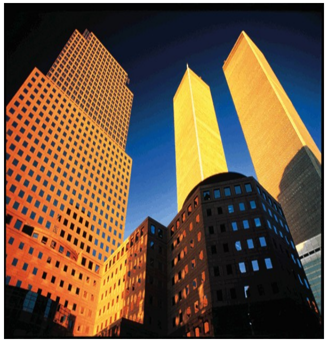
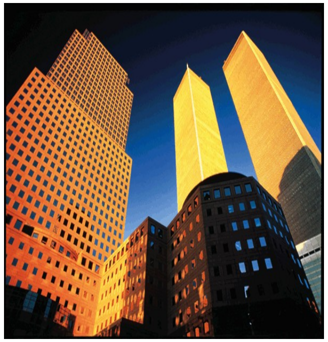


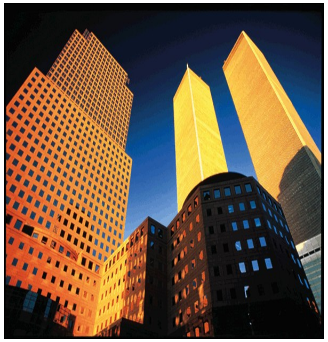
Chapter 4

The Valuation of Long-Term Securities



The Valuation of Long-Term Securities

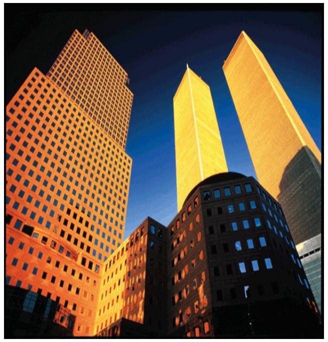
- Distinctions Among Valuation Concepts
- Bond Valuation
- Preferred Stock Valuation
- Common Stock Valuation
- Rates of Return (or Yields)



What is Value?

Liquidation value represents the amount of money that could be realized if an asset or group of assets is sold separately from its operating organization.

Going-concern value represents the amount a firm could be sold for as a continuing operating business.

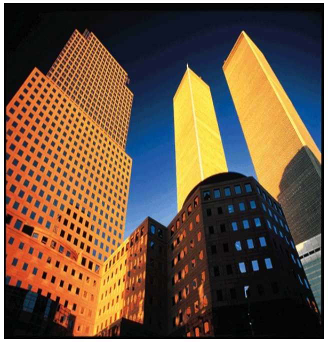


What is Value?

<u>**Book value**</u> **represents either**

(1) ***<u>an asset</u>*****: the accounting value of an asset -- the asset's cost minus its accumulated depreciation;**

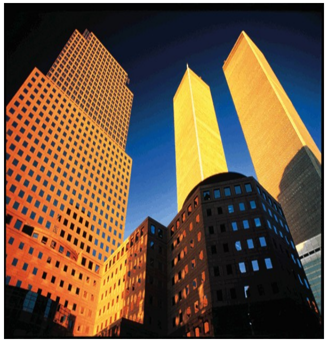
(2) ***<u>a firm</u>*****: total assets minus liabilities and preferred stock as listed on the balance sheet.**



What is Value?

Market value represents the market price at which an asset trades.

Intrinsic value represents the price a security "ought to have" based on all factors bearing on valuation.



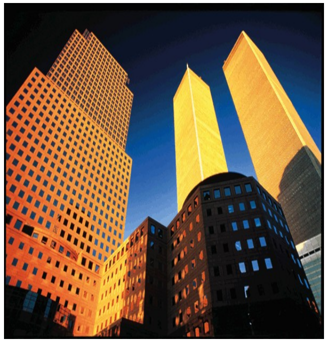
Bond Valuation

Important Terms

Types of Bonds

Valuation of Bonds

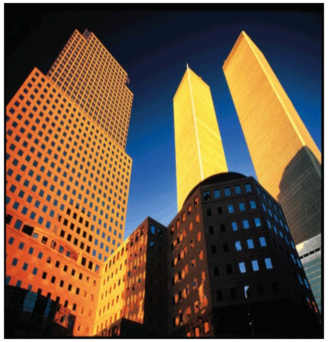
Handling Semiannual Compounding



Important Bond Terms

A **bond** is a long-term debt instrument issued by a corporation or government.

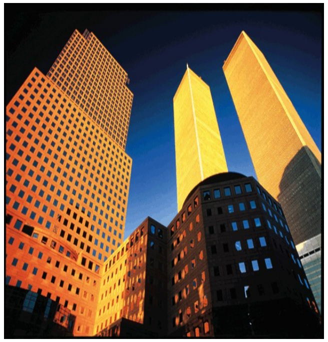
The **maturity value** (**MV**) [or face value] of a bond is the stated value. In the case of a U.S. bond, the face value is usually $1,000.



Important Bond Terms

The bond's <u>coupon rate</u> is the stated rate of interest; the annual interest payment divided by the bond's face value.

