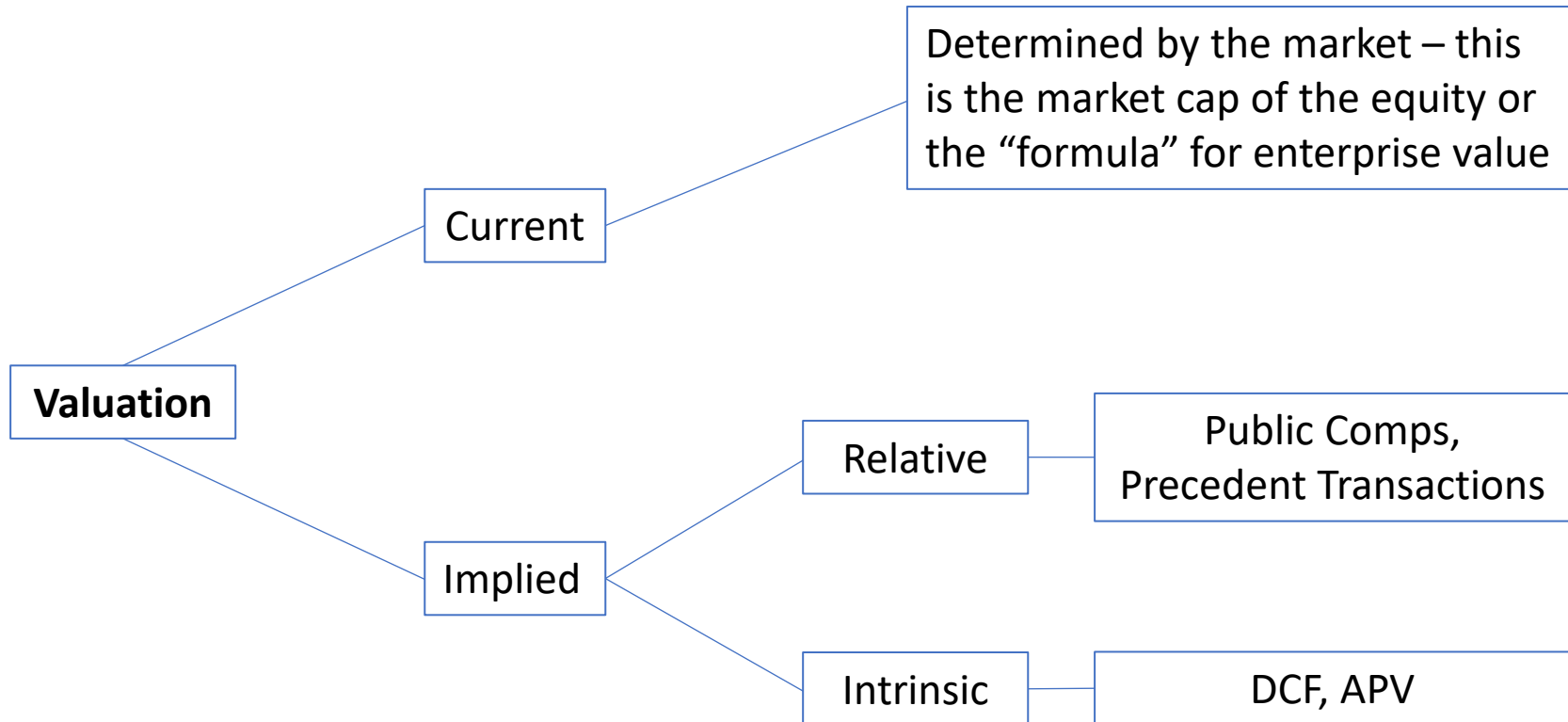
“Walk me Through a DCF”

Valuation Roadmap



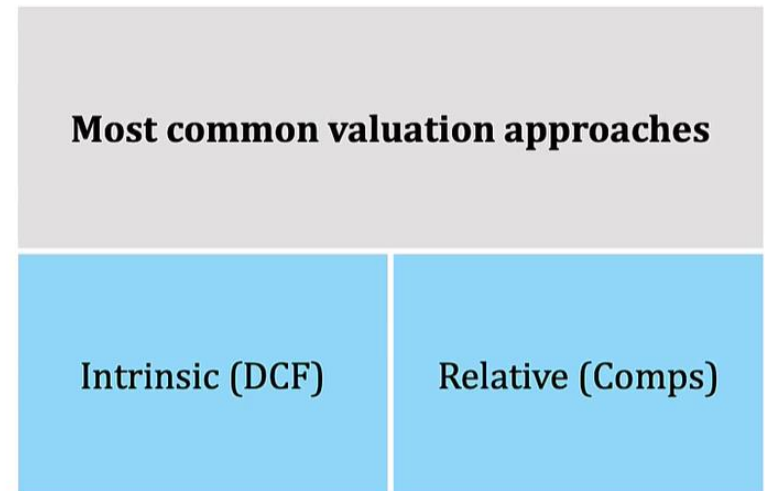
Current vs Implied Valuation

The most effective tool for valuing an asset is a financial market – analysis made by an investment banker seeks to represent value on either a relative or intrinsic basis to cross check market valuations and value private firms



