


Key Topics for Today's Lecture



- Introduction to the language of the class
 - Cash Flows
 - Projects
 - Firms
- Corporate Securities
 - Common Stock (Equity)
 - Preferred Shares
 - Corporate Debt (Bonds)
 - Derivatives

Definitions: Cash Flows, Projects, and Firms

- **Cash flow** is an amount of money paid at a specific time:
 - Cash inflow, positive amount; or
 - Cash outflow, negative amount.
- **Project** is a series of cash flows.
 - Cash inflows represent revenue.
 - Cash outflows: initial investment and expenses.
- **Firm** is a group of projects.
 - Role of management is to choose best projects.

Cash Flows and Projects: Examples

- An entrepreneur starts a bicycle store.
 - Initial investment is cash outflow (\$500)
 - Future net revenue is cash inflow (\$1000/month, 24 months)
- An investor purchases a bank Certificate of Deposit (CD)
 - Deposit is cash outflow (\$10,000)
 - Redemption is cash inflow (\$12,000 in 2 years)
- A lottery ticket:
 - Investment cost: Cash outflow of \$1
 - Jackpot: Cash inflow of \$14,000,000 (with some probability...)
- So projects can range from real investments, to pure monetary investments, to gambles (the lottery ticket).

Cash Flows: Numbers with Dates

| | Bike Shop | Bank CD | Lottery Ticket |
|--------------|------------------|-----------------------|------------------------|
| Cash Outflow | -\$500 | -\$10000 | \$1 |
| Cash Inflow | \$1000/ month | \$12000 in 2 years | \$0 or \$14 Million |
| Duration | 24 Months | 2 Years | 1 Week |

Cash Flows



- Whatever the source of the funds, finance only concerns itself with the actual cash flows.

Starting a Business

- Assuming you have a good idea, how do you “start a business”?
- Simplest method: just make and sell your product, and report income on your personal tax return (Schedule C).
 - **Sole proprietorship** if one owner
 - **(General) partnership** if more than 1 owner.
- Main disadvantage:
 - Owner(s) personally liable for all business liabilities.
 - » Debts
 - » Law suits...

Other Organizational Forms

- Personal liability can be avoided by forming a **corporation** (or **limited liability company - LLC**).
- This is pretty simple:
 - File some forms, and pay c. \$100 in fees,
 - Open a bank account,
 - Pay in money to contribute capital to the corporation and buy “shares” (**common stock** or **equity**)
 - ... and you’re a CEO!
- The number of shares owned by different people determines their percentage ownership in the corporation.
- What’s the hardest part of starting a company?

Raising Additional Capital

- What if your firm needs more money than you have available?
- Get money from someone else:
 - Credit cards (Apple computer), or bank loans.
 - Friends or family.
 - Wealthy individuals, “**angel investors**”.
 - Even wealthier **venture capitalists**.
 - General public (IPO, secondary offering).
- See “Venture Capital” article.

Raising Additional Capital – Corporate Securities

- In most cases, this does not occur as a gift...
- What must the firm give away in return?
 - Ownership/control
 - Promises to make future cash payments – “securities”
- The commonest securities issued include
 - **Common stock** (also known as **shares** or **equity**)
 - **Preferred Stock** (sometimes convertible)
 - **Bonds**

Comparison of Corporate Securities



| | <u>Common Stock (Equity)</u> | <u>Preferred Stock</u> | <u>Bonds (Debt)</u> |
|----------------------------------|---------------------------------------|----------------------------------|---|
| Ownership/ Control rights | Owners of firm. Hire/fire managers | Generally cannot vote (but, ...) | No control except in case of bankruptcy |
| Cash flows | Dividends | Dividends (fixed) | Interest (fixed) |
| Tax status of cash flows | Not deductible | Not deductible | Deductible |
| Priority of cash flows | Last in line | Before equity, after all others. | First in line |

Preferred Stock and Convertible Securities

- Until recently, preferred stock was pretty much only issued by regulated firms (e.g. public utilities). Why?
- Preferred stock, or **convertible** preferred stock is currently a common form of financing for new businesses. Why?
- How convertible preferred stock/bonds work:
 - If firm prospers, investor converts security to stock.
 - If firm does badly, investor stays with bond/preferred.