The <u>discount rate</u> (capitalization rate) is dependent on the risk of the bond and is composed of the risk-free rate plus a premium for risk.



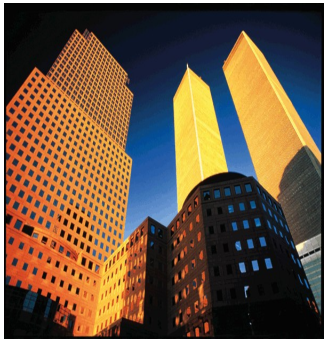
Different Types of Bonds

A **perpetual bond** is a bond that *never* matures. It has an infinite life.

$$V = \frac{I}{(1 + k_d)^1} + \frac{I}{(1 + k_d)^2} + \cdots + \frac{I}{(1 + k_d)^\infty}$$

$$= \sum_{t=1}^{\infty} \frac{I}{(1 + k_d)^t} \quad \text{or} \quad I\,(PVIFA_{k_d, \infty})$$

$$\boxed{V = I / k_d}$$ *[Reduced Form]*



Perpetual Bond Example

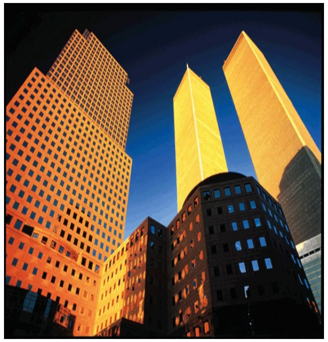
Bond P has a \$1,000 face value and provides an 8% coupon. The appropriate discount rate is 10%. What is the value of the perpetual bond?

I = \$1,000 (8%) = \$80.

k_d = 10%.

V = I / k_d [*Reduced Form*]

= \$80 / 10% = \$800.



“Tricking” the Calculator to Solve

	N	I/Y	PV	PMT	FV
Inputs	1,000,000	10		80	0
Compute			-800.0		

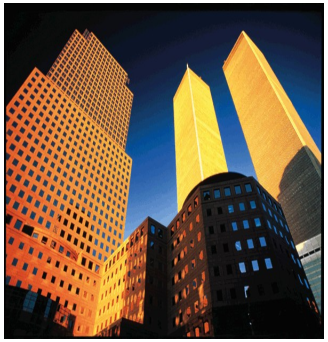
N: “Trick” by using ***huge*** N like 1,000,000!

I/Y: 10% interest rate per period (enter as 10 NOT .10)

PV: Compute (resulting answer is cost to purchase)

PMT: $80 annual interest forever (8% x $1,000 face)

FV: $0 (investor never receives the face value)



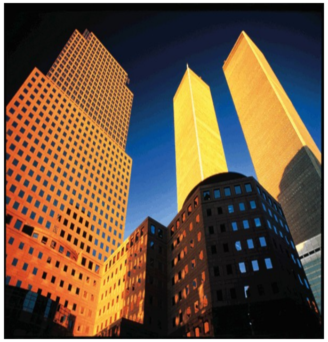
Different Types of Bonds

A non-zero coupon-paying bond is a coupon-paying bond with a finite life.

$$V = \frac{I}{(1 + k_d)^1} + \frac{I}{(1 + k_d)^2} + \ldots + \frac{I + MV}{(1 + k_d)^n}$$

$$= \sum_{t=1}^{n} \frac{I}{(1 + k_d)^t} + \frac{MV}{(1 + k_d)^n}$$

$$V = I\,(PVIFA_{k_d,\, n}) + MV\,(PVIF_{k_d,\, n})$$



Coupon Bond Example

Bond C has a \$1,000 face value and provides an 8% annual coupon for 30 years. The appropriate discount rate is 10%. What is the value of the *coupon bond*?

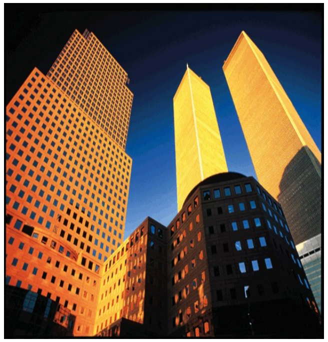
$$V = \$80\,(PVIFA_{10\%,\,30}) + \$1{,}000\,(PVIF_{10\%,\,30})$$

$$= \$80\,(9.427) + \$1{,}000\,(.057)$$

[*Table IV*] **[*Table II*]**

$$= \$754.16 + \$57.00$$

$$= \$811.16.$$



Solving the Coupon Bond on the Calculator

Inputs	30	10		80	+$1,000
	N	I/Y	PV	PMT	FV
Compute			-811.46	(Actual, rounding error in tables)	

