

Equity Valuation

CFA二级培训项目

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101% Contribution Breeds Professionalism



Topic Weightings in CFA Level II

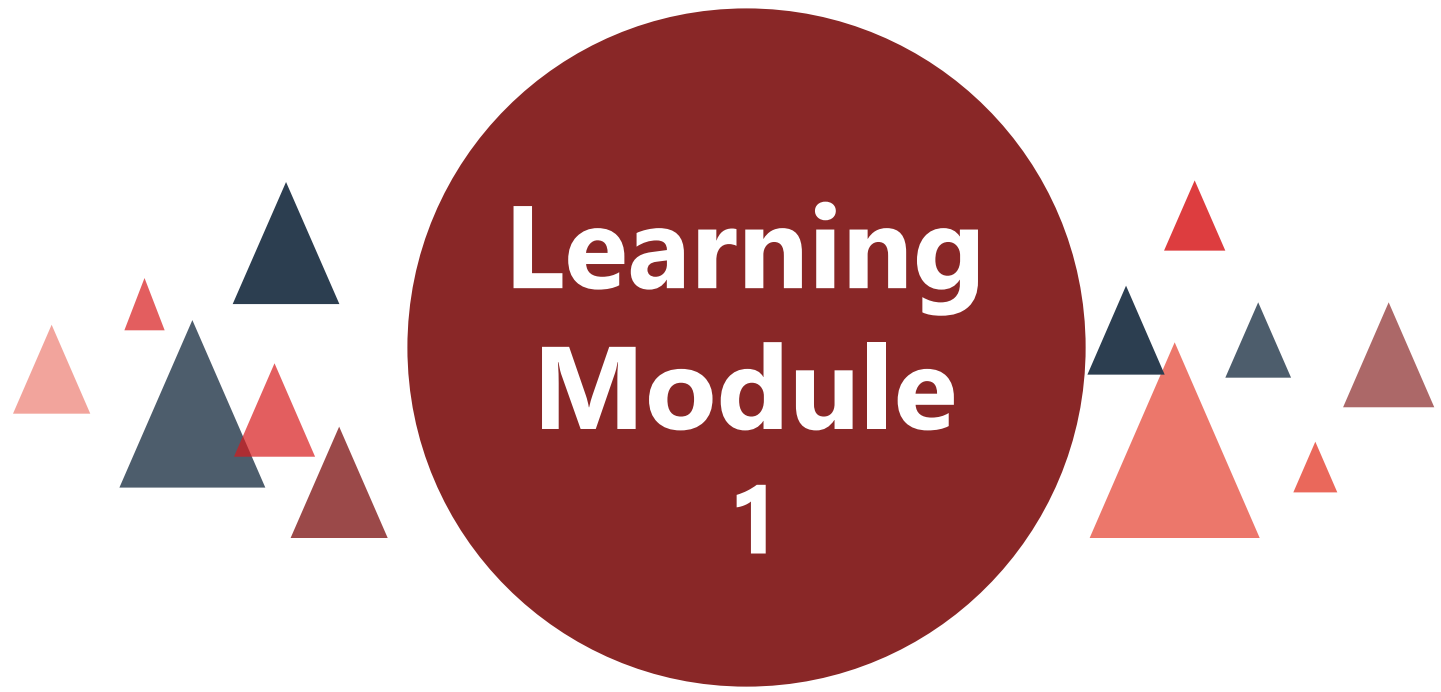
Content	Weightings
Quantitative Methods	5-10
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Framework

Equity valuation

- Equity Valuation (1)
 - LM1 Equity Valuation: Applications and Processes
 - LM2 Discounted Dividend Valuation

- Equity Valuation (2)
 - LM1 Free Cash Flow Valuation
 - LM2 Market-Based Valuation: Price and Enterprise Value Multiples
 - LM3 Residual Income Valuation
 - LM4 Private Company Valuation



Learning Module 1

Equity Valuation: Applications and Processes

Framework

1. Value Definitions and Applications
2. The Valuation Process



1. Value Definitions and Applications

- **Intrinsic value** is the value of an asset given a hypothetically complete understanding of the assets' investment characteristics. Valuation is a part of the active manager's attempt to production positive excess return.
- **Alpha**, an excess risk-adjusted return, also called an **abnormal return**.

perceived mispricing

true mispricing

$$V_E - P = (V - P) + (V_E - V)$$

the error in the estimate of the intrinsic value

- The **first component** is the true mispricing, that is, the difference between the true but unobservable intrinsic value V and the observed market price P (this difference contributes to the abnormal return).
- The **second component** is the difference between the valuation estimate and the true but unobservable intrinsic value, that is, the error in the estimate of the intrinsic value.

Value Definitions and Applications

- **Going-Concern Value** and **Liquidation Value**
 - **Going-concern value** is the value under a going-concern assumption. The valuation models we will cover are all based on the going concern assumption.
 - **Liquidation value** is the value of a company if the company were dissolved and its assets sold individually.
- **Fair Market Value** and **Investment Value**
 - **Fair market value** is the price at which an asset (or liability) would change hands between a willing buyer and a willing seller when both of them are not under any compulsion.
 - **Investment value** is the value to a specific buyer, taking account of potential synergies based on the investor's requirements and expectations.
- Under efficient market
 - **Liquidation value < intrinsic value = fair market value < investment value**

Value Definitions and Applications

➤ Applications of Equity Valuation

- **Stock selection:** Check if this security is fairly priced, overpriced, or underpriced relative to its current estimated intrinsic value and relative to the prices of comparable securities.
- **Inferring (extracting) market expectations:** Market prices reflect the expectations of investors about the future performance of companies. Analysts can estimate these expectations by comparing the market implied expectations to his own expectations.
- **Evaluating corporate events:** Investment bankers, corporate analysts, and investment analysts use valuation tools to assess the impact of such corporate events as mergers, acquisitions, divestitures, spin-offs, and going private transactions.



Value Definitions and Applications

- **Fairness opinions:** The parties to a merger may be required to seek a fairness opinion on the terms of the merger from a third party, such as an investment bank.
- **Evaluating business strategies and models:** Companies concerned with maximizing shareholder value evaluate the effect of alternative strategies on share value.
- **Communicating with analysts and shareholders:** Valuation concepts facilitate communication and discussion among company management, shareholders, and analysts on a range of corporate issues affecting company value.
- **Appraising private businesses:** Valuation of the equity of private businesses is important for transactional purposes and tax reporting purposes among others.
- **Share-based payment (compensation):** Share-based payments (e.g., restricted stock grants) are sometimes part of executive compensation. Estimation of their value frequently depends on using equity valuation tools.



2. The Valuation Process

- **General steps in the equity valuation process**
 - Understand the business;
 - Forecast company performance;
 - Select the appropriate valuation model;
 - Convert the forecasts into a valuation;
 - Apply the valuation conclusions.

The Valuation Process

➤ Valuation process

● Step 1: understanding the business

✓ Elements of industry structure (Porter's five forces)

- ◆ Intra-industry rivalry

- ◆ New entrants

- ◆ Substitutes

- ◆ Supplier power

- ◆ Buyer power

✓ Three generic strategies

- ◆ Cost leadership

- ◆ Differentiation

- ◆ Focus

- How attractive are the industries in which the company operates, in terms of offering prospects for sustained profitability?

- What is the company's relative competitive position within its industry, and what is its competitive strategy?

- How well has the company executed its strategy and what are its prospects for future execution?

● Step 2: forecasting company performance

✓ Top-down forecasting approach

✓ Bottom-up forecasting approach

The Valuation Process

- **Step 3: selecting the appropriate valuation model**
 - ✓ **Absolution valuation model**
 - ◆ DDM, FCFM, residual income approach, asset-based model.
 - ✓ **Relative valuation model**
 - ◆ Multiples, such as P/E, P/B, P/CF, etc.
- **Step 4: converting forecasts to a valuation**
 - ✓ Two important aspects of converting forecasts to valuation are **sensitivity analysis** and **situational adjustments**.
 - ◆ Control premium
 - ◆ Lack of marketability discounts
 - ◆ Illiquidity discounts/ blockage factor
- **Step 5: making the investment decision**

The Valuation Process

➤ Sum-of-the-parts valuation

- Sum-of-the-parts valuation (**breakup value** or **private market value**): A valuation that sums the estimated values of each of the company's businesses as if each business were an independent going concern.

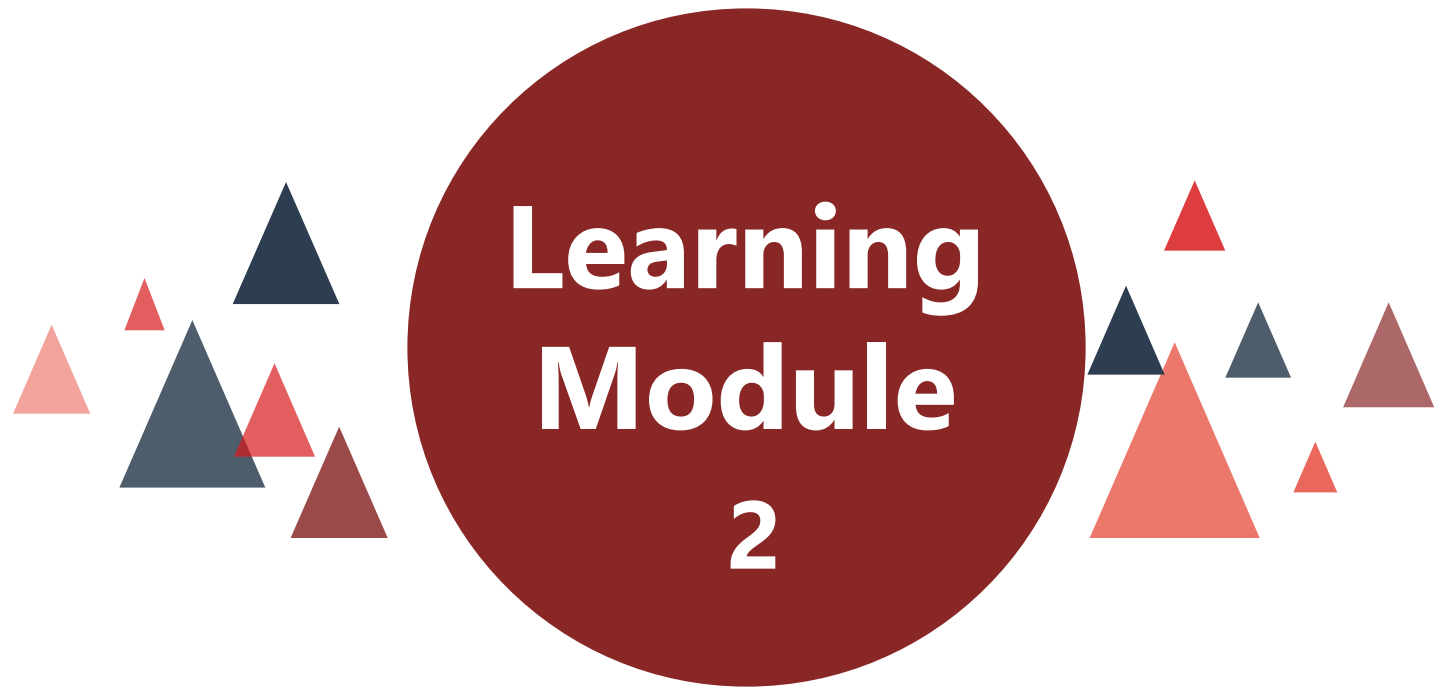
➤ Conglomerate discount

- The market applies a discount to the stock of a company operating in multiple, unrelated businesses compared to the stock of companies with narrower focuses.
- Three explanations for conglomerate discounts
 - ✓ **Inefficiency of internal capital markets**: companies' allocation of investment capital among divisions does not maximize overall shareholder value;
 - ✓ **Endogenous factors**: poorly performing companies tend to expand by making acquisitions in unrelated businesses;
 - ✓ **Research measurement errors**: conglomerate discounts do not actually exist, and evidence suggesting that they do is a result of flawed measurement.



The Valuation Process

- **How does one select a valuation model?**
- **Selected models should be**
 - Consistent with the characteristics of the company being valued;
 - Appropriate given the availability and quality of data;
 - Consistent with the purpose of valuation, including the analyst's perspective.



Learning Module 2

Discounted Dividend Valuation

Framework

1. DDM Formula
2. The Gordon Growth Model
3. Multistage Dividend Discount Models
4. Growth Phase, Transitional Phase, And Maturity Phase
5. Equity Analysis

Compare dividends, FCF, and RI

- **In stock valuation models, there are three predominant definitions of future cash flows:** dividends, free cash flow, and residual income.
- **Dividends are appropriate when:**
 - The company has a history of dividend payments.
 - The dividend policy is clear and related to the earnings of the firm.
 - The asset is being valued from the position of a minority shareholder.
- **Free cash flow is appropriate when:**
 - The company does not have a dividend payment history or has a dividend.
 - payment history that is not related to earnings.
 - The free cash flow corresponds with the firm's profitability.
 - The asset is being valued from the position of a controlling shareholder.
- **Residual income is most appropriate for firms that:**
 - Do not have dividend payment histories.
 - Have negative free cash flow for the foreseeable future.
 - Have transparent financial reporting and high-quality earnings.

1. DDM Formula

➤ **Basic formula:** $V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$

● One-period DDM: $V_0 = \frac{D_1 + P_1}{1+r}$

● Two-period DDM: $V_0 = \frac{D_1}{1+r} + \frac{D_2 + P_2}{(1+r)^2}$

● Multi-period DDM: $V_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \dots + \frac{D_n + P_n}{(1+r)^n}$

2. The Gordon Growth Model

➤ Assumptions

- The firm expects to pay a dividend, D , in one year;
- dividends will grow at a constant rate, g , forever;
- The growth rate (g) is less than the required rate (r).

➤ The formula is as follows

$$V_0 = \frac{D_1}{r-g}$$

➤ Limitations

- Very sensitive to estimates of r and g ;
- Difficult with non-dividend stocks;
- Difficult with unpredictable growth patterns (use multi-stage model).



The Gordon Growth Model

➤ Relationship between GGM and GDP

- To determine whether the company's growth rate qualifies it as a candidate for the Gordon growth model, an estimate of the economy's **nominal growth rate** is needed.
 - ✓ This growth rate is usually measured by the growth in **gross domestic product (GDP)**.
- When forecasting an earnings growth rate **far above** the economy's nominal growth rate, analysts should use a multistage DDM in which the final-stage growth rate reflects a growth rate that is more plausible relative to the economy's nominal growth rate, rather than using the Gordon growth model.



The Gordon Growth Model

- **GGM is used to value the fixed-rate perpetual preferred stock**
 - The Gordon growth model can also be used to value the **noncallable** form of a traditional type of preferred stock, **fixed-rate perpetual preferred stock. ($g=0$)**

$$V_0 = \frac{D}{r}$$

where:

- ✓ D: dividend on such preferred
 - ✓ r: discount rate (**capitalization rate**)
- Another case is a declining dividend—a **negative growth rate**. The Gordon growth model also accommodates this possibility.

The Gordon Growth Model

➤ The Links Among Dividend Growth, Earnings Growth, and Value Appreciation in the Gordon Growth Model

$$V_0 = \frac{D_1}{r - g} \quad \Rightarrow \quad V_1 = \frac{D_1(1 + g)}{r - g} = V_0(1 + g)$$

- **both** dividends and value have grown at a rate of g (holding r constant).
 - ✓ g in the Gordon growth model is the **rate of value or capital appreciation** (also called the **capital gains yield**).
- Assuming that price tracks value exactly (price equals value), the components of total return (dividend yield and capital gains yield) will also stay constant through time.

$$\text{Total return} = r = \frac{D_1}{P_0} + g = \text{Forward dividend yield} + \text{capital gains yield}$$

The Gordon Growth Model

➤ Share Repurchases

- The DDM supply accurate valuations consistent with such an approach if the analyst takes account of the effect of expected repurchases on the per-share growth rates of dividends.
 - ✓ Correctly applied, **the DDM is a valid approach** to common stock valuation even when the company being analyzed engages in share repurchases.



The Gordon Growth Model

➤ The Implied Dividend Growth Rate

- Given price, the expected next-period dividend, and an estimate of the required rate of return, the dividend growth rate reflected in price can be inferred assuming the Gordon growth model.
- The calculation of the **implied dividend growth rate** provides an alternative perspective on the valuation of the stock (fairly valued, overvalued, or undervalued).

$$\textit{implied } g = r - \frac{D_1}{P_0}$$

- ✓ If implied $g >$ expected $g \rightarrow$ overvalued
- ✓ If implied $g <$ expected $g \rightarrow$ undervalued

The Gordon Growth Model

➤ The Present Value of Growth Opportunities

- The value of a firm's equity has two components
 - ✓ The present value of a perpetual cash flow of equity;
 - ✓ The present value of its future investment opportunities (**PVGO**).

$$V_0 = \frac{E_1}{r} + PVGO$$

- where:
 - ✓ E_1 earnings at $t = 1$, constant level of earnings or average earnings of a no-growth company
 - ◆ A company **without positive** expected NPV projects is defined as a no-growth company.
 - ◆ Companies should distribute **all** their earnings in dividends.
 - ◆ Assuming a constant return on equity (ROE)
 - ✓ r = required return on equity
 - ✓ $\frac{E_1}{r}$: no-growth value per share



The Gordon Growth Model

➤ The Present Value of Growth Opportunities

- **P/E ratio** based on forecasted earnings

$$\frac{V_0}{E_1} \text{ or } \frac{P_0}{E_1} \text{ or } P/E = \frac{1}{r} + \frac{PVGO}{E_1}$$

- The first term, $1/r$, is the value of the P/E for a no-growth company.
- The second term is the component of the P/E value that relates to growth opportunities. **(growth component of the P/E)**

➤ Justified (fundamental) P/E

- Leading P/E = $P_0 / E_1 = (1 - b) / (r - g)$
- Trailing P/E = $P_0 / E_0 = (1 - b) * (1 + g) / (r - g)$

➤ Estimating a Required Return Using the Gordon Growth Model

- $r = \frac{D_1}{P_0} + g$



The Gordon Growth Model

➤ Strengths

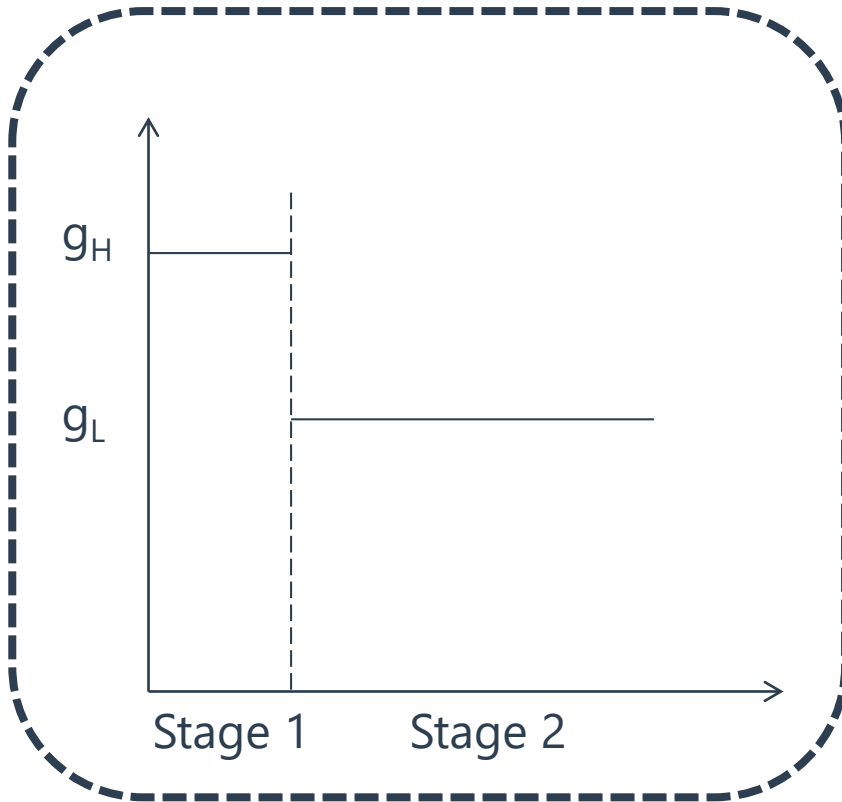
- Applicable to stable, mature, dividend paying companies;
- Applicable for valuing market indices;
- Easily communicated and explained;
- Used to determine price-implied growth rates, required rates of return, and value of growth opportunities;
- Supplement other, more complex valuation methods.

➤ Weaknesses

- Calculate values are very sensitive to the assumed growth rate and required rate of return;
- Not applicable to non-dividend paying stocks;
- Inapplicable to unstable growth, dividend-paying stocks.

3. Multistage Dividend Discount Models

- **Two-stage DDM:** the growth rate starts at a high level for a relatively short period of time, then reverts to a long-run perpetual level.



$$V_0 = \left[\sum_{t=1}^n \frac{D_0 (1+g_s)^t}{(1+r)^t} \right] + \left[\frac{D_0 \times (1+g_s)^n \times (1+g_L)}{(1+r)^n \times (r-g_L)} \right]$$

Example



- Carl Zeiss Meditec AG (Deutsche Börse XETRA: AFX), 65 percent owned by the Carl Zeiss Group, provides screening, diagnostic, and therapeutic systems for the treatment of ophthalmologic (vision) problems. Reviewing the issue as of mid-August 2013, when it is trading for €23.37.

Hans Mattern, a buy-side analyst covering Meditec, forecasts that the current dividend of €0.40 will grow by 9 percent per year during the next 10 years. Thereafter, Mattern believes that the growth rate will decline to 5 percent and remain at that level indefinitely.

