

# **FINANCE FOR NON-FINANCE PROFESSIONALS**

Week 1: Basic principals of  
valuation and discounting

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# FINANCIAL VALUATION AND DISCOUNTING

- ▶ Interest rates
- ▶ Compound rate of return
- ▶ Discounting the future
- ▶ Financial valuation by DCF
- ▶ Ratio analysis
- ▶ Examples and applications

# **BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING**

Compounding and  
Earning Returns Over Time

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# COMPOUNDING



The second year is more because you are earning interest on the interest you earned in the first year – this is **Compound Interest**.

# FUTURE VALUE: MONEY IN THE BANK

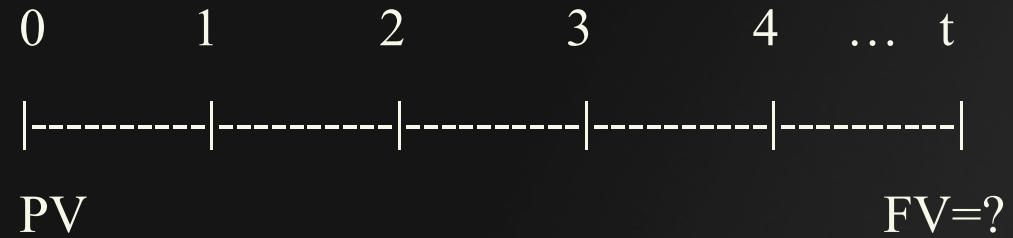
Interest rate = 11%

\$1,000 in bank for 5 years

Year	Amount
0	\$1,000
1	$\$1,110 = \$1,000 + \$1,000 * 11\% = \$1,000 * (1+11\%)$
2	$\$1,232 = \$1,110 * (1+11\%) = \$1,000 * (1+11\%)^2$
3	$\$1,368 = \$1,232 * (1+11\%) = \$1,000 * (1+11\%)^3$
4	$\$1,518 = \$1,368 * (1+11\%) = \$1,000 * (1+11\%)^4$
5	$\$1,685 = \$1,518 * (1+11\%) = \$1,000 * (1+11\%)^5$

\$1,685

# FUTURE VALUE



$$FV = PV(1+r)^t$$

FV = Future Value

PV = Present Value

r = interest rate

t = time

# FUTURE VALUE EXAMPLE 1 (LIGHTBOARD)

Suppose you put \$1,000 into a savings account today that will pay 11% interest for five years. How much will you have at the end of five years?

$$FV = \$1,000(1.11)^5 = \$1,685.06$$

# FUTURE VALUE EXAMPLE 2 (LIGHTBOARD)

- ▶ What if I bought a painting for \$700 and then 3 years later sold it for \$825. How much did I earn on the painting on an annual basis?
- ▶ Use the formula to figure it out
- ▶  $FV=PV*(1+r)^t$
- ▶ Future value is the \$825, Present value is the \$700
- ▶  $t=3$ , Solve for  $r$
- ▶  $\$825 = \$700 * (1+r)^3$

$$r = \sqrt[3]{\frac{\$825}{\$700}} - 1 = 5.63\%$$

# **BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING**

Discounting Future Cash  
Back to the Present

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# BRINGING THE FUTURE INTO THE PRESENT

What is a cash flow in the future worth today?

$$FV = PV(1+r)^t$$

$$PV = \frac{FV}{(1+r)^t}$$

# PRESENT VALUE

If I offered you \$175 payable 5 years from now, how much would you pay for that offer today if interest rates were 4%?

Today	1	2	3	4	5 years from now
0	$\$175/(1+4\%)^4$	$\$175/(1+4\%)^3$	$\$175/(1+4\%)^2$	$\$175/(1+4\%)^1$	
\$ 143.84	\$ 149.59	\$ 155.57	\$ 161.80	\$ 168.27	\$ 175.00