Options and Derivatives

- Holders of convertible preferred stock have the right (but not an obligation) to convert their preferred stock into common stock.
- **Warrants** are often issued along with other securities.
 - These give the holder the right to buy a specified number of shares at a specified price
- Many companies offer some compensation in the form of **employee stock options**

Options and Derivatives

- All of these are examples of **options**, themselves a type of **derivative security**.

Definition: *A derivative is any security whose value derives from another security.*

Options

■ Call Options.

- **American:** gives the holder the right to purchase one share at a fixed (strike) price at any time on or prior to a pre-fixed (expiration) date.
- **European:** gives the holder the right to purchase one share at a fixed price on the expiration date.

- A **put option** is the same as a call, but its owner has the right to *sell* one share at a fixed (strike) price.

Terminology

- *Strike Price*: the price at which the option holder can purchase the stock.
- *Expiration Date*: the final date at which the option can be used.
- *Exercising an Option*: to use the option to purchase stock.
- *Warrant*: A call option issued by a firm to either its employees or investors.

On expiration how much is a call option worth?

■ Case 1: Strike price is *greater* than the price of stock.

- » In this case the investor can obtain a share of the stock for less money by purchasing it in the open market. So the option should *not* be exercised.

==> *Option's value = 0.*

■ Case 2: Strike price is *less* than the price of stock.

- » In this case exercising the option is less expensive than purchasing it in the open market. So the option *should* be exercised.

==> *Option's value = Market Price of the Stock - Exercise Price.*

On expiration how much is a put option worth?

■ Case 1: Strike price is *greater* than the price of stock.

- » The investor can *sell* a share of the stock for more money than in the open market. So the option should be exercised.

\implies *Option's value = Exercise Price - Market Price of the Stock*

■ Case 2: Strike price is *less* than the price of stock.

- » Exercising the option is worse than selling the stock in the open market. The option *should be not* exercised.

\implies *Option's value = 0.*

Next Topic: Present Value Fundamentals

■ Evaluating individual investment projects

- Use of Present Value (PV)
- Role of capital markets in using PV
- Role of consumption, borrowing, and lending with PV

An Investment Decision

- You can pay \$3.5M today to construct a building in 1 year.
 - The interest rate “r” to borrow \$3.5 M for 1 year is 10%.
 - The building will be worth \$4.0 M next year.
 - Is it profitable to build this structure?
- First attempt: \$4.0M is bigger than \$3.5M, so go ahead.

What’s wrong with this answer?

 - The dates for construction cost and completed value differ
 - Need to compare them on a consistent basis
 - » Convert the \$4.0 M building value at date 1 to a **present value**, or
 - » Convert the \$3.5 M construction cost at date 0 to a **future value**.
 - We get the same result either way.

Applying Present Value (PV) and Future Value (FV)