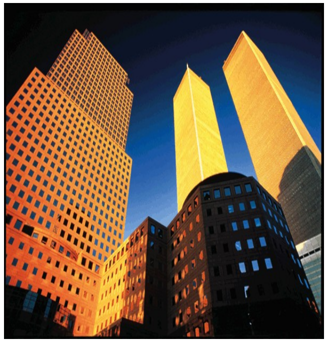
N: 30-year annual bond

I/Y: 10% interest rate per period (enter as 10 NOT .10)

PV: Compute (resulting answer is cost to purchase)

PMT: $80 annual interest (8% x $1,000 face value)

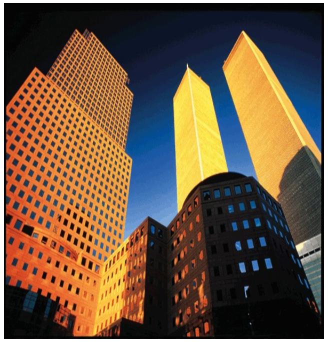
FV: $1,000 (investor receives face value in 30 years)



Different Types of Bonds

A **zero-coupon bond** is a bond that pays no interest but sells at a deep discount from its face value; it provides compensation to investors in the form of price appreciation.

$$V = \boxed{\frac{MV}{(1 + k_d)^n}} = MV\,(PVIF_{k_d,\, n})$$



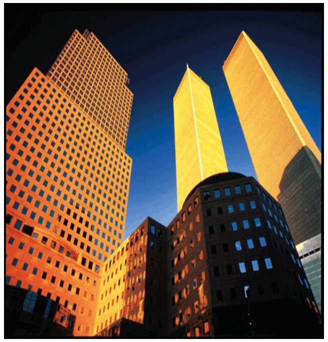
Zero-Coupon Bond Example

Bond Z has a $1,000 face value and a 30-year life. The appropriate discount rate is 10%. What is the value of the *zero-coupon bond*?

$$V = \$1,000 \, (PVIF_{10\%, 30})$$

$$= \$1,000 \, (.057)$$

$$= \$57.00$$



Solving the Zero-Coupon Bond on the Calculator

Inputs	30	10		0	+$1,000
	N	**I/Y**	**PV**	**PMT**	**FV**
Compute			-57.31	(Actual, rounding error in tables)	

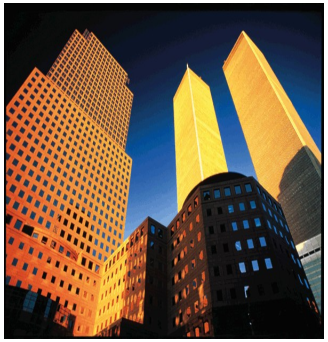
N: 30-year zero-coupon bond

I/Y: 10% interest rate per period (enter as 10 <u>NOT</u> .10)

PV: Compute (resulting answer is cost to purchase)

PMT: $0 coupon interest since it pays no coupon

FV: $1,000 (investor receives <u>only</u> face in 30 years)



Semiannual Compounding

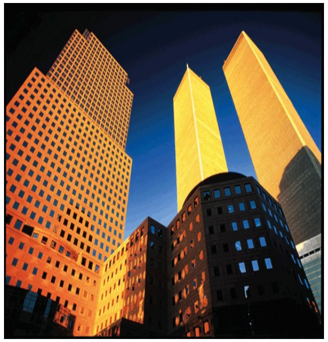
Most bonds *in the U.S.* pay interest twice a year (1/2 of the annual coupon).

<u>Adjustments needed</u>:

(1) Divide k_d by 2

(2) Multiply n by 2

(3) Divide I by 2



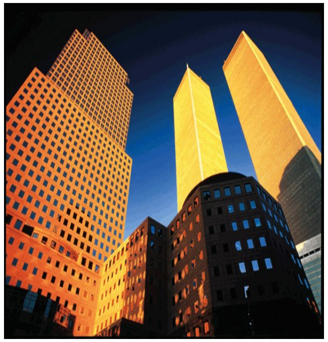
Semiannual Compounding

A **non-zero coupon bond** adjusted for semiannual compounding.

$$V = \frac{\boxed{I / 2}}{(1 + \boxed{k_d/2})^1} + \frac{I / 2}{(1 + k_d/2)^2} + \ldots + \frac{I / 2 + MV}{(1 + k_d/2)^{\boxed{2*n}}}$$

$$= \sum_{t=1}^{2*n} \frac{I / 2}{(1 + k_d/2)^t} + \frac{MV}{(1 + k_d/2)^{2*n}}$$

$$= I/2\,(PVIFA_{k_d/2,\,2*n}) + MV\,(PVIF_{k_d/2,\,2*n})$$



Semiannual Coupon Bond Example

Bond C has a $1,000 face value and provides an 8% semiannual coupon for 15 years. The appropriate discount rate is 10% (annual rate). What is the value of the *coupon bond*?

