

Lecture 15

Minimum Acceptable Rate of Return



Learning Objectives

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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:

$$MARR_{\text{BeforeTax}} = \frac{0.10}{1 - 0.40} = 0.1667 = 16.67\%$$

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:**
 - **$\$20/\$200 = 0.10 = \underline{10\%}$**

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

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!**