Implied Valuation

- Two frameworks for valuation:
Intrinsic valuation (DCF) is derived from the fundamental analysis of the company's cash flow generation potential.
- **Relative valuation (“comps”)** is derived by comparing a company to its comparable peers.
- DCF and comps seem quite different but they're actually very related – in theory a DCF should yield the same value as comps (but rarely does).



Cash Flows

In the world of finance, you will often hear the word levered used to describe whether the impacts of capital structure have been taken into consideration when looking into cash flows, multiples, and valuation

Unlevered (EV)

The impacts of capital structure have not yet been considered

$$\text{FCFF (UFCF)} = \text{NOPAT} + \text{D\&A} - \text{NWC} - \text{Capex}$$

Levered (Equity Value)

The impacts of capital structure (financial leverage), including the payment of interest, have been considered

$$\text{FCFE (LFCF)} = \text{NI} + \text{D\&A} - \text{NWC} - \text{Capex} + \text{Net Borrowing}$$

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“Walk me Through a DCF”

The interest rate or rate of return used to discount future cash flows to their present value. In academic terms, it reflects both the **opportunity cost of capital** (what investors could earn in alternative investments of similar risk) and the **compensation required for the uncertainty** of future cash flows.

A discount rate therefore accounts for the time value of money – which is determined by consumption, investment, and risk.

WACC Overview

- **WACC** represents a given company's weighted average return on invested capital based on that company's underlying capital structure
 - Debt and equity components have different “expected” returns and tax implications, and thus need to be analyzed independently before combining
- What an investor would expect to earn from an alternative investment with a similar risk profile

Conceptual Overview of WACC Calculation

Debt	+	Equity	<u>Where:</u> <ul style="list-style-type: none">• R_d = Cost of Debt• R_e = Cost of Equity• T = Marginal Tax Rate• D = Market Value of Debt• E = Market Value of Equity• V = Total Value ($D + E$)
(After-tax Cost of Debt * % of Debt in Capital Structure)	+	(Cost of Equity * % of Equity in Capital Structure)	
$(r_d * (1-t)) * (D/(D+E))$	+	$(r_e) * (E/(D+E))$	

WACC is critical to a DCF analysis, as it represents the annual rate that free cash flows in the future are discounted by, so it is critical to intuitively understand its composition

How WACC Fits Into Valuation

There are **FOUR** key calculations to understand how to determine the WACC. Once the WACC is determined, it can be used in the NPV formula to come to a DCF valuation

Term	Equation
Net Present Value (NPV)	$NPV = CF^0 + \frac{CF^1}{1 + WACC} + \frac{CF^2}{(1 + WACC)^2} + \dots,$
Weighted Average Cost of Capital (WACC)	<p>①</p> $WACC = \left(\frac{D}{V}\right) R_d \times (1 - T_c) + \left(\frac{E}{V}\right) R_e$
Capital Asset Pricing Model (CAPM)	<p>②</p> $CAPM = R_i = R_f + \beta (R_m - R_f)$
Unlevered Beta	<p>③</p> $\beta_a = \frac{\beta_e}{1 + (1 - T_c) \left(\frac{D}{E}\right)}$ <p>OR</p> <p>④</p> $\beta_a = \left(\frac{E}{V}\right) \beta_e + \left(\frac{D}{V}\right) \beta_d$

These equations can be layered up or down based on the specific variable you are looking for

Solving for WACC

WACC represents a firm's weighted average return on invested capital based on its underlying capital structure. It is also the discount rate applied to future UFCF to derive DCF-based EV

$$WACC = \left(\frac{D}{V} \right) Rd \times (1 - Tc) + \left(\frac{E}{V} \right) Re$$

