Selected Topics (FIN Prerequisite)

- Chapters 4, 5, **6**, 8, 9, 11 and **13**

- Focus – Valuation
  - Cash Flow Estimation; Cost of Capital/Discount Rate; and Decision Rules

- Finance Thinking/Fundamentals
  - VALUATION
  - RISK and RETURN

Time Value of Money (TVM)

- Basic Concept of TVM
  - A dollar in the future does not have the same value as a dollar today. Be specific, a future dollar is less valuable than a today dollar. WHY?

  Implications
  - Cash flows that are located at different time points on a time line have different TVM. As such, they should **_not_** be added together or subtracted from one another **_horizontally_**. On the other hand, we **_can_** add cash flows together or subtract them from one another **_vertically_** at any time point on a time line because they have the same TVM.

  The Opportunity Cost Principle, i.e., **the rate of return on the best available alternative investment of equal risk.**

  Reference: Chapter 4!

Slide 3

Multiple Cash Flows Patterns

- **Uneven (lumpy) cash flows**
- Perpetuity
  - A constant stream of cash flows that lasts forever
- **Growing perpetuity**
  - A stream of cash flows that grows at a constant rate forever
- **Annuity (and Due)**
  - A stream of constant cash flows that lasts for a fixed number of periods
- Growing annuity (and due)
  - A stream of cash flows that grows at a constant rate for a fixed number of periods

Reference: Chapter 4!

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Slide 4

Valuation Principle

Intrinsic Value
- PV of future cash flows over the life of an investment discounted at the appropriate rate.

- Estimate future cash flows:
  - Size (how much) and
  - Timing (when)
- Discount future cash flows at an appropriate rate:
  - The rate should be appropriate to the risk associated with the investment, i.e., the Opportunity Cost Principle (Chapter 4).

Intrinsic Value Analysis
- If market price < intrinsic value, i.e., NPV>0, the investment is underpriced ➔ BUY/Accept!
- If market price > intrinsic value, i.e., NPV<0, the investment is overpriced ➔ SELL/Reject!

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Bond Valuation (Chapter 8)

Find the present value (as of January 1, 2012), of a 6 3/8% coupon bond with <u>semi-annual</u> payments, and a maturity date of December 2016 if the YTM is 5%.

N	10
I/Y	2.5
PV	$-1,060.17$ ➔ Bond Value = $1,060.17
PMT	$31.875 = \dfrac{1,000 \times 0.06375}{2}$
FV	1,000

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Stock Valuation - DDM (Chapter 9)

- Assume that dividends will grow at different rates in the foreseeable future and then will grow at a constant rate thereafter.
- To value a Multi-stage Growth Stock, we follow this 3-step procedure:
  1. Estimate future dividends in the foreseeable future, i.e., during the FINITE abnormal growth stage, N.
  2. Estimate the future stock price when the stock becomes a Constant Growth Stock at the end of the abnormal growth stage, V_N.
  3. Compute the total present value of the estimated future dividends during the *finite* abnormal growth stage (step 1) and future stock price that captures the value of the infinite series of dividends during the *infinite* normal growth stage (step 2).

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Stock Valuation – An Example

A common stock just paid a dividend of $1.80. The dividend is expected to be cut in half in the first year, stay at the same level for the following two years, and then will grow at 50% in the following year. Afterward, it will grow at 10% in perpetuity.

Given that the discount rate is 16%, how much is the (intrinsic) value of this stock?

Assume that the stock is priced at $25, what is your investment recommendation? Why?

Stock Valuation – An Example

- Step 1 – N = 4
  - $D_1 = \$1.80*(1 + -.50) = \$0.90$
  - $D_2 = \$0.90*(1 + 0) = \$0.90$
  - $D_3 = \$0.90*(1 + 0) = \$0.90$
  - $D_4 = \$0.90*(1 + .50) = \$1.35$

- Step 2 -
  - $V_4 = D_5 / (R - g) = \$(1.35*1.10) / (.16 - .10) = \$24.75$

- Step 3 -
  - $\mathbf{V_0} = \$0.90/1.10 + \$0.90/1.10^2 + \$0.90/1.10^3 + \$(1.35+24.75)/1.10^4 = \mathbf{\$20.06}$

Given the stock price of $25, the stock is overpriced and a SELL recommendation follows!