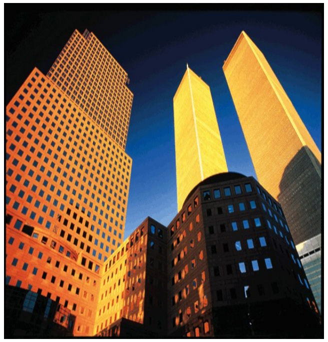
$$V = \$40\,(PVIFA_{5\%,\,30}) + \$1{,}000\,(PVIF_{5\%,\,30}) =$$

$$\$40\,(15.373) + \$1{,}000\,(.231)$$

[Table IV] *[Table II]*

$$= \$614.92 + \$231.00$$

$$= \$845.92$$



The Semiannual Coupon Bond on the Calculator

Inputs	30	5		40	+$1,000
	N	**I/Y**	**PV**	**PMT**	**FV**
Compute			-846.28	(Actual, rounding error in tables)	

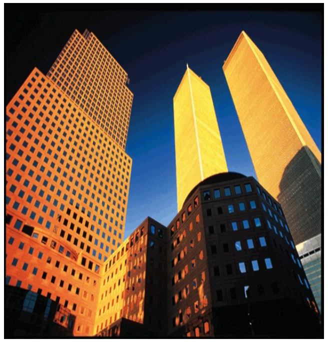
N: 15-year semiannual coupon bond (15 x 2 = 30)

I/Y: 5% interest rate per semiannual period (10 / 2 = 5)

PV: Compute (resulting answer is cost to purchase)

PMT: $40 semiannual coupon ($80 / 2 = $40)

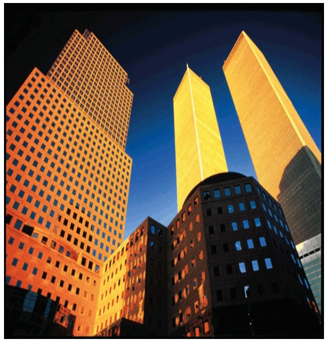
FV: $1,000 (investor receives face value in 15 years)



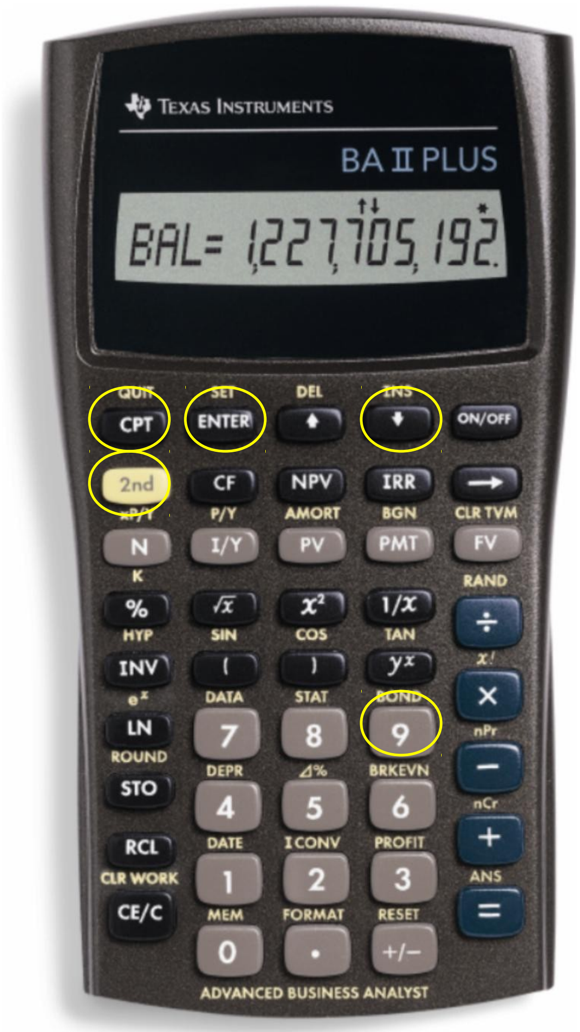
Semiannual Coupon Bond Example

Let us use another worksheet on your calculator to solve this problem. Assume that Bond C was purchased (settlement date) on 12-31-2000 and will be redeemed on 12-31-2015. This is identical to the 15-year period we discussed for Bond C.

What is its percent of par? What is the value of the bond?

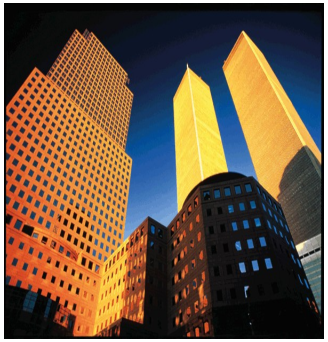


Solving the Bond Problem



Press:

2^{nd}	Bond	
12.3100	ENTER	↓
8	ENTER	↓
12.3115	ENTER	↓
↓	↓	↓
10	ENTER	↓
CPT		



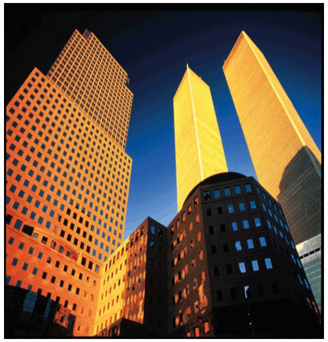
Semiannual Coupon Bond Example

1. What is its percent of par?

   84.628% of par (as quoted in financial papers)

2. What is the value of the bond?

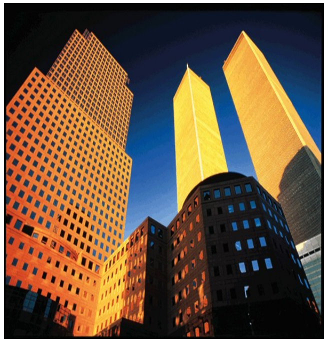
   84.628% x $1,000 face value = ***$846.28***



Preferred Stock Valuation

Preferred Stock is a type of stock that promises a (usually) fixed dividend, but at the discretion of the board of directors.

Preferred Stock has preference over common stock in the payment of dividends and claims on assets.



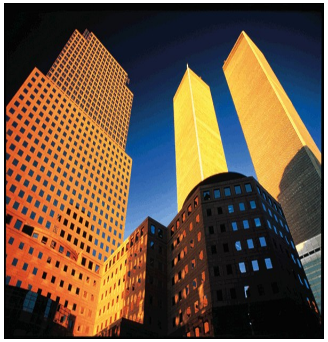
Preferred Stock Valuation

$$V = \frac{Div_P}{(1 + k_P)^1} + \frac{Div_P}{(1 + k_P)^2} + \ldots + \frac{Div_P}{(1 + k_P)^\infty}$$

$$= \sum_{t=1}^{\infty} \frac{Div_P}{(1 + k_P)^t} \quad \text{or} \quad Div_P(PVIFA_{k_P, \infty})$$

This reduces to a *perpetuity*!

$$V = Div_P / k_P$$



Preferred Stock Example

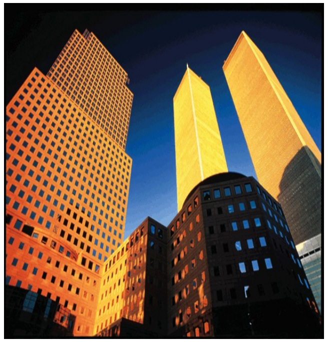
Stock PS has an 8%, $100 par value issue outstanding. The appropriate discount rate is 10%. What is the value of the preferred stock?

Div_P = $100 (8%) = $8.00. **$k_P$**

= 10%. **V**

= Div_P / k_P = $8.00 / 10%

= $80

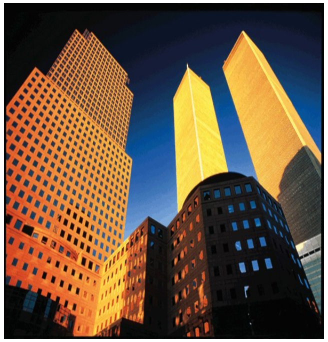


Common Stock Valuation

Common stock represents a residual ownership position in the corporation.

- Pro rata share of future earnings after all other obligations of the firm (if any remain).

- Dividends ***may*** be paid out of the pro rata share of earnings.

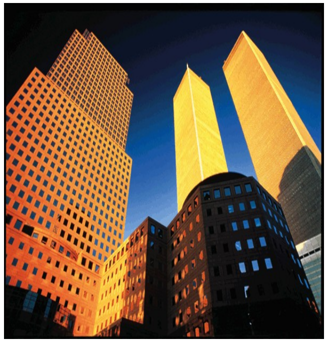


Common Stock Valuation

What cash flows will a shareholder receive when owning shares of **common stock**?

(1) Future dividends

(2) Future sale of the common stock shares



Dividend Valuation Model

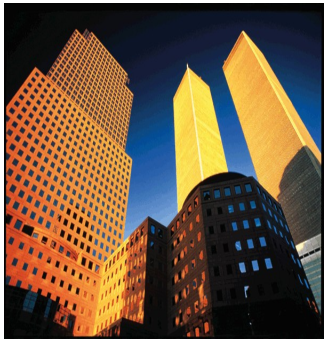
Basic dividend valuation model accounts for the PV of all future dividends.

$$V = \frac{Div_1}{(1 + k_e)^1} + \frac{Div_2}{(1 + k_e)^2} + \ldots + \frac{Div_\infty}{(1 + k_e)^\infty}$$

$$= \sum_{t=1}^{\infty} \frac{Div_t}{(1 + k_e)^t}$$

Div_t: Cash dividend at time t

k_e: Equity investor's required return

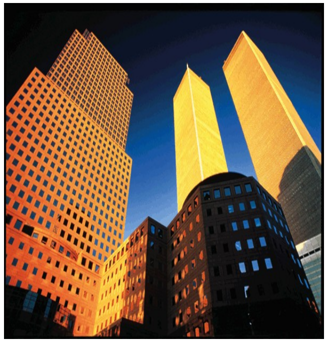


Adjusted Dividend Valuation Model

The basic dividend valuation model adjusted for the future stock sale.

$$V = \frac{Div_1}{(1 + k_e)^1} + \frac{Div_2}{(1 + k_e)^2} + \dots + \frac{Div_n + Price_n}{(1 + k_e)^n}$$

n:	The year in which the firm's shares are expected to be sold.
$Price_n$:	The expected share price in year n.



