CHAPTER 11
Long-Term Debt Financing

- Interest rate levels
- Types of long-term debt
- Required returns on debt
- Debt valuation

Financing Basics

- **Businesses need capital to acquire the assets needed to provide services.**
- **Capital comes in two basic forms:**
  - **Equity capital**
  - **Debt capital**
- **Capital is allocated in a free market economy by price. The businesses most able to pay (those that create the greatest value) get the capital.**

The Cost of Money

- The interest rate on a debt security is the cost of that capital. Furthermore, interest rates influence the cost of all capital.
- Four primary factors influence the general level of interest rates:
  - Investment opportunities
  - Time preferences for consumption
  - Risk
  - Inflation expectations

Common Long-Term Debt Instruments

- Term loans
- Bonds
  - Treasury
  - Corporate
  - Municipal
- Corporate bond types
  - Mortgage bonds
  - Debentures
  - Subordinated debentures
- Public sale versus private placement

Debt Contracts

- **Debt contracts have several different names:**
  - **Bond indenture**
  - **Loan agreement**
  - **Promissory note**
- **They usually contain:**
  - **General provisions**
    - **Maturity (when the principal must be repaid)**
    - **Type of debt**
    - **Interest rate and type**
  - **Restrictive covenants**
  - **Trustee designation (bond issue only)**

Debt Contracts (Cont.)

- **Call provisions**
  - **Permit the borrower to redeem (pay back) the debt prior to maturity.**
  - **Typically a *call premium* is specified.**
  - **Call privilege usually is *deferred.***
- **? Why would issuers want callability?**
- **? What impact does a call provision have on the riskiness of debt financing to lenders? To borrowers?**

Bond Ratings

- Rating agencies assign debt ratings that reflect the probability of *default*. Here are some typical bond ratings:

	Investment Grade				Speculative*			
Moody's	Aaa	Aa	A	Baa	Ba	B	Caa	C
S&P	AAA	AA	A	BBB	BB	B	CCC	D
Fitch	AAA	AA	A	BBB	BB	B	CCC	D

*Also called "junk"

Bond Rating Concepts

- **Bond rating criteria**
  - **Issuer's financial condition**
  - **Competitive situation**
  - **Quality of management**
  - **Includes both objective and *subjective* factors**
- **Importance of ratings**
  - **To investors**
  - **To issuing businesses**
- **Changes in ratings**

Credit Enhancement

- **Credit enhancement (bond insurance) is used primarily on municipal bonds.**
- **Insured bonds have the rating of the insurer (AAA), *not* the issuer.**
- **Issuers must pay an up-front fee to obtain bond insurance.**

? **How should issuers evaluate whether or not to use bond insurance?**

Interest Rate Components

- The interest rate (required rate of return) on any debt security can be thought of as a base rate plus one or more components to compensate for inflation and risk.
- Here is the model:

Rate = RRF + IP + DRP + LP + PRP + CRP.

Here:

RRF = Real risk-free rate.

IP = Inflation premium.

DRP = Default risk premium.

LP = Liquidity premium.

PRP = Price risk premium.

CRP = Call risk premium.

Interest Rate Example 1

One-Year Treasury Security

RRF = 2%; IP = 3%:

Rate = RRF + IP + DRP + LP + PRP + CRP
= 2% + 3% + 0 + 0 + 0 + 0
= 5%.

? **What additional premium(s) would be needed if it were a *30-year* Treasury security?**

Interest Rate Example 2

30-Year HCA Callable Bond

RRF = 2%; IP = 4%; DRP, LP, PRP = 1%; CRP = 0.4%:

$$\begin{aligned}\text{Rate} &= \text{RRF} + \text{IP} + \text{DRP} + \text{LP} + \text{PRP} + \text{CRP} \\ &= 2\% + 4\% + 1\% + 1\% + 1\% + 0.4\% \\ &= 9.4\%.\end{aligned}$$