Cash Flow Estimation Framework

- Cash Flow from Operations, OCF
  - OCF = EBIT – Taxes + Depreciation
- Net Capital Spending, CE
  - CE = Change in net fixed assets + Change in accumulated depreciation; OR
  - CE = Change in (gross) fixed assets
  - Do not forget salvage value (after tax, of course) and the related tax effect on asset transactions!
- Changes in Net Working Capital
  - Recall that an increase (or a decrease) in NWC represents a cash outflow (or inflow).
- Reference: **Chapter 6** (or Chapter 2)!

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Cash Flow Estimation Guidelines

- Cash flows matter; NOT accounting earnings.
- *Incremental* (NOT all) cash flows matter.
- Opportunity costs matter.
- Side effects, both positive and negative, matter.
- Taxes matter, i.e., incremental after-tax cash flows (hence always include the tax effect).
- Inflation matters; be consistent.
  - Fisher Equation
- Sunk/Historical costs DO NOT matter.
- Reference: **Chapter 6**!

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Capital Budgeting Decision Rules

- The Net Present Value (NPV) Method

- The Payback Period Method and its Discounted version

- The Internal Rate of Return (IRR) Method
  - -- Problems with IRR
    - -- Modified IRR (McKinsey)
    - -- Incremental IRR

- The Profitability Index (PI) Method

Reference: Chapter 5!

Risk Return Tradeoff

- Investors are risk averse
  - They dislike risk and demand compensation for risk taking in the form of risk premium
    - The *Risk Premium* is the added return (over and above the risk-free rate) resulting from bearing risk.

- Total risk = Systematic risk + Unsystematic risk (which can be avoided via diversification)

- Required Return on Investment

  = Risk-free Rate + Risk Premium (i.e., compensation for taking systematic risk only, NOT total risk)

Capital Asset Pricing Model (CAPM)

- The CAPM depicts the systematic risk, β, and required return, R, relationship of individual securities/portfolios in a market portfolio framework.

$$\overline{R}_i = R_F + \beta_i \times (\overline{R}_M - R_F)$$

Required return	=	Risk-free rate	+	Security Beta	×	Market risk premium

CAPM Analysis -

- If Required (CAPM) Return > Expected Return, then the security is OVER-priced ➔ SELL/Reject!

- If Required (CAPM) Return < Expected Return, then the security is UNDER-priced ➔ BUY/Accept!

Reference: Chapter 11!

General Concepts on Cost of Capital

-- The cost of capital is an opportunity cost. It must reflect the <u>best</u> investment opportunity <u>of equal risk</u> available to suppliers of the firm's capital in the financial markets, i.e., The Opportunity Cost Principle (Chapter 4)!

-- The cost of capital should reflect the risk of the investment which is financed by the capital raised, i.e., the use of the funds (rather than the source of the funds). It is also called the investment's required return and the appropriate discount rate.

-- Since risk averse investors are the suppliers of capital, the required return that is demanded and received by investors on a security is the cost of that security to the firm that issues it, adjusted for any flotation cost and tax effects.

Reference: **Chapter 13**!

Cost of Equity Capital - Rs

- **Capital Asset Pricing Model (CAPM) Approach**:

$$\overline{R}_i = R_F + \beta_i (\overline{R}_M - R_F)$$

- Parameter estimation:
    1. The risk-free rate, R_F
    2. The market risk premium, $\overline{R}_M - R_F$
    3. The company beta, $\beta_i = \dfrac{Cov(R_i, R_M)}{Var(R_M)} = \dfrac{\sigma_{i,M}}{\sigma_M^2}$

Reference: Chapter 11 and **Chapter 13**!

- **Dividend Discount Model (DDM) Approach**:
    - **Ri = dividend yield + capital gains yield**
    - Assume that the stock is fairly priced and at equilibrium!
    - Reference: Chapters 9 & 11!

The CAPM Approach - Rs

- Suppose the stock of Stansfield Enterprises, a publisher of PowerPoint presentations, has a beta of 2.5. The firm is 100% equity financed.
- Assume a risk-free rate of 5% and a market risk premium of 10%.
- What is the appropriate discount rate, i.e., the cost of equity capital, for an expansion of this firm?

$$\overline{R} = R_F + \beta_i (\overline{R}_M - R_F)$$
$$\overline{R} = 5\% + 2.5 \times 10\%$$
$$\overline{R} = 30\%$$

The DDM Approach - Rs

- Suppose Wal-Mart (WMT) stock is priced at $140.0 a share. In the coming year, WMT is expected to pay $2.20 dividends per share and be sold for $163.6.
- Dividend Yield = $2.20/$140.0 = 1.57%
- Capital Gain Yield = $(163.6–140.0)/$140.0 = 16.86%
- Hence, expected return = 1.57%+16.86% = 18.43%

Assuming that the stock is fairly priced, its expected return equals its required return. Hence -

From the company's perspective, the cost of equity capital, R_s, is 18.43%!

