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%

Interest Rates

\[ PV = \frac{106}{1 + r} \]

The Basic Assumption

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

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.

\[ PV = \frac{106}{1 + 0.06} = \frac{106}{1.06} = 100 \]

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
- 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.
• The present value is

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

The Series

\[
PV = \frac{x}{(1+r)} + \frac{x}{(1+r)^2} + \ldots + \frac{x}{(1+r)^n} = \frac{x}{r} \left(1 - \frac{1}{(1+r)^n}\right)
\]

A Consol

\[
PV = \frac{x}{r}
\]

End