Equation	Name	Where to Find It
$\left(\frac{D}{V} \right)$	Market Value of Debt / Total Firm Value (E + D)	<ul style="list-style-type: none"> Book value of debt can <u>usually</u> serve as a proxy as long as the debt does not trade at meaningful discounts or premiums to par; otherwise use market value Capital structure should be representative of company's long-term target
Rd	Cost of Debt	<ul style="list-style-type: none"> Blended current yield on debt outstanding (Bloomberg for public debt) Yields of debt with similar credit ratings for a private company (Moody's / S&P)
Re	Cost of Equity	<ul style="list-style-type: none"> Can be derived from the CAPM equation
Tc	Corporate Tax Rate	<ul style="list-style-type: none"> Marginal tax rate; often assumed to equal US corp. tax rate (currently 21%)
$\frac{E}{V}$	Market Value of Equity / Total Firm Value (E + D)	<ul style="list-style-type: none"> Can be found by calculating or researching a company's Market Cap Capital structure should be representative of company's long-term target

Introduction to the CAPM

CAPM calculates the cost (expected return) of equity capital based on expected stock market performance and risks and the company's share price sensitivity to movements in the overall market (beta)

$$\text{CAPM} = Re = Rf + \beta (Rm - Rf)$$

Equation	Name	Where to Find It
Re	Re (cost of equity)	<ul style="list-style-type: none">Derived from CAPM
Rf	Risk-free Rate	<ul style="list-style-type: none">Current yield on US 10-year bond is preferred Rf proxy in USReflects YTM of “riskless” government bonds of equivalent maturity to the duration of each cash flows being discounted
$Rm - Rf$	Market Risk Premium	<ul style="list-style-type: none">Excess expected market return (typically the S&P 500) over that of the risk-free rate; assumptions vary but generally 5-8%
β	Asset Beta (Unlevered Beta)	<ul style="list-style-type: none">Can be derived from the Asset Beta equation (following page)

Un-levering Beta

Both Unlevered and Levered Beta represent the systematic (non-diversifiable) risk inherent to the firm's operations, but they do so in different contexts:

- Asset Beta (Unlevered Beta) measures the firm's systematic risk without the implications of its capital structure
- Equity Beta (Levered Beta) measures the firm's systematic risk accounting for the additional risk driven by the firm's use of financial leverage