Mattern estimates Meditec's required return on equity as 7.1 percent based on a beta of 0.90 against the DAX, a 2.4 percent risk-free rate, and his equity risk premium estimate of 5.2 percent.

Example

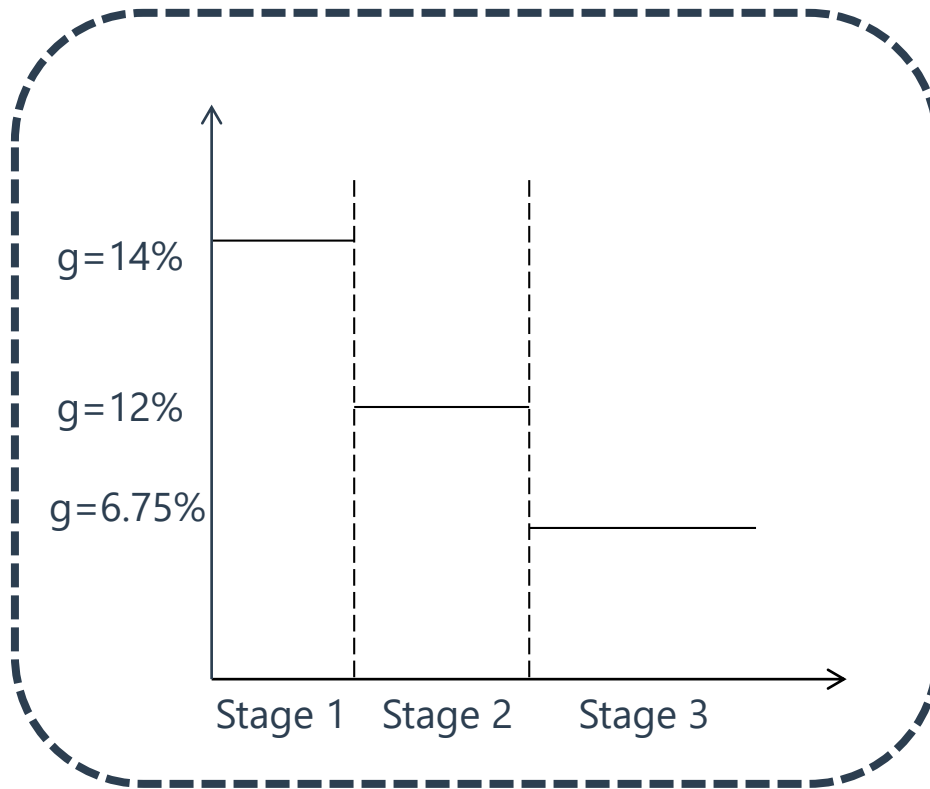


➤ **Correct Answer:**

Time	Value	Calculation	D_t or V_t	PV
1	D1	$\$0.40(1.09)$	\$0.4360	\$0.4071
2	D2	$\$0.40(1.09)^2$	\$0.4752	\$0.4143
3	D3	$\$0.40(1.09)^3$	\$0.5180	\$0.4217
4	D4	$\$0.40(1.09)^4$	\$0.5646	\$0.4291
5	D5	$\$0.40(1.09)^5$	\$0.6154	\$0.4368
6	D6	$\$0.40(1.09)^6$	\$0.6708	\$0.4445
7	D7	$\$0.40(1.09)^7$	\$0.7312	\$0.4524
8	D8	$\$0.40(1.09)^8$	\$0.7970	\$0.4604
9	D9	$\$0.40(1.09)^9$	\$0.8688	\$0.4686
10	D10	$\$0.40(1.09)^{10}$	\$0.9469	\$0.4769
10	V10	$\$0.40(1.09)^{10}(1.05)/(0.071 - 0.05)$	\$47.3473	\$23.8452
Total	\$28.2570			

Multistage Dividend Discount Models

- **Three-stage DDM:** the growth rate fits the three growth stages.



Example



- IBM (as of early 2013) pays a dividend of \$3.30 per year. A current price is \$194.98. An analyst makes the following estimates.
 - The current required return on equity for IBM is 9 percent, and
 - Dividends will grow at 14 percent for the next two years, 12 percent for the following five years, and 6.75 percent thereafter.
 - Based only on the information given, estimate the value of IBM using a three-stage DDM approach.



Multistage Dividend Discount Models



➤ Correct Answer:

Time	Value	Calculation	D_t or V_t	Present Value
1	D_1	$3.30(1.14)$	\$3.7620	\$3.4514
2	D_2	$3.30(1.14)^2$	\$4.2887	\$3.6097
3	D_3	$3.30(1.14)^2(1.12)$	\$4.8033	\$3.7090
4	D_4	$3.30(1.14)^2(1.12)^2$	\$5.3797	\$3.8111
5	D_5	$3.30(1.14)^2(1.12)^3$	\$6.0253	\$3.9160
6	D_6	$3.30(1.14)^2(1.12)^4$	\$6.7483	\$4.0238
7	D_7	$3.30(1.14)^2(1.12)^5$	\$7.5581	\$4.1346
7	V_7	$3.30(1.14)^2(1.12)^5(1.0675)/(0.09 - 0.0675)$	\$358.59	\$196.161
Total				\$222.8171



Multistage Dividend Discount Models

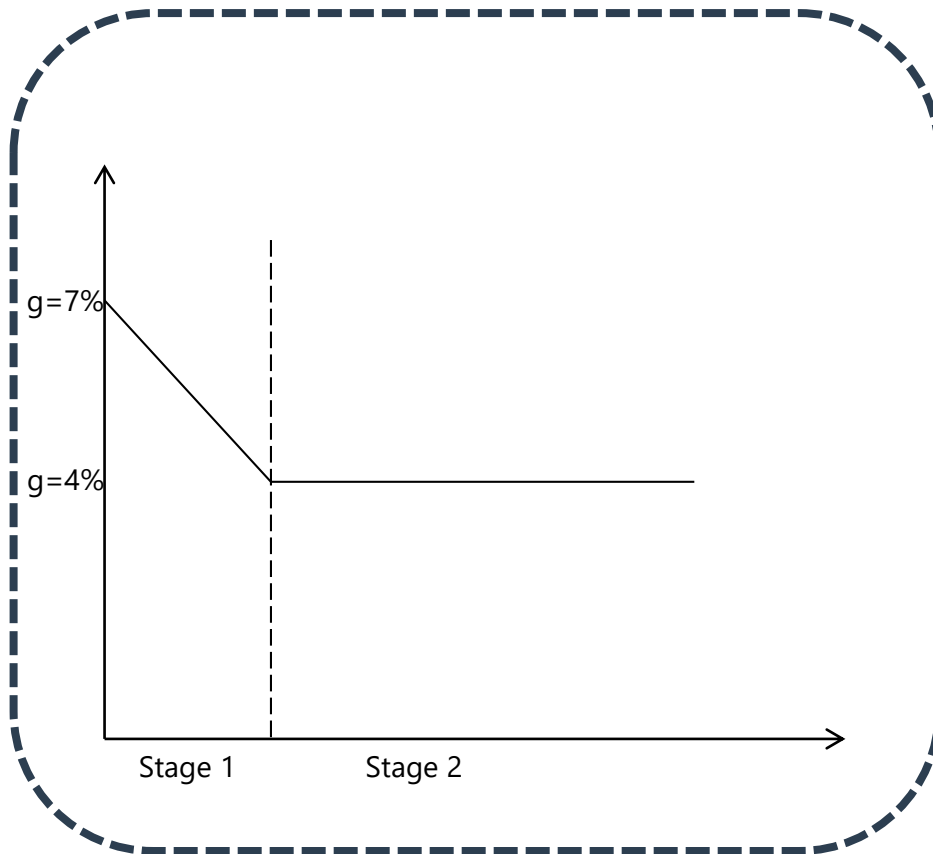


➤ **Correct Answer (cont.):**

Given these assumptions, the three-stage model indicates that a fair price should be \$222.82, which is above the current market price by over 14 percent. Characteristically, the present value of the terminal value of \$196.16 constitutes the overwhelming portion (here, about 88 percent) of total estimated value.

◆ Multistage Dividend Discount Models

- **H-Model:** the growth rate starts out high, and then declines linearly over the high-growth stage until it reaches the long-run average growth rate.



$$V_0 = \frac{[D_0 \times (1 + g_L)] + [D_0 \times H(g_s - g_L)]}{r - g_L}$$

$$H = \frac{t}{2}$$

Example



- Vinci SA (NYSE Euronext: DG). Through 2003, DG paid a single regular cash dividend per fiscal year. Since 2004 it has paid two dividends per (fiscal) year, an interim dividend in December and a final dividend in May. Although during the past five years total annual dividends grew at less than 3 percent per year, Delacour foresees faster future growth. Having decided to compute the H-model value estimate for DG, analyst gathers the following facts and forecasts:
 - The share price as of mid-August 2013 was €41.70.
 - The current dividend is €1.77.
 - The initial dividend growth rate is 7 percent, declining linearly during a 10-year period to a final and perpetual growth rate of 4 percent.
 - DG's required rate of return on equity will be 9.5 percent

Example

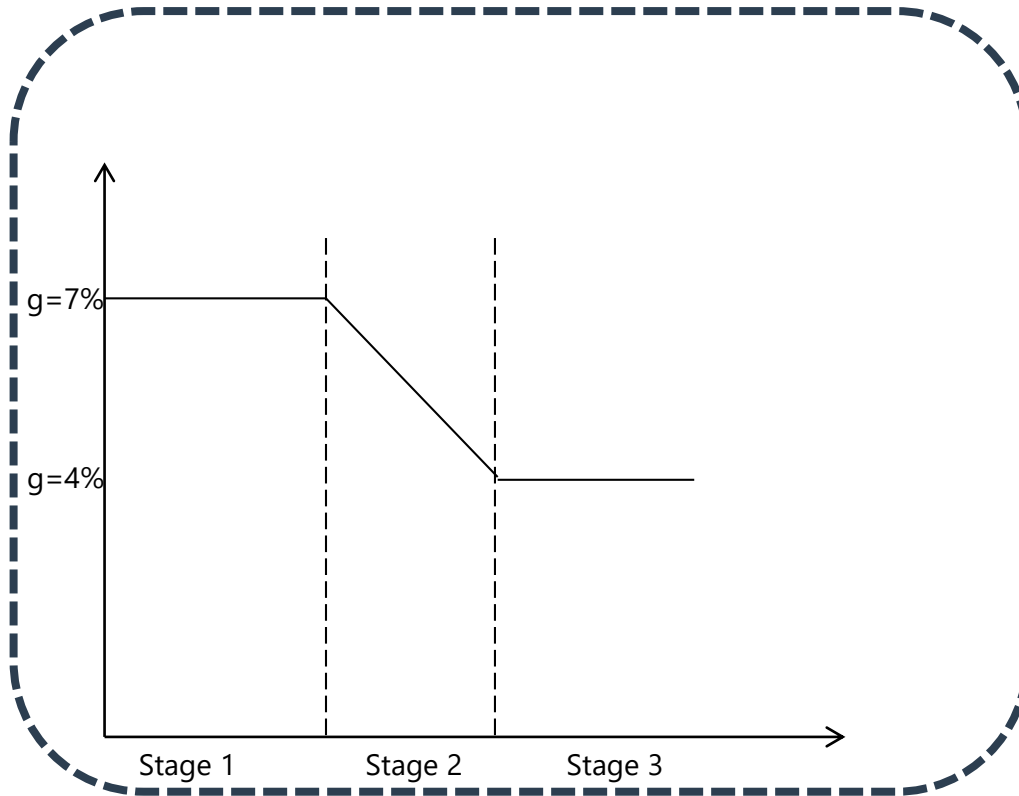


➤ **Correct Answer:**

$$\begin{aligned} V_0 &= \frac{D_0(1+g_L)}{r-g_L} + \frac{D_0H(g_S-g_L)}{r-g_L} \\ &= \frac{1.77(1.04)}{0.095-0.04} + \frac{1.77(5)(0.07-0.04)}{0.095-0.04} \\ &= 33.47 + 4.83 = 38.30 \end{aligned}$$

◆ Multistage Dividend Discount Models

- **Multistage Model:** the growth rate starts out high, and then declines linearly over the high-growth stage until it reaches the long-run average growth rate.





Multistage Dividend Discount Models

➤ Spreadsheet modeling

- In practice we can use spreadsheets to model **any pattern of dividend growth** we'd like with different growth rates for each year because the spreadsheet does all the calculations for us;
- It can involve a great deal of information and can **project different growth rates** for differing periods;
- The reason for this is the **inherent flexibility and computational accuracy** of spreadsheet modeling.

4. Growth, Transitional and Maturity Phase

Variable	Growth Phase		
	Initial Growth	Transition	Maturity
Earnings Growth	<ul style="list-style-type: none">• Very high	<ul style="list-style-type: none">• Above average but falling	<ul style="list-style-type: none">• Stable at long-run level
Capital Investment	<ul style="list-style-type: none">• Significant requirements	<ul style="list-style-type: none">• Decreasing	<ul style="list-style-type: none">• Stable at long-run level
Profit Margin	<ul style="list-style-type: none">• High	<ul style="list-style-type: none">• Above average but falling	<ul style="list-style-type: none">• Stable at long-run level
FCFF	<ul style="list-style-type: none">• Negative	<ul style="list-style-type: none">• May be positive and growing	<ul style="list-style-type: none">• Stable at long-run level
ROE Vs. Required Return	<ul style="list-style-type: none">• $ROE > r$	<ul style="list-style-type: none">• ROE approaching r	<ul style="list-style-type: none">• $ROE = r$
Dividend payout	<ul style="list-style-type: none">• Low or zero	<ul style="list-style-type: none">• Increasing	<ul style="list-style-type: none">• Stable at long-run level
Appropriate Model	<ul style="list-style-type: none">• Three-stage	<ul style="list-style-type: none">• Two-stage	<ul style="list-style-type: none">• Gordon growth

The Financial Determinants of Growth Rates

- The **sustainable growth rate** as the rate of dividend (and earnings) growth that can be sustained for a given level of return on equity, assuming that the capital structure is constant through time and that additional common stock is not issued.

$$g = b \times \text{ROE}$$

where

g = dividend growth rate

b = earnings retention rate (1 – Dividend payout ratio)

ROE = return on equity

- A practical **logic** for defining sustainable in terms of growth through **internally generated funds** (retained earnings) is that **external equity** (secondary issues of stock) is considerably more costly than internal equity (reinvested earnings).
- An increase in retained earnings will increase equity, so the company will need to **issue new debt** to maintain its target capital structure.

The Financial Determinants of Growth Rates

➤ The Gordon growth model implies a set of relationships for the **growth rates of dividends, earnings, and stock value**.

- **dividends** grow at g
- **value** grow at g
- **earnings** grow at g
- **equity** grow at g
- **debt** grow at g

➤ **PRAT model**

- Growth is a function of profit margin (P), retention rate (R), asset turnover (A), and financial leverage (T).

$$g = \frac{\text{Net income} - \text{Dividends}}{\text{Net income}} \times \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total asset}}{\text{Shareholders' equity}}$$

5. Equity Analysis

➤ Ratio analysis

- From global industry points of view: analysts should make the comparisons of each firm in the industry against the benchmark industry average.

➤ DuPont model

- Commonly used to analyze past performance.

$$ROE = \frac{NI}{\text{equity}} = \frac{NI}{EBT} \times \frac{EBT}{EBIT} \times \frac{EBIT}{\text{sales}} \times \frac{\text{sales}}{\text{assets}} \times \frac{\text{assets}}{\text{equity}}$$

- $ROE = \text{tax retention rate} \times \text{interest burden} \times \text{operating margin} \times \text{asset turnover} \times \text{leverage}$
 - ✓ The sustainable growth rate expression and this expansion of it based on the DuPont decomposition of ROE **hold** exactly only when ROE is calculated using **beginning-of-period** shareholders' equity

Equity Analysis

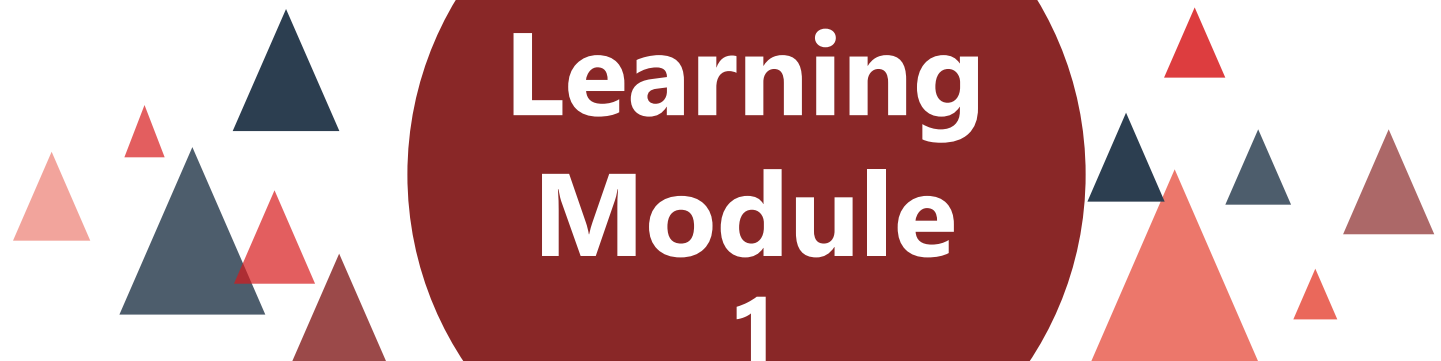


- Baggai Enterprises has an ROA of 10 percent, retains 30 percent of earnings, and has an equity multiplier of 1.25. Mondale Enterprises also has an ROA of 10 percent, but it retains two-thirds of earnings and has an equity multiplier of 2.00. What are the sustainable dividend growth rates for Baggai Enterprises and Mondale Enterprises?

- **Correct Answer:**

Baggai's dividend growth rate should be $g = 0.30 \times 10\% \times 1.25 = 3.75\%$

Mondale's dividend growth rate should be $g = (2/3) \times 10\% \times 2.00 = 13.33\%$

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Learning Module 1

Free Cash Flow Valuation

Framework

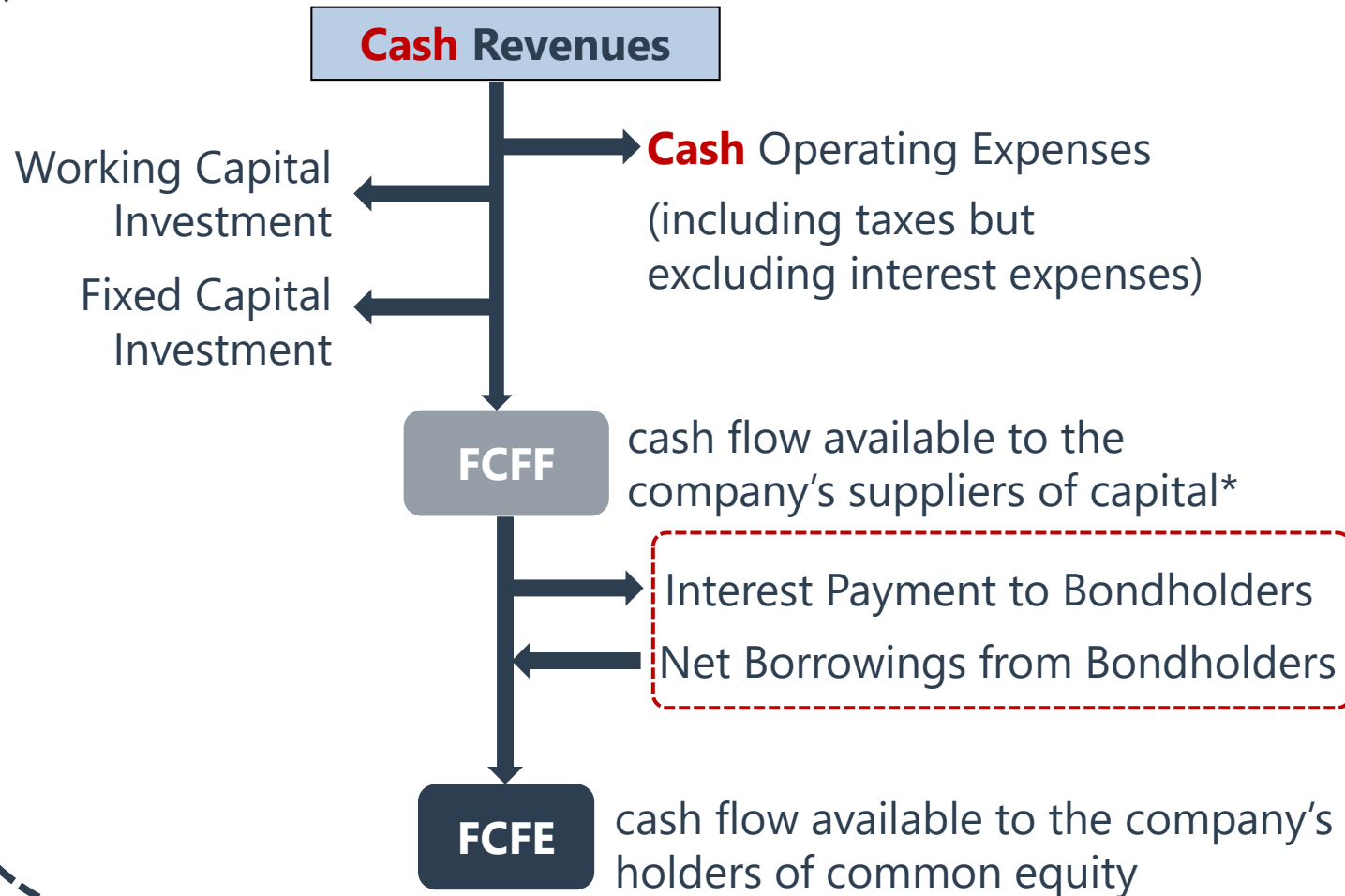
1. Introduction to Free Cash Flows
2. FCFF and FCFE Valuation Approaches
 - Calculating FCFF From EBIT and EBITDA
 - Calculating FCFF From CFO
 - NCC (Non-cash charges) Adjustments
 - WC_{INV} Calculation
 - FC_{INV} Calculation
 - Net borrowing Calculation
 - Preferred Stocks issue
 - Forecasting FCFE with Target Capital Structure
3. Other Issues in Free Cash Flow Analysis
4. Free Cash Flow Model Variations
5. Sensitivity Analysis in FCFF and FCFE
6. Nonoperating assets and firm value



1. Introduction to Free Cash Flows

- **The reasons for using free cash flow (FCFF/FCFE)**
 - The company does **not pay dividends**;
 - The company pays dividends but the dividends paid **differ significantly from the company's capacity** to pay dividends;
 - Free cash flows **align with profitability within a reasonable forecast period** with which the analyst is comfortable;
 - The investor takes a **“control” perspective**. With control comes discretion over the uses of free cash flow. If an investor can take control of the company, dividends may be changed substantially.