? **What would be the interest rate if the bond were *noncallable*?**

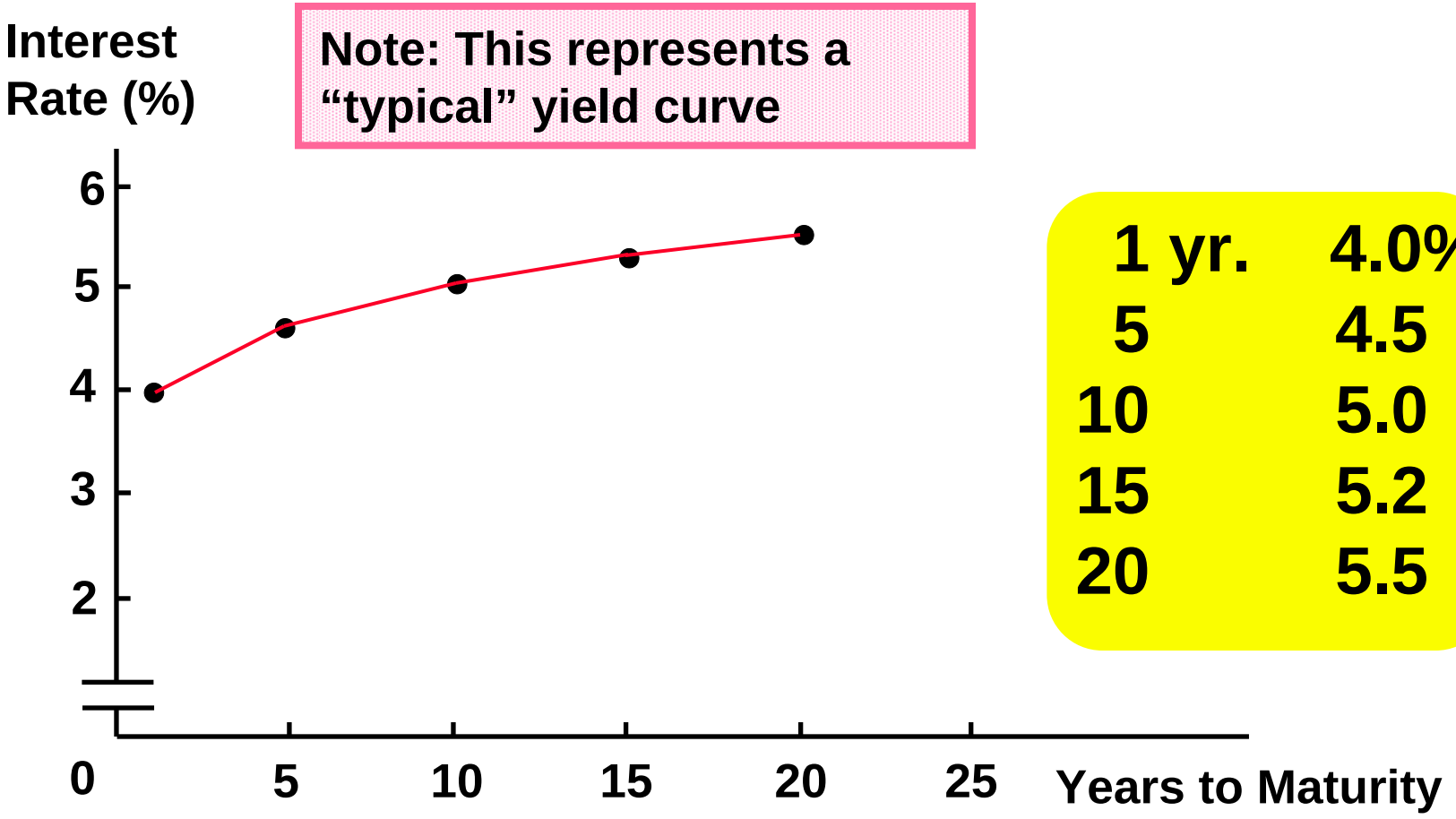
? **What would be the rate if the issuer were Memorial Healthcare, an *NFP* provider?**

The Term Structure of Interest Rates

- **Term structure is the relationship between *interest rates* and debt *maturities*.**
- **Thus, term structure tells us the relationship between short-term and long-term rates.**
- **A graph of the term structure is called the yield curve.**

Treasury Yield Curve

Note: This represents a "typical" yield curve



1 yr.	4.0%
5	4.5
10	5.0
15	5.2
20	5.5

Debt Valuation

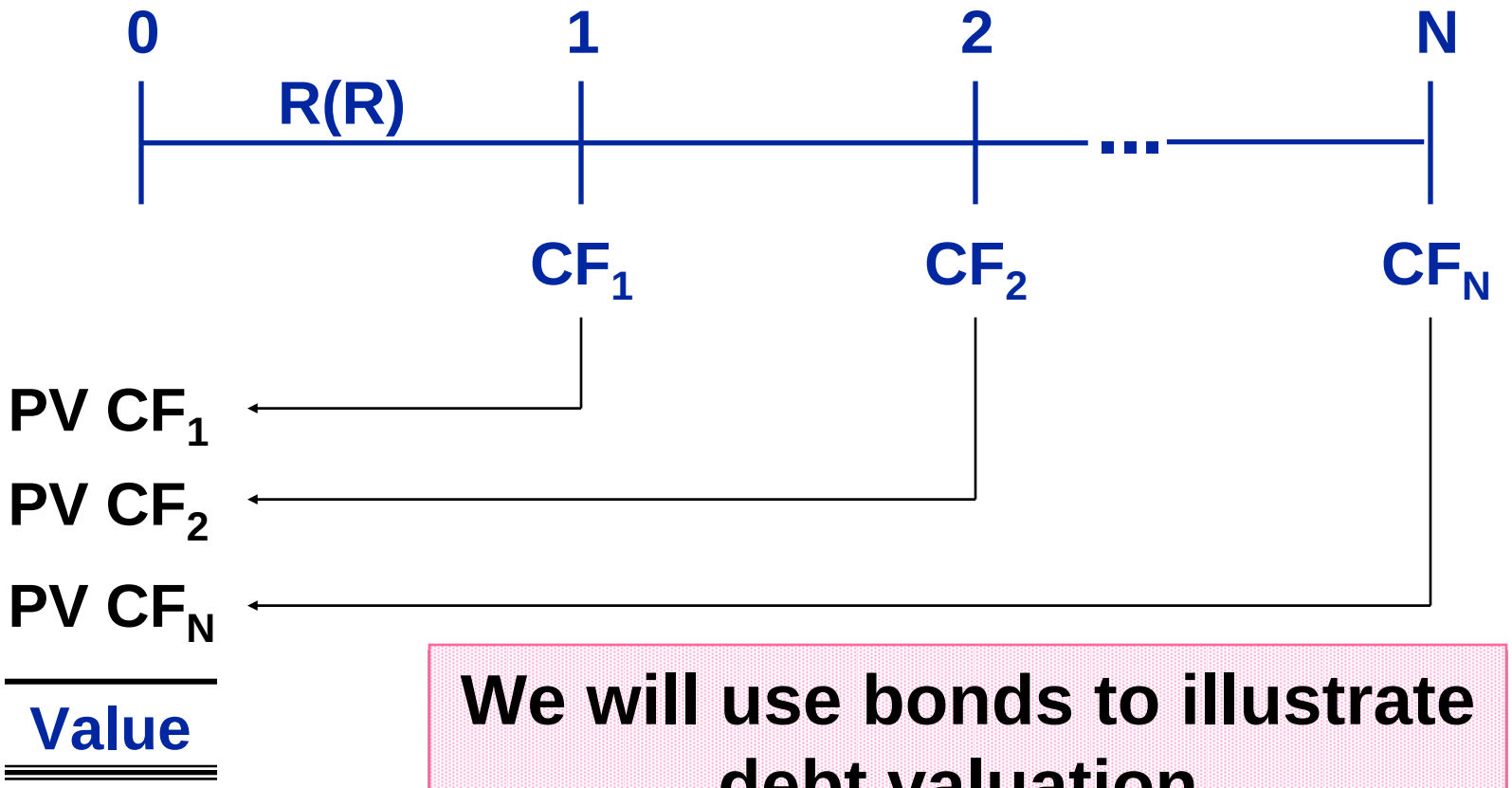
Why should healthcare managers worry about debt valuation?