$$\beta_a = \frac{\beta_e}{1 + (1 - T_c) \left(\frac{D}{E} \right)}$$

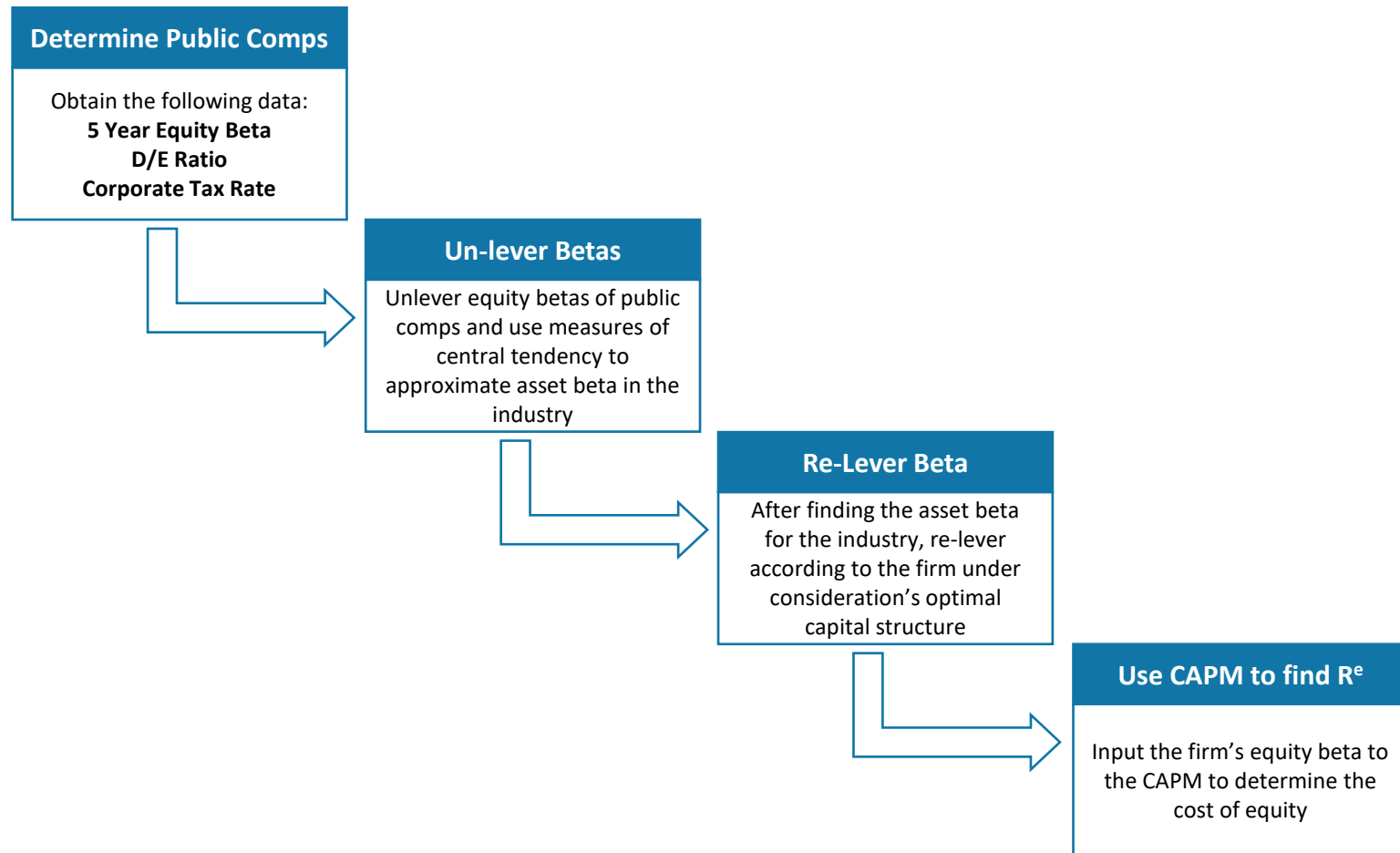
Re-Levering Beta

When valuing a private company, the equity beta will not be readily observable online – therefore comparable companies will be utilized to make a best estimate of equity beta for the firm under consideration.

$$\beta_e = \beta_a * \left(1 + \left(\frac{D}{E} * (1 - \text{Tax})\right)\right)$$

Determining the Cost of Equity

Determining a firm's cost of equity is a multi-step process that requires the use of the capital asset pricing model in addition to the evaluation of systematic risk as measured by beta



Determining Cost of Debt

To determine the cost of debt, take the blended interest rate (weighted average interest rate) on all debt instruments outstanding. The process varies slightly for a private vs public company.

- **Private:**

- Estimate using comparables
- Estimate using market interest rates
- If given financial information, solve as blended interest rate

- **Public:**

- Use the YTM on publicly traded bonds
- Look at comparables
- Risk free rate + credit spread

Practice Determining WACC

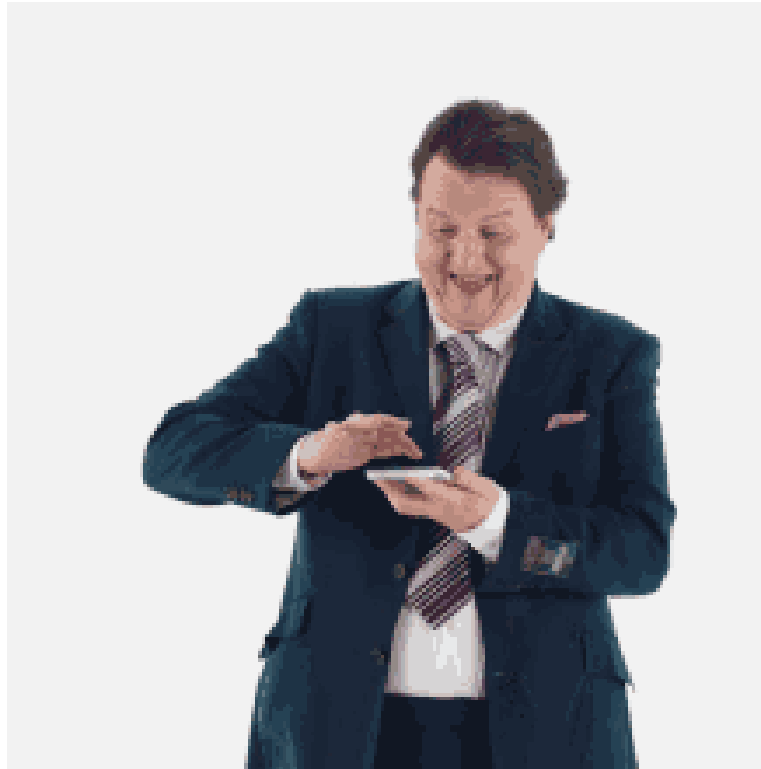


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“Walk me Through a DCF”

Present Value & Cash Flows

- Cash flow refers to the movement of money into or out of a business, project, or investment over a specific period – on the buy-side these could be interest payments, principal repayments, dividends, and share repurchases; on the sell-side cash flows are often viewed as FCFE, FCFF, & FCF
- The discount rate represents both the opportunity cost of investing in a specific asset and the riskiness of the cash flows associated with the asset
- The present value is determined by discounting the cash flow at the appropriate rate compounded for the duration of the investment

$$PV = \frac{\text{Future Cash Flow}}{(1 + \text{Discount Rate})^t}$$

The Discounted Cash Flow (DCF) method is a valuation technique used to estimate the value of a company by **forecasting its future cash flows and then discounting them back to their present value.**

This method helps determine what a company is worth today based on its ability to generate cash in the future. It is commonly used in corporate finance to assess investment opportunities, mergers, and acquisitions.

