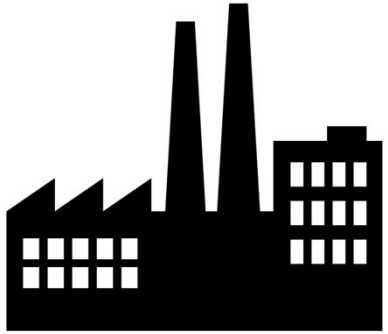
Where does the Discount Rate come from?

The Discount Rate Revisited

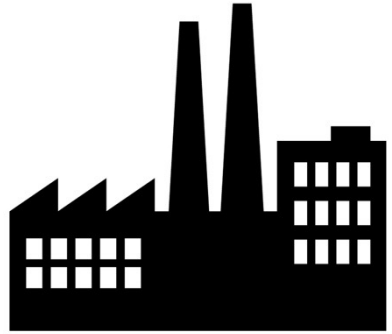
ACME Company



Discount Rate = 20%

Management has determined that any project requires a minimum rate of return of 20%

A1 Company



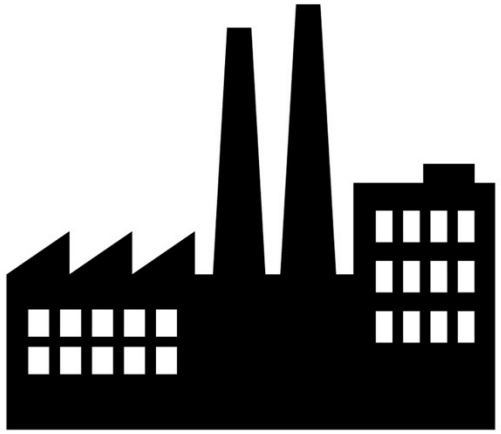
Discount Rate = 15%

Management has determined that any project requires a minimum rate of return of 15%

All projects are evaluated relative to each company's discount rate, their minimum acceptable rate of return.

The Discount Rate Revisited

ACME Company



Discount Rate: the value used to discount future cash flows to today.

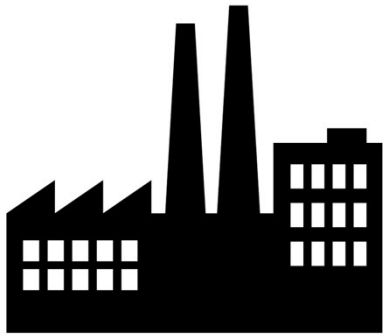
Hurdle Rate: the minimum required return for a project.

Cost of Capital: minimum rate of return a company needs before it can generate value for its investors.

In general, these all mean the same thing, and are often used interchangeably to describe a company's minimum required rate of return for any project it is considering.

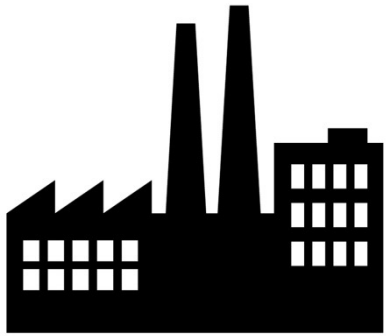
The Discount Rate Revisited

ACME Company



Hurdle Rate = 20%

A1 Company



Hurdle Rate = 15%

How do companies establish their discount rate or in other words, their Cost of Capital?

The Discount Rate and the Cost of Capital

Consider the following:

- A company invests in a new project by taking out loans:
  - Bank Loans: $4M at an interest rate of 8%

What is the minimum required return on the project?

Something greater than the interest rate on the loan!

Minimum Required Rate of Return = 8%

Cost of Capital is equal to the interest rate on the debt!

The Cost of Capital based on Debt

Consider this situation:

- A company invests $10M in a new project by taking out loans and by issuing bonds:
  - Bank Loans: $4M at an interest rate of 8%
  - Bonds: $6M at an interest rate of 6%

What is the Cost of Capital for this project?

The weighted average interest rate on the $10M in debt!

$$\text{Cost of Capital} = \left(\frac{\$4\text{M}}{\$10\text{M}}\right) 8\% + \left(\frac{\$6\text{M}}{\$10\text{M}}\right) 6\% = 6.8\%$$

The Cost of Capital based on Equity

Consider the following:

- A company has no debt and invests in a new project using its profits from the year before (retained earnings).

What is the Cost of Capital for this project?

Hmmm. It's a bit more complicated.

In this case, the Cost of Capital is tied to the investors' expected rate of return on the stock.