Introduction to Free Cash Flows



*: A company's suppliers of capital include common stockholders, bondholders, and sometimes, preferred stockholders.

Introduction to Free Cash Flows

➤ Selection of FCFF or FCFE

- FCFE is easier and more straightforward to use in cases where the company's capital structure is not particularly volatile.
- If a company has **negative FCFE** and **changing capital structure**, FCFF is generally the best choice.
 - ✓ Equity value = Firm value – Market value of debt

2. FCFF and FCFE Valuation Approaches

➤ FCFF

- **Free cash flow to the firm** is the cash flow available to the company's **suppliers of capital** after all operating expenses (including taxes) have been paid and necessary investments in working capital (e.g., inventory) and fixed capital (e.g., equipment) have been made.
- The value of the firm is estimated as the present value of the expected future
- FCFF discounted at the **WACC**.

$$\text{FCFF}_t = \text{FCFF}_{t-1} \times (1+g)$$

- Constant Growth Valuation Model

$$\text{Firm Value} = \text{FCFF}_1 / (\text{WACC} - g) = \text{FCFF}_0(1+g) / (\text{WACC} - g)$$

FCFF and FCFE Valuation Approaches

➤ FCFE

- **Free cash flow to equity** is the cash flow available to the company's **holders of common equity** after all operating expenses, interest, and principal payments have been paid and necessary investments in working and fixed capital have been made.
- The value of equity: the present value of the expected future FCFE discounted at the required return on equity(r).
 - ✓ $FCFE_t = FCFE_{t-1} \times (1+g)$
- The methods to estimate r
 - ✓ CAPM;
 - ✓ APT;
 - ✓ The Gordon growth model;
 - ✓ Build-up method.
- Constant Growth Valuation Model
 - ✓ $\text{Equity Value} = FCFE_1 / (r-g)$
 - ✓ $= FCFE_0(1+g) / (r-g)$

FCFF and FCFE Valuation Approaches-Summary

➤ FCFF

- From NI: $FCFF = (NI + \text{NCC} - WC_{INV}) + \text{Int} \times (1 - T) - FC_{INV}$
- From EBIT: $FCFF = EBIT(1 - T) + \text{Dep} - FC_{INV} - WC_{INV}$
- From EBITDA: $FCFF = EBITDA(1 - T) + \text{Dep} \times T - FC_{INV} - WC_{INV}$
- From CFO: $FCFF = CFO + \text{Int} \times (1 - T) - FC_{INV}$
 - ✓ $EBIT \times (1 - T) = NI + \text{Int} \times (1 - T)$
 - ✓ $EBIT = EBITDA - \text{Dep}$
 - ✓ $CFO = NI + \text{NCC} - WC_{INV}$

- In the calculation of net income, many **noncash charges(NCC)** are made after computing EBIT or EBITDA, so they do not need to be added back when calculating FCFF based on EBIT or EBITDA.

FCFF and FCFE Valuation Approaches-Summary

➤ FCFE

- From NI: $FCFE = NI + NCC - WC_{INV} - FC_{INV} + \text{Net Borrowing}$
- From EBIT: $FCFE = EBIT \times (1-T) - \text{Int} \times (1-T) + Dep - WC_{INV} - FC_{INV} + \text{Net Borrowing}$
- From EBITDA: $FCFE = EBITDA \times (1-T) - \text{Int} \times (1-T) + Dep \times T - WC_{INV} - FC_{INV} + \text{Net Borrowing}$
- From CFO: $FCFE = CFO - FC_{INV} + \text{Net Borrowing}$
- From FCFF: $FCFE = FCFF - \text{Int} \times (1-T) + \text{Net Borrowing}$

2.1 Calculating FCFF From EBIT and EBITDA

- **From NI** $FCFF = (NI + NCC - WC_{INV}) + Int \times (1 - T) - FC_{INV}$
- **From EBIT** $FCFF = EBIT \times (1 - T) + NCC - FC_{INV} - WC_{INV}$
- **From EBITDA** $FCFF = EBITDA \times (1 - T) + NCC \times T - FC_{INV} - WC_{INV}$

$$\begin{aligned} NI &= (EBIT - Int)(1 - T) = EBIT \times (1 - T) - Int \times (1 - T) \\ &= (EBITDA - NCC - Int)(1 - T) \\ &= EBITDA \times (1 - T) - NCC \times (1 - T) - Int \times (1 - T) \end{aligned}$$

2.2 Calculating FCFF From CFO

➤ Relationship between FCFF and CFO

- From CFO

$$\text{CFO} = \text{NI} + \text{NCC} - \text{WCInv}$$

$$\text{FCFF} = \text{CFO} + \text{Interest expense} \times (1 - \text{tax rate}) - \text{Investment in fixed capital}$$

$$\text{or FCFF} = \text{CFO} + \text{Int} \times (1 - T) - \text{FCInv}$$

➤ Attentions

- Whether interest expense or dividend was taken out of net income and out of CFO
- If yes, add it back
- If no, keep it in and no need to add it back, thus avoiding double calculation.

2.3 NCC (Non-cash charges) Adjustments

➤ Issue #1: NCC (Non-cash charges) adjustments for FCFF

Noncash Item	Adjustment to NI to Arrive at FCFF
Depreciation	Added back
Amortization and impairment of intangibles	Added back
Restructuring charges (expense)	Added back
Restructuring charges (income resulting from reversal)	Subtracted
Losses non-operating activity	Added back
Gains non-operating activity	Subtracted
Amortization of long-term bond discounts	Added back
Amortization of long-term bond premiums	Subtracted
Deferred taxes	Added back but calls for special attention

2.4 WC_{INV} Calculation

➤ Issue #2: Calculation WC_{INV}

- Working capital for cash flow and valuation purposes is **defined** to exclude cash and short-term debt.
- **Excluding cash, cash equivalents**
 - ✓ A change in cash is what we are trying to explain.
- **Excluding notes payable, and current portion of long-term debt.**
 - ✓ They are liabilities with explicit interest costs that make them financing items rather than operating items.
- Working Capital = (Current Asset – Cash) – (Current liability – Debt)
- The investment in net working capital is equal to the change in working capital.

$$WC_{INV} = WC_t - WC_{t-1}$$

- $-\Delta WC$, (+ sign in front of a reduction in working capital)

2.5 FC_{INV} Calculation

➤ Issue #3: Calculation FC_{INV}

- Fixed capital investment is a **net amount**: It is equal to the difference between capital expenditures (investments in long-term fixed assets) and the proceeds from the sale of long-term assets.

$$FC_{INV} = \text{CapEx} - \text{cash received from selling LT assets}$$

- Both **capital expenditures** and **proceeds** from long-term asset sales (if any) are likely to be reported on the firm's statement of cash flows.
- Two cases (judge: $\Delta AD = \text{Dep ?}$)
 - ✓ **No disposal** of fixed assets, then
 - ◆ Proceeds from sales of Long-Term assets = 0
 - ◆ $FC_{INV} = \text{CAPEX}$
 - ✓ **Disposal** of fixed assets, then
 - ◆ Proceeds from sales of Long-Term assets $\neq 0$
 - ◆ $FC_{INV} = \text{CAPEX} - \text{Proceeds}$



Calculation of FC_{Inv}

补充参考资料

➤ Cash used in purchase of fixed assets:

- Book Value = Carrying value = Purchase cost – AD – Impairment
- $BV_{end} = BV_{begin} + \text{Purchase} - \text{Disposal NBV} - \text{Depreciation}$

➤ Proceeds received from sale of fixed assets

- Gain or loss = proceeds received – disposal NBV

$$\text{Purchase} = BV_{end} - BV_{begin} + \text{Disposal NBV} + \text{Dep}$$

$$\text{Proceeds received} = \text{Gain/Loss} + \text{Disposal NBV}$$

$$FC_{Inv} = \text{Purchase} - \text{Proceeds received}$$

$$= (BV_{end} - BV_{begin} + \text{Disposal NBV} + \text{Dep}) - (\text{Gain/Loss} + \text{Disposal NBV})$$

$$= BV_{end} - BV_{begin} + \text{Dep} - \text{Gain/Loss}$$

Example



- The following exhibit shows partial financial information for Chow's toy Inc. in 2015 and 2016.

	2016	2015
Gross PP&E	600	540
Accumulated depreciation	320	300
Net PP&E	280	240

Assume there is no dispose of fixed assets. Depreciation expense was \$20. What is the FC_{Inv} for Chow's toy Inc. in 2016?

➤ **Correct Answer:**

- $FC_{Inv} = \text{Ending Gross PP\&E} - \text{beginning Gross PP\&E} = \text{Capital Expenditures} = \$600 - \$540 = \60

Example: Long-term Asset Sales



- Rutherford Inc. is a massage armchair manufacture. Last year, Rutherford reported a capital expenditures of \$2.2 million, a \$0.6 million cash from disposing fully depreciated long-term asset, and a depreciation expense of \$0.2 million. What is the FC investment for Rutherford last year?

- **Correct Answer:**
 - $FC_{Inv} = \text{capital expenditures} - \text{proceeds from sales of long-term assets} = \$2.2 - \$0.6 = \1.6 million

2.6 Net borrowing Calculation

➤ Issue #4: Net borrowing

● FCFE

- ✓ From FCFF: $FCFE = FCFF - \text{Int} \times (1 - T) + \text{Net borrowing}$
- ✓ From CFO: $FCFE = CFO - FC_{INV} + \text{Net borrowing}$
- ✓ From NI: $FCFE = NI + \text{Dep} - FC_{INV} - WC_{INV} + \text{Net Borrowing}$

- **Net Borrowing = long- and short-term new debt**
 - long- and short-term debt repayments

2.7 Preferred Stocks issue

➤ Issue #5: Free Cash Flow with Preferred Stocks

- If preferred dividends are tax deductible, preferred shares can be treated just like debt.

✓ If the company has preferred stock

$$\blacklozenge \text{FCFF} = (\text{NI}_{\text{common}} + \text{Div}_{\text{pre}} + \text{NCC} - \text{WC}_{\text{INV}}) + \text{Int} \times (1 - T) - \text{FC}_{\text{INV}}$$

$$\blacklozenge \text{FCFE} = \text{FCFF} - \text{Int} \times (1 - T) - \text{Div}_{\text{pre}} + \text{Net Borrowing}$$

Example



- An analyst following Barlow Energy has compiled the following information in preparation for additional analysis she has to include in a report she has been asked to produce (data is in hundreds of millions of \$):

Security Type	Market Value	Before-Tax Required Return
Preferred stock	200	7.0%
Bonds	600	7.5%
Common Stock	700	14.0%
Total	1500	

- Bonds are trading at par.
- Preferred share dividends: \$14
- Net income available to common: \$125
- Investment in working capital: \$30
- Investment in fixed capital: \$100
- Net new borrowing: \$40
- Depreciation: \$50
- Tax rate: 40%

Example



- The current FCFF for Barlow Energy is closest to:

A. \$36 B. \$62 C. \$86

- **Correct Answer: C.**

- With the bonds trading at par, the interest expense is based on the before-tax yield

$$\text{Interest} = \$600 \times 0.075 = \$45$$

- Add back preferred dividends to net income available to common to get FCFF

$$\text{FCFF} = \text{NI (available to common)} + \text{NCC} + [\text{Int} \times (1 - \text{tax rate})] + \text{preferred dividends} - \text{FCInv} - \text{WCInv}$$

$$\text{FCFF} = 125 + 50 + [45 \times (1 - 0.40)] + 14 - 100 - 30 = \$86$$

2.8 Forecasting FCFE with Target Capital Structure

➤ Issue #6: Target debt ratio

➤ Forecasting FCFE

- 1) Applying some **constant growth rate** to a current level of free cash flow
- 2) To forecast the **components of free cash flow**.
 - ✓ E.G. one popular method is to forecast: the individual components of free cash flow – $EBIT(1-T)$, net noncash charges, investment in fixed capital, investment in working capital, and net borrowing.
- 3) A more complex approach is **sales-based forecasting method**.

Forecasting FCFE with Target Capital Structure

- Issue #6: Target debt ratio
- Sales-based forecasting method

- Major assumption

- ✓ Investment in fixed capital in excess of depreciation (FCInv – Dep) and investment in working capital (WCInv) both bear a **constant** relationship to forecast increases in the **size** of the company as **measured by increases in sales**.

$$\frac{CAPEX - Dep}{\Delta Sales}$$

$$\frac{Increase\ in\ working\ capital}{\Delta Sales}$$

- ✓ This method involves a simplification because it considers **depreciation as the only noncash charge**.
- The **debt ratio (DR)**—debt as a percentage of debt plus equity.

Forecasting FCFE with Target Capital Structure

- Issue #6: Target debt ratio
- Sales-based forecasting method

$$FCFE = NI - (FC_{INV} - Dep) - WC_{INV} + \text{Net borrowing}$$

- capital expenditures have **two components**: those expenditures necessary to maintain existing capacity (fixed capital replacement) and those incremental expenditures necessary for growth.
- If a target debt ratio exists, **Net borrowing** = $(FC_{INV} - Dep + WC_{INV}) \times DR$

$$FCFE = NI - (FC_{INV} - Dep) - WC_{INV} + (FC_{INV} - Dep + WC_{INV}) \times DR$$



$$FCFE = NI - (1 - DR) \times (FC_{INV} - Dep) - (1 - DR) \times WC_{INV}$$

- Explain: FCFE equals NI minus the amount of fixed capital expenditure (net of depreciation) and working capital investment that is **financed by equity**.

Forecasting FCFE with Target Capital Structure

- **Issue #6: Target debt ratio**
- **Sales-based forecasting method**
 - Given Debt ratio

$$\begin{aligned} \text{FCFE} &= \text{NI} + \text{Dep} - \text{WC}_{\text{Inv}} - \text{FC}_{\text{Inv}} + (\text{WC}_{\text{Inv}} + \text{FC}_{\text{Inv}} - \text{Dep}) \times \text{DR} \\ &= \text{NI} - \left[(1 - \text{DR}) \times (\text{FCInv} - \text{Dep}) \right] - \left[(1 - \text{DR}) \times \text{WCInv} \right] \\ &= \text{NI} - \left(1 - \frac{D}{A} \right) (\text{FCInv} - \text{Dep}) - \left(1 - \frac{D}{A} \right) \text{WCInv} \\ &= \text{NI} - \frac{E}{A} \text{FCInv} - \frac{E}{A} \text{WCInv} + \frac{E}{A} \text{Dep} \end{aligned}$$

3. Other Issues in Free Cash Flow Analysis

➤ Proxy for free cash flow

- **EBITDA** is a **poor** proxy for FCFF because it does **not account** for the depreciation tax shield and the investment in fixed capital and working capital.
 - ✓ $FCFF = EBITDA(1-T) + \text{Dep} \times T - FC_{INV} - WC_{INV}$
- **Net income** is a **poor** proxy for FCFE because it does **not include** several cash flows. So, net income tells only part of the overall story. Investments in fixed or working capital reduce the cash available to stockholders, as do loan repayments.
 - ✓ From NI: $FCFE = NI + NCC - WC_{INV} - FC_{INV} + \text{Net Borrowing}$

Other Issues in Free Cash Flow Analysis

- Transactions between the company and its shareholders (through cash dividends, share repurchases, and share issuances) do **not affect** free cash flow (FCFF & FCFE);
 - The reason is that FCFF and FCFE are the cash flows **available** to investors or to stockholders; dividends and share repurchases are **uses** of these cash flows.
- **Leverage changes** have some impact because they increase the interest tax shield (reduce corporate taxes because of the tax deductibility of interest) and **reduce the cash flow available to equity**;
- **Erroneously** use earnings components such as NI, EBIT, EBITDA, or CFO in a discounted cash flow valuation may lead the practitioner to systematically overstate or understate the value.

Example: Calculating FCFF and FCFE



- Holt's 2007 and 2008 financial statements, contained in Exhibits 1 in the following slides and 2, are prepared in accordance with US GAAP. The net income for Holt in 2008 is 485 million, and the tax rate they proposed to is 32%. The interest expense is 195 million. The depreciation expense is 270 million. Assume there is no dispose of fixed assets.
- Calculate Holt's FCFF and FCFE for 2008.

Example: Calculating FCFF and FCFE



Exhibit 1

	As of 31 December			
		2008		2007
Assets				
Current assets				
Cash and cash equivalents		\$372		\$315
Accounts receivable		770		711
Inventories		846		780
Total current assets		1,988		1,806
Gross fixed assets	4,275		3,752	
Less: accumulated depreciation	1,176	3,099	906	2,846
Total assets		\$5,087		\$4,652

Example: Calculating FCFF and FCFE



	As of 31 December	
	2008	2007
Liabilities and shareholders' equity		
Current liabilities		
Accounts payable	\$476	\$443
Accrued taxes and expenses	149	114
Notes payable	465	450
Total current liabilities	1,090	1,007
Long-term debt	1,575	1,515
Common stock	525	525
Retained earnings	1,897	1,605
Total liabilities and shareholders' equity	\$5,087	\$4,652

Example: Calculating FCFF and FCFE



➤ Correct Answer:

- $FCFF = NI + NCC + \text{Interest expense} (1 - \text{Tax rate}) - FC_{Inv} - WC_{Inv}$.
In this case:
- $NI = \$485$ million
- $NCC = \text{Depreciation expense} = 1176 - 906 = \270 million
- $\text{Interest expense} (1 - \text{Tax rate}) = 195 (1 - 0.32) = \132.6 million
- $FC_{Inv} = \text{Net purchase of fixed assets} = \text{Increase in gross fixed assets} = 4,275 - 3,752 = \523 million
- $WC_{Inv} = \text{Increase in accounts receivable} + \text{Increase in inventory} - \text{Increase in accounts payable} - \text{Increase in accrued liabilities} = (770 - 711) + (846 - 780) - (476 - 443) - (149 - 114) = \57 million
- $FCFF = 485 + 270 + 132.6 - 523 - 57 = 307.6$ million



Example: Calculating FCFF and FCFE



- $FCFE = NI + NCC - FC_{Inv} - WC_{Inv} + \text{Net borrowing.}$
- $NI = \$485 \text{ million}$
- $NCC = \text{Depreciation expense} = \270 million
- $FC_{Inv} = \text{Net purchase of fixed assets} = \text{Increase in gross fixed assets} = 4,275 - 3,752 = \523 million
- $WC_{Inv} = \text{Increase in accounts receivable} + \text{Increase in inventory} - \text{Increase in accounts payable} - \text{Increase in accrued liabilities} = (770 - 711) + (846 - 780) - (476 - 443) - (149 - 114) = \57 million
- $\text{Net borrowing} = \text{Increase in notes payable} + \text{Increase in long-term debt} = (465 - 450) + (1,575 - 1,515) = \75 million
- $FCFE = 485 + 270 - 523 - 57 + 75 = \250 million
- An alternative calculation is
- $FCFE = FCFF - \text{Int}(1 - \text{Tax rate}) + \text{Net borrowing}$
- $FCFE = 307.6 - 195(1 - 0.32) + (15 + 60) = \250 million

4. Free Cash Flow Model Variations

➤ Single-stage model

For FCFF valuation: $V_o = \frac{FCFF_1}{WACC - g}$

Firm Value

For FCFE valuation: $V_o = \frac{FCFE_1}{r - g}$

Equity Value

- The importance of various forecasting errors can be assessed through comprehensive **sensitivity analysis**.

Example: Single-stage Model



- YPF Sociedad Anonima (NYSE: YPF) is an integrated oil and gas company headquartered in Buenos Aires, Argentina. Although the company's cash flows have been volatile, an analyst has estimated a per share normalized FCFE of 7.05 Argentine pesos (ARS) for the year just ended. The real country return for Argentina is 7.30 percent; adjustments to the country return for YPF S.A. are an industry adjustment of + 0.80 percent, a size adjustment of -0.33 percent, and a leverage adjustment of -0.12 percent. The long-term real growth rate for Argentina is estimated to be 3.0 percent, and the real growth rate of YPF S.A. is expected to be about 0.5 percent below the country rate.

