TheInfiniteActuary

The Infinite Actuary's

Detailed Study Manual for the

CFE 201 Exam

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About This Study Manual

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This detailed study manual is just one component of our CFE 201 course, which also includes comprehensive video lessons, handouts, practice problems, commentary on prior SOA exams, flashcards, and more.

The manual follows the same structure as the online course—organized in a logical learning sequence rather than the order of the official syllabus:

A. Corporate Finance and Financial Statement Analysis

B. Managerial Accounting and Operational Excellence

C. Evolving Quantitative Methods and Technologies

We recommend downloading each section's manual before starting its corresponding lessons on the TIA platform — especially if you're using the Today view — so you can reference it as you move through the material.

This manual is designed to help you work through the source readings more efficiently. Some readings are dense enough that you may wonder if the authors were being paid by the word. Do not fret - this is exactly why we built this study manual. Don't worry if every concept doesn't 'click' on the first attempt. Move forward, and return to difficult topics during your second pass.

How to Use This Study Manual With the Online Course

This manual serves as your primary written foundation and reference throughout the course. It is intentionally more detailed than the condensed outlines or flashcards, which are designed for memorization and last-stage review. The focus here is **readability** and **conceptual understanding**, not memorization.

If possible, plan for a 3-4 month study window. Spend the first half learning concepts—without stressing about memorizing details. The final 1-2 months should shift toward review, memorization, and practice.

Each reading begins with an 'Overview of This Reading' section summarizing the major topics and most testable ideas. Review these overviews before and after working through each chapter. Some readings will feel intuitive while others will require patience, caffeine, and possibly a small nap. After reading the detailed manual for a section, watch the video lesson to reinforce key ideas and see additional examples.

Good Luck!

As you progress through the material, keep two principles in mind:

1. Keep moving forward - don't get bogged down!
2. You are not trying to become an expert in the material. You are trying to identify and master testable material sufficiently to pass the exam.

With steady, consistent study, you'll be surprised how much you can retain — *especially if you focus on concepts early and leave memorization for later*. The condensed handouts and flashcards will guide your memorization during the final phase of your preparation.

Finally, remember that one of the most important features of our online course is customer support. Our course forum is the best place to post questions about the material since other students can chime in and learn from the responses as well.

Looking forward to embarking on this journey with you!

Your Instructor,

Shiv Morjaria, FSA, CFA

Change Documentation

We maintain a detailed revision log in the 'Study Schedule' spreadsheet posted in the Introduction section of the online course. Whenever we make any corrections or post new content, the affected parts of the course are listed there.

Check this revision history periodically leading up to the exam. Each PDF includes a version number in the file name so you can confirm you have the most recent edition.

Exam CFE 201 Section A

Section A.1.

Valuation Concepts

CFE201-100-23: Hurdle Rates

Source Author: SOA Study Notes (CFI Team)

Overview of this Reading

The *hurdle rate* serves as a critical benchmark in capital budgeting. It is used to determine the viability of investments by comparing their expected returns to a minimum required threshold. In this chapter, we will explore the calculation and considerations surrounding this hurdle rate.

Key topics include:

- Hurdle Rate Determination
- Hurdle Rate Considerations

Hurdle Rate Determination

The hurdle rate (or minimum acceptable rate of return (MARR)) represents the minimum rate of return investors expect to receive on their investment. For a potential investment to be accepted, its *internal rate of return (IRR)* must be greater than or equal to the *hurdle rate*.

When determining the required hurdle rate:

- Most companies use their weighted average cost of capital (WACC)
  - This approach is rooted in the concept of opportunity cost
  - A company always has the alternative to invest in itself by buying back its own shares which would earn a return equal to the WACC[1]
  - Another way to look at it: if companies invest in projects earning a lower return than it costs them to raise capital, they are destroying value
  - Therefore, WACC serves as a benchmark return for any investment being considered
- However, several other factors are relevant when assessing potential hurdle rates
  - Risk premium - an adjustment to the WACC to control for the anticipated risk of the project. Riskier investments command higher risk premiums and, therefore, higher hurdle rates
  - Interest rates - any hurdle rate should be compared to real interest rates since the company could also invest in instruments earning these rates
  - Inflation rates - hurdle rates are often adjusted for expected inflation to account for the eroding value of future cash flows
- These adjustments enable a more refined and accurate investment evaluation

[1] This is a simplification that the source material takes. In reality, buying back shares would alter the capital structure and thus change the WACC.