- **Managers must understand how investors make resource allocation decisions.**
- **Cost of financing is important to good capital investment decisions.**
- **Debt valuation concepts can be applied to other investments.**

General Valuation Model

- The financial value of any asset (investment) stems from the asset's expected *cash flows*.
- Thus, all assets are valued in the same way:
  - Estimate the expected cash flows
  - Assess their riskiness
  - Set the required rate of return
  - Discount the cash flows and sum the present values

General Valuation Model (Cont.)



We will use bonds to illustrate debt valuation.

Bond Definitions

1. **Par value:** Stated face value of the bond. Generally the amount borrowed and repaid at maturity. Often $1,000 or $5,000.

2. **Coupon rate:** Stated interest rate on the bond. Multiply by par value to get dollar coupon payment. Usually fixed.

3. **Maturity date:** Date when the par value will be repaid to investors. Note that the effective maturity of a bond declines each year after issue.

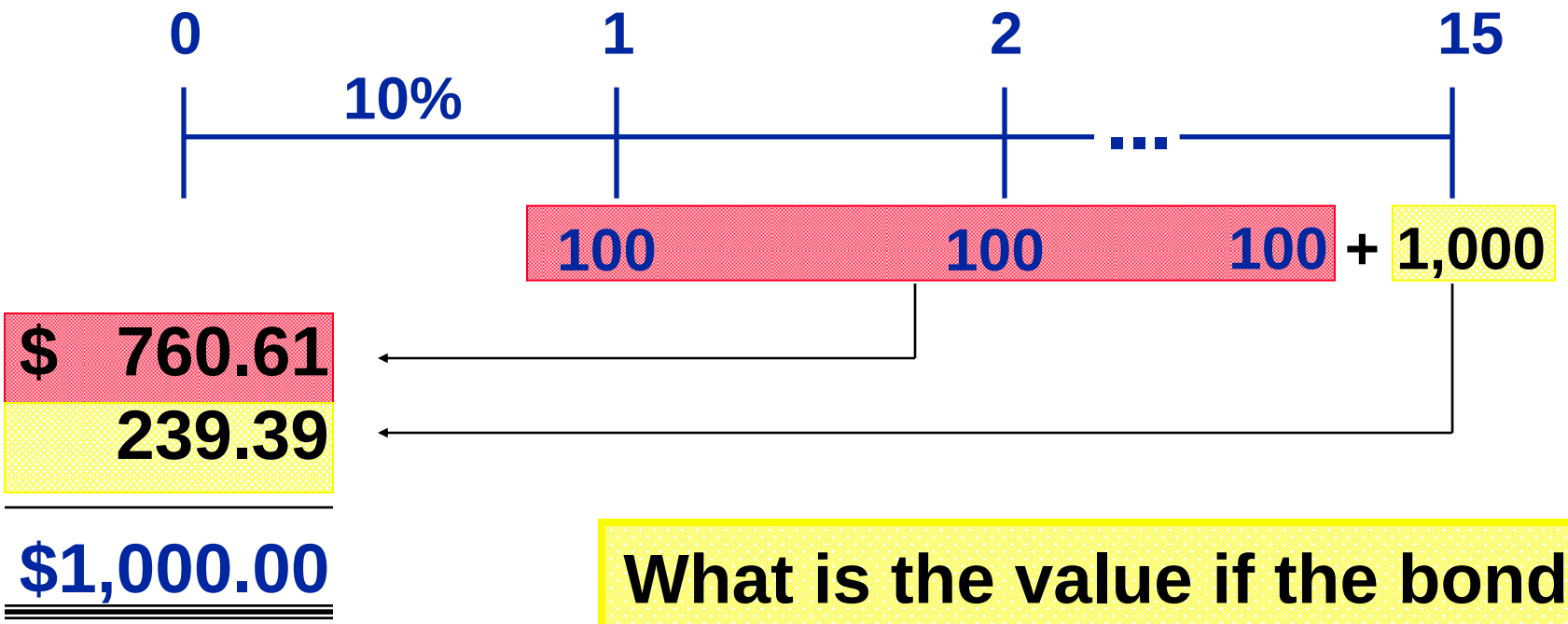
4. **New versus seasoned bonds:** When a bond is issued, its coupon rate reflects current conditions. When conditions change, bond values change.