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

Introduction to Discounted Cash Flows

Definition

The **DCF analysis** values a company based on the **present value (“NPV”)** of the sum of its projected **future free cash flows**

Deep Dive

How its Calculated

- Sum of future free cash flows for ~5 years and **Terminal Value (“TV”)**
- **Discount** each annual cash flow at least one year in the future **at a rate (or “cost of capital”) reflecting the risk profile** of the business
- Projection period should be long enough for company to achieve a “steady state⁽¹⁾”

Additional Details

- **Free cash flows** can be derived based on one's assumptions for a company's growth, margins profile, CapEx, and working capital requirements
- **TV** reflects company value beyond the projection period (i.e. in perpetuity)
- Increases in cash flows or the TV increase valuation, but increases in WACC decrease valuation

What It's Not

- **Intrinsic Value** does not reflect the current **Market Value** of a company
- Not sensitive to periods of market volatility

$$NPV = CF^0 + \frac{CF^1}{1 + WACC} + \frac{CF^2}{(1 + WACC)^2} + \dots,$$

DCF Example

Given Info:

- You are considering selling your home and received a \$1 million cash offer with no closing risks
- Alternatively, that same potential buyer offers to rent the home from you (rather than purchase it from you) for \$150,000 per year for 10 years. You can assume would not be obligated to fund any repairs or ongoing maintenance costs
- Your discount rate is 3% per year
- Dec. 2019 if closing on sale; or first year's rent payment occurs in Dec. 2020
- Which proposal offers a higher value in today's dollars?



Solution:

Income Stream:

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000
$\$150K / (1.03) = \$146K$	$\$150K / (1.03)^2 = \$141K$	$\$150K / (1.03)^3 = \$137K$					$\$150K / (1.03)^{10} = \$112K$	

NPV = ~\$1.28mm

Terminal Value – the DCF in Perpetuity

Given Info:

- A university alumni wants to endow a professorship to fund emerging virus vaccine research
- However, the alumni does not know how to determine the appropriate donation to fund it. The alumni can reliably assume the following:
 1. Donation must fund professor salary, agreed upon at \$150K/year with 5% annual increase
 2. 10% discount rate

Solution:

Value of Donation = Cash Flow to Fund Professor / (Discount Rate – Cash Flow Growth Rate)

$$\text{Value of Donation} = \$150\text{K} / (.10 - .05)$$

$$\text{Value of Donation} = \$150\text{K} / (.05)$$



$$\text{Value of Donation} = \$3\text{mm}$$

Terminal Value – the DCF in Perpetuity

- The perpetual growth model assumes the firm continues to exist indefinitely by expanding the forecasts applied at the end of the explicit forecast period

$$TV = \frac{FCF_n * (1 + g)}{(r - g)}$$

2 stage DCF

DCF Mechanics (cont'd)



- In practice, you will often have explicit forecasts for a few years, and then you'll have to make simplifying assumptions beyond this period.

Year	Cash Flow
2015	10,500
2016	13,000
2017	15,000
2018	17,500
2019	20,500
Perpetual % growth thereafter	5%
Discount rate	10%

Other Methods of Determining Terminal Value

In addition to the perpetual growth model, there exist multiple other forms of valuing the firm's enterprise value at the conclusion of the explicit forecast period.

Exit Multiples Method

Assumes the firm is sold at the end of the explicit forecast period.

Apply market determined multiples to the final year's EBITDA and discount this terminal EV back over the course of the explicit forecast period.

Liquidation Valuation

Assumes the company is liquidated at the conclusion of the explicit forecast period.

This technique is used far more commonly for DCF terminal value in cases of capital budgeting than in firm valuation.