  - Rather than using a single company-wide hurdle rate, companies can calculate hurdle rates for each individual investment
  - The WACC is adjusted by either adding or subtracting a risk premium to account for the risk profile of the project relative to the overall company
  - Example:
    * Company WACC is 12% because half its assets are in a high-risk country
    * Investments made in the safer country should have a hurdle rate lower than 12%
    * Investments made in the high-risk country should have a hurdle rate higher than 12%
    * This project-specific adjustment ensures the hurdle rate aligns with each investment's risk profile

Once the company has determined its hurdle rate, the most common way to use it is by performing a discounted cash flow (DCF) analysis which involves 3 steps:

1. Forecast cash flows
   - All revenues, expenses, and capital costs (including the initial investment) are modeled
   - These are used to estimate future free cash flows over the project's lifetime
2. Discount these cash flows at the established hurdle rate
3. Analyze net present value (NPV)
   - If NPV is greater than 0, the project exceeds the hurdle rate
   - If NPV is negative the project does not meet the hurdle rate

This process forms the basis for many financial decisions across industries.

Hurdle Rate Considerations

Using the hurdle rate to assess investment decisions allows managers to make *objective* decisions on investments. This ensures financial discipline and prevents management from accepting projects based on non-financial factors (project popularity, use of new and exciting technology, etc.).

However, there are a few limitations in setting and applying the hurdle rate:

1. Simply comparing a project's rate of return to its hurdle rate doesn't account for the absolute size of the investment or
   - This approach can favor investments with high rates of return even if the dollar value created is small
   - Similarly, lower return, higher scale projects may be rejected even though they generate more cash for the investor

    - This is why the NPV approach discussed above is preferable

2. A company's cost of capital is not static and may change over time
    - Using the cost of capital as the basis for setting the hurdle rate may lead to an obsolete hurdle rate

3. Risk premiums can be subjective and setting them incorrectly can lead to incorrect investment decisions
    - Setting the hurdle rate too high can bias toward short-term investments and may prevent investment in profitable long-term projects
    - Setting the hurdle rate too low may lead to accepting projects that are unprofitable on a risk-adjusted basis

This concludes our brief look at hurdle rates. These concepts will be revisited throughout the syllabus so it is important to maintain a solid foundation for understanding them.

Valuation Chapter 10: Frameworks for Valuation

Source Author: McKinsey & Company

Overview of this Reading

The goal of any Valuation framework is to establish a systematic, unbiased and consistent approach for estimating an asset or company's value. This is one of the most fundamental concepts in all of Corporate Finance and one you have probably encountered multiple times in your professional and exam journey. This chapter provides multiple options for how to value a company.

Key topics for the exam include:

- Introduction to Valuation Frameworks
- Enterprise Discounted Cash Flow Model
- Economic Profit Based Model
- Adjusted Present Value Model
- Other Cash Flow Models
- Alternative Approaches

Introduction to Valuation Frameworks

A company's value stems from two primary drivers:

- Return on Invested Capital (ROIC) – ability to earn a healthy return on invested capital.
- Growth – ability to generate sustainable growth

Both of these drive future *free cash flows (FCF)* which is regarded as the ultimate source of value.

This reading provides different ways of arriving at an answer to the same question: how much is a company worth? In theory, they should all come up with the same result so it may seem like picking one approach is more efficient. However, as we'll learn, every approach has its shortcomings, so using multiple approaches with complementary benefits may allow us to hone in on a more reasonable answer.

For the remainder of this reading, we will discuss each of the models below:

1. Enterprise Discounted Cash Flow
    - Discounts *free cash flow* at the *weighted average cost of capital*
    - Best used to value projects, business units and companies that manage to a target capital structure
2. Discounted Economic Profit
    - Discounts *economic profit* at the *weighted average cost of capital*

- Demonstrates the company's value creation most clearly

3. Adjusted Present Value Model
    - Discounts *free cash flow* at the *unlevered cost of equity*
    - Useful for valuing companies with changing capital structure
4. Capital Cash Flow
    - Discounts *capital cash flows* at the *unlevered cost of equity*
    - Simple to implement but difficult to analyze results since operating and financing results are combined
5. Equity Cash Flow
    - Discounts *cash flow to equity* at the *levered cost of equity*
    - Difficult to implement because the cash flows depend on the capital structure
    - Best used for valuing financial institutions

Enterprise Discounted Cash Flow (DCF) Model

The most common valuation framework is the Enterprise DCF model. This approach determines the value of a company by projecting and discounting its future free cash flows (FCF). It is widely used in both academic and professional settings because it ties value directly to the cash generated by the business rather than accounting earnings.