ANSWER: \$143.84

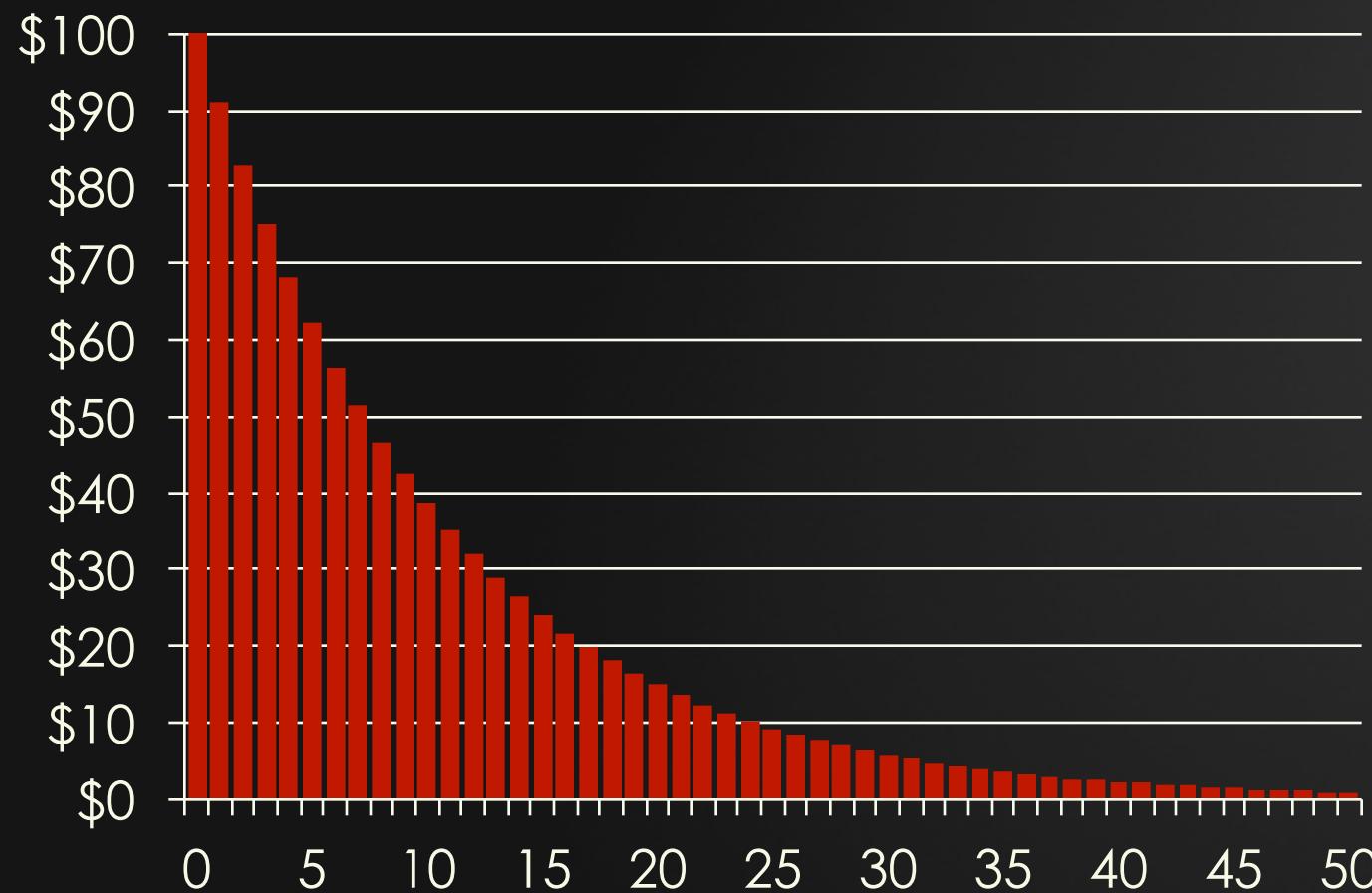
# PRESENT VALUE

Two things drive how hard  
discounting slams down the future

- ▶ How far out is the cash
- ▶ How big is the interest rate

# PRESENT VALUE

\$100 discounted at 10%



# BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING

Discounted Cash Flow as  
the Basis for All Valuation

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# DISCOUNTED CASH FLOWS (DCF)

- ▶ Method of valuing an investment
- ▶ Uses all anticipated future cash flows
- ▶ Discounts all cash flows back to present value

# VALUATION BY DCF

Why do investors buy different assets?

Real Estate

Stocks

Bonds

Because they want to earn a return and use  
the money later.

Cash is King!

# WHAT GIVES AN INVESTMENT VALUE?

How much cash is coming in?

When is the cash coming in?