Use of the DCF in Practice

While the DCF is a highly analytical tool for determining a company's Intrinsic Value, in practice it may be less relevant than the company's Relative Valuation (implied by comps)

- **DCF** provides a view of a company's future cash flows and discounts those cash flows at some **WACC** to derive the present value (its **Intrinsic Value**)
- Using the DCF analysis in practice comes with a few challenges:
 - Sensitivity to key assumptions, including future financial performance, **Cost of Capital**, **Terminal Value**, etc.
 - Performing a comprehensive, thoughtful analysis may require detailed company information
- Garbage data or assumptions will result in a meaningless DCF-implied valuation

- **Relative Valuation** uses comparable company valuation multiples (i.e., multiples of Revenue, EBITDA, etc.) to derive a company's **Market Value**
- Multiples allow us to compare comps of different sizes, capital structures, and other characteristics
- In theory, **Market Value** and **Intrinsic Value** should equal one another in a perfect market



DCF Valuation

The discounted cash flow analysis can be used for a variety of purposes ranging from capital budgeting to equity value and/or enterprise value

Enterprise Value DCF

Impacts of Total Capital Structure Accounted for by WACC

Discount UFCF

Equity Value DCF

**Impacts of Capital Structure Accounted for Interest Expense,
Value of Equity Determined by Cost of Equity**

Discount LFCF

How does a DCF quantify enterprise value?

- Unlevered free cash flow (UFCF) represents the cash flow left over for all capital providers, such as debt, equity, and preferred stock investors
- In a DCF you are estimating future UFCF and then discounting them back to today
- Once you find EV, you can back into what equity value is

$$EV = \sum_{i=1}^n \frac{FCFF_i}{(1+WACC)^i} + \frac{TV}{(1+WACC)^n}$$

Events Impacting the Output of the DCF

$$EV = \sum_{i=1}^n \frac{FCFF_i}{(1+WACC)^i} + \frac{TV}{(1+WACC)^n}$$

Events Impacting Current and Intrinsic Valuation

Each of the following changes might affect a company's current Market-Implied and Intrinsic (DCF-based) Enterprise Value



Advantages and disadvantages of the DCF

DCF Advantages in Contrast to Comps



- Widely used in practice and respected academically.

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“Walk me Through a DCF”

Equity Value DCF

- The DCF can also be used to quantify equity value – this is done by discounting back **levered free cash flows** at the appropriate discount rate, the cost of equity.
- This sort of DCF is most used in situations of financial distress, restructuring, or to value financial institutions for which capital structure is essential to operational value.

$$\text{Equity Value} = \sum_{t=1}^n \frac{LFCF_t}{(1 + Re)^t} + \frac{TV}{(1 + Re)^n}$$

Adjusted Present Value

- **APV method** separates the impact of financing decisions (such as tax shields from debt) from the base valuation of the firm's operations
- **NPV of unlevered firm:** The value of the firm without considering any financing effects, discounted at the firm's unlevered cost of equity
- **Tax shields:** These are discounted at the cost of debt, reflecting the value created by tax-deductible interest payments
- APV is useful when a company's capital structure is expected to change over time, as it **separates the operational value from financing effects**

$$APV = NPV_{\text{unlevered}} + \text{PV of tax shields} - \text{PV of financial distress costs}$$

Leveraged Buyout

- Although a leveraged buyout does not explicitly “discount” cash flows back to their present value, it is used to determine the IRR (Internal Rate of Return) of an investment that is highly levered
- **The IRR is a discount rate of its own** – it is the rate at which the cash flows can all be discounted such that the NPV of the investment is 0
- More information to come on the LBO in future lessons