Steps in the Enterprise DCF approach:

1. Forecast free cash flow to operations and discount these at the weighted average cost of capital
2. Add the value of any non-operating assets that aren't contributing to free cash flow
    - This includes excess cash, securities and non-consolidated subsidiaries
    - The sum of these first two items is the Enterprise Value
3. Subtract the value of all debt/non-equity claims against the enterprise
    - Includes simple debt like bonds but also more complex debt like unfunded pensions, employee options & preferred stock
    - The result of this subtraction is the Value of Common Equity
    - It is important to distinguish between Enterprise and Equity Value
    - Enterprise Value represents the value of all assets, while Equity Value equals Enterprise Value minus liabilities.
4. Divide this by the number of current shares outstanding to estimate value per share

Next we will delve deeper into each of the steps in the valuation process:

Valuing Operations

There are 3 main steps involved in valuing the company's operations:

1. Forecast Free Cash Flows
2. Calculate Continuing Value beyond forecast period
3. Discount both items back to T0 at the Weighted Average Cost of Capital

Forecast Free Cash Flows

Cash flows are the lifeblood of any business and when valuing a company's operations, we use Free Cash Flows (FCF) which are:

- Cash flows generated by operations less amounts reinvested back into the business
- Calculated after tax
- Representative of the cash flows available to *all* investors - equity and debt
- Independent of the company's financing decisions/capital structure - they are the cash before interest/debt/dividend/equity buybacks are paid
- Discounted at the Weighted Average Cost of Capital which represents the required return by the company's investors

The analyst's job is to project out company performance and create a set of forecasted *integrated* financial statements (fully internally consistent). Some issues to consider when forecasting:

- The shorter the projection time horizon, the more important it is to project each line item and project its trends
- Over a longer horizon, individual line items are difficult/less important to forecast so only critical drivers of value are needed
- Develop a strong understanding of past financial statements in order to identify previous sources of value/trends and assess their repeatability
- Focus on key drivers of value: return on invested capital, growth, free cash flow, etc.
- Carefully choose the forecast length before switching to a simplified method for calculating the terminal value (discussed further below)
  - Companies going through significant changes may require longer, more detailed forecasts
  - Stable, mature companies can have shorter explicit forecasts before switching to the terminal value calculation

To derive FCF from the income statement:

1. Start with operating profit before interest and taxes (EBIT)

2. Compute Net Operating Profit After Tax (NOPAT) as:
   NOPAT = EBIT × (1 − tax rate)
3. Add back non-cash charges such as depreciation and amortization
4. Subtract reinvestment requirements:
   - Capital expenditures net of disposals
   - Change in net working capital (change in current assets less most current liabilities)

A commonly used formula is:

FCF = NOPAT + Depreciation/Amortization − ΔWorking Capital − Capital Expenditures

Using NOPAT as the basis for deriving FCFs allows us to explicitly separate operating items, non-operating items and the sources of financing. Note that since NOPAT doesn't deduct interest expenses, the taxes embedded in the calculation represent the taxes the company *would have* paid if the firm was entirely equity financed.

Calculate Continuing Value

Once we have the explicit portion of the forecast, we can use a perpetuity-based method for estimating the terminal/continuing value of the company, discounted to the last forecast period. Continuing Value (CV) can be calculated as:

$$CV_t = \frac{NOPAT_{t+1}\left(1 - \frac{g}{RONIC}\right)}{WACC - g}$$

Where:

- $NOPAT_{t+1}$ is the NOPAT one year after the explicit forecast period ends
- g is the assumed perpetual growth rate of $NOPAT$
- $RONIC$ is the assumed future return on net invested capital
- $WACC$ is the Weighted Average Cost of Capital which is discussed in more detail below

Discounting Using WACC

The WACC is defined as

$$\text{WACC} = \frac{E}{V}r_e + \frac{D}{V}r_d(1 - T_c)$$

where

- E = market value of equity
- D = market value of debt
- $V = E + D$
- r_e = cost of equity

- r_d = pre-tax cost of debt
- T_c = marginal tax rate

Note, we include the tax shield in the discount rate calculation, not in the FCF projections. This makes FCFs independent of capital structure and easier to compare across time and between companies. However, this means the effect of capital structure is captured in the WACC which assumes a constant capital structure going forward. If this is not the case, a different valuation model (such as the Adjusted Present Value (APV)) should be used instead.