With these two answers we can put a value on anything!!!

# BOND

- ▶ Contract between an issuer and a bondholder
- ▶ Buyer of bond lends money (principal) to issuer
- ▶ Issuer pays interest on loan and repays principal at maturity

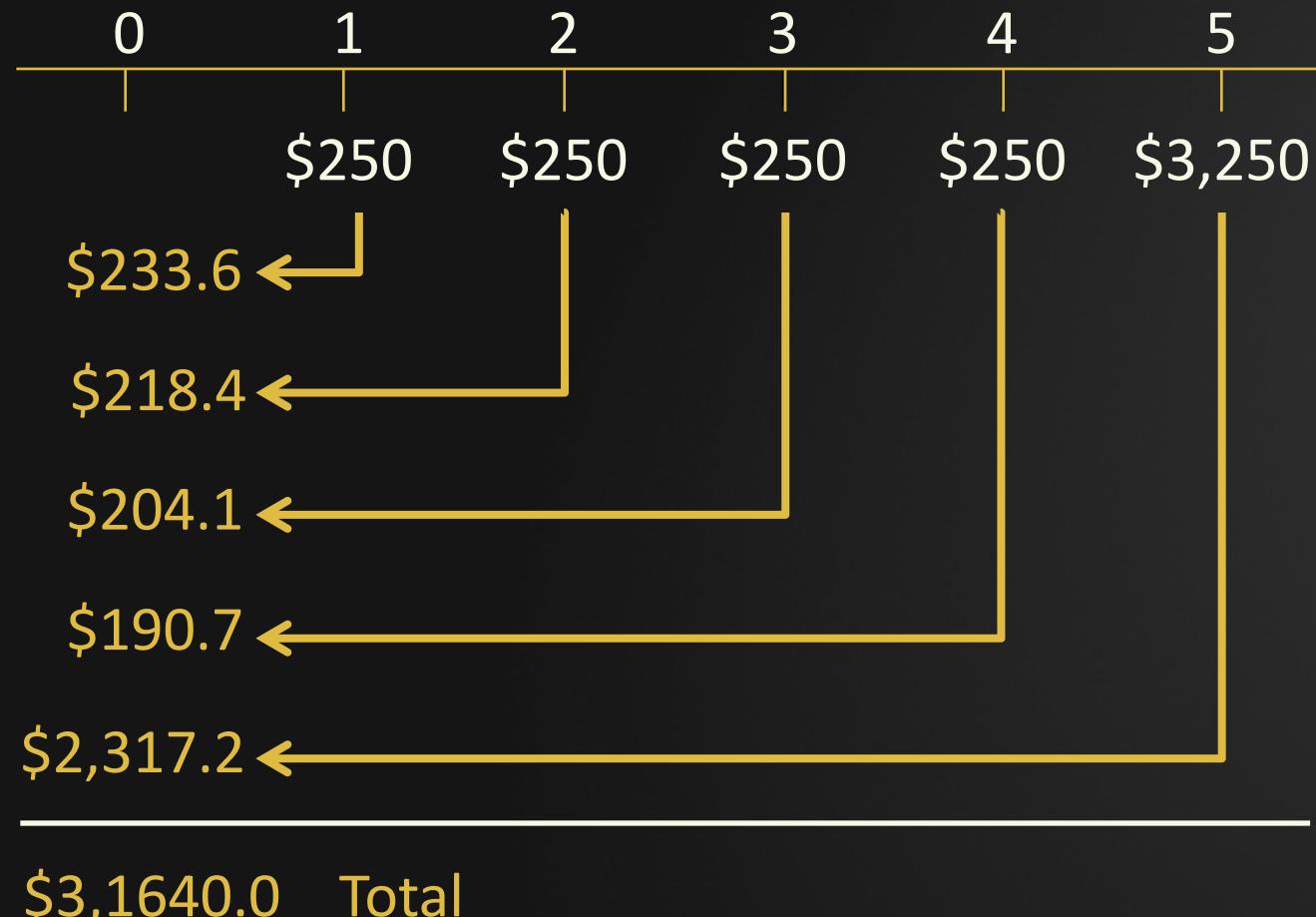
# DCF: SIMPLE BOND

Consider a simple bond of \$3,000 that makes annual payments of \$250 for 5 years if the discount rate is 7%?

What is it worth?