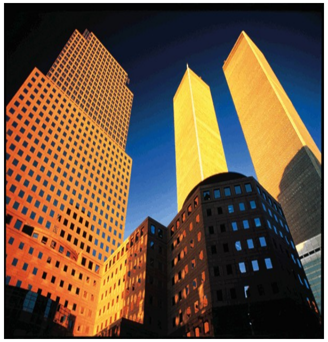
Dividend Growth Pattern Assumptions

The dividend valuation model requires the forecast of *all* future dividends. The following dividend growth rate assumptions simplify the valuation process.

Constant Growth

No Growth

Growth Phases



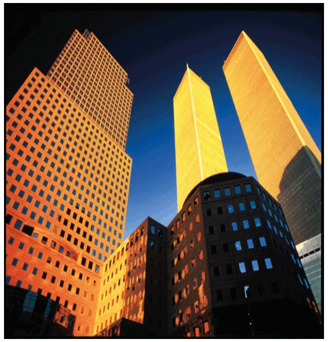
Constant Growth Model

The **constant growth model** assumes that dividends will grow forever at the rate g.

$$V = \frac{D_0(1+g)}{(1+k_e)^1} + \frac{D_0(1+g)^2}{(1+k_e)^2} + \dots + \frac{D_0(1+g)^{\infty}}{(1+k_e)^{\infty}}$$

$$= \boxed{\frac{D_1}{(k_e - g)}}$$

D_1:	Dividend paid at time 1.
g:	The constant growth rate.
k_e:	Investor's required return.

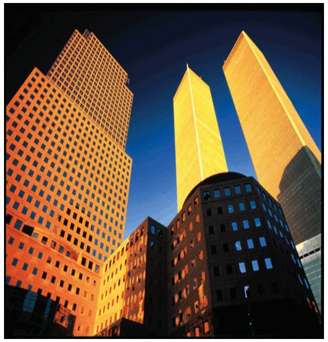


Constant Growth Model Example

Stock CG has an expected growth rate of 8%. Each share of stock just received an annual $3.24 dividend per share. The appropriate discount rate is 15%. What is the value of the common stock?

$D_1 = \$3.24\ (1 + .08) = \$3.50$

$V_{CG} = D_1 / (k_e - g) = \$3.50 / (.15 - .08) = \$50$



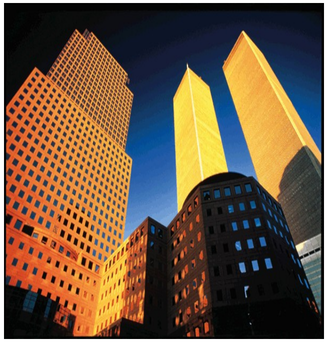
Zero Growth Model

The **zero growth model** assumes that dividends will grow forever at the rate $g = 0$.

$$V_{ZG} = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \dots + \frac{D_\infty}{(1+k_e)^\infty}$$

$$= \boxed{\frac{D_1}{k_e}}$$

D_1:	Dividend paid at time 1.
k_e:	Investor's required return.

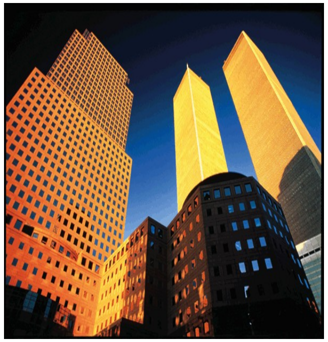


Zero Growth Model Example

Stock ZG has an expected growth rate of 0%. Each share of stock just received an annual $3.24 dividend per share. The appropriate discount rate is 15%. What is the value of the common stock?