Once we have the forecasted FCFs, Continuing Value and WACC, we put it all together to get the Value of Operations:

$$V_{\text{operations}} = \sum_{t=1}^{T} \frac{\text{FCF}_t}{(1 + \text{WACC})^t} + \frac{\text{CV}_T}{(1 + \text{WACC})^T}$$

Valuing Non-operating Assets

In addition to operations, companies often hold assets that do not directly contribute to generating operating free cash flows and should be included as part of the Enterprise Value.

Examples include:

- Excess cash beyond what is required for operations
- Marketable securities or other financial investments
- Non-consolidated subsidiaries or equity stakes in other businesses (not recorded on the company's own financials)
- Real estate or other assets not essential to the core business

The value of operations and the value of non-operating assets together form the *Enterprise Value* of the company.

Valuing Debt and Non-equity Claims

The final adjustment needed before arriving at Equity Value is to subtract all debt and other non-equity claims from Enterprise Value. These represent obligations of the company that reduce the portion of value available to common shareholders.

Examples include:

- Debt such as bonds, loans and notes payable
  - Use *market value* of debt to be consistent with how Enterprise Value is being measured
  - Using book value is a reasonable proxy unless the probability of default or interest rates have changed significantly since issue
  - Analysts may have to scour the financials for non-traditional obligations not presented on the balance sheet (e.g., contingent lawsuits)

- Finance, operating and variable leases
  - Any portion of a lease classified as an interest expense (rather than a rental expense) should be deducted here since they weren't when valuing the operations
- Hybrid instruments such as preferred stock
- Employee and management claims such as stock options or deferred compensation
- Pension obligations or other unfunded liabilities
- Noncontrolling interest in a subsidiary
  - The balance sheet usually includes the entire value of the subsidiary
  - Analysts need to deduct the portion not owned by the company

The goal is to isolate the portion of Enterprise Value that rightfully belongs to common equity holders so any item that doesn't flow through to these shareholders should be deducted in this step. It is important to avoid double counting so if certain payments are already modeled within the FCF, they should not be subtracted here and vice versa.

Valuing Equity

The final step in the DCF framework is to translate this Equity Value into a per-share estimate for comparison with the company's stock price:

1. Start with Enterprise Value
2. Add the value of non-operating assets
3. Subtract debt and other non-equity claims
4. The result is the total value of common equity
5. Divide by the number of *undiluted* shares outstanding to calculate Equity Value per share

This value per share represents the company's intrinsic value as implied by the Enterprise DCF approach. If the intrinsic value differs materially from the market price, the analyst should investigate and determine whether the difference is due to market mispricing, incorrect assumptions in the forecast, or factors not captured in the model.[2].

Enterprise DCF Model Example

The source material provides a running simplistic example of a fictional company which we will summarize here. Details around the calculations involved can be reviewed in the Excel file attached to this lesson.

[2] Unless it is GameStop in which case we HODL like it's 2021

Veroxxotle Co. DCF Model Example

Veroxxotle Co. is attempting to calculate their Equity Value per share and collects the following details:

- Cash flows in Y1/2/3 of -$2M/+$22.5M/+$54.6M respectively
- Continuing value discounted to T3 = $1,176.2M
- WACC of 7.8%
- The company has no non-operating assets
- The company's outstanding debt is valued at $250M
- The company has 12.5M common shares outstanding

Calculate the Equity Value per share for *Veroxxotle*

Solution:
The value of operations can be calculated as:

$$V_{operations} = \frac{-\$2}{1.078} + \frac{\$22.5}{1.078^2} + \frac{\$54.6 + \$1,176.2}{1.078^3} = \$1,000$$

- Value of operations = $1,000M
- Enterprise Value = $1,000M (no non-operating assets)
- Equity Value = $750M
- Equity Value per share = $\boxed{\$60.00}$

Of course, this is an extremely simple example but it highlights the basic steps needed in order to arrive at an estimated value per share, also known as the intrinsic value. If a company is publicly traded and the calculated intrinsic value is materially different than the market price, it is a signal to investigate, explain and/or trade on this discrepancy.