5. Debt service requirements:

Issuers are concerned with their total debt service payments, including both interest expense and repayment of principal. Many municipal bond issues (serial issues) are structured so that debt service requirements are roughly constant over time.

? **Why?**

What is the value of a 15-year, 10% coupon bond if $R(R_d) = 10\%$?



What is the value if the bond were a zero-coupon bond?

The bond consists of a 15-year, 10% annuity of $100 per year plus a $1,000 lump sum at t = 15:

PV annuity	=	$ 760.61
PV maturity value	=	239.39
PV annuity	=	$1,000.00

	N	I/YR	PV	PMT	FV
INPUTS	15	10		-100	-1000
OUTPUT			1000		

Spreadsheet Solution 1

	A	B	C	D
1				
2	10.0%		Interest rate	
3				
4	$ 100		Year 1 coupon	
5	100		Year 2 coupon	
6	100		Year 3 coupon	
7	100		Year 4 coupon	
8	100		Year 5 coupon	
9	100		Year 6 coupon	
10	100		Year 7 coupon	
11	100		Year 8 coupon	
12	100		Year 9 coupon	
13	100		Year 10 coupon	
14	100		Year 11 coupon	
15	100		Year 12 coupon	
16	100		Year 13 coupon	
17	100		Year 14 coupon	
18	1,100		Year 15 coupon + Principal	
19				
20	$1,000.00	=NPV(A2,A4:A18) (entered into Cell A20)		

Spreadsheet Solution 2

	A	B	C	D
1				
2	15		Number of payments	
3	$ 100.00		Payment (coupon amount)	
4	$ 1,000.00		Future value (principal)	
5	10.0%		Interest rate	
6				
7				
8	$ 1,000.00	=-PV(A5,A2,A3,A4) (entered into Cell A8)		
9				
10				

What is the value after one year if interest rates (R[R_d]) remain constant?

	N	I/YR	PV	PMT	FV
INPUTS	14	10		-100	-1000
OUTPUT			1000		

If interest rates (the required rate of return on the bond) stay *constant*, the bond's value remains at $1,000.

Spreadsheet Solution 1

	A	B	C	D
1				
2	10.0%	Rate	Interest rate	
3				
4	$ 100			
5	100		Year 1 coupon	
6	100		Year 2 coupon	
7	100		Year 3 coupon	
8	100		Year 4 coupon	
9	100		Year 5 coupon	
10	100		Year 6 coupon	
11	100		Year 7 coupon	
12	100		Year 8 coupon	
13	100		Year 9 coupon	
14	100		Year 10 coupon	
15	100		Year 11 coupon	
16	100		Year 12 coupon	
17	100		Year 13 coupon	
18	1,100		Year 14 coupon + Principal	
19				
20	$1,000.00	=NPV(A2,A5:A18) (entered into Cell A20)		

Spreadsheet Solution 2

	A	B	C	D
1				
2	14		Number of payments	
3	$ 100.00		Payment (coupon amount)	
4	$ 1,000.00		Future value (principal)	
5	10.0%		Interest rate	
6				
7				
8	$ 1,000.00	=-PV(A5,A2,A3,A4) (entered into Cell A8)		
9				
10				

Now suppose interest rates fell, so that R(R_d) is now only 5 percent.

	N	I/YR	PV	PMT	FV
INPUTS	14	5		-100	-1000
OUTPUT			1494.93		

When R(R_d) falls, a bond's value increases. Now the bond sells above its par value, or at a premium.

Spreadsheet Solution 1

	A	B	C	D
1				
2	5.0%	Rate	Interest rate	
3				
4	$ 100			
5	100		Year 1 coupon	
6	100		Year 2 coupon	
7	100		Year 3 coupon	
8	100		Year 4 coupon	
9	100		Year 5 coupon	
10	100		Year 6 coupon	
11	100		Year 7 coupon	
12	100		Year 8 coupon	
13	100		Year 9 coupon	
14	100		Year 10 coupon	
15	100		Year 11 coupon	
16	100		Year 12 coupon	
17	100		Year 13 coupon	
18	1,100		Year 14 coupon + Principal	
19				
20	$1,494.93	=NPV(A2,A5:A18) (entered into Cell A20)		

Spreadsheet Solution 2

	A	B	C	D
1				
2	14		Number of payments	
3	$ 100.00		Payment (coupon amount)	
4	$ 1,000.00		Future value (principal)	
5	5.0%		Interest rate	
6				
7				
8	$ 1,494.93	=-PV(A5,A2,A3,A4) (entered into Cell A8)		
9				
10				

What would happen if interest rates rise, and R(R_d) is now 15 percent?