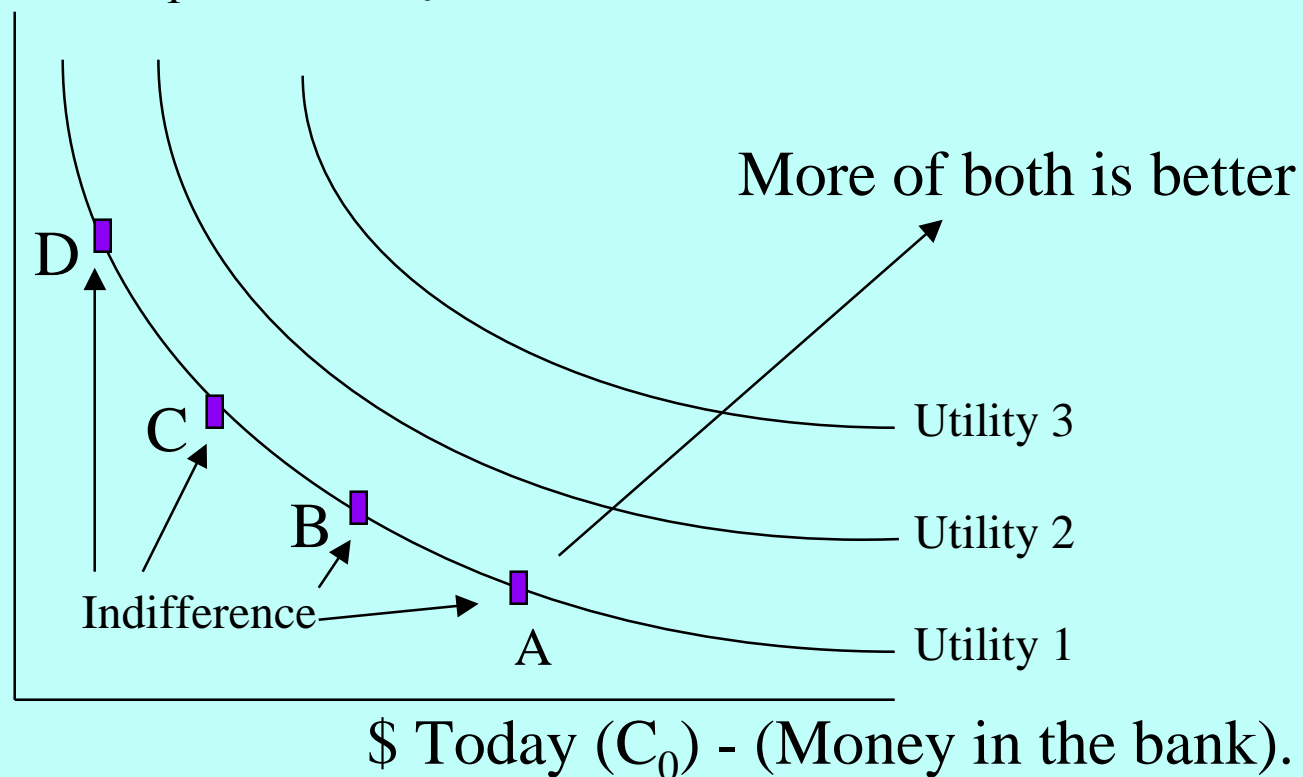
- Future value (FV) method: (C_0 is \$ borrowed)
 - FV of C_0 = loan repayment amount = $3.5 \times 1.10 = \$3.85$
 - The building value (4.0) > FV of C_0 (3.85), so do the project.
- Present value (PV) method: (C_1 is investment return)
 - PV of C_1 = amount we need to invest today to have C_1 next year.
 - $PV = C_1 / (1+r) = 4.0 / 1.1 = \3.64 .
 - The PV (\$3.64) > construction cost (\$3.50), so do the project.
- *PV is generally computationally more convenient, especially when project investment returns cover a sequence of future periods*