Economic Profit Based Model

The Economic Profit model is an alternative way of valuing companies that emphasizes the spread between a company's return on invested capital (ROIC) and its weighted average cost of capital (WACC). It demonstrates value creation most clearly by focusing on whether a firm earns more than its cost of capital.

In order to calculate Economic Profit, we can use one of the two equivalent calculations:

$$\text{Economic Profit} = \text{Invested Capital} \times (ROIC - WACC)$$

$$\text{Economic Profit} = \text{NOPAT} - (\text{Invested Capital} \times WACC)$$

A few notes:

- $ROIC$ is Return on Invested Capital
- Invested Capital measures how much has been invested into the business independent of capital structure
- If a company is able to earn a higher ROIC than its WACC, it is generating Economic Value
- We can calculate the value of a company as the present value of Economic Profit it is able to generate:

$$V_{\text{operations}} = \text{Invested Capital}_0 + [\sum_{t=1}^{T} \frac{\text{Economic Profit}_t}{(1+\text{WACC})^t}] + \frac{\text{Economic Profit}_{T+1}}{(WACC - g) \times (1+\text{WACC})^T}$$

The three parts of the equation can be thought of as:

1. The book value of invested capital available today
2. The economic profit that capital will generate over the forecast period discounted back to today
3. The present value of constantly growing economic profit that will be generated beyond the forecast period discounted back to today

When applied consistently, the value of operations should be identical to the Discounted Cash Flow method but provides clearer intuition on the sources and timing of true value creation.

Economic Profit Example

We continue our example from the source material for the same company but this time using the Economic Profit approach:

Veroxxotle Co. Economic Profit Example

Veroxxotle Co. is attempting to calculate their Equity Value per share and collects the following details:

- Return on invested capital in Y1, 2, 3, 4 of 24.2%, 22.3%, 20.3%, 19.8% respectively
- Invested capital at BOY 1, 2, 3, 4 of \$248M, \$310M, \$356.5M, \$374.3M respectively
- All other details identical to the previous example

Calculate the Equity Value per share for *Veroxxotle*

Solution:
Using the Economic Profit formula, the Economic Profit in Y1, 2, 3, 4 is \$40.7M, \$44.8M, \$44.6M, \$44.8M respectively. Using Y1 as an example:

$$\text{Economic Profit}_1 = \$248M \times (24.2\% - 7.8\%) = \$40.7M$$

To calculate the continuing value, we divide the Economic profit in Y4 by the WACC less perpetual growth rate:

$$\text{Continuing Value} = \frac{\$44.8M}{7.8\% - 2.2\%} = \$801.8M$$

Finally, we discount all these values back and add the T0 invested capital:

$$V_{\text{operations}} = \$248M + \frac{\$40.7M}{1.078} + \frac{\$44.8M}{1.078^2} + \frac{\$44.6M + \$801.8}{1.078^3} = \boxed{\$1,000M}$$

Further details around the calculation and an alternative approach for calculating Economic Profit can be found in the Excel example attached to this lesson.

Adjusted Present Value Model

Thus far, the approaches we've taken assume a constant WACC and, therefore, that the company maintains a target debt-to-equity ratio. This may not be a fair assumption in all cases (e.g. a leveraged buyout). In these cases, we can use a more flexible model: the Adjusted Present Value (APV) model.

The APV model separates the value of operations into two components:

1. Enterprise Value as if the company were entirely equity financed
   - The process of calculating Free Cash Flows is virtually unchanged
   - The discount rate is the *unlevered cost of equity* (discussed below)
2. Present value of tax shields created by the use of debt
   - Includes tax shields due to interest being deductible, security issuance costs and distress costs
   - All calculations should be performed using the marginal tax rate

- Use the same discount rate as above

This makes the APV approach particularly useful when analyzing companies with changing or complex capital structures since it separates out the cash flow and financing pieces explicitly.