D_1 = \$3.24 (1 + 0) = \$3.24

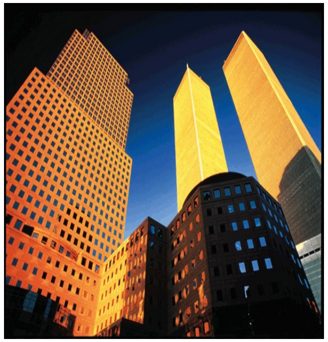
V_{ZG} = D_1 / (k_e - 0) = \$3.24 / (.15 - 0)
= \$21.60



Growth Phases Model

The **growth phases model** assumes that dividends for each share will grow at two or more *different* growth rates.

$$V = \sum_{t=1}^{n} \frac{D_0(1+\boxed{g_1})^t}{(1+k_e)^t} + \sum_{t=n+1}^{\infty} \frac{D_n(1+\boxed{g_2})^t}{(1+k_e)^t}$$

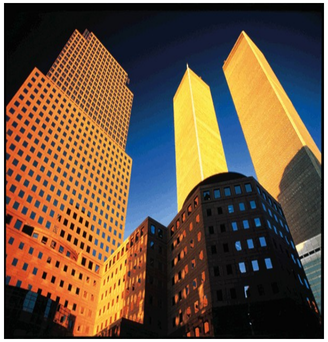


Growth Phases Model

Note that the second phase of the growth phases model assumes that dividends will grow at a constant rate g_2.

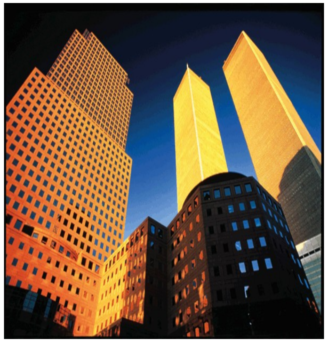
We can rewrite the formula as:

$$V = \sum_{t=1}^{n} \frac{D_0(1+g_1)^t}{(1+k_e)^t} + \left[\frac{1}{(1+k_e)^n}\right]\left[\frac{D_{n+1}}{(k_e - g_2)}\right]$$

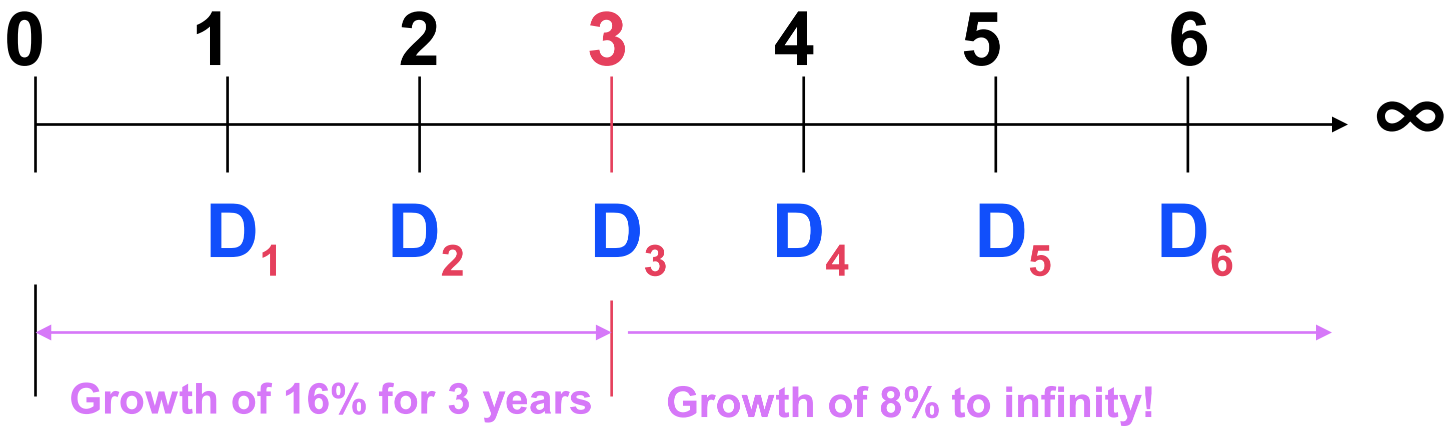


Growth Phases Model Example

Stock GP has an expected growth rate of 16% for the first 3 years and 8% thereafter. Each share of stock just received an annual $3.24 dividend per share. The appropriate discount rate is 15%. What is the value of the common stock under this scenario?