Net Present Value (NPV)

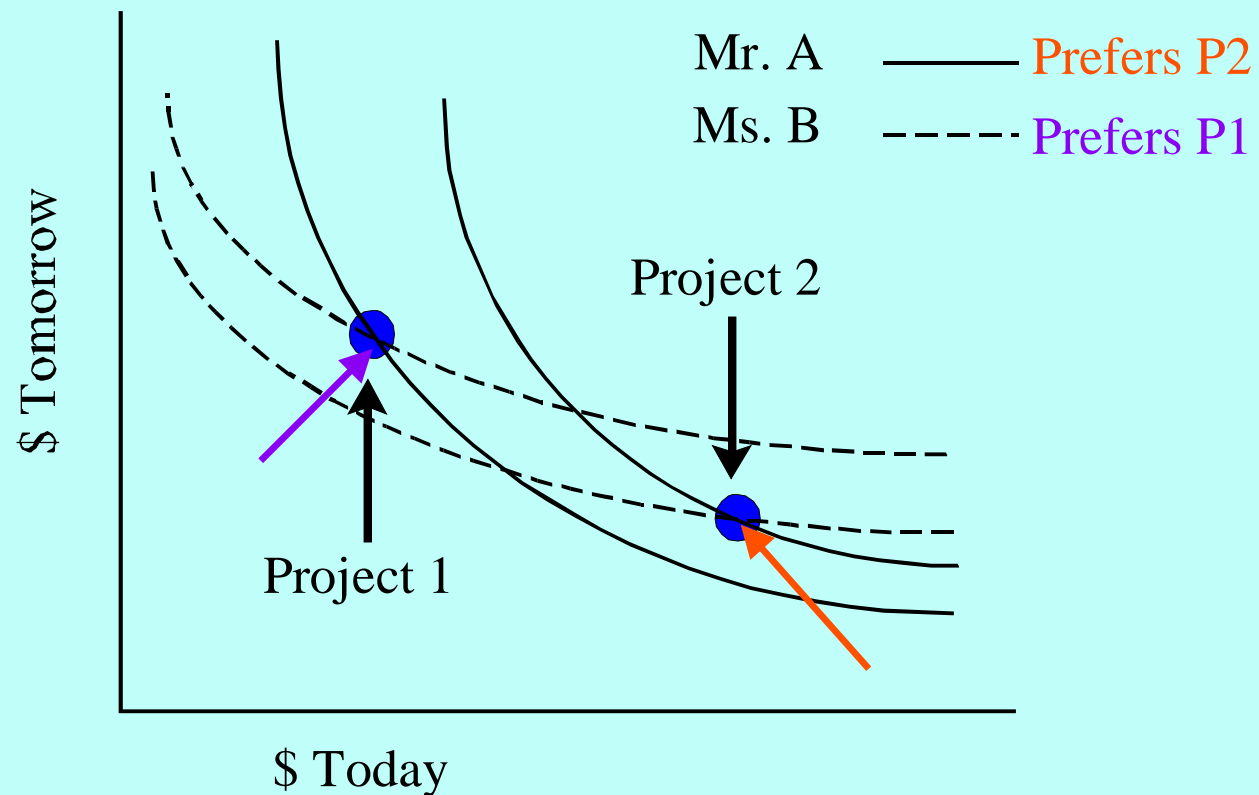
- $NPV = \text{Project PV} - \text{Investment Cost}$
 - If Investment cost is \$3.50 and $PV = \$3.64$, then
 $NPV = \$3.64 - \$3.50 = \$0.14 > 0$
- General formula: $NPV = C_0 + C_1/(1+r)$.
 - C_0 is generally an investment cost, therefore negative.
- **NPV rule**: Carry out project if $NPV > 0$.
- Equivalently, the **Rate of Return rule**: Carry out project if $\text{return} > r$
 - In our example, $\text{return} = (4.0 - 3.5) / 3.5 = 14.3\% > 10\%$.
- This rule makes intuitive sense, but when and why does it work?