Unlevered Equity

The fundamental theory behind the APV model is that a firm's value is independent of its capital structure if taxes didn't exist. Using the Discounted FCF approach to illustrate:

- The FCFs themselves are independent of the capital structure so only the discount rate impacts the value
- If a firm is 100% equity financed but then discovers it can finance with debt at a lower cost, it may elect to do so
- This would appear to reduce the WACC
- However, debt holders are paid first in a default event so adding leverage makes the equity positions riskier
- The cost of equity should rise proportional to the leverage taken to reflect this additional risk
- The net result is that the WACC and firm's value stay constant regardless of capital structure

Since taxes do exist, there is a value to the tax shield that debt provides and so the firm's value is the sum of the unlevered operations and the value of financing. We can state the levered cost of equity using the generalized formula:

$$r_e = r_u + \frac{D}{E}(r_u - r_d) - \frac{V_{txa}}{E}(r_u - r_{txa})$$

Where:

- r_e is the levered cost of equity (akin to the cost we use in the WACC calculation)
- r_u is the unlevered cost of equity
  - This is what the cost of equity would be if the firm was 100% equity financed
  - Usually lower than the levered cost of equity since it has less risk embedded
- D and E are the market value of debt and equity respectively
- V_{txa} is the value of tax shields created by using debt
- r_{txa} is the cost of financial assets (different than cost of debt)

If we believe a company will manage to a target debt-to-value ratio then debt will grow proportional to the business. This means the risk of tax shields will mirror the risk of operating assets and $r_{txa} = r_u$ which simplifies our equation:

$$r_e = r_u + \frac{D}{E}(r_u - r_d)$$

We can use this to solve for the unlevered cost of equity.

Tax Shields

The tax shield can be estimated by:

- Projecting the company's future debt balances and interest rates paid
- Calculating projected interest expenses by multiplying the two
- Calculating projected tax shields by multiplying projected interest expense by marginal tax rate
- Use the growing perpetuity formula to value the PV of tax shields beyond the forecast period
  - Growth rate = Assumed NOPAT growth rate
  - Discount rate = Unlevered cost of equity
- Discount these projected tax shields using the unlevered cost of equity

The Excel file attached to this lesson shows an example of how the unlevered cost of equity is calculated and then used to discount the FCFs and the calculated value of the tax shields.

Other Cash Flow Models

In addition to the Enterprise DCF and APV approaches, analysts may use alternative cash flow definitions. Each of these models should, in theory, produce the same intrinsic value if applied consistently, but the mechanics and ease of use differ.

Capital Cash Flow (CCF) Model

This method is basically identical to the APV assuming the company manages to a target debt-to-value ratio. The only difference is that the FCF and tax shields are projected and discounted in aggregate:

$$V_{operations} = \sum_{t=1}^{T} \frac{FCF_t + \text{Tax Shield}_t}{(1 + r_u)^t}$$

- This model avoids the need for calculating WACC and is simple to calculate
- However, it mixes operating and financing effects making it harder to analyze the drivers of value creation

Cash Flow to Equity Model

All the methods we've discussed so far start by valuing the total Enterprise Value and then subtracting debt/other non-equity claims in order to arrive at the value of Equity. This model values equity directly by discounting cash flows to equity holders at the *levered* cost of equity:

$$V_{equity} = \sum_{t=1}^{T} \frac{ECF_t}{(1+r_e)^t}$$

The Equity Value per share is then calculated by dividing by the number of shares outstanding.

A few notes about this model:

- The model aggregates operating, non-operating and financing items
- The terminal value calculation is a function of Net Income/ROE instead of NOPAT/ROIC:

$$CV(\text{equity})_t = \frac{\text{Net Income}_{t+1}(1 - \frac{g}{ROE})}{r_e - g}$$

- Assumes the company manages to a constant debt-to-value ratio
  - If leverage is expected to change, projected r_e should be updated to reflect the change in equity risk
  - Analysts should be careful to avoid implicitly changing the capital structure in the projection
  - E.g. if future projections include increases in dividends, care should be taken that these are funded by increases in Retained Equity
- Combining operating and non-operating results may be misleading
  - By using r_e to discount all cash flows, non-operating assets are treated the same as operating assets
  - Companies with low-risk, low-yielding non-operating cash will appear to be destroying value (asset value less than book value)
- Requires detailed modeling of debt issuances and repayment that may be impractical
  - This is especially true when valuing different business units within a company
  - Each business unit requires debt and interest expense projections which can be cumbersome
- The model works best when valuing financial institutions such as banks
  - For financial institutions, the capital structure is an integral part of the operations
  - Therefore, commingling operations and financing items is reasonable

An example of the Cash Flow to Equity model is shown in the Excel file attached to this lesson.