$$0 = NPV = \sum_{t=0}^n \frac{CF_t}{(1 + IRR)^t}$$

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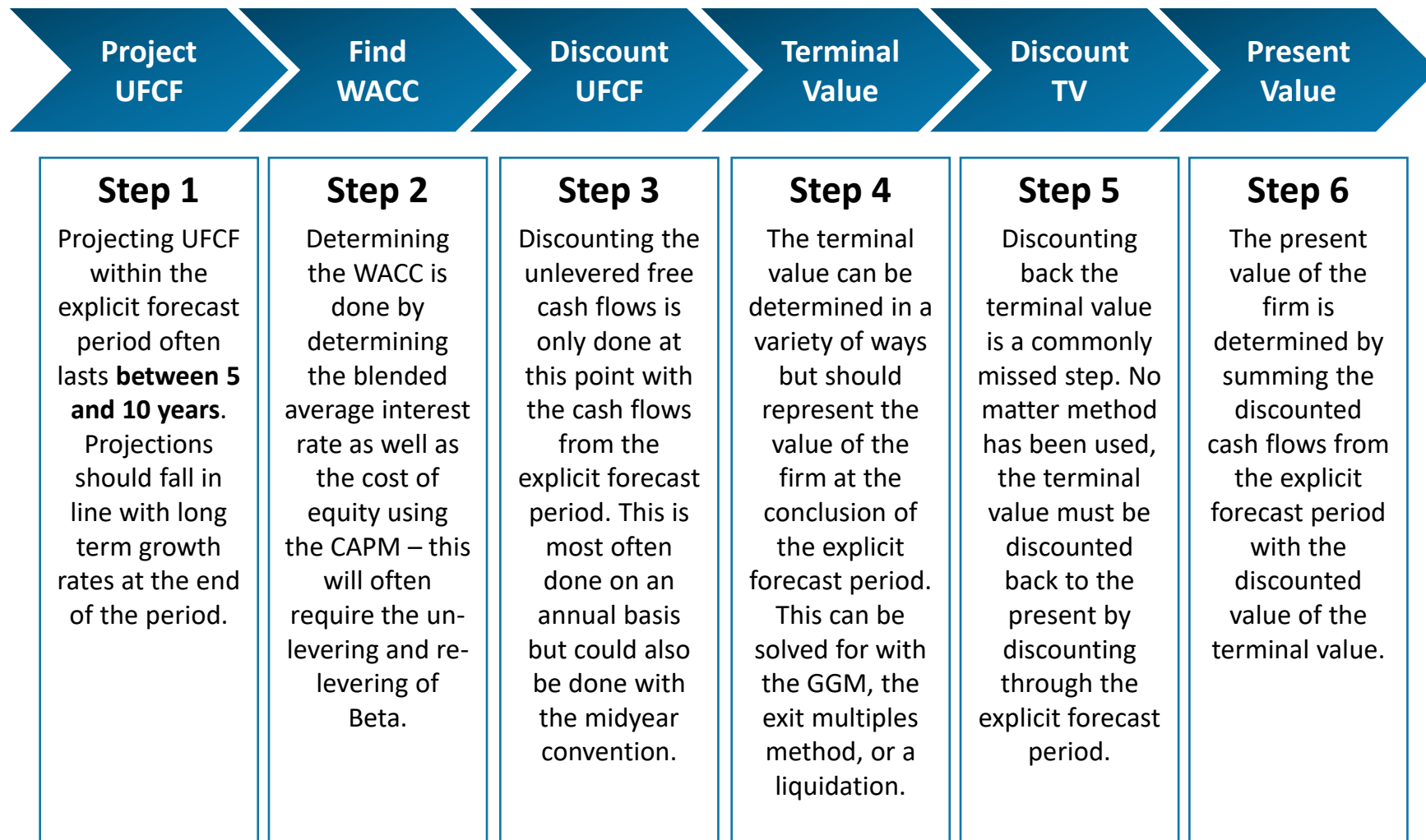
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“Walk me Through a DCF”

Walk me Through a DCF



Rare liquid example

EX-J.P. MORGAN

WHARTON MBA (IP)

