Principles of Corporate Finance

Chapter 2

Present Value and The Opportunity Cost of Capital

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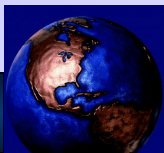
Topics Covered

- Present Value
- Net Present Value
- NPV Rule
- ROR Rule
- Opportunity Cost of Capital
- Managers and the Interests of Shareholders



Present Value

Present Value

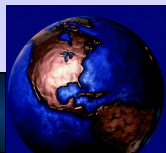
Value today of a future cash flow.

Discount Factor

Present value of a $1 future payment.

Discount Rate

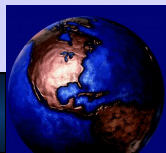
Interest rate used to compute present values of future cash flows.



Present Value

Present Value = PV

$$PV = \text{discount factor} \times C_1$$

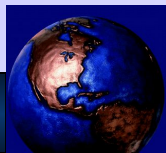


Present Value

Discount Factor = DF = PV of $1

$$DF = \frac{1}{(1+r)^t}$$

Discount Factors can be used to compute the present value of any cash flow.



Valuing an Office Building

Step 1: Forecast cash flows

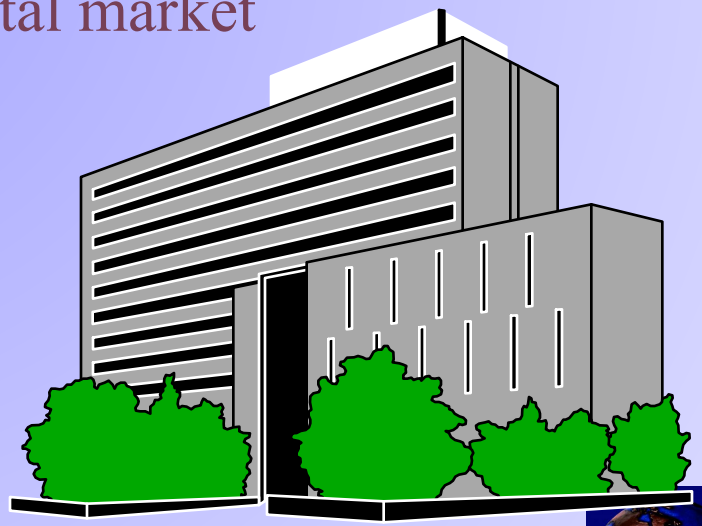
Cost of building $= C_0 = 350$

Sale price in Year 1 $= C_1 = 400$

Step 2: Estimate opportunity cost of capital

If equally risky investments in the capital market offer a return of 7%, then

Cost of capital $= r = 7\%$



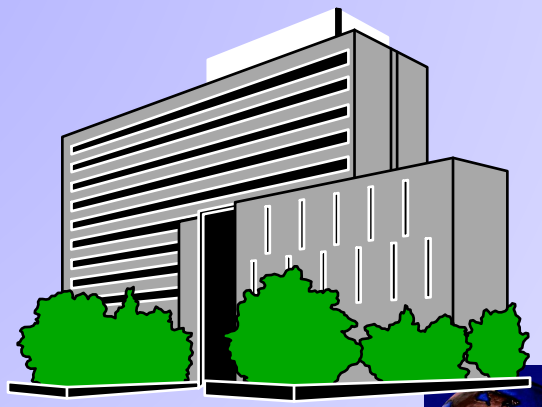
Valuing an Office Building

Step 3: Discount future cash flows

$$PV = \frac{C_1}{(1+r)} = \frac{400}{(1+.07)} = 374$$

Step 4: Go ahead if PV of payoff exceeds investment

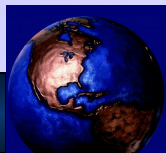
$$NPV = -350 + 374 = 24$$



Net Present Value

$$\text{NPV} = \text{PV} - \text{required investment}$$

$$\text{NPV} = C_0 + \frac{C_1}{1 + r}$$

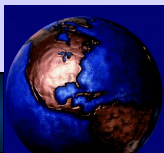


Risk and Present Value

- Higher risk projects require a higher rate of return
- Higher required rates of return cause lower PVs

$$\text{PV of } C_1 = \$400 \text{ at } 7\%$$

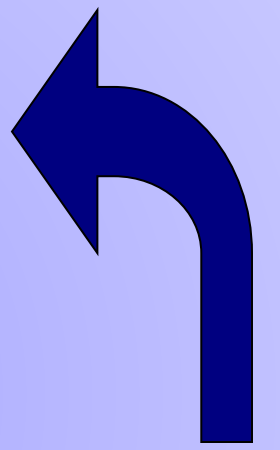
$$\text{PV} = \frac{400}{1 + .07} = 374$$