Example: Single-stage Model



➤ Correct Answer:

- The real required rate of return for YPF S.A. is

Country return (real)	7.30%
Industry adjustment	+ 0.80%
Size adjustment	– 0.33%
Leverage adjustment	– 0.12%
Required rate of return	7.65%

- The real growth rate of FCFE is expected to be 2.5 percent (3.0 percent – 0.5 percent), so the value of one share is

$$V_0 = \frac{FCFE_0(1+g_{\text{real}})}{r_{\text{real}} - g_{\text{real}}} = \frac{7.05(1.025)}{0.0765 - 0.025} = 140.32$$

Free Cash Flow Model Variations

➤ Two-stage model

- The company value is the present value of the first stage' FCFF plus the present value of the terminal value of the FCFF.
- The terminal value is interpreted as

$$\text{Terminal value} = \frac{\text{FCFF}_{t+1}}{\text{WACC}-g} \qquad \text{Terminal value} = \frac{\text{FCFE}_{t+1}}{r_e - g}$$

- And calculate the present value of each period

$$\text{Value of the firm} = \frac{\text{FCFF}_1}{1 + \text{WACC}} + \frac{\text{FCFF}_2}{(1 + \text{WACC})^2} + \dots + \frac{\text{FCFF}_t + \text{terminal value}}{(1 + \text{WACC})^t}$$

$$\text{Value of the equity} = \frac{\text{FCFE}_1}{1 + r} + \frac{\text{FCFE}_2}{(1 + r)^2} + \dots + \frac{\text{FCFE}_t + \text{terminal value}}{(1 + r)^t}$$

Example: Two-stage Model



- Vishal Noronha needs to prepare a valuation of Sindhuh Enterprises. Noronha has assembled the following information for his analysis. It is now the first day of 2013.
- EPS for 2012 is \$2.40.
 - For the next five years, the growth rate in EPS is given in the following table. After 2017, the growth rate will be 7 percent.

	2013	2014	2015	2016	2017
Growth rate for EPS	30%	18%	12%	9%	7%



Example: Two-stage Model



- Net investments in fixed capital (net of depreciation) for the next five years are given in the following table. After 2017, capital expenditures are expected to grow at 7 percent annually.

	2013	2014	2015	2016	2017
Net capital expenditure per share	\$3.00	\$2.50	\$2.00	\$1.50	\$1.00

- The investment in working capital each year will equal 50 percent of the net investment in capital items.
- Thirty percent of the net investment in fixed capital and investment in working capital will be financed with new debt financing.
- Current market conditions dictate a risk-free rate of 6.0 percent, an equity risk premium of 4.0 percent, and a beta of 1.10 for Sindhuh Enterprises.

What is the per-share value of Sindhuh Enterprises on the first day of 2013?

Example: Two-stage Model



➤ Correct Answer:

- The required return for Sindhuh should be
- $r = E(R_i) = R_F + \beta_i [E(R_M) - R_F] = 6\% + 1.1(4\%) = 10.4\%$

	Year				
	2013	2014	2015	2016	2017
Growth rate for EPS	30%	18%	12%	9%	7%
EPS	3.120	3.682	4.123	4.494	4.809
Net FCInv per share	3.000	2.500	2.000	1.500	1.000
WCInv per share	1.500	1.250	1.000	0.750	0.500
Debt financing per share	1.350	1.125	0.900	0.675	0.450
FCFE per share	-0.030	1.057	2.023	2.919	3.759
PV of FCFE discounted at 10.4%	-0.027	0.867	1.504	1.965	

Example: Two-stage Model



$$V_{2016} = \frac{FCFE_{2017}}{r-g} = \frac{3.759}{0.104-0.07} = 110.56$$

$$PV = 110.56 / (1.104)^4 = \$74.425 \text{ per share}$$

$$\begin{aligned} V_{2012} &= -0.027 + 0.867 + 1.504 + 1.965 + 74.42 \\ &= \$78.73 \text{ per share} \end{aligned}$$



Example : Three-Stage FCFE Model



- Charles Jones is evaluating Reliant Home Furnishings by using a three-stage growth model. He has accumulated the following information:
- Current FCFF = \$745 million.
 - Outstanding shares = 309.39 million.
 - Equity beta = 0.90, risk-free rate = 5.04 percent; equity risk premium = 5.5 percent.
 - Cost of debt = 7.1 percent.
 - Marginal tax rate = 34 percent.
 - Capital structure = 20 percent debt, 80 percent equity.
 - Long-term debt = \$1.518 billion.
 - Growth rate of FCFF =
 - 8.8 percent annually in Stage 1, Years 1–4.
 - 7.4 percent in Year 5, 6.0 percent in Year 6, 4.6 percent in Year 7.
 - 3.2 percent in Year 8 and thereafter.

Example : Three-Stage FCFE Model



➤ Correct Answer:

- WACC.
- The required return for equity is
- $r = E(R_i) = R_F + \beta_i [E(R_M) - R_F] = 5.04\% + 0.9(5.5\%) = 9.99\%$
- WACC is
- $WACC = 0.20(7.1\%)(1 - 0.34) + 0.80(9.99\%) = 8.93\%$
- Total value of the firm.

Year								
	1	2	3	4	5	6	7	8
Growth rate	8.80%	8.80%	8.80%	8.80%	7.40%	6.00%	4.60%	3.20%
FCFF	811	882	959	1,044	1,121	1,188	1,243	1,283
PV at 8.93%	744	743	742	741	731	711	683	

Example : Three-Stage FCFE Model



➤ Correct Answer (cont.):

- The terminal value at the end of Year 7 is

$$TV_7 = \frac{FCFF_8}{WACC-g} = \frac{1,283}{0.0893-0.032} = 22,391$$

$$PV \text{ of } TV_7 = \frac{22,391}{1.0893^7} = 12,304$$

- The total present value of the first seven years of FCFF is \$5,095 million. The total value of the firm is $12,304 + 5,095 = \$17,399$ million

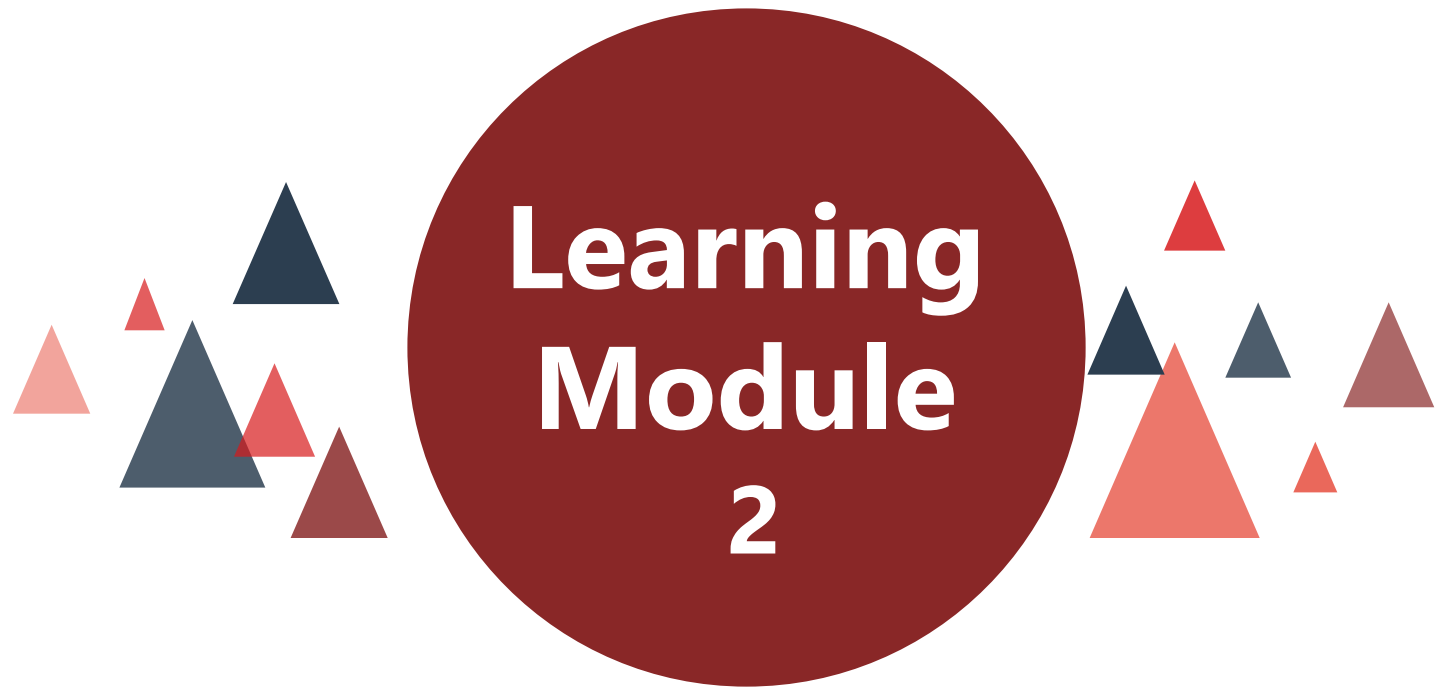
5. Sensitivity analysis in FCFF and FCFE

- To examine how sensitive the final valuation is to changes in each of a valuation model's input variables, analysts can perform a sensitivity analysis.
- The base-year values for the FCFF or FCFE growth models are also critical.
 - Given the same required rates of return and growth rates, the value of the firm or the value of equity will increase or decrease proportionately with the initial value of FCFF or FCFE used.

6. Nonoperating assets and firm value

- Free cash flow valuation focuses on the value of assets that generate or are needed to generate operating cash flows.
 - If a company has significant nonoperating assets, such as excess cash, excess marketable securities, or land held for investment, then analysts often calculate the value of the firm as the **value of its operating assets** (e.g., as estimated by FCFF valuation) **plus** the value of its **nonoperating assets**:

Value of firm = Value of operating assets + Value of non- operating assets



Learning Module 2

Market-Based Valuation: Price and Enterprise Value Multiples

Framework

1. Price Multiples
 - P/E
 - P/B
 - P/S
 - P/CF
 - Price to Dividends and Dividend Yield
2. Enterprise Value Multiples
 - EV/EBITDA
3. International Considerations When Using Multiples
4. Momentum Valuation Indicators
5. Averaging Multiples: The Harmonic Mean



1. Price and enterprise value multiples in valuation

- **Price multiples** are ratios of a stock's market price to some measure of fundamental value per share.
- **Enterprise value multiples**, by contrast, relate the total market value of all sources of a company's capital to a measure of fundamental value for the entire company.

Price and enterprise value multiples in valuation

➤ The Method of **Comparables**

- The method refers to the valuation of an asset based on **multiples of comparable (similar) assets**—that is, valuation based on multiples benchmarked to the multiples of similar assets.
- The similar assets may be referred to as the **comparables**, the **comps**, or the **guideline assets** (or in the case of equity valuation, **guideline companies**).
- The economic rationale for the method of comparables is the **law of one price**.

➤ The Method Based on Forecasted **Fundamentals**

- The method based on **forecasted fundamentals** refers to the use of multiples that are derived from forecasted fundamentals—characteristics of a business related to profitability, growth, or financial strength.
- A **justified price multiple** for the stock is the estimated **fair value of multiples**.
 - ✓ The justified price multiple is also called the warranted price multiple or the intrinsic price multiple.

1.1 P/E

➤ Advantages & disadvantages

- Several rationales support the use of P/E multiples in valuation
 - ✓ Earning power is a **chief driver** of investment value, and EPS, the denominator in the P/E ratio, is perhaps the chief focus of security analysts' attention;
 - ✓ The P/E ratio is **widely recognized** and used by investors;
 - ✓ Differences in stocks' P/Es may be related to differences in **long-run average returns** on investments in those stocks, according to empirical research.
- **Potential drawbacks**
 - ✓ EPS can be **zero, negative, or insignificantly small** relative to price;
 - ✓ The **ongoing** or **recurring** components of earnings that are most important in determining intrinsic value can be practically difficult to distinguish from transient components;
 - ✓ choices and estimates, managers may **distort EPS** as an accurate reflection of economic performance.



P/E

- A stock's **trailing P/E** (sometimes referred to as a current P/E) is its current market price divided by **the most recent four quarters' EPS**.
 - Valuation is a forward-looking process, so analysts usually focus on the forward P/E when earnings forecasts are available.
 - For example, a major acquisition or divestiture or a significant change in financial leverage may change a company's operating or financial risk so much that the trailing P/E based on past EPS is not informative about the future and thus not relevant to a valuation. In such a case, the forward P/E is the appropriate measure.
- The **forward P/E** (also called the leading P/E or prospective P/E) is a stock's current price divided by **next year's expected earnings**.
 - When earnings are not readily predictable, however, a trailing P/E (or another valuation metric) may be more appropriate than forward P/E.

Calculating the Trailing P/E

- When using trailing earnings to calculate a P/E, the analyst must take care in determining the EPS to be used in the denominator.
 - potential **dilution** of EPS;
 - **transitory, nonrecurring** components of earnings that are company specific;
 - transitory components of earnings ascribable to **cyclical** (business or industry cyclical); and
 - **differences in accounting methods** (when different companies' stocks are being compared).

Calculating the Trailing P/E

➤ 1) Diluted EPS

- **Basic EPS** reflect total earnings divided by the weighted average number of shares actually outstanding during the period.
- **Diluted EPS** reflects division by the number of shares that would be outstanding if holders of securities such as executive stock options, equity warrants, and convertible bonds exercised their options to obtain common stock.
- When comparing companies, analysts generally **prefer to use diluted EPS** so that the EPS of companies with differing amounts of dilutive securities are on a comparable basis.

Calculating the Trailing P/E

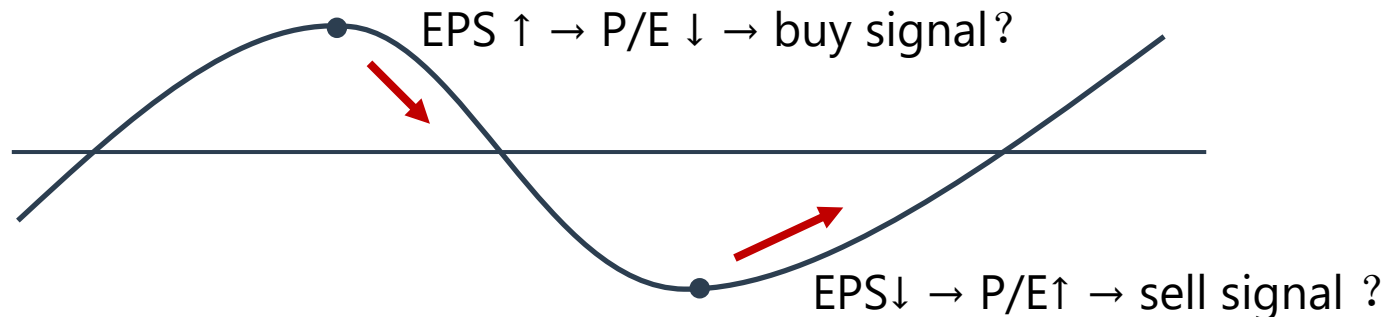
➤ 2) Adjustments for Nonrecurring Items

- Items in earnings that are **not expected to recur in the future** are generally **removed** by analysts because valuation concentrates on future cash flows.
- The analyst's focus is on estimating underlying earnings (also called persistent earnings, continuing earnings, and core earnings)—that is, earnings that **exclude nonrecurring items**.
- Nonrecurring items include:
 - ✓ gains and losses from the sale of assets
 - ✓ asset write-downs
 - ✓ goodwill impairment
 - ✓ provisions for future losses
 - ✓ changes in accounting estimates

◆ Calculating the Trailing P/E

➤ 3) Adjustments for Business-Cycle Influences

- Because of **cyclical effects**, the most recent four quarters of earnings may **not** accurately reflect the average or long-term earning power of the business.
- Empirically, P/Es for **cyclical companies** are often **highly volatile** over a cycle even without any change in business prospects.
- High P/Es on depressed EPS at the bottom of the cycle and low P/Es on unusually high EPS at the top of the cycle reflect the **countercyclical property** of P/Es known as the **Molodovsky effect**.
- Analysts address this problem by **normalizing EPS**.



Normalizing EPS

➤ Two methods for

- The method of **historical average EPS**
 - ✓ Normal EPS is calculated as average EPS over the **most recent full cycle**;
 - ✓ One of several possible statistical approaches to the problem of **cyclical earnings**;
 - ✓ The method does **not** account for **changes in the business's size**.
- The method of **average ROE**
 - ✓ Normal EPS is calculated as the average return on equity from the most recent **full cycle, multiplied by current book value per share**;
 - ✓ by using recent book value per share, **reflects** more accurately the effect on EPS of **growth or shrinkage in the company's size**;
 - ✓ For that reason, the method of **average ROE** is sometimes **preferred**.

Example: Normalizing EPS



- On 5 July 2013, the closing price of TSM, the NYSE listed ADR, was \$18.21. The semiconductor industry is notably cyclical, so you decide to normalize earnings as part of your analysis. You believe that data from 2006 reasonably captures the beginning of the most recent business cycle, and you want to evaluate a normalized P/E. Exhibit 1 supplies data on EPS for one TSM ADR, book value per share (BVPS) for one ADR, and the company's ROE.

Measure	2006	2007	2008	2009	2010	2011	2012
EPS (ADR)	\$0.74	\$0.63	\$0.61	\$0.54	\$1.07	\$0.88	\$1.08
BVPS (ADR)	\$3.00	\$2.93	\$2.85	\$2.99	\$3.80	\$4.03	\$4.82
ROE	24.7%	21.5%	21.4%	18.1%	28.2%	21.8%	22.4%

Example: Normalizing EPS



Calculate a normalized EPS for TSM by the method of historical average EPS and then calculate the P/E based on that estimate of normalized EPS.

Calculate a normalized EPS for TSM by the method of average ROE and the P/E based on that estimate of normalized EPS.

➤ **Correct Answer to 1:**

- Averaging EPS over the 2006–2012 period:
- $(\$0.74 + \$0.63 + \$0.61 + \$0.54 + \$1.07 + \$0.88 + \$1.08)/7 = \$0.79.$
- The P/E based on this estimate is $\$18.21/\$0.79 = 23.1$

➤ **Correct Answer to 2:**

- Average ROE over the 2006–2012 period:
- $(24.7\% + 21.5\% + 21.4\% + 18.1\% + 28.2\% + 21.8\% + 22.4\%)/7 = 22.6\%.$
- EPS: $0.226 \times \$4.82 = \1.09
- The P/E based on this estimate is $\$18.21/\$1.09 = 16.7$

Calculating the Trailing P/E

➤ 4) Adjustments for Comparability with Other Companies

- Analysts adjust EPS for differences in accounting methods between the company and companies it is being compared with so that the P/Es will be **comparable**.
 - ✓ For example: LIFO method vs. FIFO method
- The analyst should adjust earnings to **provide comparability** in all ratio and valuation analyses.

➤ 5) Dealing with Extremely Low, Zero, or Negative Earnings

- Dividing by zero is **undefined**, P/Es cannot be calculated for zero earnings.
- Negative P/Es are not **meaningful**.
- If the analyst is interested in a ranking, one solution is the use of an **inverse price ratio**.
 - ✓ In the case of the P/E, the inverse price ratio is earnings to price (E/P), known as the **earnings yield**.

Valuation Based on Forecasted Fundamentals

➤ Justified P/E

- Leading $P/E_1 = \frac{1-b}{r-g}$

- Trailing $P/E_0 = \frac{(1-b)(1+g)}{r-g}$

➤ Using any DCF model, all else being equal, justified P/E is:

- **inversely** related to the stock's required rate of return, and
- **positively** related to the growth rate(s) of future expected cash flows, however defined.

Valuation Based on Forecasted Fundamentals

➤ Predicted P/E Based on Cross-Sectional Regression

- A predicted P/E can be estimated from **cross-sectional regressions** of P/E on the fundamentals believed to drive security valuation.

- For example:

$$\text{Predicted P/E} = 12.12 + (2.25 \times \text{DPR}) - (0.20 \times \text{Beta}) + (14.43 \times \text{EGR})$$

DPR: dividend payout ratio

EGR: five-year earnings growth rate

- **Limitations:**

- ✓ The method captures valuation relationships **only** for the specific stock (or sample of stocks) over a particular time period.
- ✓ The regression coefficients and explanatory power of the regressions **tend to change** substantially over a number of years.
- ✓ Because regressions based on this method are prone to the problem of **multicollinearity**, interpreting individual regression coefficients is difficult.

Valuation Based on Comparables

➤ Predicted P/E Based on Cross-Sectional Regression

- The **benchmark** of the P/E include:
 - ✓ the average or median value of the P/E for the company's **peer group** of companies within an industry.
 - ✓ the average or median value of the P/E for the company's **industry or sector**.
 - ✓ the P/E for a representative **equity index**.
 - ✓ an average **past value** of the P/E for the stock.

P/E to Growth (PEG) Ratio

➤ **P/E to growth (PEG) ratio** $\text{PEG ratio} = \frac{\text{P/E Ratio}}{g}$

- One metric that appears to address the **impact of earnings growth** on P/E ratios.
- Calculated as the stock's P/E divided by the expected earnings growth rate. The ratio in effect calculates a stock's P/E per unit of expected growth.
- Stocks with lower PEGs are more attractive than stocks with higher PEGs, all else equal.
- The PEG ratio must be used with care for several reasons:
 - ✓ Assumes a **linear relationship** between P/E ratios and growth. The model for P/E in terms of DDM shows that in theory the relationship is **not linear**.
 - ✓ Does **not** factor in **differences in risk**, a very important component of P/E ratios.
 - ✓ Does **not** account for **differences in the duration of growth**.



