Interest Rates

$$PV = \frac{\$106}{1+r}$$

What is an interest rate

- You borrow $100; you pay back $106 a year later. You have paid interest at 6%.
- You lend $100; you get $106 a year later. You have received interest at 6%

Present Value

- Suppose you promise to pay me $106 a year from now, and that I can borrow and lend at 6%. The present value is $100, the amount that, *if I had today*, would be worth $106 a year from now.

$$PV = \frac{\$106}{1+r} = \frac{\$106}{1+0.06} = \$100$$

The Basic Assumption

- There is a market interest rate *r* at which I can borrow and lend as much as I want.

Different Interest Rates

- Borrowing and lending

Different Interest Rates

- Borrowing and lending
  - Banks pay you less than they charge their customers. (Wholesale vs retail)

Different Interest Rates

- Borrowing and lending
- "Riskiness"
  - You pay more for a used car loan than GM does to borrow (Risk adjustment)
  - Stock market

Different Interest Rates

- Borrowing and lending
- "Riskiness"
- Taxes

Different Interest Rates

- Borrowing and lending
- "Riskiness"
- Taxes
- Long term vs Short Term

The Basic Assumption

- There is *a* market interest rate *r* at which I can borrow and lend as much as I want.

Two Extensions

- I have $x coming in two years from now.

Two Extensions

- I have $x coming in two years from now.
- The present value is

$$PV = \frac{X}{(1+r)^2}$$

Two Extensions

- I have \$x coming in n years from now.
- The present value is

$$PV = \frac{X}{(1+r)^n}$$

Two Extensions

- I have \$x coming in each year for the next n years.

Two Extensions

- I have \$x coming in each year for the next n years.
- The present value is

$$PV = \frac{x}{(1+r)} + \frac{x}{(1+r)^2} + \ldots + \frac{x}{(1+r)^n}$$

The Series

$$PV = \frac{x}{(1+r)} + \frac{x}{(1+r)^2} + \ldots + \frac{x}{(1+r)^n}$$

$$PV = \frac{x}{r}\left(1 - \frac{1}{(1+r)^n}\right)$$

A Consol

$$PV = \frac{x}{r}$$

End