- ▶ Step 1: What are the cash flows
- ▶ Step 2: What are they worth today?
- ▶ Step 3: Add up the present values

# DCF: SIMPLE BOND



## DCF: SIMPLE BOND

In our example the bond is worth \$3,164.  
That is how much money the bond would  
raise if sold today.

Why would anyone pay more or less?

# DCF: STOCK VALUATION

Share of General Electric

Cash to Shareholders? When?

Model both of these and DCF!

This is (partly) what stock analysts do

# DCF: OTHER ASSETS

Apply the principle to any asset:

- ▶ Real Estate
- ▶ Mergers and Acquisitions
- ▶ Derivatives

Cash and timing drive all valuation

# **BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING**

## DCF Practical Example

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# DCF PRACTICAL EXAMPLE

A water well in the desert. How much is it worth to sell or acquire?

If the well is dry?

Connected to an active source of water?

# DCF PRACTICAL EXAMPLE: WATER WELL

How much water is there?

Infinite

How much does it produce?

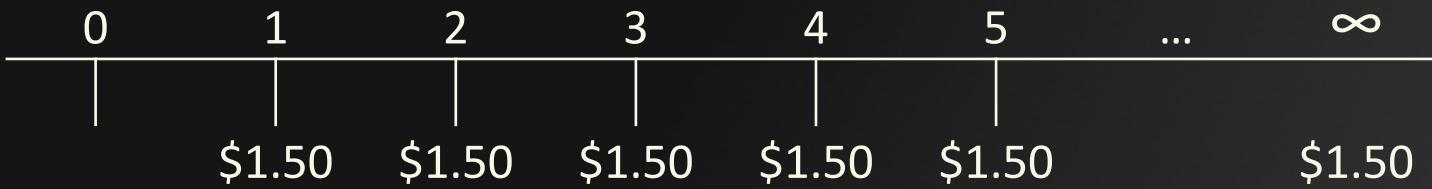
1 gallon/day

How much cash flow?

Net \$1.50/day

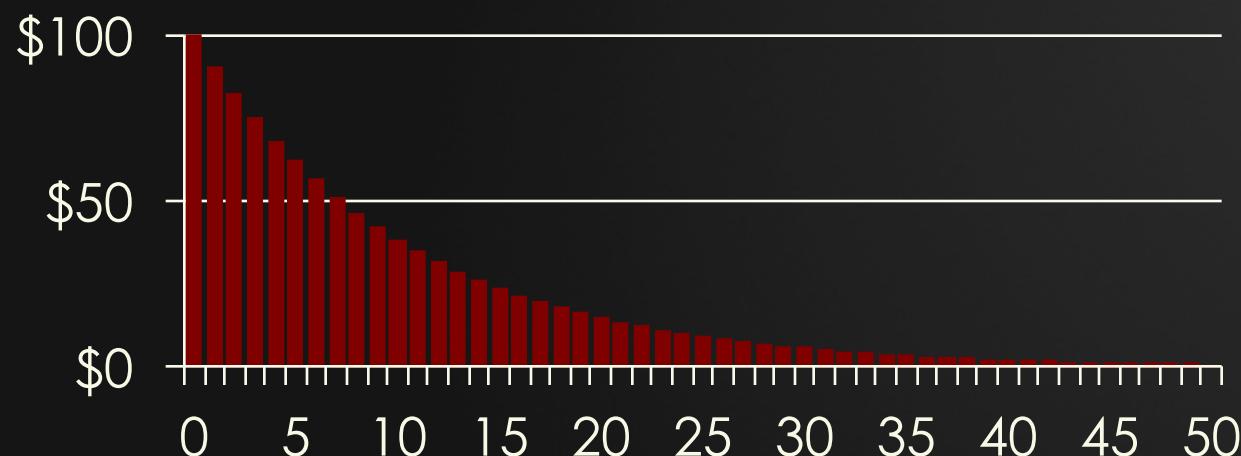
Can we put a realistic price on this asset?

# DCF PRACTICAL EXAMPLE: WATER WELL



Problem: Is it worth infinity?