1.2 P/B

- The measure of value in the P/B ratio, **book value per share**, is a stock or level variable coming from the balance sheet.
- Book value per share attempts to represent the investment that **common shareholders** have made in the company, on a per-share basis.
- The computation of book value:
 - Common shareholders' equity = (Shareholders' equity) - (the total value of equity claims that are senior to common stock)
 - (**Common** shareholders' equity)/(number of **common stock** shares outstanding) = book value per share



➤ Advantages

- BV **almost always** > 0 .
- BV **more stable** than EPS.
- Measures NAV per share, more fit for valuing companies composed chiefly of liquid assets, such as finance institutions.
- Book value has also been used in the valuation of companies that are **not** expected to continue as a **going concern**.
- Differences in P/Bs may be related to differences in long-run average returns, according to empirical research.

➤ Disadvantages

- **Size differences** cause misleading comparisons.
- Influenced by **accounting choices**.
- **BV \neq MV** due to inflation/ technology.
- Other assets besides those recognized in accounting may be critical.



➤ Justified P/B

- Use fundamental forecasts to estimate a stock's justified P/B ratio

$$P_0/B_0 = (ROE - g) / (r - g)$$

- ✓ The P/B increases as ROE increases.
- ✓ It also increases as the spread between ROE and r increases.
- Common adjustments to the book value include:
 - ✓ **Excluding** intangible assets such as goodwill.
 - ✓ Since the book value forecasts are not widely disseminated like EPS forecasts, analysts typically use trailing BV when calculating P/B.



1.3 P/S

➤ Advantages

- Meaningful even for **distressed firms**;
- Sales revenue **not easily manipulated**;
- Sales are **positive** even when EPS is negative;
- **Not** as volatile as P/E ratios;
- Useful in valuing mature, cyclical, and start-up firms;
- Differences in P/Ss may be related to differences in long-run average returns.

➤ Disadvantages

- High sales do **not imply** high profits and cash flows;
- Does **not capture cost structure differences**;
- Revenue recognition practices still **distort sales**.



➤ Justified P/S

- Leading $\frac{P_0}{S_1} = \frac{\left(\frac{E_1}{S_1}\right)(1-b)}{r-g}$
- Trailing $\frac{P_0}{S_0} = \frac{\left(\frac{E_0}{S_0}\right)(1-b)(1+g)}{r-g}$
- E/S is the business's **profit margin**;
- Justified P/S is an increasing function of its profit margin and earning growth rate.



1.4 P/CF

➤ Advantages

- Cash flow **less subject to manipulate** than EPS;
- **More stable** than P/E;
- Handles the problem of differences in the quality of reported earning (differences in the quality of earnings);
- Empirical evidence supported.

➤ Disadvantages

- **Difficult to estimate** true CFO;
- FCFE better but **more volatile** and more frequently **negative**.

Cash flow definition

➤ Earning plus non-cash charges

✓ $CF = \text{net income} + \text{depreciation} + \text{amortization}$

✓ Limitation

◆ **Ignore** some items that influence cash flow (such as, noncash revenue and changes in net working capital).

➤ Adjusted CFO

- Adjustments to CFO for components **not expected to persist** into future time periods may also be appropriate.

- Adjustments to CFO may be required when comparing companies that use **different accounting standards**.

✓ IFRS allow more flexibility in classification of interest paid and received, and dividends received.

➤ FCFE

- $FCFE = CFO - FC_{Inv} + \text{net borrowing}$

➤ EBITDA

- Used in enterprise value-to-EBITDA ratio

1.5 Price to Dividends and Dividend Yield

➤ Advantages

- Dividend yield is a **component** of total return.
- Dividends are a **less risky** component of total return than capital appreciation.

➤ Disadvantages

- Dividend yield is **only one component of total return**; not using all information related to expected return is suboptimal.
- Investors may **trade off** future earnings growth to receive higher current dividends.
 - ✓ That is, holding return on equity constant, dividends paid now displace earnings in all future periods (a concept known as the **dividend displacement of earnings**).
- The argument about the relative safety of dividends presupposes that **market prices reflect in a biased way** differences in the relative risk of the components of return.

Price to Dividends and Dividend Yield

- The **P/D ratio** is undefined with **zero** in the denominator.
 - For practical purposes, then, **dividend yield** is the **preferred** way to present this multiple.
- **Trailing dividend yield** is generally calculated by using the dividend rate divided by the current market price per share.
 - The annualized amount of the most recent dividend is known as the **dividend rate**.
 - ✓ For companies paying quarterly dividends, the dividend rate is calculated as four times the most recent quarterly per-share dividend.
- The **leading dividend yield** is calculated as forecasted dividends per share over the next year divided by the current market price per share.

Price to Dividends and Dividend Yield

➤ Trailing dividend yield

$$\text{Trailing D/P} = \frac{\text{dividend rate}}{\text{current market price per share}} \text{ or } \frac{4 \times \text{most recent quarterly dividend}}{\text{current market price per share}}$$

➤ Leading dividend yield

$$\text{Leading D/P} = \frac{\text{forecasted dividends per share over the next year}}{\text{current market price per share}}$$

➤ Justified dividend yield in a Gordon model

$$\text{Justified D/P} = \frac{D_0}{P_0} = \frac{r-g}{1+g}$$

- Dividend yield is **negatively** related to the expected rate of growth in dividends and **positively** related to the stock's required rate of return.
 - ✓ The first point implies that the selection of stocks with relatively high dividend yields is consistent with an orientation to a value rather than growth investment style.

2. EV/EBITDA

- EV is designed to measure the **net price** an acquirer would pay for the company as a whole.
 - When analysts do not have market value of debt, they often use **book value** of debt obtained from B/S.
- **Enterprise value (EV) is total company value, not equity.**
- **EV = market value of common stock + market value of preferred equity + market value of debt – cash and investments**
 - **Advantage**
 - ✓ Useful for comparing firms with **different degrees of financial leverage**;
 - ✓ EBITDA is useful for valuing **capital-intensive** business;
 - ✓ EBITDA is usually **positive** even when EPS is not.
 - **Disadvantages**
 - ✓ If working capital is **growing**, EBITDA will **overstate** CFO;
 - ✓ **FCFF** is more strongly linked with **valuation theory** than EBITDA.

Comparable Method Using Price Multiples

- Basic fundamental idea of using comparables: **to compare a stock's price multiple with a benchmark.**

$$\frac{P}{?} \left\{ \begin{array}{l} \text{Multiples} < \text{benchmark} \rightarrow \text{the stock's value is undervalued} \\ \text{Multiples} > \text{benchmark} \rightarrow \text{the stock's value is overvalued} \end{array} \right.$$

- **Basic requirement of using comparables**
 - The fundamentals of stock and benchmark both should be **similar**.
- **Dividend yield or E/P**
 - To identify on the basis of comparable risk and expected growth
 - **Else are equal relative to peer firms**
 - ✓ **Higher ratio → undervalued**
 - ✓ **Lower ratio → overvalued**

3. International Considerations When Using Multiples

➤ Sources of differences in cross-border valuation comparisons

- Comparing companies across borders frequently involves differences in **accounting methods, cultural differences, economic differences**, and resulting **differences in risk and growth opportunities**.
- International accounting differences affect the comparability of all price multiples.
 - ✓ **P/CFO** and **P/FCFE** will generally be **least affected** by accounting differences.
 - ✓ **P/B, P/E**, and multiples based on such concepts as EBITDA, which start from accounting earnings, will generally be the **most affected**.

4. Momentum Valuation Indicators

➤ Momentum indicators

- Valuation indicators that relate either price or a fundamental to the **time series** of their own past values or, in some cases, to the fundamental's expected value.

➤ Growth/momentum investment strategies

- Uses **positive momentum** in various senses as a selection criterion.

➤ Unexpected Earnings

- The difference between reported EPS and expected EPS. Also referred to as an earnings surprise.

➤
$$UE_t = EPS_t - E(EPS_t)$$

- Where UE_t is the unexpected earnings per share for quarter t , EPS_t is the reported earnings per share for quarter t , and $E(EPS_t)$ is the expected earnings per share for the quarter.

Momentum Valuation Indicators

➤ Standardized Unexpected Earnings

- The same rationale lies behind **standardized unexpected earnings (SUE)**

$$SUE_t = \frac{EPS_t - E(EPS_t)}{\sigma[EPS_t - E(EPS_t)]}$$

- Where the numerator is the unexpected earnings for t and the denominator, $\sigma[EPS_t - E(EPS_t)]$, is the standard deviation of past unexpected earnings over some period prior to time t.

Momentum Valuation Indicators

➤ Relative strength (RSTR) indicators

- Relative strength (RSTR) indicators **compare** a stock's performance during a period
 - ✓ To its own past performance;
 - ✓ To the performance of some group of stocks.
 - The simplest relative strength indicator of the first type is **the stock's compound rate of return** over some specified time, such as six months or one year.
 - A simple relative strength indicator of the second type is **the stock's performance** divided by the performance of an equity index.
 - ✓ This indicator may be scaled to 1.0 at the beginning of the study period.
 - ✓ If the stock goes up quickly (slowly) than the index, then relative strength will be above (below) 1.0.
 - The rationale for using relative strength is the thesis that patterns of **persistence** or **reversal** in returns exist.
- Momentum indicators as **signals** that should prompt an analyst to consider whether a stock price is moving **successively farther** from or **successively closer** to the fundamental valuations derived from models and multiples.

5. Averaging Multiples: The Harmonic Mean

- **Portfolio or index P/E is best calculated as the weighted harmonic mean P/E**

$$\text{weighted harmonic mean} = \frac{1}{\sum_{i=1}^n \frac{W_i}{X_i}}$$

- **When there are outliers**

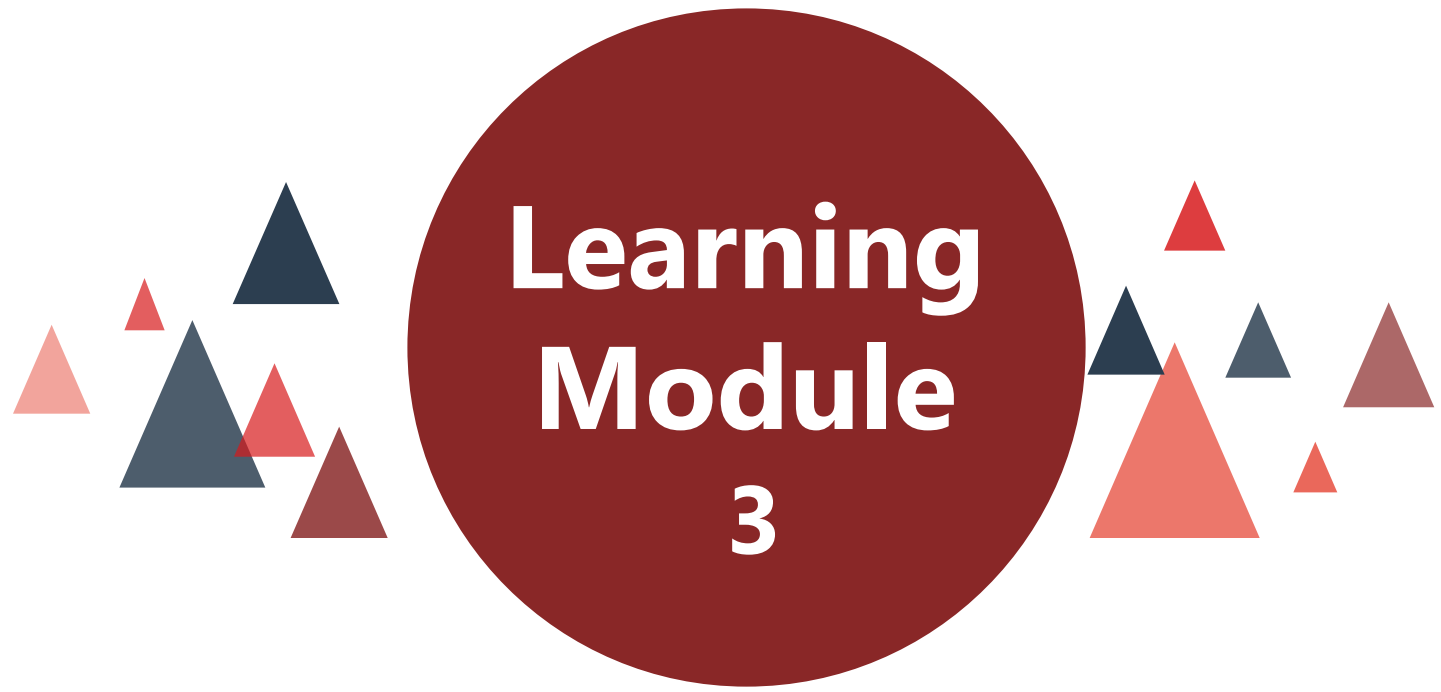
- The harmonic mean **inherently** gives less weight to higher P/Es and more weight to lower P/Es.

- ✓ Therefore **median** or **weighted** harmonic mean with the outliers excluded may be more appropriate measures.

- The harmonic mean tends to **mitigate** the impact of large outliers. The harmonic mean may **aggravate** the impact of small outliers, but such outliers are bounded by zero on the downside.

Central Tendency of a Group of Multiples

Security	Market Cap		Earnings (€ Million s)	Stock P/E				
	(€M)	%			(1)	(2)	(3)	(4)
Stock 1	715	55	71.50	10	0.5×10	0.55×10	0.5×0.1	0.55×0.1
Stock 2	585	45	29.25	20	0.5×20	0.45×20	0.5×0.05	0.45×0.05
					15	14.5	0.075	0.0775
Arithmetic mean P/E (1)					15			
Weighted mean P/E (2)						14.5		
Harmonic mean P/E (3)							$1/0.075 = 13.33$	
Weighted harmonic mean P/E (4)								$1/0.0775 = 12.90$



Learning Module 3

Residual Income Valuation

Framework

1. Concept of Residual Income
2. Residual Income Valuation Model
3. Single-stage Model
4. Multistage Models
5. Accounting and International Considerations

1. Concept of Residual Income

- Residual income is calculated as net income minus a deduction for the cost of equity capital (**equity charge**).

$$RI = \text{net income} - \text{equity capital} \times \text{cost of equity}$$

- Economic value added (EVA) is a commercial implementation of the residual income concept.

$$\begin{aligned} EVA &= EBIT \times (1 - t) - \$WACC \\ &= NOPAT - WACC \times \text{total capital} \end{aligned}$$

$$\text{Total capital} = \text{book value of debt} + \text{book value of equity}$$

Where

NOPAT: net operating profit after taxes

- Market value added (MVA) = market value – total capital
 - A company that generates **positive economic profit** should have a market value in excess of the accounting book value of its capital.

Concept of Residual Income



- Axis Manufacturing Company, Inc. (AXCI), a very small company in terms of market capitalization, has total assets of €2 million financed 50 percent with debt and 50 percent with equity capital. The cost of debt is 7 percent before taxes. The cost of equity capital is 12 percent. The company has earnings before interest and taxes (EBIT) of €200,000 and a tax rate of 30 percent. What is the residual income?

EBIT	€200,000
Less: Interest Expense	70,000
Pretax Income	€130,000
Less: Income Tax Expense	39,000
Net Income	€91,000

Concept of Residual Income



➤ Correct Answer:

- **Equity charge** = Equity capital × Cost of equity capital = €1,000,000 × 12% = €120,000
- As stated, residual income is equal to net income minus the equity charge:

Net Income	€91,000
Less: Equity Charge	120,000
Residual Income	€(29,000)

- AXCI did not earn enough to cover the cost of equity capital. As a result, it has negative residual income. Although AXCI is profitable in an accounting sense, it is not profitable in an economic sense.

Concept of Residual Income



➤ What is the EVA for AXCI?

➤ **Correct Answer:**

- $WACC = 0.5 \times 7\% \times (1 - 30\%) + 0.5 \times 12\% = 8.45\%$
- $\$WACC = 8.45\% \times \$2,000,000 = \$169,000$
- $EVA = \$200,000 \times (1 - 30\%) - \$169,000 = -\$29,000$

Calculation of Residual Income

$$RI_t = EPS_t - r_e \times B_{t-1} = (ROE - r_e) \times B_{t-1}$$

$$B_{t-1}$$

$$E_t$$

$$D_t = E_t(1 - b)$$

$$B_t = B_{t-1} + E_t - D_t$$

$$r_e \times B_{t-1}$$

$$RI_t = E_t - r_e \times B_{t-1}$$

$$B_t$$

$$E_{t+1}$$

$$D_{t+1}$$

$$B_{t+1}$$

$$r_e \times B_t$$

$$RI_{t+1} = E_{t+1} - r_e \times B_t$$

Clean surplus relation: ending BV = beginning BV + earnings - dividend

2. Residual Income Valuation Model

- Residual income model of valuation breaks the intrinsic value of equity into **two components**
 - Adjusted current book value of equity;
 - Present value of expected future RI.
- Under the residual income model, the intrinsic value of the stock can be expressed as

$$V_0 = B_0 + (RI_1/(1+r)^1 + RI_2/(1+r)^2 + RI_3/(1+r)^3....)$$

- Residual income valuations typically are **less sensitive** to terminal value estimates. The derivation of value from the earlier portion of a forecast horizon is one reason residual income valuation can be a useful analytical tool.

Residual Income Valuation Model

➤ Difference with DDM & FCFE

- The assumptions are different;
- Residual income model starts with a **book value** and adds to **this the PV of the expected stream** of residual income;
- However, DDM & FCFE measure value **by discounting a stream of expected cash flows**.

➤ Two important points about residual income models.

- First, the RI model is fundamentally similar to other valuation models, such as the dividend discount model (DDM), and given consistent assumptions will yield equivalent results.
- Second, recognition of value typically occurs earlier in RI models than in DDM.

3. Single-Stage Residual Income Valuation Model

➤ Single-stage valuation

$$V_0 = B_0 + [(ROE - r) \times B_0]/(r - g)$$

- If return on equity = the required return on equity, the justified market value of a share of stock is equal to its book value;
- The single-stage model assumes **constant ROE** and **constant earnings growth**, which implies that residual income will **persist indefinitely**;
- $[(ROE - r) \times B_0]/(r - g)$ is the additional value generated by the firm's ability to produce returns in excess of the cost of equity and, consequently, is the **present value of a firm's expected economic profits**.

➤ Residual income **implied** growth rate

$$g = r - \left[\frac{B_0 \times (ROE - r)}{V_0 - B_0} \right]$$

- **Assumption:** intrinsic value = market price

Relationship with Justified P/B

➤ Relationship with justified P/B

- Residual income models can be used to estimate justified price multiples;
- Mostly closely to P/B, due to justified P/B directly links with expected future residual income.

$$V_0 = B_0 + \frac{(ROE - r_e)}{r_e - g} \times B_0 \Rightarrow \frac{P_0}{B_0} = 1 + \frac{ROE - r_e}{r_e - g}$$

$$\begin{cases} ROE > r_e \Rightarrow P_0 > B_0 \Rightarrow P/B > 1 \\ ROE < r_e \Rightarrow P_0 < B_0 \Rightarrow P/B < 1 \\ ROE = r_e \Rightarrow P_0 = B_0 \Rightarrow P/B = 1 \end{cases}$$

4. Multistage Residual Income Model

- The multistage residual income approach can be used to forecast residual income for a certain time horizon and then estimate a **terminal value** based on continuing residual income at the end of that time horizon.
 - **Continuing residual income** is residual income after the forecast horizon.
- **Continuing residual income**
 - Problem about the forecasting residual income
 - ✓ ROE may fade over time toward the cost of equity.
 - Solution
 - ✓ Forecast over the short term, like 5 years, then follow the pattern of RI growth.

Multistage Residual Income Model

- In the residual income model, intrinsic value is the sum of **three components**

Intrinsic value = book value + (PV of interim high-growth residual income) + (PV of continuing residual income)

- **Step 1:** Obtain the current book value per share;
- **Step 2:** Based on the current book value per share, net income and dividend in a certain period **(0-T)**, book value for each year in this period can be calculated. The present value of residual income for each year in this period then can be computed;
- **Step 3:** Calculate continuing residual income at **time T** by using residual income of time T and then calculate the present value of this continuing residual income

✓ $PV_T = RI_{T+1}/(1 + r - \omega)$, where ω = persistence factor

$$0 \leq \omega \leq 1$$

Multistage Residual Income Model

➤ Assumptions

- 1) Residual income **continues indefinitely** at a positive level
 - ✓ $PV_T = RI_{T+1} / r$
- 2) Residual income is **zero** from the terminal year forward
 - ✓ $PV_T = 0$
- 3) Residual income declines to zero as ROE reverts to the **cost of equity** through time
 - ✓ $PV_T = RI_{T+1} / (1 + r - \omega) = RI_T \times \omega / (1 + r - \omega)$
 - ◆ $0 \leq \omega \leq 1$
- 4) Residual income reflects the reversion of ROE to some **mean level**
 - ✓ $PV_T = (P/B) \times B_T - B_T = P_T - B_T$

Multistage Residual Income Model

➤ Justify an estimate of continuing residual income

- Reason

- ✓ The longer the forecast period, the greater the chance that the company's residual income will converge to zero. For long forecast periods, this last term may be treated as zero.