	N	I/YR	PV	PMT	FV
INPUTS	14	15		-100	-1000
OUTPUT			713.78		

When R(R_d) rises, a bond's value decreases. Now the bond sells below its par value, or at a discount.

Spreadsheet Solution 1

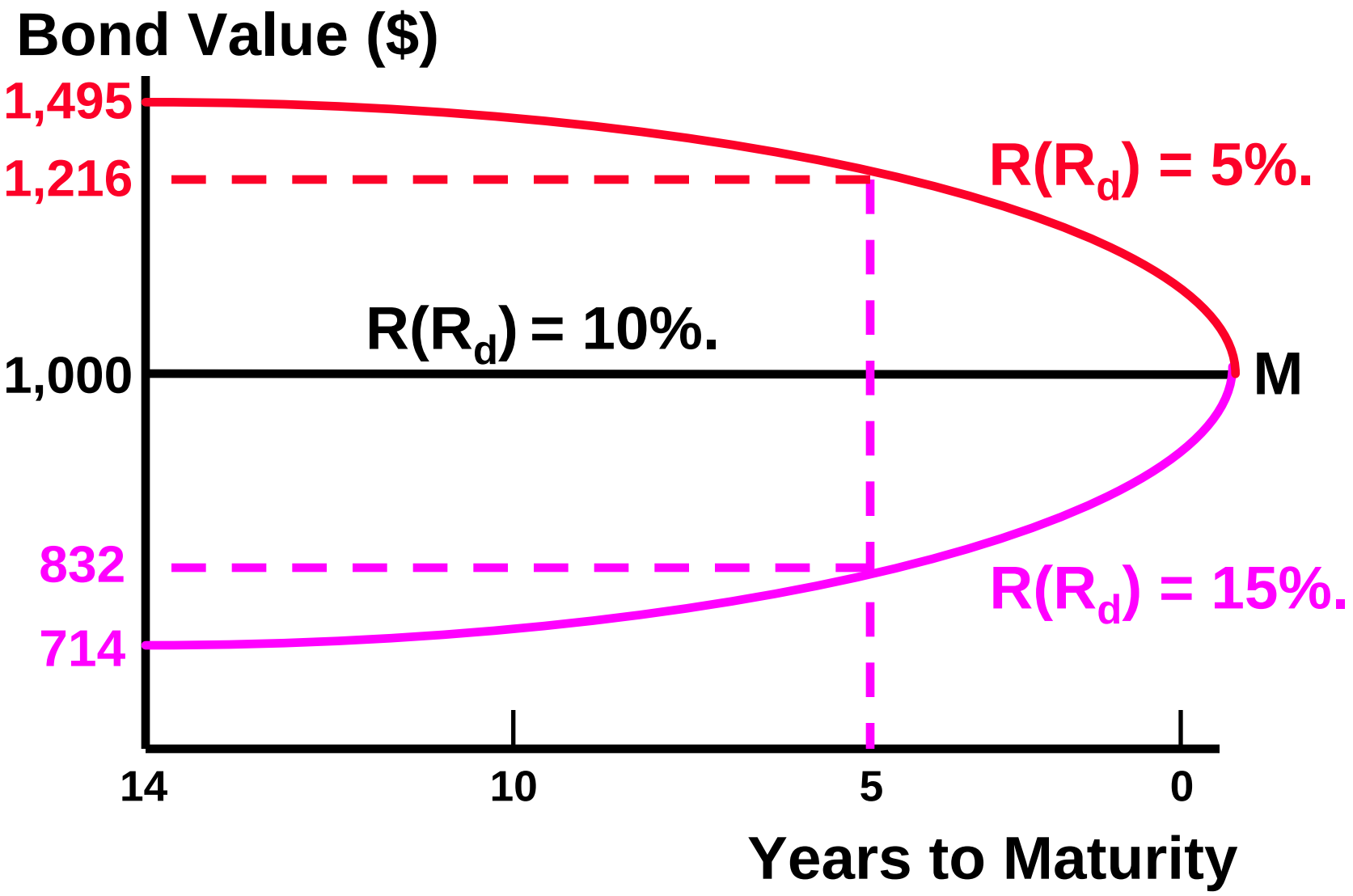
	A	B	C	D
1				
2	15.0%	Rate	Interest rate	
3				
4	$ 100			
5	100		Year 1 coupon	
6	100		Year 2 coupon	
7	100		Year 3 coupon	
8	100		Year 4 coupon	
9	100		Year 5 coupon	
10	100		Year 6 coupon	
11	100		Year 7 coupon	
12	100		Year 8 coupon	
13	100		Year 9 coupon	
14	100		Year 10 coupon	
15	100		Year 11 coupon	
16	100		Year 12 coupon	
17	100		Year 13 coupon	
18	1,100		Year 14 coupon + Principal	
19				
20	$713.78	=NPV(A2,A5:A18) (entered into Cell A20)		

Spreadsheet Solution 2

	A	B	C	D
1				
2	14		Number of payments	
3	$ 100.00		Payment (coupon amount)	
4	$ 1,000.00		Future value (principal)	
5	15.0%		Interest rate	
6				
7				
8	$ 713.78	=-PV(A5,A2,A3,A4) (entered into Cell A8)		
9				
10				

Assume the bond has 14 years to maturity. What would happen to bond values over time if interest rates remained at the levels given: 5 percent, 10 percent, and 15 percent?