Indifference Curves

\$ Tomorrow (C_1) - (Next year's cash inflows)



Project choice without capital markets



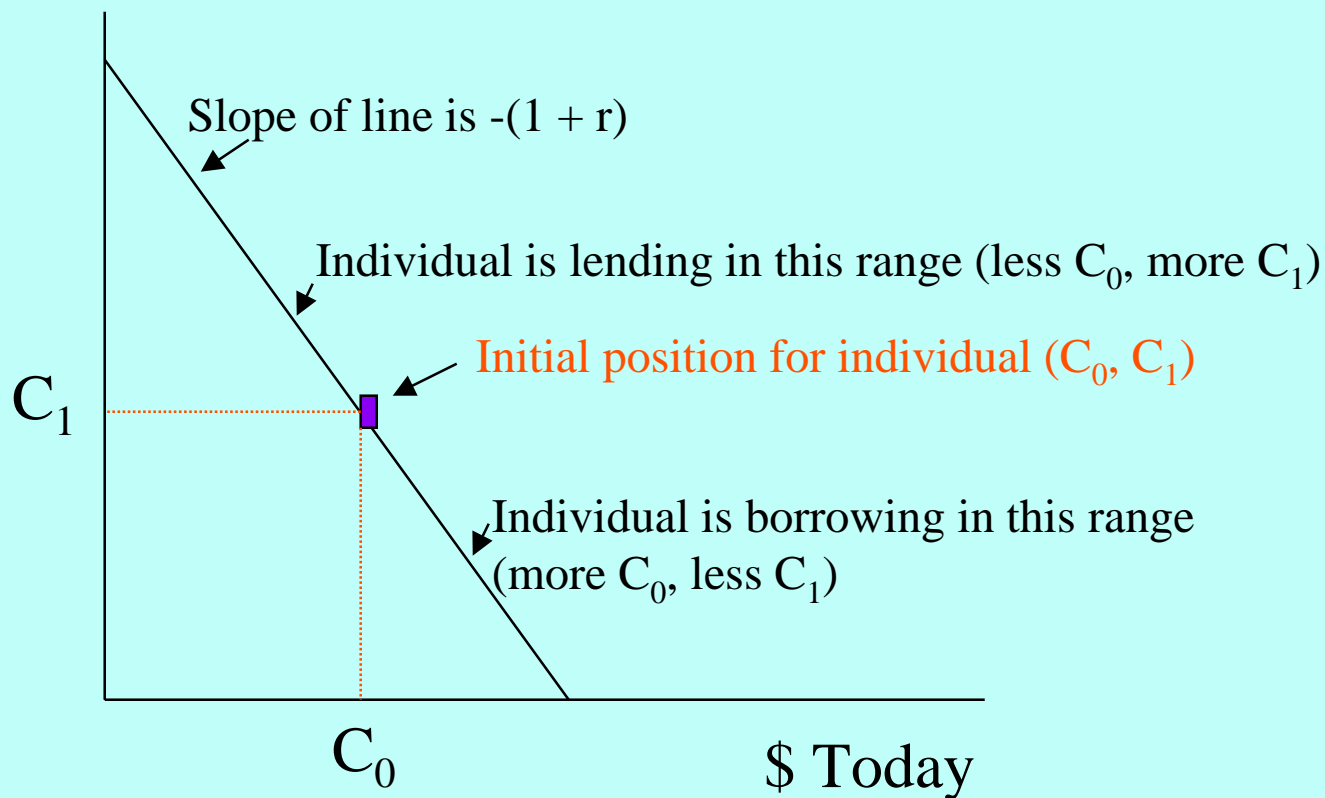
Project choice without capital markets

- Mr. A prefers project 2.
- Ms. B prefers project 1.

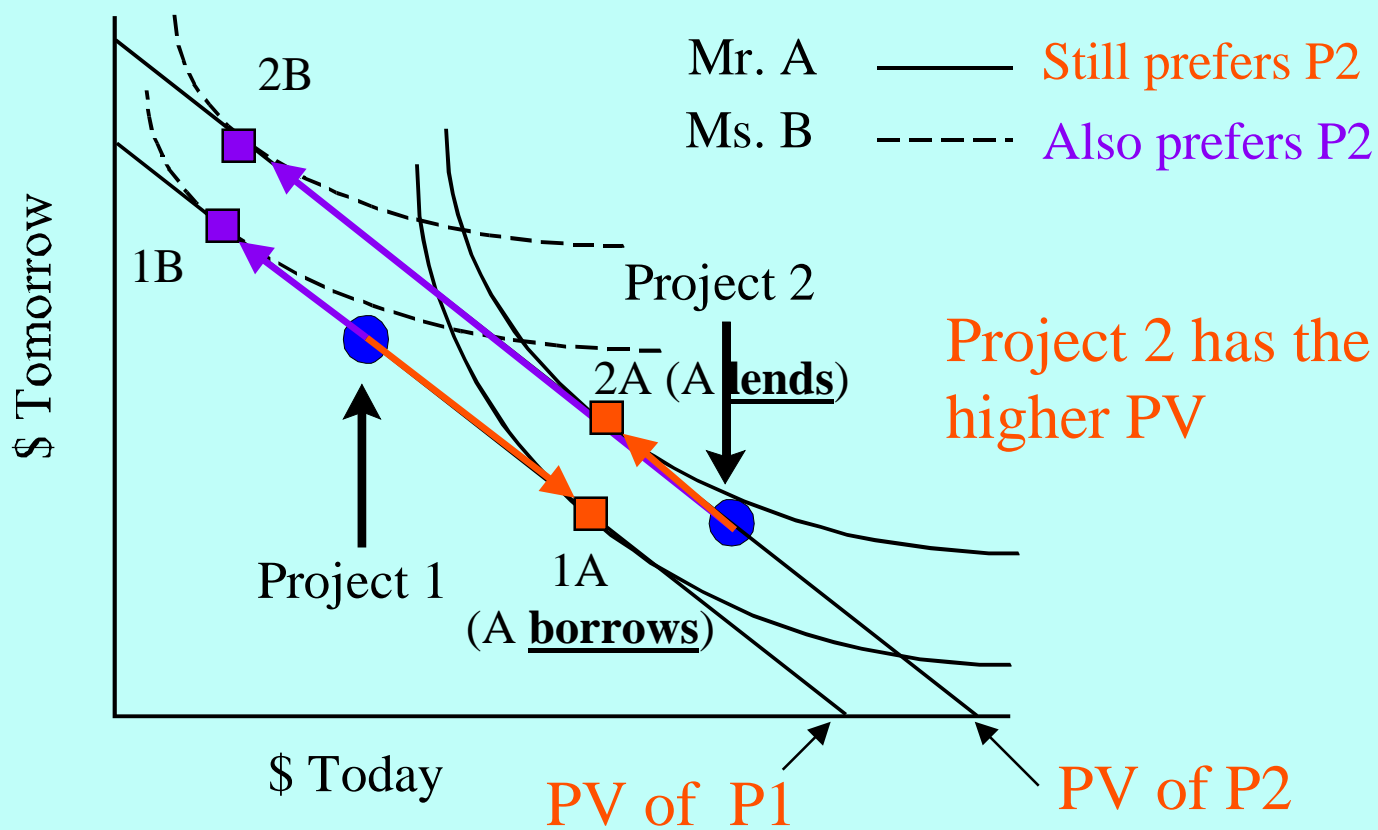
Without knowing an investor's consumption preferences, and absent a capital market, it is impossible to say one project is superior to another.

