Understanding Interest Rates

FIN 204 Lecture 2.1.

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Outline

Why are interest rates important?

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- the most closely watched variables in the economy. Why?
- directly affect life of citizen and firms
- buy a house or invest on the stock market or put your money in a bank?
- invest in a new project, or buy government bonds?

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Definition: Interest Rate

Interest rate is the amount of money that a given asset or debt instrument worth 100 units of money produces per unit of time to its owner

However, assets live infinitely long, bonds can be very short-term. How do we compare the money that they produce for us?:

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The Present Value

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Definition: Present Value

Present Value of an asset is what the lifetime yield of an asset is worth today

How do we calculate the present value of an asset?

Calculating the Present Value

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$110 + 11 = 121 = 100(1 + 0.1)^2$

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Suppose you give these 121 to your friend again.
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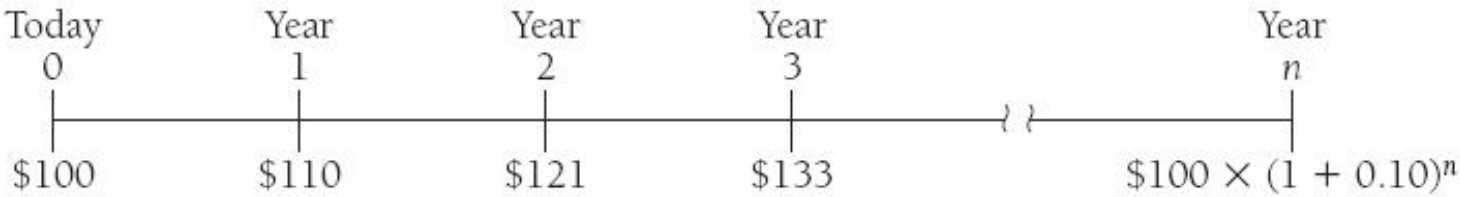
$121 + 12.1 = 131.1 = 100(1 + 0.1)^3$

Calculating the Present Value

How to generalize the argument for n periods?



The **present value** is:

$$PV = \frac{FV}{(1+i)^n}$$

Back to the lottery example. How much did you really win?

Calculating the Present Value

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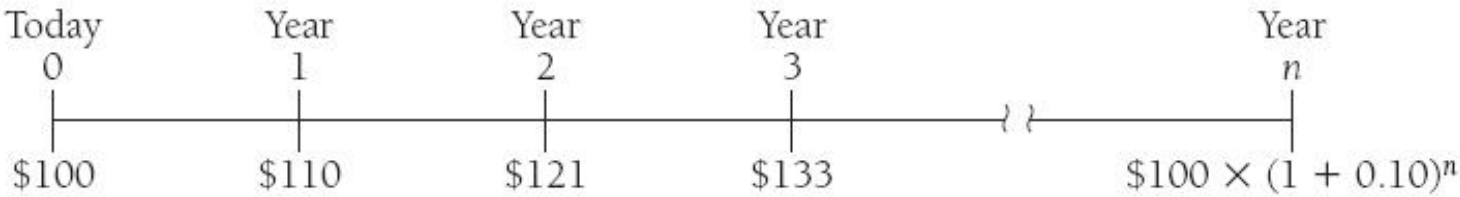

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6,759,019 or something;-)

The Yield to Maturity (Internal Rate of Return)

The Internal Rate of Return (IRR) is the most accurate measure of interest rates; It is what economists mean when they use the term interest rate.

Definition: Internal Rate of Return (IRR)

The **IRR** is an *interest rate* with a special quality: it equates the present value of payments received from a debt instrument with its value today

How do we calculate the IRR?

Calculating the IRR for a simple loan

How to calculate the IRR of a 1-year simple loan with 10% interest rate?

Value today	Present value
100	$\frac{110}{1+i}$

Now solve for i.

$i = \ldots$

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For simple loans, the interest rate equals the IRR.

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Disentangling the Rate of Return

What stands behind it?

Definition: Current yield

Current yield of an asset is the interest payments to the owner expressed as a fraction of its purchase price: $i_c = \frac{C}{p_t}$

Definition: Capital gain

Capital gain of an asset is the increase of its price expressed as a fraction of its purchase price: $g = \frac{p_{t+1} - p_t}{p_t}$

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Pretty different concepts: the *interest rate*, the *rate of return*, and the *internal rate of return*.

Real and Nominal Interest Rates

What is the effect of inflation on interest rates?

Definition: Nominal Interest Rate

The **Nominal Interest Rate** is the interest rate that is written down in a mortgage contract, on the face of a bond as a coupon, or on another debt instrument such as a fixed-term loan

Definition: Real Interest Rate

The **Real Interest Rate** is the inflation-adjusted nominal interest rate: $i_r = i - \pi_e$

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Real and Nominal Interest Rates

How do the real and nominal interest rates compare?