Remember that the bond has a 10 percent coupon rate.


Bond Value ($)
1,495
1,216
1,000
832
714
R(R_d) = 5%.
R(R_d) = 10%.
R(R_d) = 15%.
M
14
10
5
0
Years to Maturity

- **At maturity, a bond's value must equal its par value (plus final interest payment).**
- **The value of a *premium bond* will decrease to par value at maturity.**
- **The value of a *discount bond* will increase to par value at maturity.**
- **A par bond value will remain at par if interest rates remain constant.**
- **The return in each year consists of an *interest payment (yield)* and a *price change (capital gains yield)*.**

Definitions

$$\text{Current yield} = \frac{\text{Annual interest payment}}{\text{Current price}}.$$

$$\text{Capital gains yield} = \frac{\text{Change in price}}{\text{Beginning price}}.$$

$$\text{Total return} = \text{Current yield} + \text{Capital gains yield}.$$

Find the current yield, capital gains yield, and total return (yield) for Year 1 when the interest rate falls to 5%. Remember the bond is bought for $1,000 at Year 0.

$$\text{Current yield} = \frac{\$100}{\$1{,}000} = 0.100 = 10.00\%.$$

$$\text{CG yield} = \frac{\$495}{\$1{,}000} = 0.495 = 49.5\%.$$

$$\text{Total return} = 10.0\% + 49.5\% = 59.5\%.$$

Repeat the calculation, but this time for Year 2.

$$\text{Current yield} = \frac{\$100}{\$1{,}495} = 0.670 = 6.70\%.$$

$$\text{Capital gain} = \frac{-\$25}{\$1{,}495} = -0.170 = -1.70\%.$$

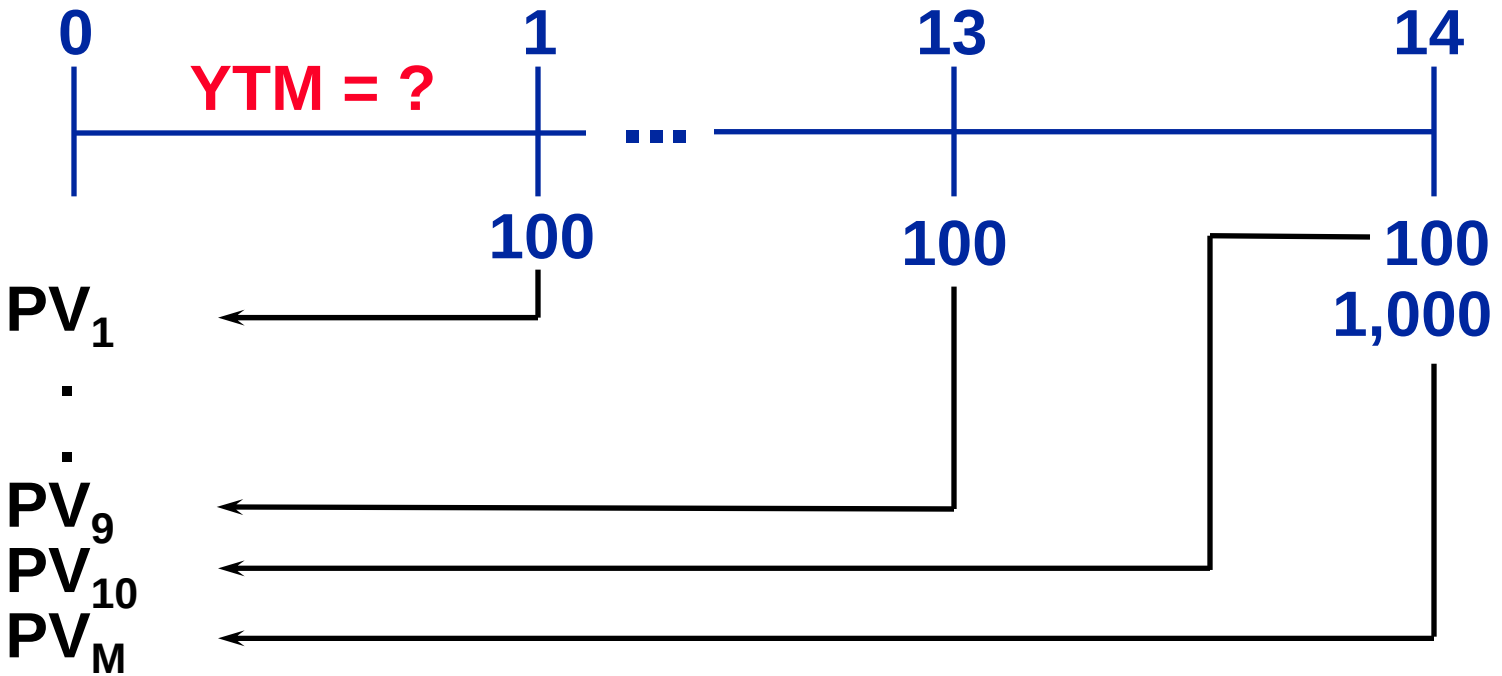
Total return = 6.7% - 1.7% = 5.0%.

