Lecture 15

Minimum Acceptable Rate of Return
Learning Objectives
Learning Objectives

Be able to:

- Estimate and justify a value for minimum acceptable rate of return!
- Compute cost of capital
- Explain its relationship to minimum acceptable rate of return
- Compute debt-to-equity mix
- Compute weighted average cost of capital
Comparing Mutually Exclusive Alternatives (Review)
Review of the Basic Methods

- The four basic evaluation methods are:
  - Present worth
  - Annual worth
  - Rate of return
  - Benefit/cost ratio

- Any of the above methods will result in the same decision
  - *(If used correctly!)*
Review of the Basic Methods

For certain problem types, one of the methods may be better due to:

- Ease of use
- Customs in a particular sector
- Preferences of the decision maker
Evaluation Methods

- In the private sector:
  - Present worth, annual worth, and incremental rate of return are all popular with equal lifetimes.
  - Annual worth is easy with unequal lifetimes.

- In the public sector:
  - Benefit/cost ratio is most commonly used.
  - Projects generally have longer lifetimes, so perpetual worth may be used.
Project Lifetimes

Present worth, incremental rate of return, and benefit/cost ratio always requires the least common multiple.

Annual worth allows analysis over a single cycle.
Rate of Return

For present worth, annual worth, and benefit/cost ratio:

- The discount rate must be specified “up front”
- It is used in calculating equivalence relations

For rate of return:

- Find the internal rate of return for the project
- (Multiple rates of return can cause problems!)
- Compare to minimum acceptable rate of return
- The minimum acceptable rate of return is used after the internal rate of return is computed!
Minimum Acceptable Rate of Return and Cost of Capital
Minimum Acceptable Rate of Return

- One of the most important parameters in engineering economics

Minimum acceptable rate of return should be based on company’s financial condition (and other factors):

- Need to raise money for investments
- Money is not free – it has a "cost"
Cost of Capital

Firms raise capital by:

- Selling stock (equity)
- Issuing bonds or taking out loans (debt)
- Using retained earnings (a form of equity)

Equity:
- Belongs to the owners of the firm
- The firm owns nothing – *only its owners do!*

Debt:
- Provided by outside parties (banks, etc.)
- Cost is the interest paid on the borrowed funds
Debt and Equity Capital

Every firm has a capital structure:
- Debt
- Equity

Each type of capital has associated costs:
- Normally expressed as a percent
- (Similar to an interest rate)

For each source of capital:
- Compute its cost as a percent
- Compute a weighted average cost
- (Based on percentages of debt and equity)
Weighted Average Cost of Capital

Compute the percentage cost of:
- Debt
- Equity

Compute the weighted average percentage cost
Debt and Equity Capital

The weighted average cost of capital is:
- An estimate of the firm’s capital structure
- Basis for minimum acceptable rate of return

The profit earned by a firm must cover:
- The costs of capital involved with investing...
- PLUS required return over and above cost
- PLUS some compensation for perceived risk
Definitions

- **Debt capital**:
  - Funds borrowing from outside the company
  - Repaid at a stated interest rate and a specified time schedule
  - Includes *bonds, loans, and mortgages*

- **Cost of debt**:
  - The *interest rate* per dollar raised by borrowing
Debt Capital

- The lender does not share in profits made using debt funding
- There is risk to the lender:
  - The borrower could default on part of or all of the loan
Definitions

*Equity capital:*

- Owners’ funds
- Retained earnings

*Owners' funds are either:*

- Common and preferred stock proceeds
- Owners' capital for private companies (ones that do not issue stock)
Retained Earnings

- Retained earnings are funds reinvested in the company
- After-tax profits:
  - Not distributed as dividends to shareholders
  - *Belongs to the owners (shareholders)!*
Example

- A firm needs a $5,000,000 computer
- The firm sells bonds at 8% to raise money
- The “cost” of the $5,000,000 is then 8%
- If this is the only activity at that time:
  - The basis for the minimum acceptable rate of return is 8%!
  - The minimum acceptable rate of return will typically be greater than 8%, but never lower!
Minimum Acceptable Rate of Return

The 8% is modified upward to account for:

Return over and above cost, and
Perceived risk

Note the additional increments!
Minimum Acceptable Rate of Return

- Not an exact science!
- Minimum acceptable rate of return may vary over time
- Within a firm, there may be different minimum acceptable rates of return
- For example:
  - 10% for investments in new equipment
  - 20% for expansion projects and new products
- Why would the minimum acceptable rate of return vary from project to project?
Five Reasons

1. Project risks
2. Investment opportunities
3. Limits on available capital
4. Rate of return at other companies
5. Tax structure
Project Risk

Where there is greater risk:

- Set *higher minimum acceptable rate of return*!
- *Risk-adjusted* minimum acceptable rate of return

Higher cost of debt for risky projects:

- Want extra return on average
- In case the project does not produce its projected revenues
Investment Opportunity

If management wants to expand:

- Set *lower minimum acceptable rate of return!*
- Encourage investment in desired areas
Limited Capital

- As debt and equity capital become limited:
  - Minimum acceptable rate of return increases!
- Demand for capital exceeds supply:
  - (Basic supply and demand at work!)
- *Opportunity cost* plays a role in setting the minimum acceptable rate of return

Consider two companies:
- One with obsolete equipment
- One with brand-new equipment

*Which company should have a higher minimum acceptable rate of return?*
Rates of Return at Other Companies

If competitors increase their minimum acceptable rates of return:
- A company may choose to follow suit
- And vice versa!