It is important to be careful to distinguish FCF vs. Cash Flow to Equity and the rules surrounding them:

- FCFs are cash flows available to all investors and discounted using WACC
- Cash Flow to Equity is only available to equity holders and discounted using r_e

The source material also provides some potential pitfalls to steer clear of when projecting out future cash flows:

- If projecting nominal/real cash flows, use nominal/real discount rates respectively
- Using nominal cash flows is generally easier in order to more easily compare the projected vs. historical ROIC/ROE
- Using post-tax cash flows and a post-tax discount rate is recommended in order to avoid making implicit assumptions about tax deductibility of certain items

Alternative Approaches

The reading discusses two alternative approaches for valuing companies that are not rooted in projecting/discounting future cash flows.

Multiples

The use of multiples relies on relative valuation: multiples estimate value by comparing assuming a company's financial ratios are similar to othe. The general steps are:

1. Pick a financial ratio that you believe would be roughly equal across a set of companies (e.g. Enterprise Value to NOPAT)
2. Calculate the value of the financial ratio for a comparable company/group of companies (e.g. EV/NOPAT = 13)
3. Collect the known part of the ratio for the company being valued (e.g. NOPAT = \$100M)
4. Assume the ratio holds and calculate the implied company value (e.g. \$100M $\times$ 13 = \$1.3B)

Some important considerations when using multiples:

- Multiples are easy to apply and widely used in practice, but they are not a substitute for intrinsic valuation
- Multiples can only provide a reasonable estimate if the peer group is truly comparable in terms of risk, growth, and profitability
- Multiples such as the Price/Earnings (P/E) ratio embed market sentiment and therefore reflect whatever mispricing may exist in the overall market or peer group

In practice, multiples are best used as a complement to a DCF-based approach. They provide a useful cross-check on the reasonableness of the intrinsic valuation, but they should not be relied upon in isolation for investment or corporate finance decisions.

Real Options and Replicating Portfolios

The valuation technique of *Real Options* attempts to draw similarities between financial options, where the holder has the right (but not the obligation) to exercise their option, and decisions

that management can make. In situations of uncertainty, company management has the right to expand, delay or abandon projects. The value of these options can be estimated using the same valuation techniques used to value financial options.

A common way to value real options is through the *replicating portfolio* method:

- This method relies on the law of one price
- If a portfolio of traded securities exists that can perfectly replicate the cash flows of a security of unknown value, then the security value must equal the portfolio value
- This method allows us to avoid projecting cash flows or using multiples

In practice, replicating portfolios for entire companies are difficult to create which limits the practical application of the Real Options method.

We've gone through a lot of different frameworks here which can be hard to keep straight so I created the following table to help summarize the main points from this lesson:

Valuation Method	Best For	Metric Measured	Discount Rate	Terminal CV_T
Enterprise DCF	Projects, business units, stable capital structure	Free cash flow	$WACC$	$\frac{NOPAT_{T+1} \times (1 - g/RONIC)}{WACC - g}$
Economic Profit	Highlighting value creation vs. cost of capital	Economic Value	$WACC$	$\frac{\text{Economic Profit}_{T+1}}{(WACC - g)}$
Adjusted Present Value (APV)	Changing capital structure	Free cash flow + tax shield	r_u	$\frac{NOPAT_{T+1} \times (1 - g/RONIC) + TS_{T+1}}{r_u - g}$
Capital Cash Flow	Changing capital structure	Free cash flow + tax shield	r_u	$\frac{NOPAT_{T+1} \times (1 - g/RONIC) + TS_{T+1}}{r_u - g}$
Equity Cash Flow	Financial institutions	Cash flow to equity holders	r_e	$\frac{NI_{T+1} \times (1 - g/ROE)}{r_e - g}$

This wraps up our coverage on the Frameworks for Valuation. I would ensure you are familiar with all the formulas presented here and can replicate the Excel example on your own since the methods presented are highly likely to be testable.