The Cost of Capital based on Equity

Investors' expectation for rate of return on their stock is:

$i_{expected}$ = (interest rate on a government bond) + (risk premium for the company's stock)

$$i_{expected} = r_{RF} + \beta(r_M - r_{RF})$$

where:

$i_{expected}$ = the investors expected rate of return

r_{RF} = the Risk-Free rate of return (i.e., short-term government bond)

r_M = the average return for the entire stock Market (often tied to the S&P500)

β = the risk associated with the company relative to the overall stock market

The Cost of Capital based on Equity

Example: ABC Inc. needs to raise $50M for a new expansion project. It decides to sell stock (equity) to investors to fund the project.

Currently the interest rate on short-term government bonds is 2%. The S&P500 index is returning 10%. ABC Company has a beta, β, of 1.5.

What is ABC's Cost of Capital for the expansion project?

$$i_{expected} = r_{RF} + \beta(r_M - r_{RF})$$

$$i_{expected} = 2\% + 1.5(10\% - 2\%)$$

$$i_{expected} = 14\%$$

ABC's Cost of Capital for the expansion project is 14%.

The Cost of Capital based on Debt and Equity

Let's summarize this:

- A company must meet investor expectations (their expected rate of return).
- A company is financed by debt (bank loans) and has interest payments it must make to the bank (bank loan's interest rate).
- A company is also financed through the sale of bonds (debt), and it has those interest payments to make to bondholders (the bond interest rate).

The Weighted Average Cost of Capital, or "WACC", takes all these into account to determine the company's minimum required rate of return:
The Discount Rate.

The Weighted Average Cost of Capital

Calculating the WACC…

A company's "capital structure" is based on the following:

Financing Type	Amount ($)	Rate of Return or Interest Rate (%)
Equity (Stock)	$60M	12%
Corporate Bonds	$40M	6%
Bank Loans	$20M	8%
Total:	$120M	

The WACC is just the weighted average of all the interest rates or rates of return.

Equity *Bond* *Bank Loan*

$$\text{Weighted Average Cost of Capital (WACC)} = \left(\frac{\$60\text{M}}{\$120\text{M}}\right)12\% + \left(\frac{\$40\text{M}}{\$120\text{M}}\right)6\% + \left(\frac{\$20\text{M}}{\$120\text{M}}\right)8\% = 9.3\%$$

The Weighted Average Cost of Capital

What about taxes - they matter as well…

Interest payments are tax-deductible, so this changes the *actual* interest rate for all the debt:

Debt: $i_{\text{After-Tax}} = i_{\text{Before Tax}}(1\text{-Tax Rate})$

Financing Type	**Amount ($)**	**Rate of Return or Interest Rate (%)**	**After-Tax Rates (Tax Rate = 21%)**
Equity (Stock)	$60M	12%	12%
Corporate Bonds	$40M	6%	6% (1-0.21) = 4.79%
Bank Loans	$20M	8%	8% (1-0.21) = 6.32%
Total:	$120M		

$$\text{WACC}_{\text{After-Tax}} = \left(\frac{\$60\text{M}}{\$120\text{M}}\right)12\% + \left(\frac{\$40\text{M}}{\$120\text{M}}\right)4.79\% + \left(\frac{\$20\text{M}}{\$120\text{M}}\right)6.32\% = 8.6\%$$

The Weighted Average Cost of Capital

The WACC…

Weighted Average Cost of Capital

=

Cost of Equity

x

% of Equity Financing

=

- Risk-Free Rate of Return, r_{RF}
- Beta, β
- Market Return, r_M

$$i_{expected} = r_{RF} + \beta (r_M - r_{RF})$$

+

Cost of Debt (After-Tax)

x

% of Debt Financing

=

- Interest Rate on Bond & Loan Debt
- Tax Rate

Weighted average cost of debt

x

(1-Tax Rate)

Main Takeaways…

Projects need to provide a return greater than the Cost of Capital.

A company's Discount Rate is essentially their Cost of Capital, the WACC.

Once established, the Cost of Capital is applied to all future projects.

Companies are funded by a combination of debt and equity. The Cost of Capital captures the risk associated to its investors. And this risk is then reflected in the discount rate.

The greater the risks to investors, the greater the discount rate, and the greater the required rate of return need by future projects.

Next Time…

Incremental Cash Flow Analysis

Credits & References

Slide 1: WACC - Weighted Average Cost of Capital acronym, business concept background on blackboard by dizain, Adobe Stock (468355259.jpeg).

Slide 2-4: Black factory icons on white background by Anthonycz, Adobe Stock (93389062.jpeg).

Slide 15: Incremental cash-flow written on the keyboard button by AliFuat, Adobe Stock (273075230.jpeg).