➤ Persistence factor

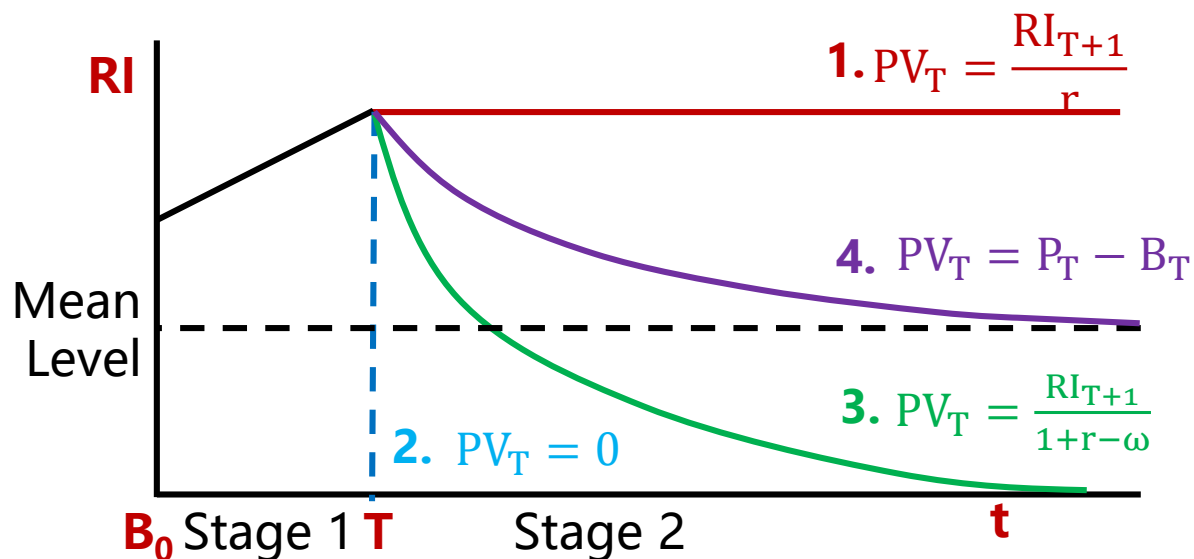
- Higher persistent factors

- ✓ **Low** dividend payout;
- ✓ **High historical persistence** in the industry.

- Lower residual income persistence

- ✓ Extreme accounting **rates of return** (ROE);
- ✓ Extreme levels of **special items**;
- ✓ Extreme levels of **accounting accruals**.

Multistage Residual Income Model



Assumption 1: $\omega = 1$

Assumption 2: $\omega = 0$

Assumption 3: $0 \leq \omega \leq 1$

$$\left. \begin{array}{l} \text{Assumption 1: } \omega = 1 \\ \text{Assumption 2: } \omega = 0 \\ \text{Assumption 3: } 0 \leq \omega \leq 1 \end{array} \right\} PV_T = \frac{RI_{T+1}}{1+r-\omega}$$

Assumption 4: $\frac{P}{B} \times B_T - B_T$

Example



- The ROE of Allenton Partner Inc. over next 6 years are estimated constantly at 12 percent. The book value of the firm is \$8 per share, There's no dividends payout, and all earnings are reinvested. The required return on equity is 10 percent. Each years forecasted earnings are equal to ROE times beginning book value.
1. After 6 years will remains constant at \$0.28 forever. Calculate the new intrinsic value.
 2. Using a residual income model to Calculate the intrinsic value of the company, assuming after 6 years that continuing residual income become zero.
 3. Suppose the persistence factor of 0.2 and the residual income decline to zero over time. The residual income in year 7 is forecasted to be \$0.06. Calculate today's intrinsic value.
 4. Suppose at the end of year 6, Allenton Partner Inc 's ROE falls to a long-run average level and the P/B ratio equals to 1.1. Calculate today's intrinsic value.

Example



➤ Correct Answer:

- Allenton Partner's Residual Income Forecast:

Year	E_t	Ending Book Value (B_t)	ROE	Equity Charge ($r \times B_{t-1}$)	Residual Income [$E - (r \times B_{t-1})$]
0		\$8.00			
1	\$0.96	\$8.96	0.12	\$0.80	\$0.16
2	\$1.08	\$10.04	0.12	\$0.90	\$0.18
3	\$1.20	\$11.24	0.12	\$1.00	\$0.20
4	\$1.35	\$12.59	0.12	\$1.12	\$0.22
5	\$1.51	\$14.10	0.12	\$1.26	\$0.25
6	\$1.69	\$15.79	0.12	\$1.41	\$0.28

Example



➤ **Correct Answer to 1:**

- By using Gordon Growth model, the \$0.28 perpetuity beginning in Year 6 is worth \$2.80 (\$0.28/0.10). The intrinsic value today is:

$$V_0 = \$8.00 + \left[\frac{\$0.16}{1.10} + \frac{\$0.18}{1.10^2} + \frac{\$0.20}{1.10^3} + \frac{\$0.22}{1.10^4} + \frac{\$0.25}{1.10^5} + \frac{\$0.28 + \$2.80}{1.10^6} \right] = \$10.49$$

Example



➤ Correct Answer to 2:

- Under the assumption that residual income after six years is zero .

Intrinsic value today is:

$$8.00 + \left[\frac{\$0.16}{1.10} + \frac{\$0.18}{1.10^2} + \frac{\$0.20}{1.10^3} + \frac{\$0.22}{1.10^4} + \frac{\$0.25}{1.10^5} + \frac{\$0.28}{1.10^6} \right] = \$8.91$$

- Solving the problem by using your financial calculator: CFO = 8, CO1 = 0.16, CO2 = 0.18, CO3 = 0.2, CO4 = 0.22 CO5 = 0.25 CO6 = 0.28, I = 10, CPT -> NPV = \$8.91.

Example



➤ **Correct Answer to 3:**

- Residual income begins to decline after year 6, so the terminal value in year 6 will be:

$$TV_6 = \frac{\$0.06}{1+0.10-0.20} = \$0.07$$

- The intrinsic value today is:

$$V_0 = \$8.00 + \left[\frac{\$0.16}{1.10} + \frac{\$0.18}{1.10^2} + \frac{\$0.20}{1.10^3} + \frac{\$0.22}{1.10^4} + \frac{\$0.25}{1.10^5} + \frac{\$0.28 + \$0.07}{1.10^6} \right] = \$8.95$$

- Compare to the formal example, we know a lower persistence factor could reduce the intrinsic value of the stock.

Example



➤ Correct Answer to 4:

- The market price at the end of year 6 will be \$ $15.79 \times 1.1 = \$17.37$. The book value per share at the end of Year 6 is 15.79. The terminal value of continuing residual income is:

$$TV_6 = \$17.37 - \$15.79 = \$1.58$$

- Then intrinsic value today is:

$$V_0 = \$8.00 + \left[\frac{\$0.16}{1.10} + \frac{\$0.18}{1.10^2} + \frac{\$0.20}{1.10^3} + \frac{\$0.22}{1.10^4} + \frac{\$0.25}{1.10^5} + \frac{\$0.28 + \$1.58}{1.10^6} \right] = \$9.8$$



Residual Income Valuation Model

➤ Strengths

- Terminal values **do not make up a large portion** of the total present value, relative to other models;
- RI models use **readily available** accounting data;
- The models can be readily applied to companies that **do not pay dividends** or **do not have positive** expected near-term free cash flows;
- The models can be used when cash flows are **unpredictable**;
- The models have an appealing focus on **economic profitability**.



Residual Income Valuation Model

➤ Weaknesses

- The models are based on accounting data that can be subject to **manipulation** by management;
- Accounting data used as inputs may **require significant adjustments**;
- The models require that the **clean surplus relation holds**, or that the analyst makes appropriate adjustments when the clean surplus relation does not hold;
- The residual income model's use of accounting income assumes that the **cost of debt capital is reflected appropriately by interest expense**.

Residual Income Valuation Model

➤ **Appropriate for**

- A company does **not pay dividends**, or its dividends are **not predictable**;
- A company's expected free cash flows are **negative** within the analyst's comfortable forecast horizon;
- Great **uncertainty** exists in forecasting **terminal values** using an alternative present value approach.

➤ **Not appropriate**

- **Significant departures** from clean surplus accounting exist;
- Significant determinants of residual income, such as book value and ROE, are **not predictable**.

5. Accounting and International Considerations

➤ Accounting considerations

- Two principal drivers of residual earnings are **ROE** and **book value**.

➤ The following issues in particular affect the valuation of residual income.

- violations of the clean surplus relationship;
 - balance sheet adjustments for fair value;
 - intangible assets;
 - nonrecurring items;
 - aggressive accounting practices; and
 - international considerations.
- In any valuation, close attention must be paid to the **accounting practices** of the company being valued.

Clean Surplus Violations

➤ The clean surplus relationship

- The clean surplus relationship can be expressed as

$$B_t = B_{t-1} + E_t - D_t$$

- Violations of this assumption occur when accounting standards permit charges directly to stockholders' equity, **bypassing** the income statement.
- Items that commonly bypass the income statement include
 - ✓ **Unrealized changes** in the fair value of some financial instruments;
 - ✓ Foreign currency **translation** adjustments;
 - ✓ Certain **pension adjustments**;
 - ✓ Portion of gains and losses on certain **hedging instruments**.

Clean Surplus Violations

➤ The clean surplus relationship

- Items that commonly bypass the income statement include
 - ✓ Changes in **revaluation surplus** related to property, plant, and equipment or intangible assets (IFRS only);
- In all of these cases in which items bypass the income statement, the **book value** of equity is **stated accurately** because it includes “accumulated other comprehensive income,” but **net income** is **not stated properly** from the perspective of residual income valuation.
- The **bias** will be introduced into the valuation only if the present expected value of the clean surplus violations **do not net to zero**.
- **The analyst can then assess whether amounts are likely to be offsetting and can assess the effect on future ROE.**

Balance Sheet Adjustments for Fair Value

- To have a reliable measure of book value of equity, an analyst should identify and scrutinize **significant off-balance** sheet assets and liabilities.
- Additionally, reported assets and liabilities should be adjusted to **fair value** when possible.
- **The following are some common items to review for balance sheet adjustments. Note, however, that this list is not comprehensive**
 - Inventory;
 - Deferred tax assets and liabilities;
 - Operating leases;
 - Reserves and allowances (for example, bad debts);
 - Intangible assets.

Intangible Assets Adjustments

➤ Two intangible assets require special attention

● Intangibles recognized at acquisition

- ✓ Advertising expenditures are shown as an expense, and the value of a brand would **not appear** as an asset on the financial statements unless the company owning the brand was acquired.
- ✓ If an acquirer **overpays** for an acquisition, the overpayment should become evident in a **reduction in future residual income**.

● R&D expenditures

- ✓ If a company engages in **unproductive** R&D expenditures, these will **lower** residual income through the expenditures made.
- ✓ If a company engages in **productive** R&D expenditures, these should result in **higher** revenues to offset the expenditures over time.
- ✓ In summary, on a continuing basis for a **mature company**, ROE should reflect the productivity of R&D expenditures **without requiring an adjustment**.



Nonrecurring Items

- In applying a residual income model, it is important to develop a forecast of future residual income **based on recurring items**.
 - Companies often report **nonrecurring charges** as part of earnings, which can lead to **overestimates** and **underestimates** of future residual earnings if no adjustments are made.
 - **No adjustments** to book value are necessary for these items, however, because nonrecurring gains and losses are **reflected** in the value of assets in place.
 - Other sources for items that may warrant adjustment in determining recurring earnings:
 - ✓ unusual items
 - ✓ extraordinary items (US GAAP only)
 - ✓ restructuring charges
 - ✓ discontinued operations
 - ✓ accounting changes



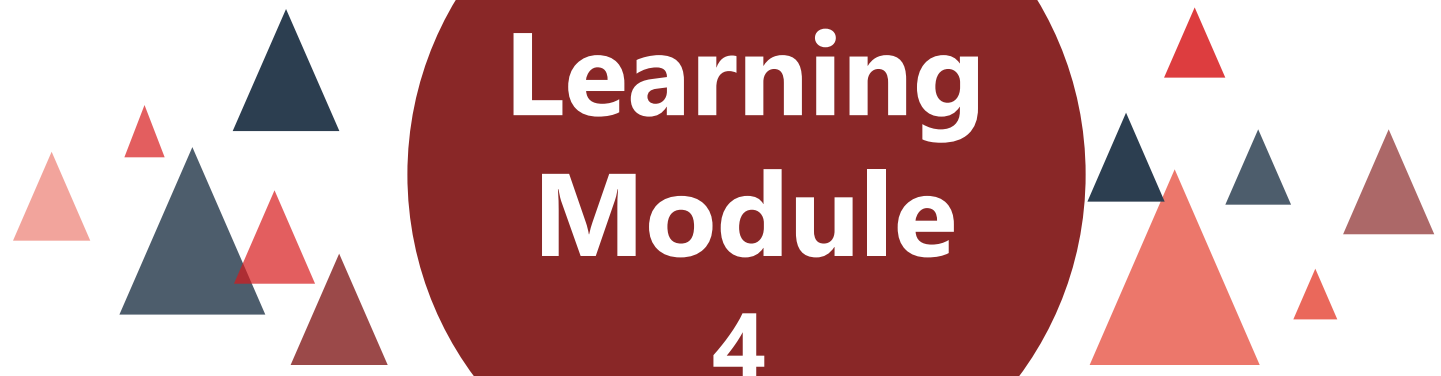
Other Considerations

➤ Aggressive Accounting Practices

- Overall, the analyst must evaluate a company's accounting policies carefully and consider the integrity of management when assessing the inputs in a residual income model.

➤ International Considerations

- Differences in international accounting standards lead to different international measures of book value and earnings.
- There are three primary considerations in applying a residual income model internationally:
 - ✓ the availability of **reliable earnings forecasts**;
 - ✓ systematic **violations** of the clean surplus assumption; and
 - ✓ "**poor quality**" accounting rules that result in delayed recognition of value changes.

A central dark red circle contains the text 'Learning Module 4'. To the left and right of this circle are several triangles of varying sizes and colors (dark blue, red, and brownish-red) arranged in a scattered pattern.

Learning Module 4

Private Company Valuation

Framework

1. Public vs. Private Company Valuation: Similarities and Contrasts
2. Uses of Private Company Valuation
3. Private Company Valuation Methods
 - Normalized Earnings
 - Estimating Cash Flow
 - Estimating The Discount Rate For Private
 - Valuation Discounts and Premiums
4. Private Company Valuation Approaches
 - Income Approach
 - Market Approach Methods
 - Asset-Based



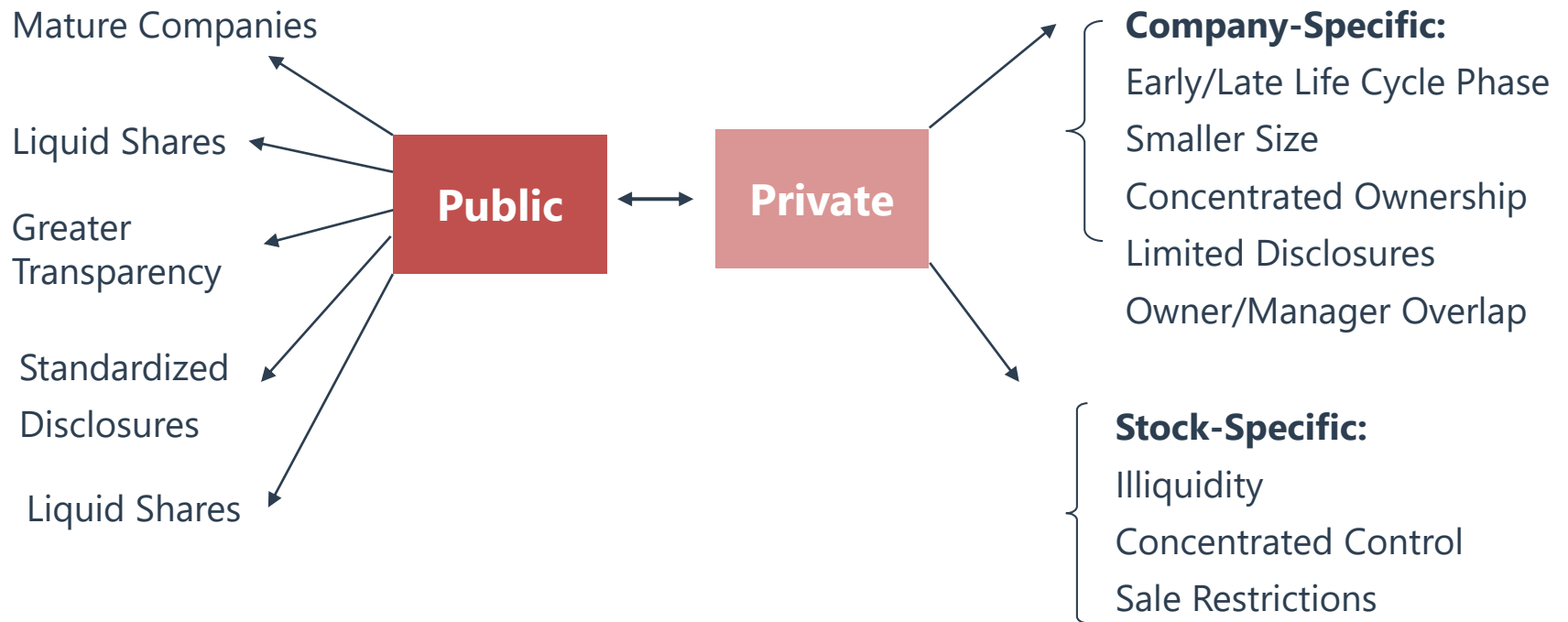
1. Public vs. Private Company Valuation

➤ Public Company Valuation

- Based on **standard issuer disclosures** and a share price which represents the collective expectations of market participants regarding firm value.
- Rely on **audited financial statements** as a basis to project future cash flows, taking the perspective of an **outside investor** with a non-controlling stake in the company.
- The **intrinsic value** from the valuation process is compared to the **market price** to assess whether a company's stock is over- or undervalued.

1. Public vs. Private Company Valuation

➤ Public Versus Private Company Features





1. Public vs. Private Company Valuation

➤ Company-specific factors

- **Life-cycle stage:** Private companies involve companies at an **early stage** of development, but may also involve large, stable, going concerns or failed companies in the process of liquidation.
- **Smaller Size:** private companies in a given line of business tend to be smaller whether measured by income, asset size, or other measures.;
 - ✓ less-diversified lines of business and customers;
 - ✓ less well developed marketing, sales, and distribution;
 - ✓ limited growth prospects because of reduced access to capital.→ **higher required rate of return**
- **Concentrated Ownership:** **Family ownership** or other forms of concentrated control (i.e., through private equity or different share classes).



1. Public vs. Private Company Valuation

➤ Company-specific factors

- **Owner/Manager Overlap:** senior management of many private firms often has a controlling ownership interest in the company.
 - ✓ This feature greatly reduces the principal-agent problem
 - ✓ private companies typically do not experience similar stock price performance pressure as public companies and such companies can take a longer term investment focus.
- **Limited Disclosures:** analyst usually has more limited access to information.



1. Public vs. Private Company Valuation

➤ Stock-specific factors

- **Illiquidity:** The limited number of existing and potential buyers **reduces** the value of the shares in private companies versus otherwise similar public companies.
- **Concentration of control:** control of private companies is often concentrated in one or in very few investors.
 - ✓ May lead to corporate actions which benefit some shareholders at the expense of others.
 - ◆ E.g., above-market executive compensation or transactions with related entities
 - ✓ May also be viewed as “company specific.”
- **Sale Restrictions:** Shareholder agreements that restrict the ability to sell shares may also reduce the marketability of equity interests.

2. Uses of Private Company Valuation

- **Transaction-related valuations encompass events affecting the ownership or financing of a business**
 - **Venture capital financing (early stage):** When future cash flows are highly uncertain, less formal valuations are often used as a basis for negotiation between the company and prospective investors.
 - **Private equity financing (growth or buyout stage):**
 - ✓ Growth equity funds usually take a minority stake with the intention of rapidly growing the business.
 - ✓ Leveraged buyout firms acquire majority control and seek to create value through more efficient business practices and optimizing the balance sheet.
 - ✓ The goal of both types of investment is to exit at a higher valuation.
 - **IPO:** Prospective primary market investors, the issuer, and their investment banking advisors typically prepare valuations as part of the IPO process.

2. Uses of Private Company Valuation

- **Transaction-related valuations encompass events affecting the ownership or financing of a business**
 - **Debt financing:** Private company issuers and lenders may perform a valuation to determine a firm's ability to repay existing debt or its capacity to assume additional debt.
 - **Acquisitions and divestitures:** Acquisition-related valuations may be performed by the management of the target and/or buyer as well as investment banking advisors typically involved in larger transactions.
 - **Bankruptcy:**
 - ✓ Use company- and asset-based valuations to determine whether a company is more valuable as a going concern or in liquidation.
 - ✓ Valuation insights may be critical to the restructuring of an overleveraged capital structure.
 - **Share-based incentive compensation:** share-based payments can be viewed as transactions between a company and its employees. For private companies, stock option grants will frequently require valuations.