? **Why are the returns so different?**

Yield to Maturity

- **The yield to maturity (YTM) on a bond is the *expected rate of return* assuming the bond is held to maturity and no default is expected.**
- **Mathematically, it is the discount rate that forces the present value of the cash flows from the bond to *equal* the bond's price.**

What's the YTM on a 14-year, 10% annual coupon, $1,000 par value bond that sells for $1,494.93?



Find the discount rate that "works"!

Using a Financial Calculator for YTM

	N	I/YR	PV	PMT	FV
INPUTS	14		1494.93	-100	-1000
OUTPUT		5.00			

? **Could we have made a guess for the YTM before doing the calculation?**

Find the YTM if the price were $713.78.

	N	I/YR	PV	PMT	FV
INPUTS	14		713.78	-100	-1000
OUTPUT		15.0			

? **Could we have made a guess for the YTM before doing the calculation?**

Spreadsheet Solution 1

	A	B	C	D
1				
2	10.0%		Interest rate guess	
3				
4	$ (1,494.93)		Bond price	
5	100		Year 1 coupon	
6	100		Year 2 coupon	
7	100		Year 3 coupon	
8	100		Year 4 coupon	
9	100		Year 5 coupon	
10	100		Year 6 coupon	
11	100		Year 7 coupon	
12	100		Year 8 coupon	
13	100		Year 9 coupon	
14	100		Year 10 coupon	
15	100		Year 11 coupon	
16	100		Year 12 coupon	
17	100		Year 13 coupon	
18	1,100		Year 14 coupon + Principal	
19				
20	5.0%	=IRR(A4:A18:A2) (entered into Cell A20)		

Spreadsheet Solution 2

	A	B	C	D
1				
2	14		Number of payments	
3	$ (1,494.93)		Present value (bond price)	
4	$ 100.00		Payment (coupon amount)	
5	$ 1,000.00		Future value (principal)	
6				
7				
8	5.0%	=RATE(A2,A4,A3,A5) (entered into Cell A8)		
9				
10				

Find the YTM if the price were $713.78.

	A	B	C	D
1				
2	10.0%		Interest rate guess	
3				
4	$ (713.78)		Bond price	
5	100		Year 1 coupon	
6	100		Year 2 coupon	
7	100		Year 3 coupon	
8	100		Year 4 coupon	
9	100		Year 5 coupon	
10	100		Year 6 coupon	
11	100		Year 7 coupon	
12	100		Year 8 coupon	
13	100		Year 9 coupon	
14	100		Year 10 coupon	
15	100		Year 11 coupon	
16	100		Year 12 coupon	
17	100		Year 13 coupon	
18	1,100		Year 14 coupon + Principal	
19				
20	15.0%	=IRR(A4:A18:A2) (entered into Cell A20)		

Spreadsheet Solution 2

	A	B	C	D
1				
2	14		Number of payments	
3	$ (713.78)		Present value (bond price)	
4	$ 100.00		Payment (coupon amount)	
5	$ 1,000.00		Future value (principal)	
6				
7				
8	15.0%	=RATE(A2,A4,A3,A5) (entered into Cell A8)		
9				
10				

What is the yield to call (YTC) on a 14-year, 10% annual coupon, $1,000 par value bond that sells for $713.78 and can be called after 5 years at $1,100?

Spreadsheet Solution 1

	A	B	C	D
1				
2	10.0%		Interest rate guess	
3				
4	$ (1,494.93)		Bond price	
5	100		Year 1 coupon	
6	100		Year 2 coupon	
7	100		Year 3 coupon	
8	100		Year 4 coupon	
9	100		Year 5 coupon	
10	100		Year 6 coupon	
11	100		Year 7 coupon	
12	100		Year 8 coupon	
13	100		Year 9 coupon	
14	100		Year 10 coupon	
15	100		Year 11 coupon	
16	100		Year 12 coupon	
17	100		Year 13 coupon	
18	1,100		Year 14 coupon + Principal	
19				
20	5.0%	=IRR(A4:A18:A2) (entered into Cell A20)		

Spreadsheet Solution 2

	A	B	C	D
1				
2	14		Number of payments	
3	$ (1,494.93)		Present value (bond price)	
4	$ 100.00		Payment (coupon amount)	
5	$ 1,000.00		Future value (principal)	
6				
7				
8	5.0%	=RATE(A2,A4,A3,A5) (entered into Cell A8)		
9				
10				

Bonds Actually Have Semiannual Coupons

- Therefore, there are *twice* as many interest payments compared with annual coupon payments.
- But the interest payment is only *half* of the annual amount.
- And the required rate of return is only *half* of the annual rate.
- Otherwise, the valuation process is the same as for annual coupons.

What is the value of a 14-year, 10% coupon, semiannual bond if the required rate of return is 5 percent?

	N	I/YR	PV	PMT	FV
INPUTS	2x14 28	5 / 2 2.5		100 / 2 -50	-1000
OUTPUT			1499.12		

Find the YTM of a 14-year, 10% coupon, semiannual bond if the bond is selling for $1,400.

	N	I/YR	PV	PMT	FV
INPUTS	2x14 28		1400	100 / 2 -50	-1000
OUTPUT		2.90			

Thus, the annual YTM = 2 x 2.90% = 5.80%.