ENTREPRENEUR



rareliquid

FINANCE

MBA LIFE

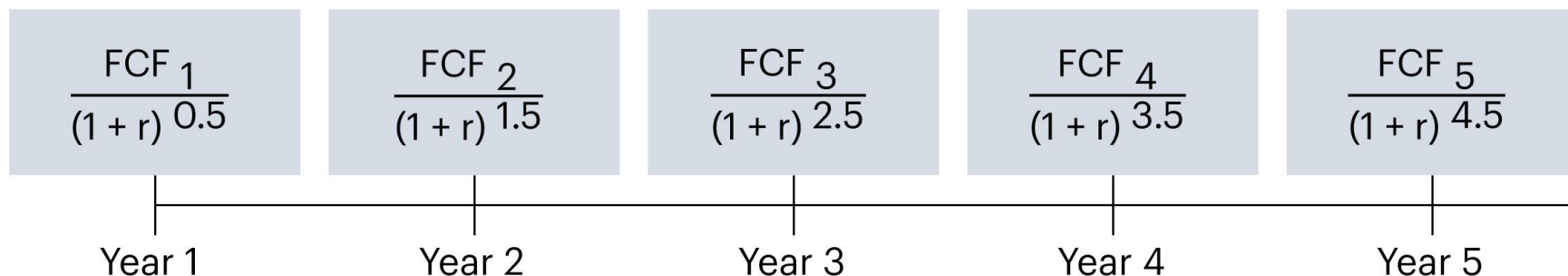
CAREERS



Midyear convention

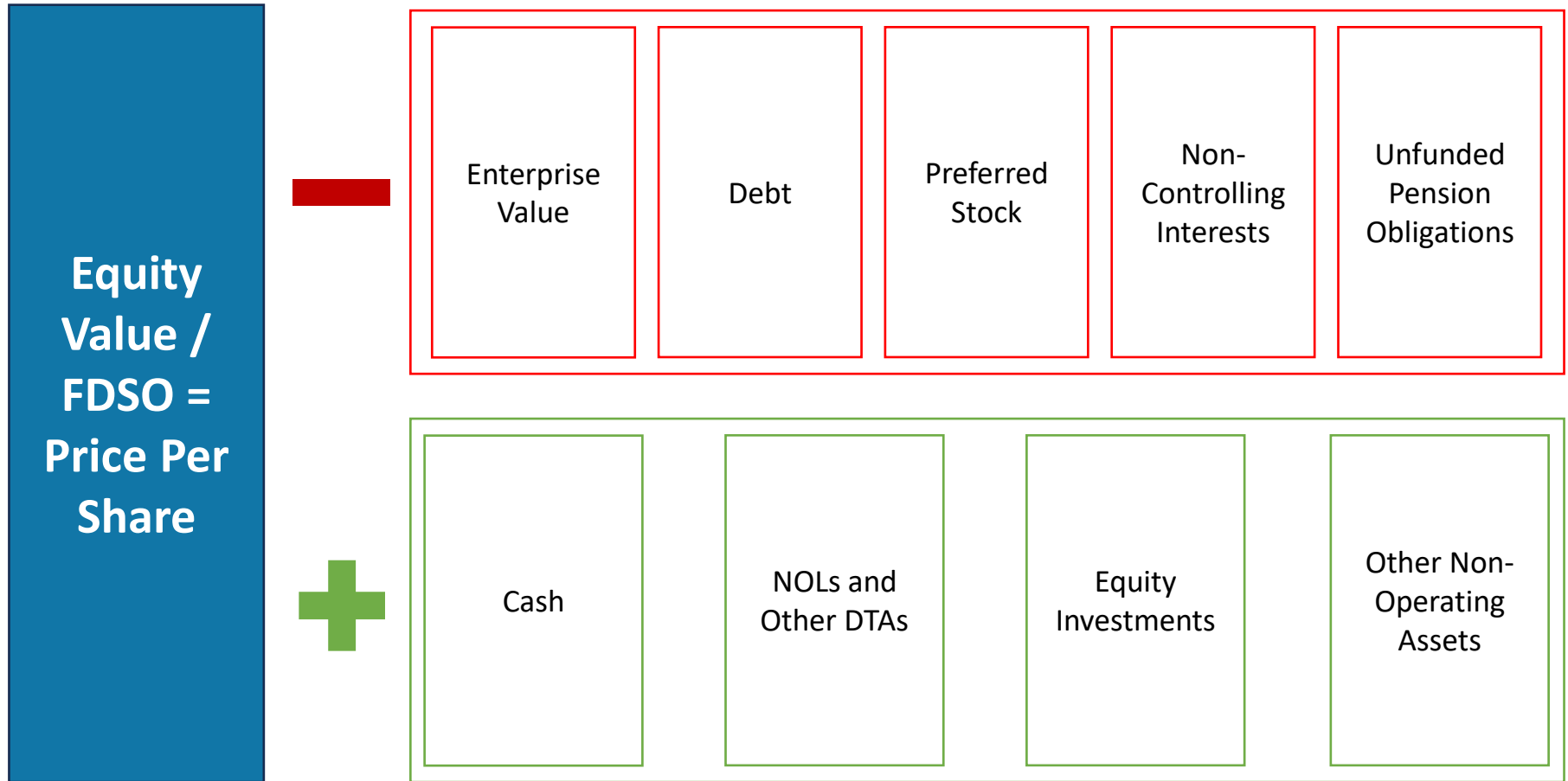
The mid-year convention assumes the FCF generation of a company occurs evenly, therefore resulting in a steadier inflow of cash throughout the fiscal year.

$$\text{Discount Factor}_{\text{Mid-Year Convention}} = \frac{1}{(1 + \text{Discount Rate})^{(\text{Period Number} - 0.5)}}$$



Using the DCF to Determine Share Price

For a private company, upon completion of the DCF valuation is complete – however in the case of a public company, transition to equity value and divide by FDSP to find an implied price per share



Key DCF principles to know for interviews

- Can you do a simple walk-through of a DCF
- WACC formula and intuition
- Forecast period vs terminal value
- What major levers affect the outcome of a DCF
- How to calculate cost of equity and cost of debt
- Gordon growth method vs multiples method
- What are the limitations / advantages of a DCF
- How to go from revenue to ULFC / LFCF
- Beta
- Levered vs unlevered beta
- Bridge from EV to price per share
- Midyear convention



DCF Practice



Attendance word: Dogecoin