These variations are often based on:
- Changes in interest rates for loans (which directly affect the cost of capital)
- Federal Reserve monetary policy (changing interest rates charged to member banks)

Companies with low minimum acceptable rates of return will tend to invest more in competitiveness!
Tax Structure

- Rising corporate taxes:
  - Due to increased profits, capital gains, changes in local tax rates, etc.) create pressure to increase the minimum acceptable rate of return

- Not true for after-tax analysis:
  - Apply minimum acceptable rate of return to after-tax costs, revenues!
Before-Tax Analysis

- Assume a tax rate:
  - E.g., 34% for most U.S. companies

- Before-tax minimum acceptable rate of return is:

\[
MARR_{\text{BeforeTax}} = \frac{MARR_{\text{after tax}}}{1 - \text{Tax Rate}}
\]

Start by establishing the after-tax minimum acceptable rate of return.

Can then compute the before-tax minimum acceptable rate of return (for use in analyses that do not consider tax implications).
Tax Example

- Assume a firm is in the 40% tax bracket:
  - Combined state and federal tax rates
- The firm has set an after-tax minimum acceptable rate of return of 10%
- For projects where taxes are not considered:
  - The before-tax minimum acceptable rate of return would be:

\[
MARR_{BeforeTax} = \frac{0.10}{1 - 0.40} = 0.1667 = 16.67\%
\]
Before-Tax Analysis

Minimum acceptable rate of return before taxes will always be greater than minimum acceptable rate of return after taxes:

- (Assuming that the tax rate is positive)

See Chapter 17!
Cost of Equity and Minimum Acceptable Rate of Return
Sources of Equity

- Sale of preferred stock
- Sale of common stock
- Retained earnings:
  - Past after-tax profits
  - **NOT** distributed to owners as dividends
  - *Belong to the owners, not the firm!*
Stock

Buying stock establishes ownership:
- In anticipation of increased stock prices

Stock may pay dividends to owner:
- Dividends come from after-tax profits
Common Stock

- Most common
- Gives the owner voting rights
- May not pay dividends:
  - Depending on whether the company earns a profit!
- If the firm does well:
  - The price of a share of stock increases
  - Or the stock can “split”
Preferred Stock

- More conservative investment:
  - Carries a commitment to pay dividends
- May not carry voting rights
- If the corporation liquidates:
  - "Preferred" stockholders are paid first
Preferred Stock

- Cost of preferred equity is the percentage paid in dividends
- Assume a share sells for $200:
  - Current dividend is $20/share of stock
- Cost of preferred equity is:
  - $20/$200 = 0.10 = 10%
Common Stock

- Cost is more difficult to estimate
- Current dividends are not a good indicator of future stock price!
- Several models are used by the financial community:
  - But they are just models
- There is no way to estimate the cost of common stock precisely:
  - Based on growth rate believed to be necessary to attract stockholders
Minimum Acceptable Rate of Return

- The minimum acceptable rate of return must cover the cost of capital for the alternatives being considered.

- If a firm has a mixture of debt and equity:
  - Weighted average cost of capital establishes a floor for the minimum acceptable rate of return.

Minimum acceptable rate of return is usually between:

- Weighted average cost of capital
- Cost of equity capital

- There is NO universally accepted method for setting the minimum acceptable rate of return.
  - (No single method used by all companies)
Effect of Debt-Equity Mix on Investment Risk
Debt-to-Equity Mix

- The more debt a firm has:
  - The greater the risk for possible projects

- Too much debt is **bad**!
  - High risk
  - Little flexibility in repayment

- But too much equity can also be bad!
  - Low rate of return on equity

- Companies try to achieve a **balance** of debt to equity
Highly Leveraged Firms

Consequences of too much debt:

- Harder to get loans — over-extended!
- Higher interest rates on new loans
- The company owns “less of itself”
- Banks and lenders control key decisions
Highly Leveraged Firms

Companies with too much debt:
- Increase the risk to both lenders and owners (stockholders)
- Can have reduced stock prices in the long run

Reasonable “balance”:
- Roughly 30-40% debt
Summary

The minimum acceptable rate of return depends on:

- Cost of capital
- Mix between debt and equity financing

Minimum acceptable rate of return should be at least as large as the weighted average cost of capital:

- With an allowance for risk
- And consideration of opportunity costs!