Remember:



# DCF PRACTICAL EXAMPLE: WATER WELL

Discount rate: 15%

Build a spreadsheet model

- ▶ Step 1: What are the cash flows
- ▶ Step 2: What are they worth today?
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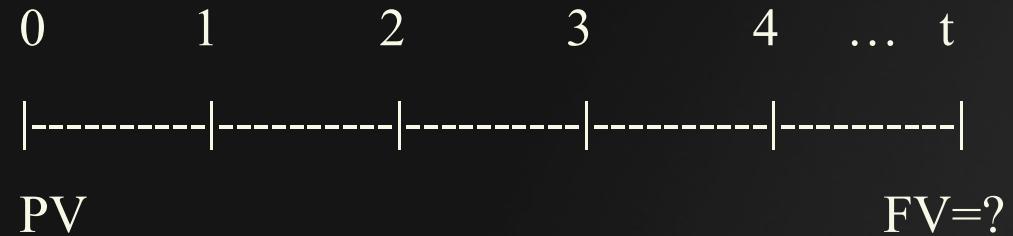
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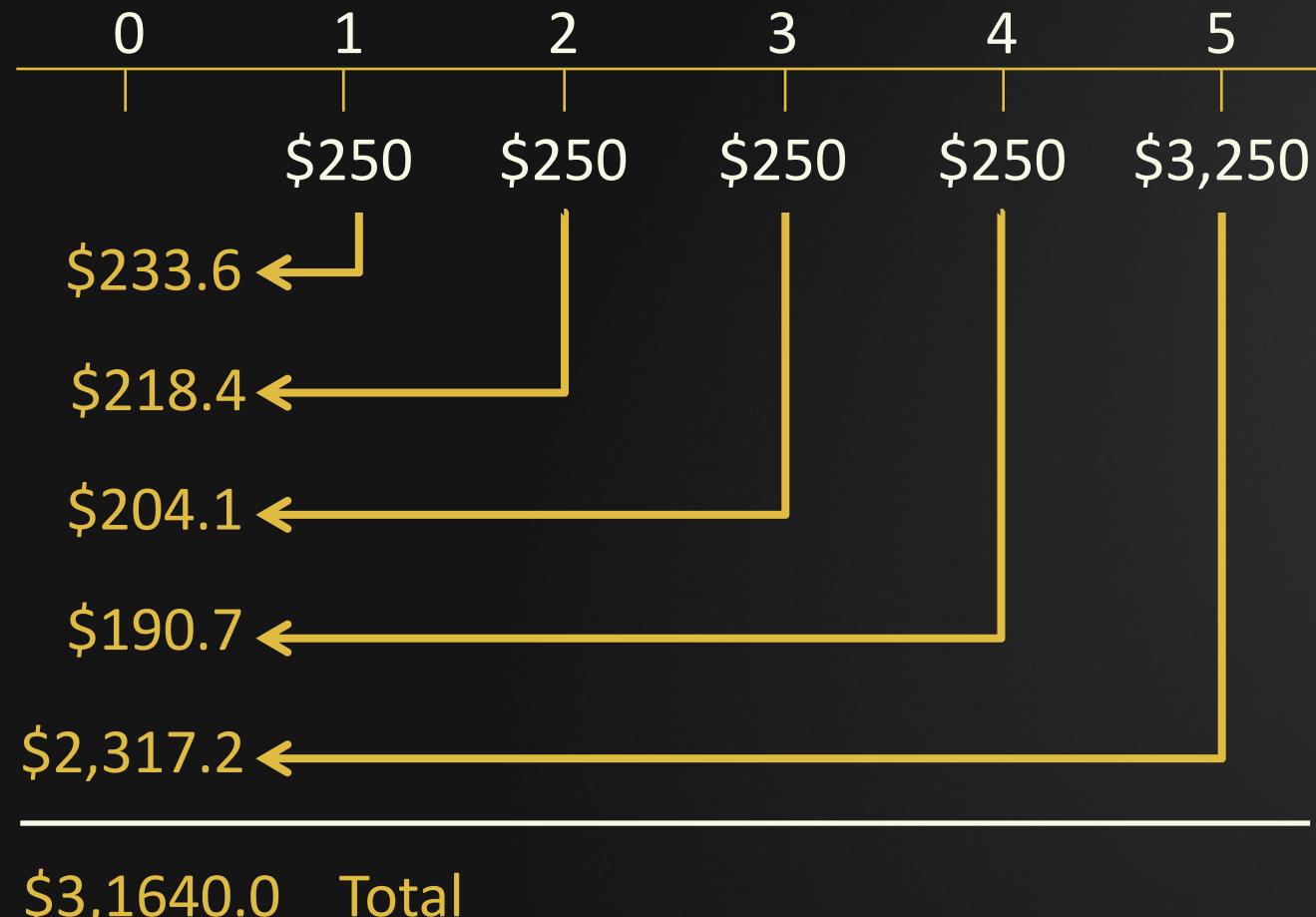
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# BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING

## Valuation by Comparables

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# VALUATION BY COMPARABLES

Practitioners often refer to “comps”

Comparable transactions or prices

Quick, easy, and dangerous!