2. Uses of Private Company Valuation

- **Compliance-related valuation: law or regulation**
 - **Financial reporting:** Goodwill impairment is one of the most frequent financial reporting valuations.
 - ✓ cash-generating unit (IFRS) & reporting unit (US.GAAP)
 - **Tax purposes:** Tax-related reasons for valuations include corporate and individual tax reporting.
 - ✓ corporate activities: corporate restructurings, transfer pricing, and property tax matters
 - ✓ individual's tax requirements: estate and gift taxation in some jurisdictions
- **Litigation-related valuation: damages, lost profits, shareholder disputes, and divorce.**

3. Private Company Valuation Areas of Focus

- Three key areas related to private company valuation

1) Earnings Normalization/Cash
Flow Issues

$$\text{Intrinsic Value}_t = \sum_{i=1}^n \frac{FCFF_{t+i}}{(1 + WACC)^i} + \frac{\text{Terminal Value}}{(1 + WACC)^n}$$

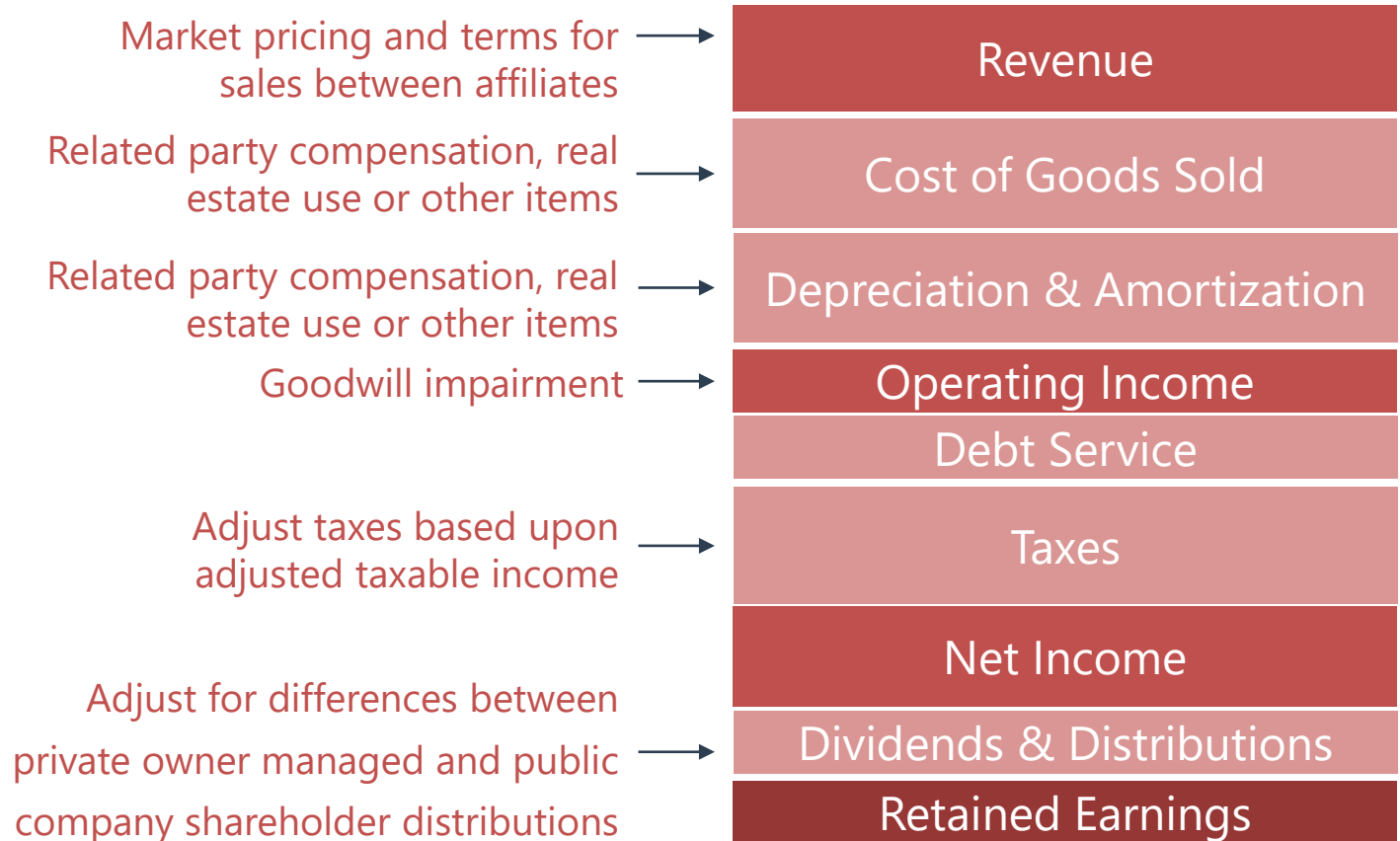
2) Discount Rate/Rate of Return
Adjustments

3) Potential Valuation Discount
or Premium

3.1 Normalized Earnings

➤ Normalized earnings

- Economic benefits adjusted for nonrecurring, non-economic, ongoing anomalies which prevent direct comparisons to publicly owned entities.



3.1 Normalized Earnings

➤ Normalized earnings

- It is important to distinguish between one-time events and ongoing distortions.
- Ongoing distortions requiring adjustment often result from revenues or expenses which may be considered **related-party transactions**.
 - ✓ A **related party transaction** is one between parties which share economic or other interests
 - ✓ An **arm's length transaction** is one between independent parties acting in their own self-interest which occur and are recorded at or near fair market value.
- Private company transactions which may not take place at fair market value include the following:
 - ✓ Transactions between a private company and its controlling owners and are often related to **compensation or non-operating assets**
 - ✓ Transactions between related private entities controlled by controlling shareholders which include tangible goods, services, financing and/or use of intangible property such as licenses or cost sharing.

3.1 Normalized Earnings

➤ Normalized earnings

- **Above-market compensation or expenses** can:
 - ✓ reduces the company's taxable income and income tax expense.
 - ✓ result in a controlling shareholder receiving a disproportionately high return versus other shareholders.
- A private company purchasing inventory, using assets, or receiving services at a recorded cost **below** fair market value from another private company with the same controlling shareholder(s) will **appear more profitable** than it would be if owned by a separate third party.
- When a private company **owns real estate**, some analysts separate the real estate from the operating company.
 - ✓ **Removing** any revenues and expenses associated with the real estate from the income statement.
 - ✓ **Adding** a market rental charge for the use of the real estate to the expenses .

Example: Normalized Earnings (1)



- John Smith is the sole shareholder and CEO of Able Manufacturing, Inc. Smith has put Able up for sale in advance of his retirement. Duvall notes the following facts affecting the most recent fiscal year's reported results:
 - Smith's compensation for the year was \$1.5 million. Duvall's executive compensation consultant believes a normalized compensation expense of \$500,000 for a CEO of a company like Able is appropriate.
 - Fiscal year expenses associated with the ranch and condominium were \$400,000, including \$300,000 of such operating expenses as property upkeep, property taxes, and insurance reflected in SG&A expenses, and depreciation expense of \$100,000.
 - Able's debt balance of \$2,000,000 (interest rate of 7.5 percent) was lower than the optimal level of debt expected for the company. As reported interest expense did not reflect an optimal charge, Duvall believes the use of an earnings figure that excludes interest expense altogether, specifically operating income after taxes, will facilitate the assessment of Able.

Example: Normalized Earnings (1)



➤ I/S before normalized

Able Manufacturing, Inc. Operating Income after Taxes	
As of 31 December 2013	As Reported
Revenues	\$50,000,000
Cost of goods sold	30,000,000
Gross profit	20,000,000
Selling, general, and admin. expenses	5,000,000
EBITDA	15,000,000
Depreciation and amortization	1,000,000
Earnings before interest and taxes	14,000,000
Pro forma taxes (at 40.0 percent)	5,600,000
Operating income after taxes	\$8,400,000

Example: Normalized Earnings (1)



➤ **Correct Answer:**

- First, SG&A should be reduced by $\$1,500,000 - \$500,000 = \$1,000,000$ to reflect the expected level of salary expense under professional management at a market rate of compensation. Second, the ranch and condominium are non-operating assets—they are not needed to generate revenues—so expense items should be adjusted to reflect their removal (e.g., through a sale). Two income statement lines are affected: SG&A expenses should be reduced by \$300,000 and depreciation and amortization reduced by \$100,000.

Example: Normalized Earnings (1)



➤ I/S after normalized

Able Manufacturing, Inc. Pro Forma Normalized Operating Income after Taxes As of 31 December 2013	
	Pro Forma
Revenues	\$50,000,000
Cost of goods sold	30,000,000
Gross profit	20,000,000
Selling, general, and admin. expenses	3,700,000
EBITDA	16,300,000
Depreciation and amortization	900,000
Earnings before interest and taxes	15,400,000
Pro forma taxes (at 40.0 percent)	6,160,000
Operating income after taxes	\$9,240,000



Example: Normalized Earnings (2)



- Chandra Consolidated is a family-owned private firm consisting of two primary companies: an established commercial real estate business (Chandra Holdings) and a recently founded luxury retail business (Chandra Shops). Chandra Holdings owns several office buildings in major business centers across India. Given growing demand for luxury goods among urban white-collar workers and seeing an opportunity to better utilize building capacity less suited for corporate leases, the Chandra family established Chandra Shops, a separate business which operates luxury retail stores which utilize ground floor space in its office buildings.
- While Chandra Shops directly covers the cost of operating expenses other than rent, the separate units of Chandra Consolidated have no formal agreement and no payments occur between the two units related to the retail space use.



Example: Normalized Earnings (2)



1. Describe how an analyst should approach normalizing the earnings of the two Chandra companies regarding the use of retail space.

➤ **Solution:**

The payment of operating expenses other than rent only in the case of Chandra Shops significantly understates the true opportunity cost of retail space usage. That is, Chandra Shops does not report a rental expense in its income statement, nor does Chandra Holdings recognize rental revenue from its retail space.

An analyst considering a normalization of Chandra Shops' earnings should assess the market cost of comparable retail leases in major business centers and add a market rental charge as a periodic expense to Chandra Shops' income statement. This market rental charge should be reported as rental income on Chandra Holdings' income statement.

Example: Normalized Earnings (2)



2. The Chandra family is considering the sale of a minority interest of its recently founded venture to a business partner with more experience in the luxury retail sector. What effect might the normalization of earnings have on the valuation of Chandra Shops?

➤ **Solution:**

The underreporting of rental costs by Chandra Shops results in lower normalized earnings and a lower valuation than one conducted using Chandra Holdings' financial statements, while Chandra Holdings has higher normalized earnings and a higher valuation once adjustments are made. For Chandra to properly value each business unit, the company needs to normalize the retail company's costs and the real estate company's revenues to reflect a proper amount of rental transfer for the use of the space.

3.2 Estimating Cash Flow

➤ Estimating cash flow

- The assumptions included in cash flow estimates may differ if a **small minority equity interest** is appraised rather than the **total equity** of a business;
- Many development stage companies and some mature companies are subject to significant uncertainties regarding future operations and cash flows. One possible solution involves **projecting the different possible future scenarios**;
 - ✓ In valuing an **individual scenario**, the discount rate chosen should **reflect the risk of achieving the projected cash flows** in that scenario;
 - ✓ **probability-weighted average** of the company's estimated scenario values;
 - ✓ The expected future cash flows based on the scenarios could be **discounted using a conventional**, single discount rate to obtain an overall value estimate.

3.2 Estimating Cash Flow

➤ Estimating cash flow

- Appraiser should be aware of **potential managerial biases**, such as to possibly overstate values in the case of goodwill impairment testing or understate values in the case of incentive stock option grants.
- Some analysts believe that **FCFF valuation is practically more robust** than FCFE valuation when substantial capital structure changes are in view because the weighted average cost of capital (WACC), the discount rate used in a FCFF approach, is typically less sensitive than the cost of equity, the discount rate used in a FCFE approach, to changes in financial leverage.

3.3 Estimating The Discount Rate For Private

➤ Estimating the discount rate

- **Size premium**

- ✓ Size premiums are frequently used in developing equity return requirements by private company appraisers.

- **Availability and cost of debt**

- ✓ A private company may have less access to debt financing than a similar public company.
- ✓ The private company may need to rely more on equity financing, which would tend to increase its WACC.

- **Discount rates in an acquisition context**

- ✓ Finance theory indicates that the cost of capital used should be based on the target company's capital structure and the riskiness of the target company's cash flows. The buyer's cost of capital is **not relevant**.

- **Projection risk**

- ✓ A relative lack of information concerning a private company's operations or business model introduces **greater uncertainty** into projections that may lead to a higher required rate of return.

3.3 Estimating The Discount Rate For Private

➤ Required Rate of Return Models

● CAPM

- ✓ Some parties have **questioned** whether the CAPM is appropriate for developing discount rate estimates for small private company valuations.

● Expanded CAPM

- ✓ The expanded CAPM is an adaptation of the CAPM that **adds to the CAPM a premium** for **small size** and **company-specific risk**.
- ✓ Many view betas that are different from 1.0 as substantially reflecting industry risk factors and thus do **not include an industry risk premium** in the expanded CAPM.

● Build-up method

- ✓ When guideline public companies (public-company comparables for the company being valued) are **not available** or of **questionable comparability**, appraisers may rely on a build-up method rather than the CAPM or other models.

3.3 Estimating The Discount Rate For Private

➤ Required Rate of Return Models

CAPM

$$= r_f + \beta(r_m - r_f)$$

Expanded CAPM

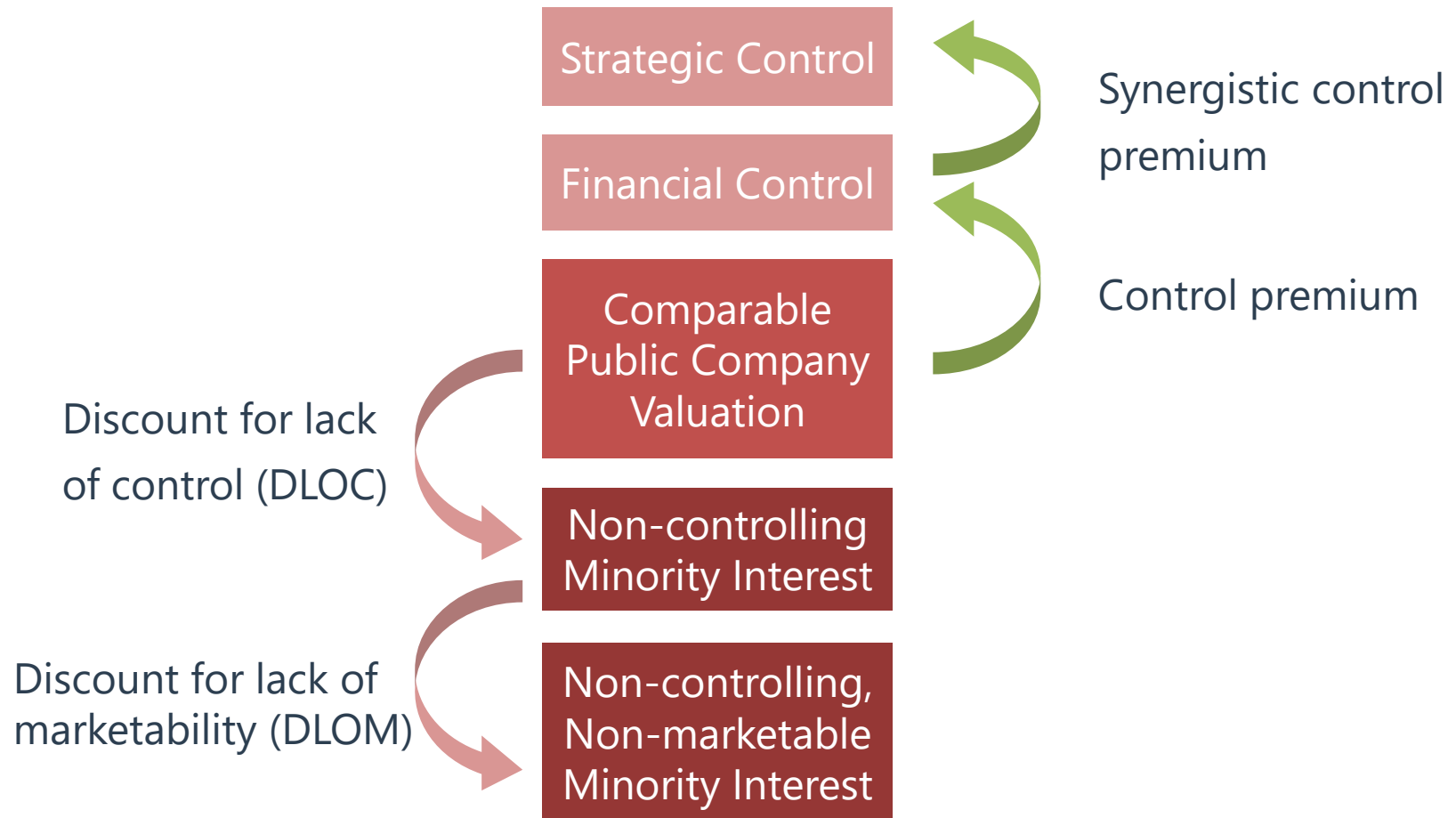
$$\begin{aligned} &= r_f + \beta(r_m - r_f) \\ &\quad + \text{Small-cap stock premium} \\ &\quad + \text{Company-specific stock premium} \end{aligned}$$

Build-Up Approach

$$\begin{aligned} &= r_f + \text{Equity risk premium} \\ &\quad + \text{Small-cap stock premium} \\ &\quad + \text{Industry risk premium} \\ &\quad + \text{Company-specific stock premium} \end{aligned}$$

3.4 Valuation Discounts and Premiums

- Private company valuations may involve an adjustment for more or less control as well as the limited ability to exchange private shares.



3.4 Valuation Discounts and Premiums

- The **highest possible value** indication for an entity would be its **investment value** to a so-called **strategic buyer** able to capitalize on **synergies**.
 - Use their controlling stake to take action to increase firm revenue and/or decrease costs.
- A **financial buyer** may be willing to pay a **premium** for a controlling interest, but is either unable to identify any synergies from a controlling interest, may be unable or unwilling to take advantage of them due to a lack of operational or management expertise, or has limited risk appetite.
- A **non-controlling equity interest** that is **readily marketable** is generally equivalent to the price at which **publicly traded companies** trade in the market.

◆ 3.4 Valuation Discounts and Premiums

➤ Discount for lack of control (DLOC)

- Involving a deduction from the pro rata share of 100% of the value of an equity interest to reflect the absence of some or all powers of control.
 - ✓ **Without control**, an investor is unable to distribute cash, buy and sell assets, obtain financing, or influence other company actions which could affect the investment's value, the timing of distributions, and ultimate return to the investor.
- Data available for estimating a lack of control discount are limited and interpretations can vary markedly. For interests in operating companies, **control premium** data from public company acquisitions are often used.

$$\text{DLOC} = 1 - \left[\frac{1}{1 + \text{control premium}} \right]$$

3.4 Valuation Discounts and Premiums

➤ Adjustments

Scenario	Comparable data (benchmark)	Subject Valuation	Adjustment
1	Controlling Interest	Controlling Interest	None
2	Controlling Interest	Non-controlling Interest	DLOC
3	Non-controlling Interest	Controlling Interest	Control Premium
4	Non-controlling Interest	Non-controlling Interest	None

3.4 Valuation Discounts and Premiums

➤ Discount of lack of marketability (DLOM)

- A deduction from an ownership interest's value to reflect the relative absence of a liquid market for a company's shares.

- ✓ Frequently applied in the valuation of **non-controlling** equity interests in private companies.

● Quantify DLOMs

- ✓ The sale of blocks of restricted stock that exceed public trading activity in the stock may be the most comparable data for quantifying a DLOM.
- ✓ The relationship of stock sales prior to initial public offerings is another source of marketability discounts;
- ✓ **Option-based approaches** seek to quantify DLOMs using the right to sell shares as captured by a put option premium.