Cost of Debt Capital - R_B

- Interest rate required on new debt issuance (i.e., yield to maturity on outstanding debt)
  - Hence, **R_B = YTM**!
  - Reference: Chapter 8!

- Adjust for the tax deductibility of interest expenses!!!

YTM – Annual Coupon

- Consider a bond with a 10% annual coupon rate, 15 years to maturity, and a par value of $1,000. The current price is $928.09.

  – N = 15; PV = -928.09; FV = 1,000; PMT = 100
  – CPT I/Y = 11%

  Hence, the cost of debt capital, R_B, is 11%!

YTM – Semi-Annual Coupon

- Suppose a bond with a 10% coupon rate and semiannual coupons has a face value of $1,000, 20 years to maturity, and is selling for $1,197.93.

  – N = 40; PV = -1,197.93; PMT = 50; FV = 1,000; CPT I/Y = 4% (Is this the YTM?)
  – YTM = 4%*2 = 8%

  Hence, the cost of debt capital, R_B, is 8%!

Cost of Preferred Equity Capital - R_P

- Preferred stock is a perpetuity, so its price is equal to the dividend paid divided by the current required return.

- Rearranging, the cost of preferred stock is:
    - **R_P = Dividend / Price**
    - Reference: Chapter 9!

Weighted Average Cost of Capital (WACC) and Weighted Average Flotation Cost (f_A)

R_{WACC} (WACC) = $R_S \times S/(S+P+B) + R_P \times P/(S+P+B)$
$+ R_B \times (1 - T_c) \times B/(S+P+B)$

and

$f_A = f_S \times S/V + f_P \times P/V + f_B \times B/V$

where S, P, and B are the respective **market values** of common equity, preferred equity, and straight debt included in the capital structure; V = S+P+B!

Notes –
-- ALWAYS use **market values** in computing WACC!
-- WACC should be computed on the AFTER-TAXES basis, i.e. use after-tax cost of debt because interest expenses are tax-deductible

Reference: Chapter 13!

Firm Valuation with WACC

- The value of the firm is the present value of expected future (distributable) cash flows discounted at the WACC
  - Reference: Chapter 4!

- To find the equity value (assumer no preferred stock in the capital structure),
  - subtract the value of the debt from the Firm value
  - subtract the value of the debt from the Enterprise value and add back cash

Cost of Capital - Firm versus Project

- Any project's cost of capital depends on the <u>use</u> to which the capital is being put—not the source.
- Therefore, it depends on the *risk of the project* and not the *risk of the company*.

- The use of the risk of the company to determine the same hurdle rate for all projects may INCORRECTLY
  - ACCEPT NPV < 0 projects that are riskier than the company.
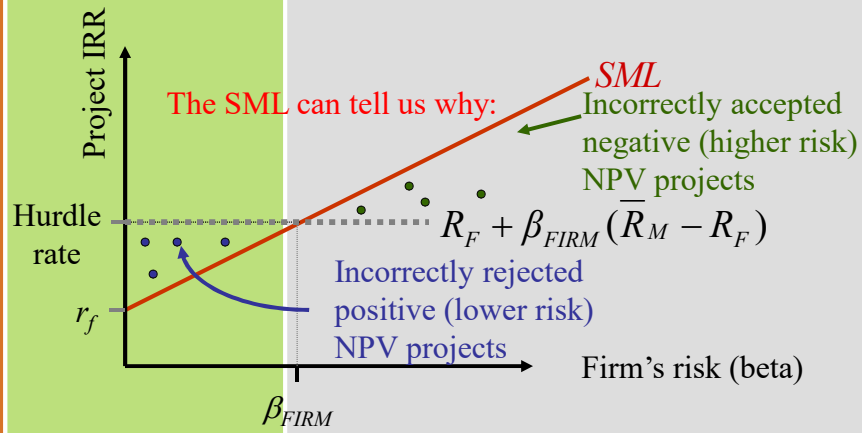 - REJECT NPV > 0 projects that are less risky than the company.

Reference: **Chapter 13**!