# ASSUMPTIONS FOR “COMPS”

1. You can identify close comparables
2. You have a value-relevant ratio
3. The market values comps similarly

# COMPARABLES IN USE

*(Price/Attribute)\* Your Attribute=Price of your asset*

Examples of attributes:

- ▶ P/E ratios
- ▶ Earnings Yield
- ▶ Dividend Yield
- ▶ Return on Assets
- ▶ EBITDA multiples

# P/E RATIOS

Price-to-earnings ratio is popular

How much a dollar of current earnings costs?

“Trades at X times earnings”

# P/E RATIOS: EXAMPLE

Value Lowes Corporation by comps

	Home Depot	Lowes
E (earnings)	\$6.80	\$2.46
P/E	25	--
Comp value	--	\$61.60

$$\begin{aligned}\text{Comp value of Lowes} &= \text{P/E}_{\text{Home Depot}} * \text{E}_{\text{Lowes}} \\ &= 25 * \$2.46 = \$61.60\end{aligned}$$

Lowes actual price in the market = \$74 (about 20% different)

## OTHER COMMON COMPS

Return on Assets or Equity (ROA/ROE)

Return on invested capital (ROI)

Dividend yield

PEG ratio (P/E ratio over Growth in E)

# MEASURING COMPS

Comps rely on historical averages

Trailing 12m, most recent Q, past 3 years...?

Negative earnings, negative prices?

# COMPS VS. DCF

- ▶ Both can provide useful information
- ▶ Executed correctly, both are valid
- ▶ Comps often used (and abused) in practice
- ▶ Both require forecasts
- ▶ DCF is more appealing in theory and more accurate, but requires much more work
- ▶ Comps can be a good quick-and-dirty valuation, but be careful!

# **BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING**

Examples and Applications:  
Bonds

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# BONDS

Simple debt instruments

Promise coupons (interest) and face value

Easy application of DCF valuation

# KINDS OF BONDS

U.S. treasury bonds

Corporate Bonds

Municipals

Sovereign Debt

What's different about each?

# HOW TO VALUE BONDS

Bond contract: what cash and when

All we need to do is discount the payments

# TREASURY BOND EXAMPLE

Treasury issues 3 year bonds with a 2.5% coupon rate. If the six month interest rate is 1.2%, what is the price of the bond per \$100 of face value?

# **BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING**

Examples and Applications:  
Mortgages

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# MORTGAGES

Simple debt instrument

Borrow money today to purchase real estate

Each payment includes principal and interest

Amortization schedule

# MORTGAGE EXAMPLE

**Problem:** Assume a bank charges 7% interest per year. You borrow \$10,000 to be repaid in equal yearly installments of \$3,810.52 over 3 years. Let's amortize the loan schedule and compute interest and principle repayments.

# MORTGAGE EXAMPLE

Year	Payment	Interest	Principal Payment	Balance
0	--	--	--	\$10,000
1	\$3,810.52	\$700.00	\$3,110.52	\$6,889.48
2	\$3,810.52	\$482.26	\$3,328.26	\$3,561.22
3	\$3,810.52	\$249.29	\$3,561.22	0

# **BASIC PRINCIPLES OF FINANCIAL VALUATION DISCOUNTING**

Examples and Applications:  
Annuities

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# ANNUITIES

Series of equal payments at regular intervals.

- ▶ Regular deposits to savings account
- ▶ Monthly mortgage payments
- ▶ Insurance premiums
- ▶ Pension payments

# RETIREMENT ANNUITY EXAMPLE

**Problem:** You want to retire and maintain a monthly income of \$2,500 for the next 20 years. How much would it cost to purchase this annuity if discount rates are currently 4%?