➤ Total discount

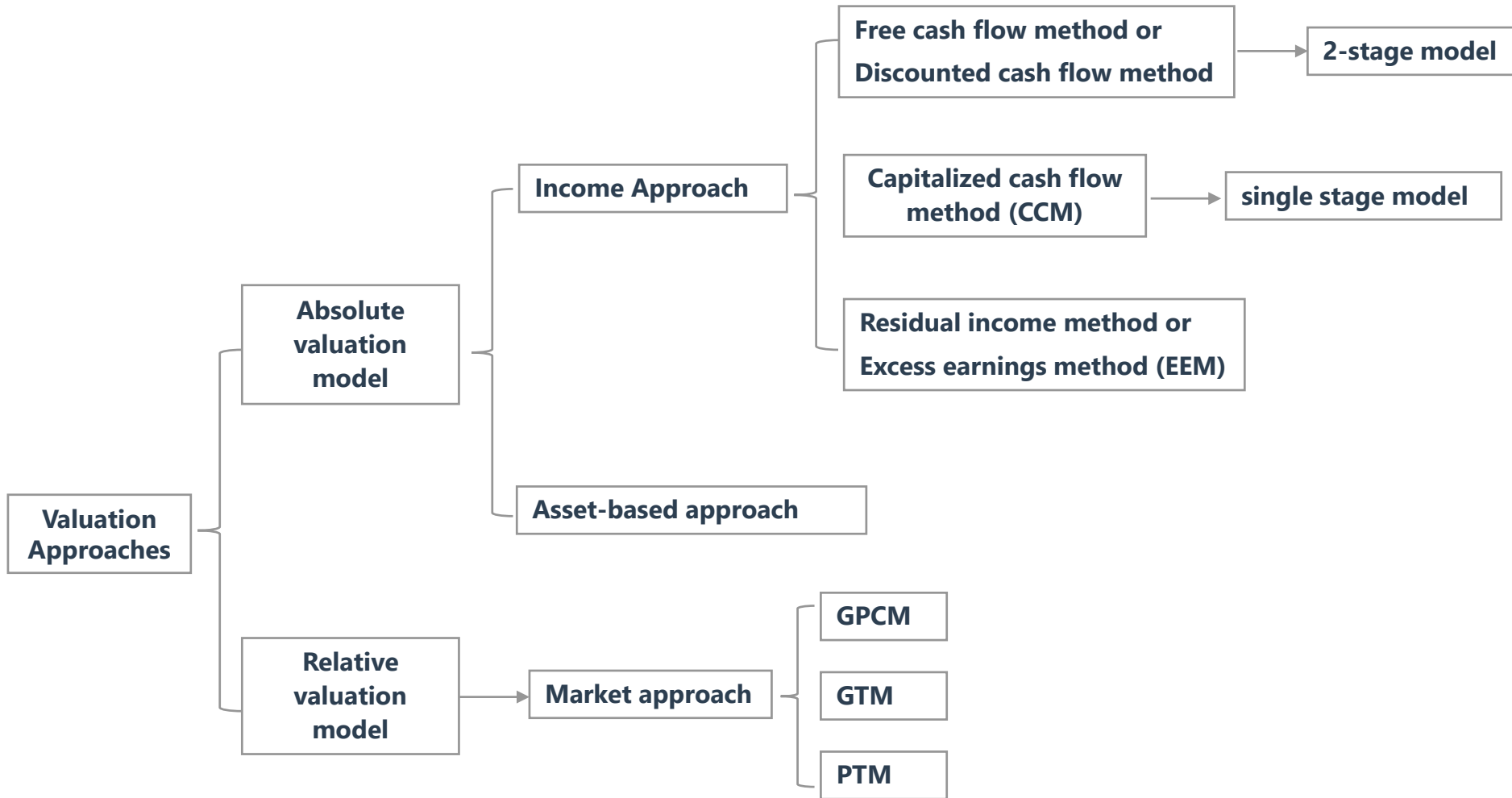
$$\text{Total discount} = 1 - [(1 - \text{DLOC})(1 - \text{DLOM})]$$

Example: Discount / Premium



- Northland is a diversified holding company for numerous businesses. Analyst is going to evaluate the value of Northland. The control premium paid for the most similar guideline firm used in the analysis suggests a discount for lack of control of 20 percent. The discount for lack of marketability was estimated at 15 percent. The total discount for both control and marketability is closest to:
 - A. 15 percent.
 - B. 32 percent.
 - C. 35 percent.
- **Correct Answer: B.**
 - Both discounts apply and they are multiplicative rather than additive. $1 - (1 - 0.20)(1 - 0.15) = 1 - 0.68 = 32$ percent

4. Private Company Valuation Approaches



4.1 Income Approach

➤ Free Cash Flow Valuation Approach

- Free cash flow valuation for private and public companies is substantially **similar**.


$$\text{Intrinsic Value}_t = \sum_{i=1}^n \frac{FCFF_{t+i}}{(1 + WACC)^i} + \frac{E(S_{t+n})}{(1 + WACC)^n}$$

- $E(S_{t+n})$ (terminal value estimate) represents firm value at the end of the initial n year period.
 - ✓ An expected sale price at the end of a finite holding period, or
 - ✓ a point beyond which individual cash flow estimates are less certain and a perpetuity is used with a constant growth rate of g .

4.1 Income Approach

➤ Free Cash Flow Valuation Approach

- Three basic approaches to establishing a terminal value for private companies.

$$IV_t = \sum_{i=1}^n \frac{FCFF_{t+i}}{(1+WACC)^i} + \frac{Terminal\ Value}{(1+WACC)^n}$$


- Capitalized Cash Flow**
Cash flow/g
- Excess Earnings**
Residual income/(r – g)
- Market-Based Multiple**

4.1 Income Approach

➤ The capitalized cash flow method (single stage)

- Estimates value based on the expression for the value of a **growing perpetuity** and is essentially a stable growth.

$$\text{Firm Value}_t = \frac{\text{FCFF}_{t+1}}{\text{WACC} - g}$$

$$\text{Reinvestment rate} = \text{RIR} = \frac{g}{\text{WACC}}$$

$$\text{Firm Value}_t = \frac{\text{EBIT}_{t+1}(1 - t)(1 - \text{RIR})}{\text{WACC} - g}$$

- ✓ **Reinvestment rate**, or the rate of investment in working capital and long-term assets are analogous to the **retention ratio**
- ✓ Solve for intrinsic equity value (IV_t): the estimated market value of debt must be subtracted from firm value

$$\text{IV}_t = \frac{\text{FCFE}_{t+1}}{r_e - g} \longleftarrow \text{capitalization rate}$$

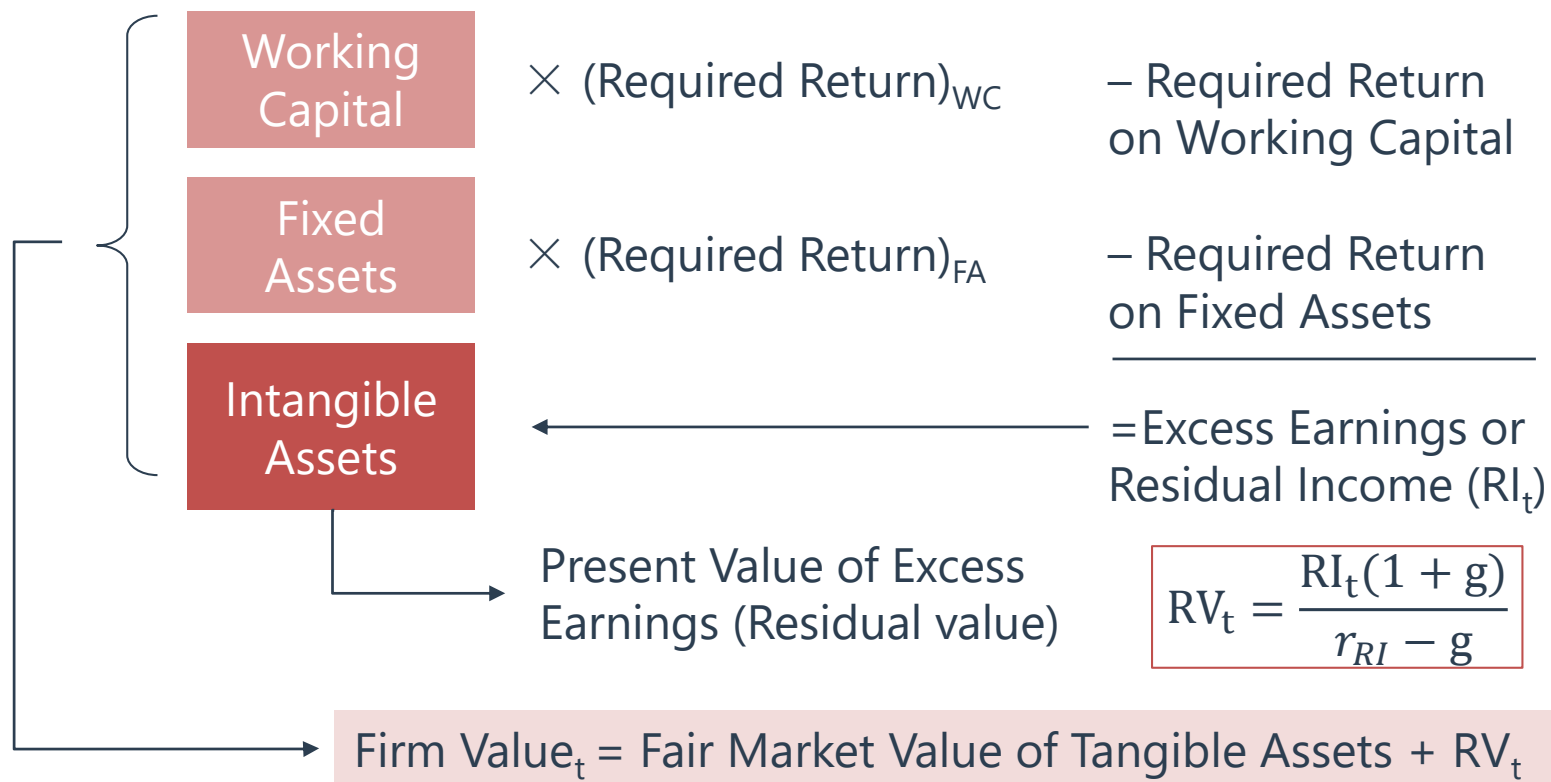
4.1 Income Approach

- **The capitalized cash flow method (single stage)**
 - **Less frequently used** for the public companies, larger private companies, or in the context of acquisitions or financial reporting.
 - **Appropriate** for a private company that:
 - ✓ no projections are available and an expectation of stable future operations;
 - ✓ market pricing evidence from public companies or transactions is **limited**.

4.1 Income Approach

➤ Residual income or the excess earnings method

Normalized Income



$$RI_t = \text{Normalized Income} - (\text{Working Capital} \times r_{WC}) - (\text{Fixed Assets} \times r_{FA})$$

4.1 Income Approach

➤ Steps of EEM

1. Determine the **normalized earnings** of the business enterprise;
2. Determine the fair market value of tangible assets, including working capital and fixed assets
3. Develop discount rates for working capital and fixed assets. Working capital is viewed as the **lowest risk** and most liquid asset with the lowest required rate of return(r_{WC}). Fixed assets require a somewhat **greater rate of return**(r_{FA}). Intangible assets, given their limited liquidity and high risk, often **require the highest return**(r_{RI});

4.1 Income Approach

➤ Steps of EEM

4. Deduct required return on tangible assets from normalized earnings to solve for excess earnings (residual income or RI_t)
5. Estimate the **capitalization rate ($r_{RI} - g$)** required for the valuation of the intangible assets. Value intangible assets of the enterprise using the formula for a growing perpetuity;

$$RV_t = \frac{RI_t(1 + g)}{r_{RI} - g}$$

6. Total of working capital, fixed assets, and intangibles equals the value of the firm.
- The EEM is used **only rarely** in pricing entire private businesses, and has generally been used to **value intangible assets** and **very small businesses**.

Example: EEM



- You have been asked to value Pacific Corporation, Inc., using an excess earnings method, given the following information:
- Working capital balance = \$2,000,000
 - Fair value of fixed assets = \$5,500,000
 - Book value of fixed assets = \$4,000,000
 - Normalized earnings of firm = \$1,000,000
 - Required return on working capital = 5.0 percent
 - Required return on fixed assets = 8.0 percent
 - Required return on intangible assets = 15.0 percent
 - Weighted average cost of capital = 10.0 percent
 - Long-term growth rate of excess earnings = 5.0 percent
1. What is the value of Pacific's intangible assets?
 2. What is the market value of invested capital?

Example: EEM



➤ **Correct Answer to 1:**

- The return required for working capital:
- $\$2,000,000 \times 5.0 \text{ percent} = \$100,000$
- the return required for fixed assets:
- $\$5,500,000 \times 8.0 \text{ percent} = \$440,000$
- the return required is \$540,000 in total.
- residual income for intangible assets:
- $1,000,000 - 540,000 = 460,000$
- Capitalization rate: $15\% - 5\% = 10\%$
- A year ahead excess earning: $460,000 \times 1.05 = 483,000$
- The value of intangible assets: $483,000 \div 10\% = 4,830,000$

➤ **Correct Answer to 2:**

- This value is $\$2,000,000 + \$5,500,000 + \$4,830,000 = \$12,330,000$.

4.2 Market Approach Methods

- **Using price multiples and data from previous public and private transaction**
- It is the **most frequently** used approach, and considered by many to be conceptually **preferable** to the income- and asset-based approaches for private company valuation.
- Three major variations of the market approach:
 - Guideline public company method (**GPCM**);
 - Guideline transactions method (**GTM**);
 - Prior transaction method (**PTM**);
- The **primary assumption** of the market approach is that transactions providing pricing evidence are **reasonably comparable** to the subject company.

Guideline Public Company Method (GPCM)

- In private company valuation based on **multiples of comparable public companies** is often referred to as the guideline public company method (GPCM).
 - **Step 1:** a group of public companies is identified, the **relevant pricing multiples** for the guideline companies are derived.
 - **Step 2:** **adjustments** to the multiples reflecting the relative risk and growth prospects of the subject company relative to the publicly traded companies are made.
- **Multiples used:**
 - **Public companies:** price-based multiples such as the P/E ratio are frequently cited in the valuation.
 - **Private companies:** metrics such as EV which take the value of the entire firm into consideration are more common.
 - ✓ They offer greater flexibility to accommodate changes to the capital structure over the valuation period.

Guideline Public Company Method (GPCM)

- When using **beta measures** for purposes of comparison based on multiples, it is important to adjust for the **differences in leverage** between private companies and comparable public companies.

- **Step 1: “unlever”** observed public company beta

$$\beta_{unlevered} = \frac{\beta_{levered}}{\left[1 + (1 - t) \times \left(\frac{Debt}{Equity}\right)\right]}$$

- ✓ where both the tax rate t and the ratio of debt (Debt/Equity) reflect those of the public company

- **Step 2: derive a levered beta**

$$\beta_{levered}^* = \beta_{unlevered} \left[1 + (1 - t^*) \times \left(\frac{Debt}{Equity}\right)^*\right]$$

- ✓ where the tax rate t* and the ratio of debt (Debt/Equity)* reflect those of the private company

Guideline Public Company Method (GPCM)

- When a private company conducts business in more than one sector or industry, it may be necessary to create a **composite profile** from more than one group of comparable companies.
 - Most often derived by weighting multiples using a percentage of sales or net income, which includes sales margin, leverage, and tax effects.
- **Advantages**
 - The potentially large pool of guideline companies and the significant descriptive, financial, and trading information **available** to the analyst/appraiser.
- **Disadvantages**
 - Possible issues regarding **comparability** and **subjectivity** in the risk and growth adjustments to the pricing multiple.

Guideline Public Company Method (GPCM)

➤ To estimate a control premium

- **Type of transaction:** Compared with financial transactions, control premiums for an acquisition by a **strategic buyer** are typically **larger** because of the expected synergies.
- **Industry factors:** Industry sectors with acquisition activity are considered to be **"in-play"** at a valuation date; that may reflect some part of a possible control premium in the share prices. Control premiums measured at a date significantly **before** a valuation date might reflect a different industry environment from that of the valuation date.
- **Form of consideration:** Transactions involving the exchange of significant amounts of stock might be less relevant as a basis of measuring a control premium because of the possibility that acquiring companies time such transactions during periods when their management perceives that shares of their company are **overvalued** in the marketplace.
- The multiple resulting from applying a control premium to pricing multiples from publicly-traded companies should be assessed for **reasonableness**.

Example: Guideline Public Company Method



- Everfloat Ltd., a privately held company based in the United Kingdom. Andrea Miceli seeks to estimate the value of Everfloat's EV from a non-controlling, minority interest shareholder perspective using a market approach. To employ this process, she must follow these steps:
 - Identify Everfloat's lines of business and compile a set of publicly traded comparable companies from each respective segment.
 - Select and calculate appropriate composite market multiples.
 - Calculate a range of value estimates for Everfloat, noting that these estimated values are reflective of public, not private, company valuations.
 - Apply appropriate discounts and/or premiums to reflect appropriate adjustments for control and marketability.

Example: Guideline Public Company Method



- While the company is well-known as a traditional marine navigation equipment provider, Everfloat has focused on diversification efforts over the last decade, with this business line now comprising just 70% of revenue. The company now has a growing logistics equipment business facilitating ground transportation as well as alternative energy technology for marine applications. In particular, Everfloat is pursuing electrification solutions as the shipping industry seeks to diversify away from fossil fuels, an effort which produces revenues, but is not yet profitable.

Example: Guideline Public Company Method



- The following table summarizes Everfloat's current business lines.

Everfloat Limited Financial Data (GBP millions)			
Lines of Business	Revenue	Assets	EBITDA
Marine Navigation	700	1,560	187.5
Logistics Services	250	400	75
Energy Solutions	50	40	-12.5
Total	1,000	2,000	250

Example: Guideline Public Company Method



- Miceli identifies a group of publicly traded comparable companies for each of Everfloat's three business lines. As marine navigation is the dominant component of Everfloat's business metrics, these comparables will receive the largest weighting in the valuation.
- Miceli focuses her analysis based on two market multiples: EV to sales (EV/Sales) and EV to EBITDA (EV/EBITDA). She identifies public companies of similar size and stage of development that operate primarily in each of Everfloat's business lines, gathers multiples for each, and summarizes the data by calculating the average multiple for each segment.

Example: Guideline Public Company Method



- Public peers in Logistics Services and Marine Navigation exhibit similar EV/EBITDA multiples, while publicly traded firms in Energy Solutions businesses similar to Everfloat trade at significantly higher EV/EBITDA multiples. EV/Sales shows a similar pattern, although EV/Sales multiples are significantly higher for Marine Navigation as compared to Logistics Services.

Everfloat Limited Comparable Multiples		
Lines of Business	EV/Sales	EV/EBITDA
Marine Navigation	2.8	8.2
Logistics Services	1.1	8.1
Energy Solutions	8.0	20.0

- Answer the following questions based upon the information provided:

Example: Guideline Public Company Method



1. Calculate a single EV/Sales multiple to value Everfloat.

➤ **Solution:**

Weight peer multiples by Everfloat sales to derive composite EV/Sales of 2.6:

Composite EV/Sales = 2.6

$$= (700/1,000) \times 2.8 + (250/1,000) \times 1.1 + (50/1,000) \times 8.0$$

Example: Guideline Public Company Method



2. Calculate a single EV/EBITDA multiple to value Everfloat.

➤ **Solution:**

Given Everfloat's negative Energy Solutions EBITDA, we weight peer multiples by the proportion of Everfloat's EBITDA as follows:

Composite EV/EBITDA = 7.6

$$= (187.5/250) \times 8.2 + (75/250) \times 8.1 + (-12.5/250) \times 20.0$$

An alternative would be to value Energy Solutions using Sales multiples and other divisions using EBITDA multiples.

Example: Guideline Public Company Method



- Miceli derives a preliminary value estimate for Everfloat by simply multiplying this composite by Everfloat's total revenues of GBP 1 billion to find an initial estimated EV based on EV/Sales of GBP 2.635 billion:
 - $EV_{EV/Sales} = \text{GBP } 2,635,000,000 = 2.635 \times \text{GBP } 1,000,000,000$
- We may follow the same process using EV/EBITDA multiples and Everfloat's EBITDA of GBP 250 million to derive a value estimate based on EV/EBITDA of GBP 1.895 billion:
 - $EV_{EV/EBITDA} = \text{GBP } 1,895,000,000 = 7.58 \times \text{GBP } 250,000,000$

Example: Guideline Public Company Method



- Miceli must adjust Everfloat's value to reflect a non-controlling and non-marketable shareholder's perspective. Miceli estimated 13% as a DLOC and 16.8% as a DLOM, we may solve for the total discount as follows:
 - Total Discount = $[1 - (1 - 0.13) \times (1 - 0.168)] = 0.276$
- As a final step, Miceli must adjust each of her valuation estimates for this discount as follows.
 - $EV_{EV/Sales} = \text{GBP } 1,907,740,000 = \text{GBP } 2,635,000,000 \times (1 - 27.6\%)$
 - $EV_{EV/EBITDA} = \text{GBP } 1,371,980,000 = \text{GBP } 1,895,000,000 \times (1 - 27.6\%)$
- Miceli may derive a single valuation estimate by simply averaging the two market-based results to arrive at GBP 1,639,860,000 $(= (\text{GBP } 1,907,740,000 + \text{GBP } 1,371,980,000) / 2)$ or expand the approach by considering additional multiples in the valuation.

Guideline Transactions Method (GTM)

- The **GTM** uses pricing multiples derived from **acquisitions** of **public** or **private** companies. All other things equal, transaction multiples would be the most relevant evidence for valuation of a controlling interest in a private company. **No control premium adjustment is necessary.**
 - A number of factors need to be considered in assessing transaction-based pricing multiples
 - ✓ **Synergies:** The pricing of strategic acquisitions may include payment for anticipated synergies. The relevance of payments for synergies to the case at hand merits consideration;
 - ✓ **Contingent consideration:** contingent consideration represents potential future payments to the seller that are contingent on the achievement of certain agreed on occurrences;
 - ✓ **Noncash consideration:** acquisitions may include stock in the consideration. The cash equivalent value of a large block of stock may create uncertainty regarding the transaction price.



Guideline Transactions Method (GTM)

- A number of factors need to be considered in assessing transaction-based pricing multiples (cont.)
 - ✓ **Availability of transactions:** Meaningful transactions for a specific private company may be limited. The relevance of pricing indications from a historical transaction may be challenged given any significant changes to the company, industry, or economy over the period.
 - ✓ **Changes between transaction date and valuation date:** Changes in market conditions could result in different risk and growth expectations, requiring an adjustment to the pricing multiple.
 - ✓ Differences in company size, country, tax status, and leverage may also be relevant.

Prior Transaction Method (PTM)

- The prior transaction method (**PTM**) considers **actual transactions** in the stock of the **subject company**.
 - Valuation can be based on either the **actual price paid** or the **multiples implied** from the transaction.
 - The PTM is generally most relevant when considering the value of a **minority equity interest** in a company.

4.3 Asset-based Approach (ABA) / Cost Approach

- The value of ownership of an enterprise is equivalent to the **fair value of its assets less the fair value of its liabilities**. The asset-based approach is rarely used for the valuation of going concerns.
 - Its value as a **going concern** might be **less than** its **value in liquidation** because the assets might be redeployed by buyers to higher valued uses;
 - Appropriate in the following circumstances
 - ✓ **Natural resource** companies;
 - ✓ **Financial** companies, such as bank;
 - ✓ **Holding (investment)** companies, such as real estate investment trusts (REITs) and closed end investment companies (CEICs);
 - ✓ **Very small businesses** with limited intangible value or early stage companies.

 **It's not the end but just beginning.**

Never stop smiling, not even when you're sad, someone
might fall in love with your smile.

永远都不要停止微笑，即使是在你难过的时候，说不定
有人会因为你的笑容而爱上你。

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