Risk and Present Value

$$\text{PV of } C_1 = \$400 \text{ at } 12\%$$

$$PV = \frac{400}{1+.12} = 357$$

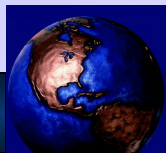


$$\text{PV of } C_1 = \$400 \text{ at } 7\%$$

$$PV = \frac{400}{1+.07} = 374$$

Rate of Return Rule

- Accept investments that offer rates of return in excess of their opportunity cost of capital



Rate of Return Rule

- Accept investments that offer rates of return in excess of their opportunity cost of capital

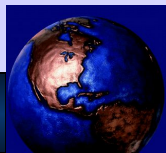
Example

In the project listed below, the foregone investment opportunity is 12%. Should we do the project?

$$\text{Return} = \frac{\text{profit}}{\text{investment}} = \frac{400{,}000 - 350{,}000}{350{,}000} = .143 \text{ or } 14.3\%$$

Net Present Value Rule

- Accept investments that have positive net present value



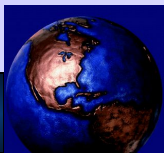
Net Present Value Rule

- Accept investments that have positive net present value

Example

Suppose we can invest $50 today and receive $60 in one year. Should we accept the project given a 10% expected return?

$$NPV = -50 + \frac{60}{1.10} = \$4.55$$



Opportunity Cost of Capital

Example

You may invest $100,000 today. Depending on the state of the economy, you may get one of three possible cash payoffs:

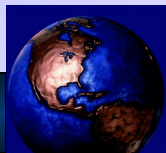
Economy	Slump	Normal	Boom
Payoff	$80,000	110,000	140,000

$$\text{Expected payoff} = C_1 = \frac{80{,}000 + 110{,}000 + 140{,}000}{3} = \$110{,}000$$

Opportunity Cost of Capital

Example - continued

The stock is trading for $95.65. Next year's price, given a normal economy, is forecast at $110

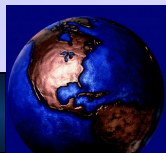


Opportunity Cost of Capital

Example - continued

The stocks expected payoff leads to an expected return.

$$\text{Expected return} = \frac{\text{expected profit}}{\textit{investment}} = \frac{110 - 95.65}{95.65} = .15 \text{ or } 15\%$$

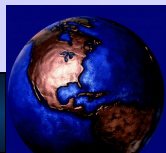


Opportunity Cost of Capital

Example - continued

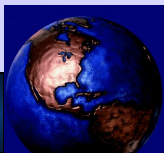
Discounting the expected payoff at the expected return leads to the PV of the project