The capital market budget line

\$ Tomorrow



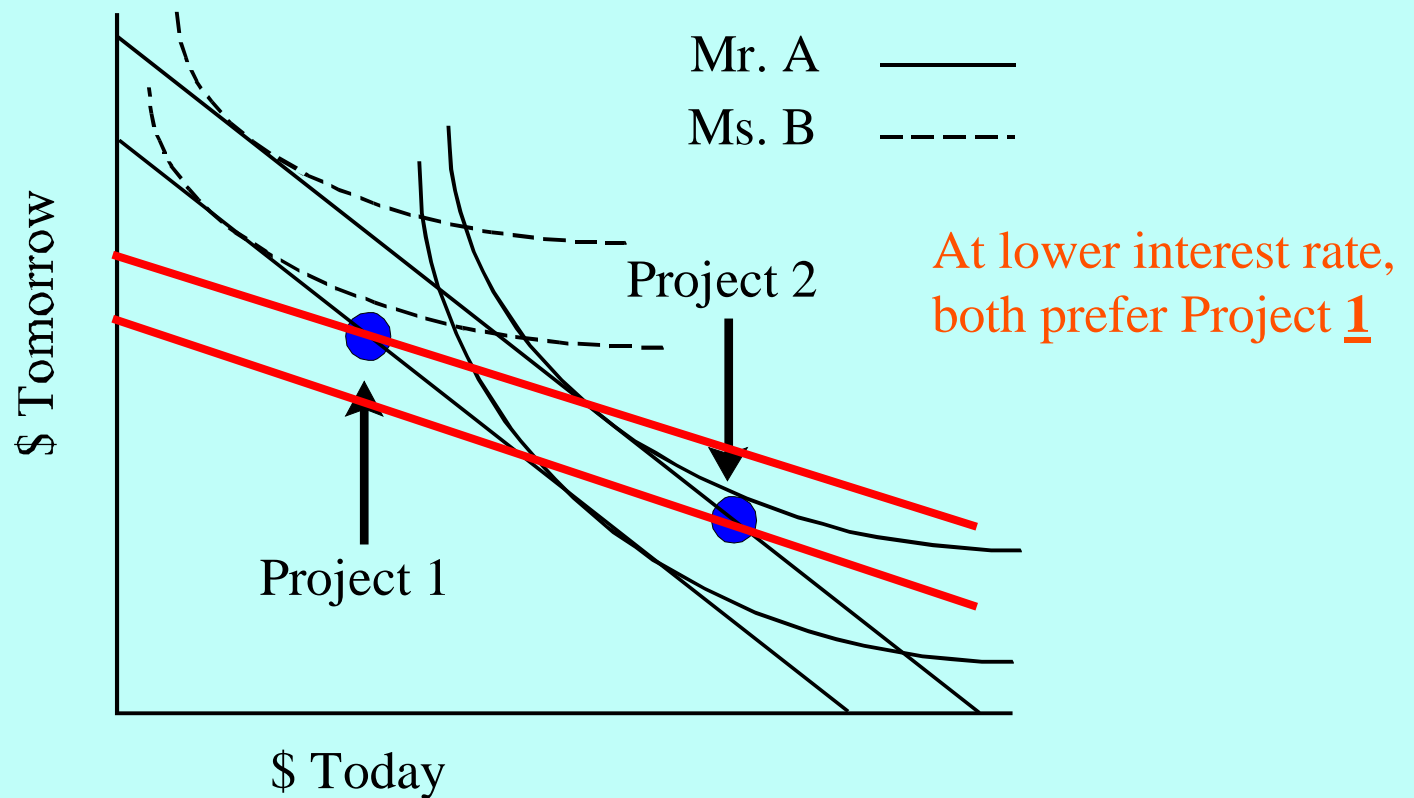
Project choice with capital markets



Present Value and Capital Markets

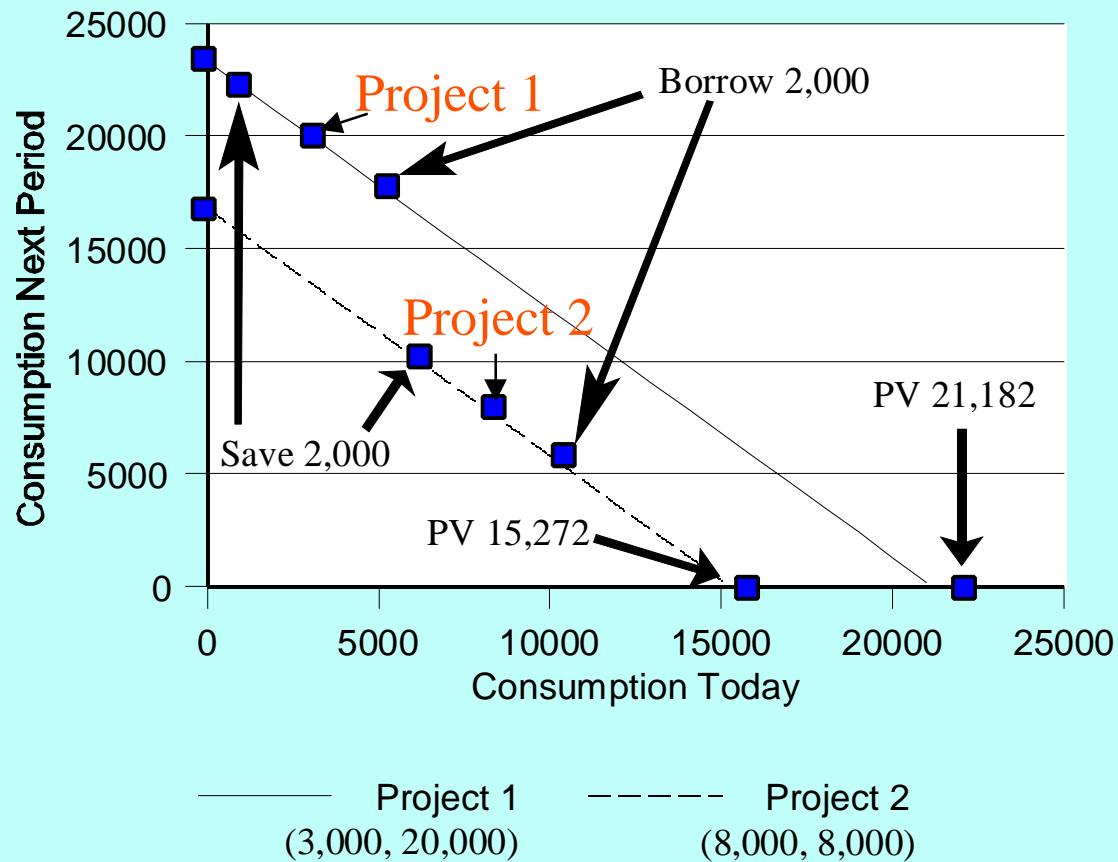
- With a capital market all investors agree on the ranking of projects.
- The highest Present Value (PV) project is best.
- Thus, if an investment advisor only knows each project's PV she can rank them for her clients.

Importance of Interest Rate



Consumption Shifting Example

$r \equiv 10\%$



Calculating Present Value

- PV is what we consume today if we consume nothing next period.
- For project 1, we need to borrow enough today that we pay back 20,000 next period.
 - Borrow $20,000 / 1.1 = 18,182$.
- So $PV(\text{Project 1}) = 3,000 + 20,000 / 1.1 = 21,182$
 $PV(\text{Project 2}) = 8,000 + 8,000 / 1.1 = 15,272$

- In general,

$$PV = C_0 + C_1 / (1+r)$$