# LECTURE TEN - PART THREE

# Shifts in Demand and Supply

- How might events in the real world cause the demand and supply curves to shift and thereby change the interest rate and the economy's level of investment?

# A Supply Shift Example
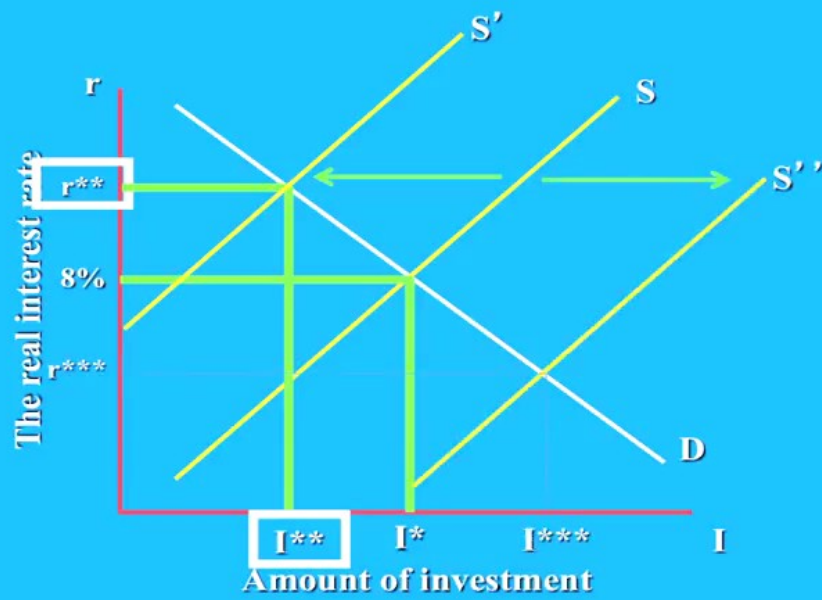
- Suppose the federal government significantly expands the social security retirement program.

**Question**
What is this likely to do to the supply curve for loanable funds and the market rate of interest?

**Pause presentation to answer this.**

# What About the Supply Side?

- Suppose the economy had been in a deep recession, but now is moving towards full employment.

- What do you think will happen to the interest rate and why?
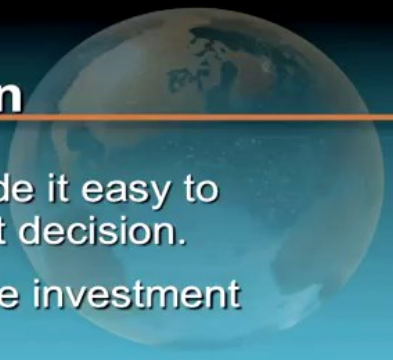
Pause presentation to think about this.

As the economy improves, more businesses are likely to increase their investment in new plant and equipment.

This will shift out the demand curve and increase the interest rate.

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The real interest rate

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8%

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Amount of investment
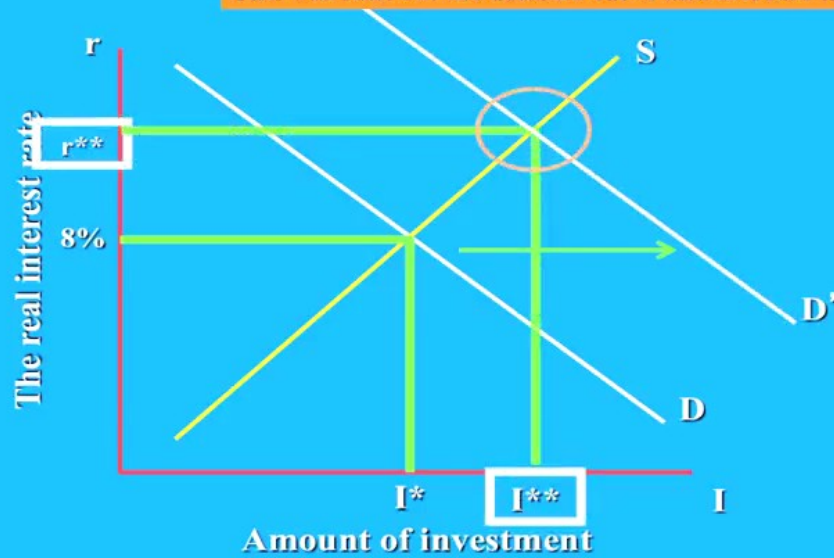
# The Investment Decision

- In the example above, we made it easy to evaluate the firm's investment decision.

- We made it easy by limiting the investment horizon to only one year.

- That is, we invested in something at the beginning of the year and got our return at the end of the year.

# Investment Analysis Over Time

- That's a pretty artificial example.

- Most investments last more than one year.

- From a few years for a new computer or some office furniture to 30 to 40 years for an electric power plant and more than 50 years for a big skyscraper.

# Net Present Value

- In order to answer this question we have to introduce one of the most important concepts in economics: net present value.

- And before I explain this concept, let me point out that net present value goes by various other names, including present discounted value or just plain present value.

# Net Present Value

- The concept behind NPV is that it provides us with the time value of money.

- NPV is defined as the dollar value today of a stream of income over time.

- Measured by calculating how much money invested today would be needed, at the going interest rate, to generate the asset's future stream of receipts.

- Let's give this definition some real world context so we can really wrap our minds around it.

# An NPV Example

- Suppose you own an apartment building which generates rental payments of $10,000 per month from your tenants.

- Suppose your tenants are always calling you up in the middle of the night to complain about a leaky faucet or a blocked toilet or a broken waste disposal.

# You Decide To Sell The Building

- **Question:** How much should you sell it for?

- More specifically, what lump sum of money today would make you at least as well off as that stream of rental payments that you would get over the life of the building?

# A Simple NPV Example

■ Suppose somebody offers to sell you a bottle of wine that matures in exactly one year and the wine can be sold for $11 at the end of the year.

■ **Question:** Assuming that the market interest rate is 10 percent per year, what is the present value of the wine -- that is, how much would you pay for the wine today?

**Pause the presentation now if you want to do this exercise.**

## The Most You Would Pay

- Is $10 because 10 dollars invested today at the 10% market rate of interest would yield you $11 at the end of the year.

- In other words, the present value of next year's eleven-dollar wine today is $10.

# Present Value for Perpetuities

- Okay, that's an example for only a one-year investment.

- Now, let's go to the other extreme by examining what's called a perpetuity.

- A perpetuity is an asset like land that lasts forever and pays a certain amount of dollars per year from now to eternity.

- So how would you evaluate a perpetuity?

# A Simple Formula

- V=N/i
  - V equals the present value of the land.
  - N is the permanent annual receipts from the land.
  - i is the interest rate in decimal terms.

> **Question**
> if the interest rate is 5% per year and the perpetuity yields $100 a year, what would be the net present value of the perpetuity?

> **Answer**
> $2000 or simply $100 divided by 0.05.

# Selling the Apartment Building

- We can use this formula for a **perpetuity** to determine what the selling price of our hypothetical apartment building should be.

- But first we have to make some further assumptions.

# Assume

- The prevailing interest rate is 5%.

- After expenses, our monthly rental income of $10,000 is reduced to $5,000, or $60,000 for the year.

**Question**

Based on that net rental income and assuming that the building will last forever, what is the least amount of money that we should sell the building for?

**Pause the presentation now if you want to do this exercise.**

# The Selling Price

- Should be at least $1.2 million, which is found simply by dividing $60,000 by the interest rate.

**Question**
What would the selling price be if the interest rate were 10%?

**Answer**
It would be only $600,000.