$$PV = \frac{110{,}000}{1.15} = \$95{,}650$$

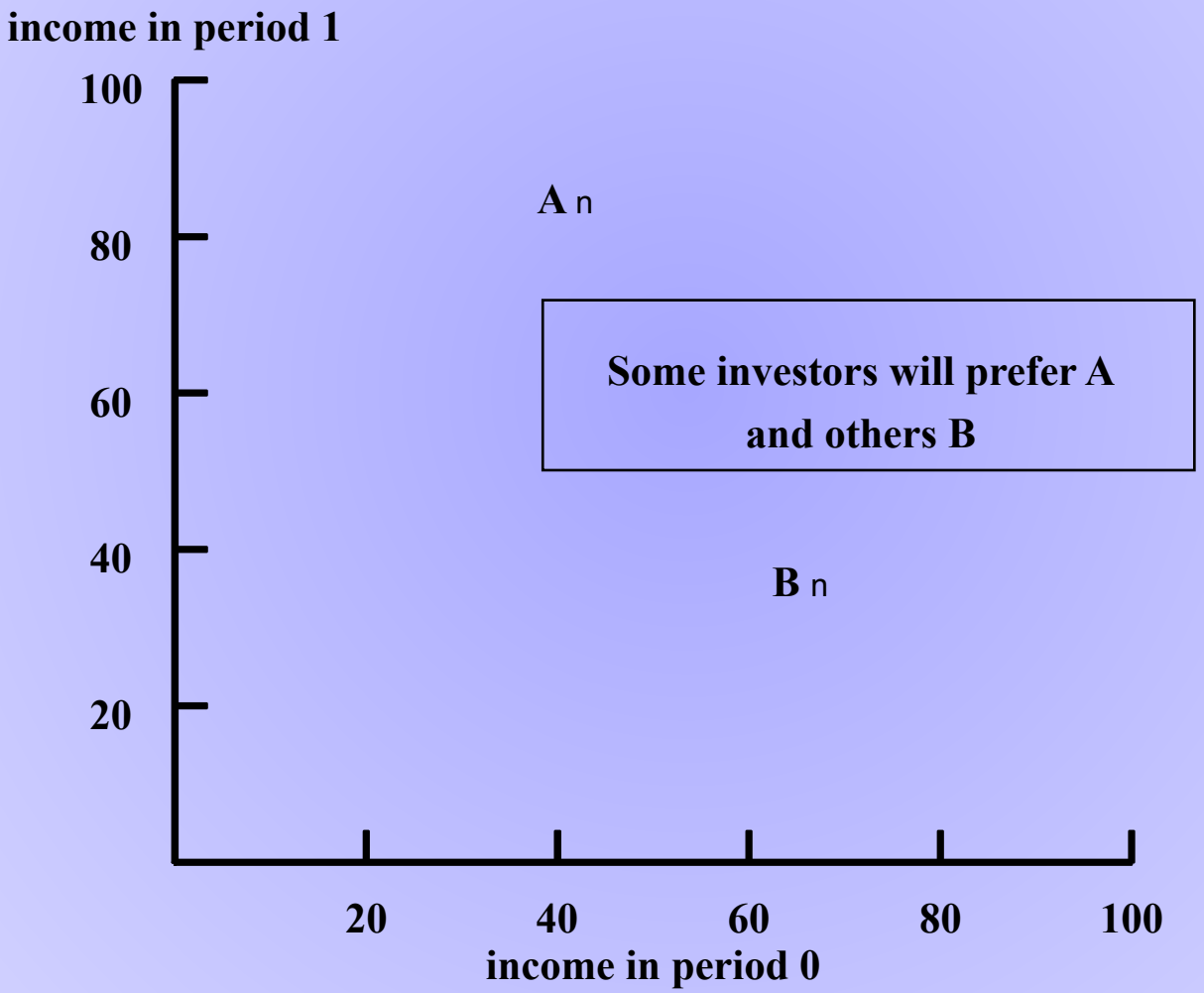


Investment vs. Consumption

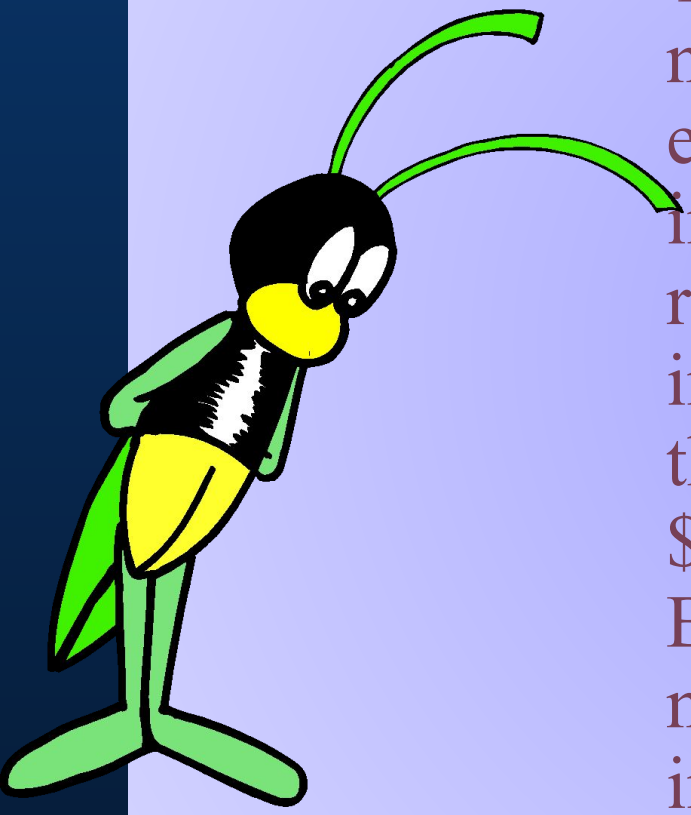
- Some people prefer to consume now. Some prefer to invest now and consume later. Borrowing and lending allows us to reconcile these opposing desires which may exist within the firm's shareholders.