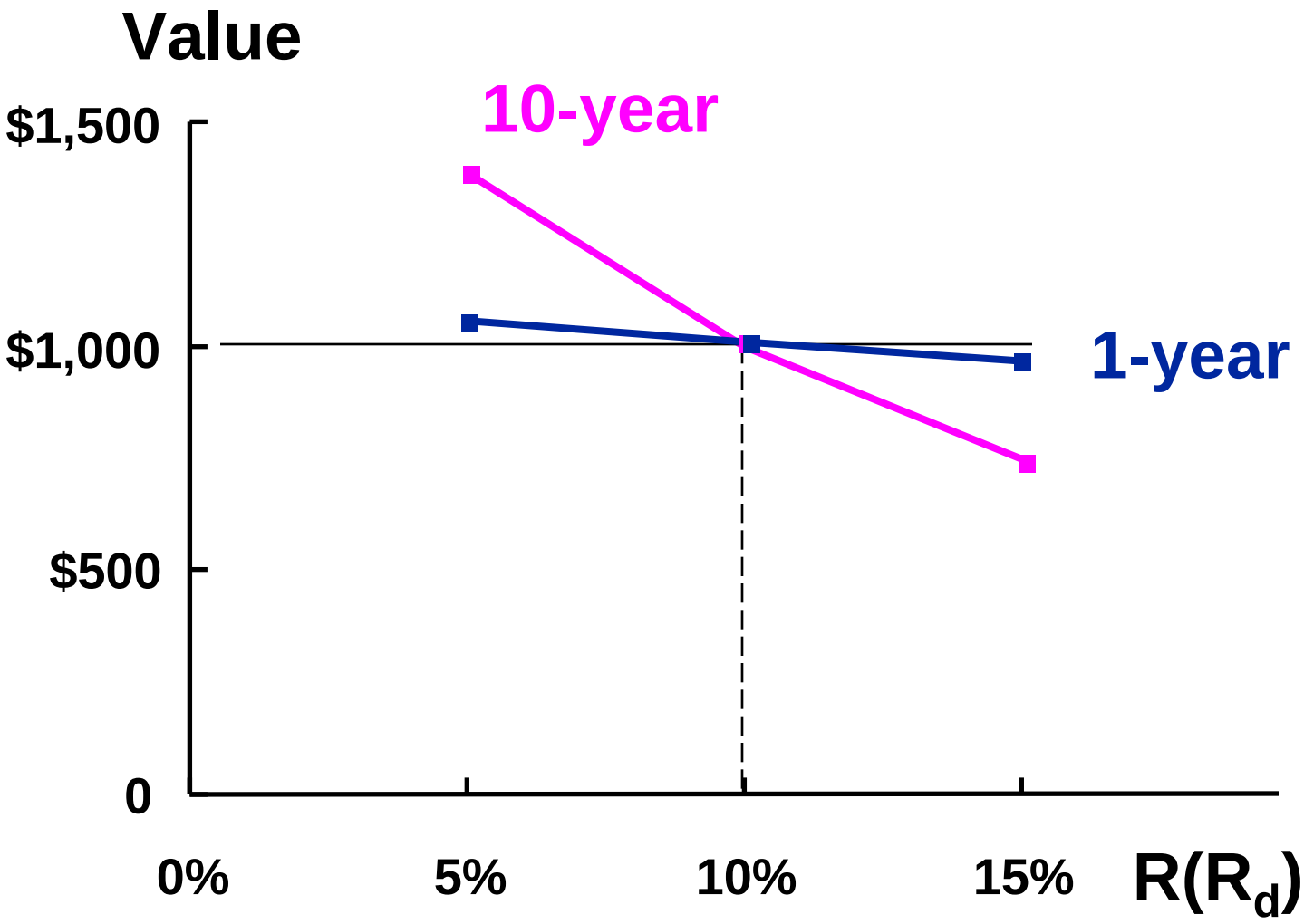
Interest Rate Risk

Interest rates change constantly, which gives rise to two types of interest rate risk.

- **Price risk arises because bond values decline when interest rates *rise*.**
- **Reinvestment rate risk arises because reinvested coupon (and principal) payments earn less when interest rates *fall*.**

Does a 1-year or 10-year 10% bond have more price risk?

$R(R_d)$	1-year	Change	10-year	Change
5%	$1,048	+4.8%	$1,386	+38.6%
10%	1,000		1,000	
15%	956	-4.4%	749	-25.1%


Value
10-year
$1,500
$1,000
1-year
$500
0
0%
5%
10%
15%
R(R_d)

Does a one-year or ten-year bond have more reinvestment rate risk?

- **Reinvestment rate risk depends both on the bond's *maturity* and the investor's holding period (investment horizon).**
- **In general, the *shorter* the maturity relative to the investment horizon, the *greater* the reinvestment rate risk.**

? **Why?**

How can interest rate risk be minimized?

- ***Long-term bonds*** **have high price risk but low reinvestment rate risk.**
- ***Short-term bonds*** **have low price risk but high reinvestment rate risk.**
- **Nothing is riskless! However, risk can be minimized by *matching the maturity* of the bond to the holding period.**

Conclusion

- **This concludes our discussion of *Chapter 11* (Long-Term Debt Financing).**
- **Although not all concepts were discussed in class, you are responsible for all of the material in the text.**

? **Do you have any questions?**