Investment vs. Consumption

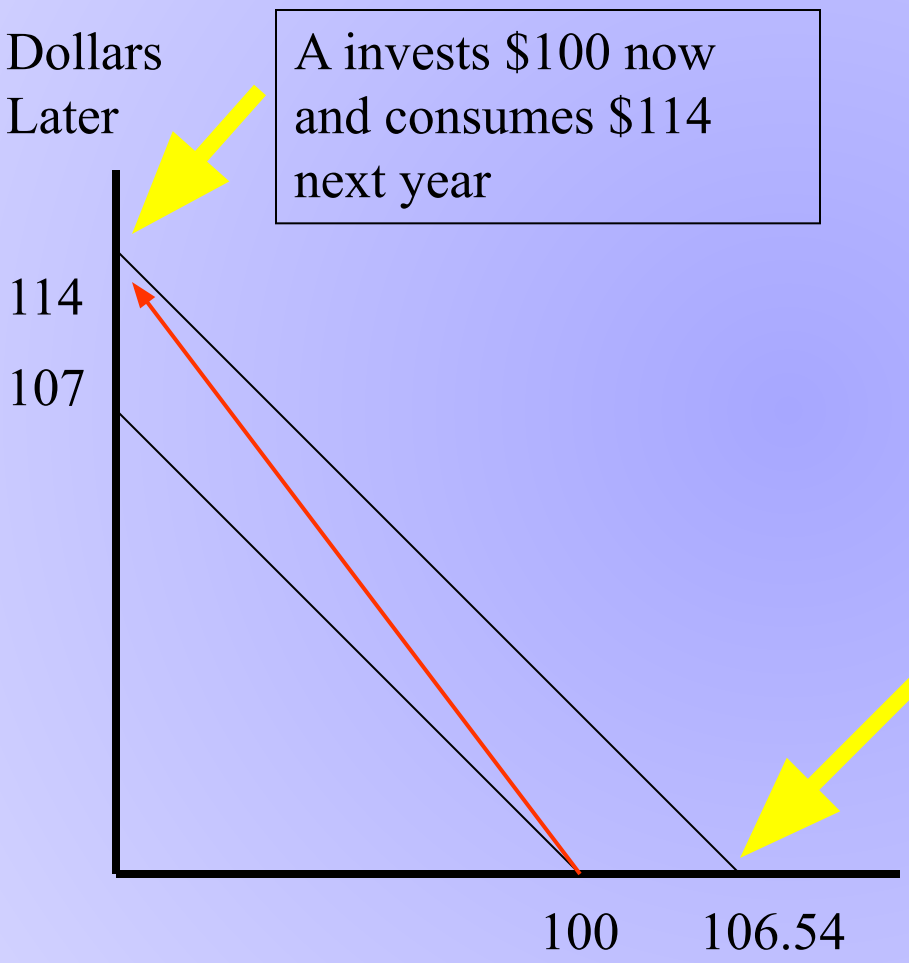


Investment vs. Consumption



The grasshopper (G) wants to consume now. The ant (A) wants to wait. But each is happy to invest. A prefers to invest 14%, moving up the red arrow, rather than at the 7% interest rate. G invests and then borrows at 7%, thereby transforming $100 into $106.54 of immediate consumption. Because of the investment, G has $114 next year to pay off the loan. The investment's NPV is $106.54-100 = +6.54

Investment vs. Consumption



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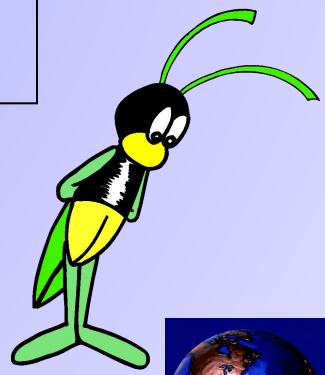

Managers and Shareholder Interests

- Tools to Ensure Management Pays Attention to the Value of the Firm
  - Manger's actions are subject to the scrutiny of the board of directors.
  - Shirkers are likely to find they are ousted by more energetic managers.
  - Financial incentives such as stock options