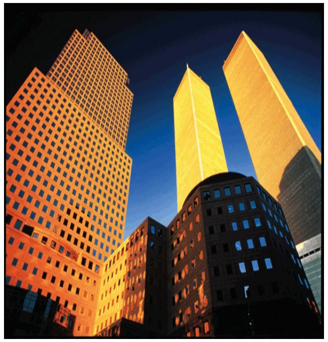


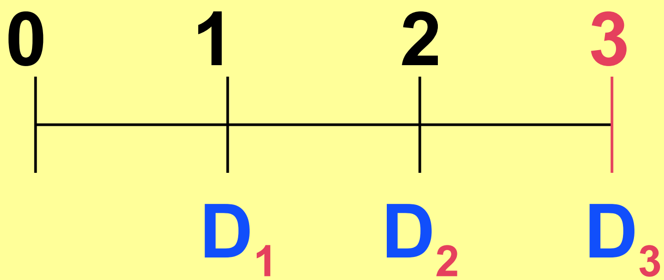
Growth Phases Model Example



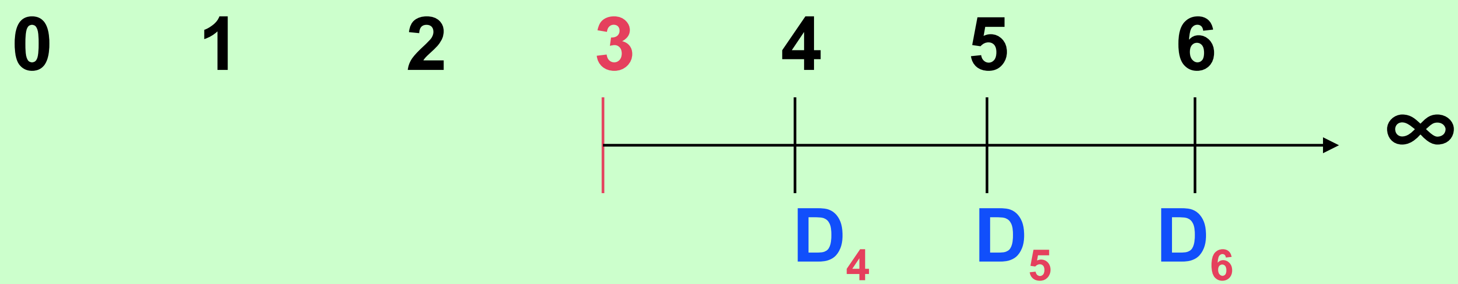
Stock GP has two phases of growth. The first, 16%, starts at time t=0 for 3 years and is followed by 8% thereafter starting at time t=3. We should view the time line as two separate time lines in the valuation.

Growth Phases Model Example

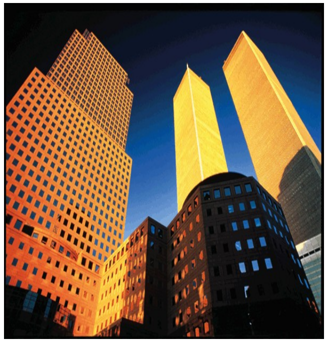




Growth Phase #1 plus the infinitely long Phase #2



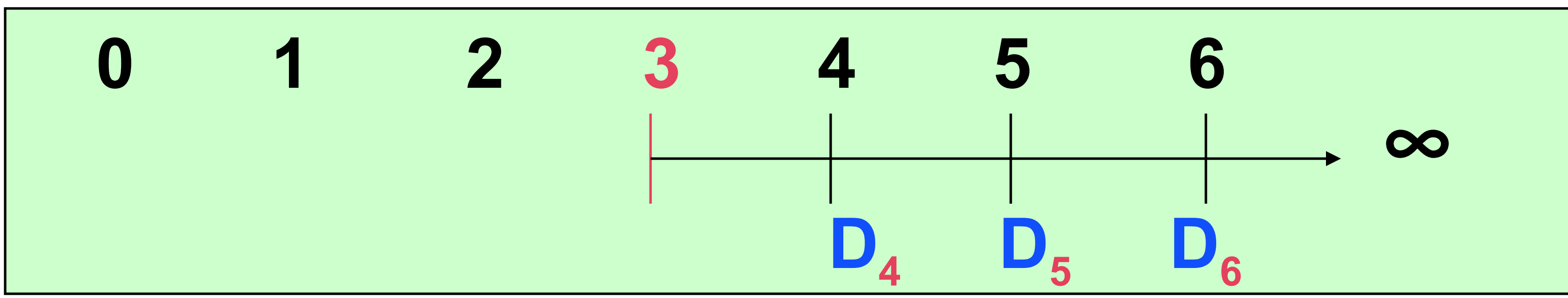
Note that we can value Phase #2 using the *Constant Growth Model*



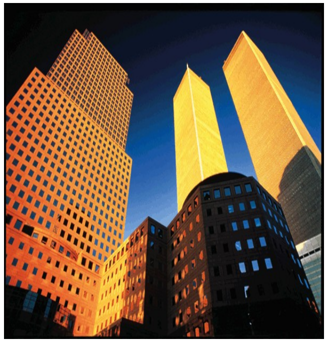
Growth Phases Model Example

$$V_3 = \frac{D_4}{k-g}$$

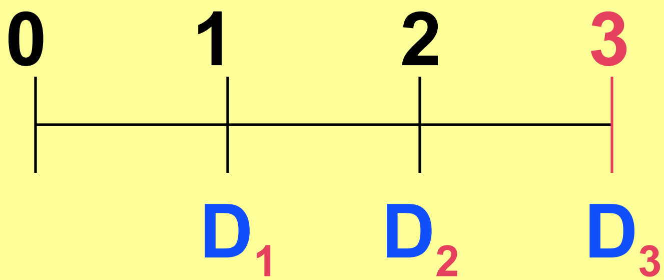
We can use this model because dividends grow at a constant 8% rate beginning at the end of Year 3.



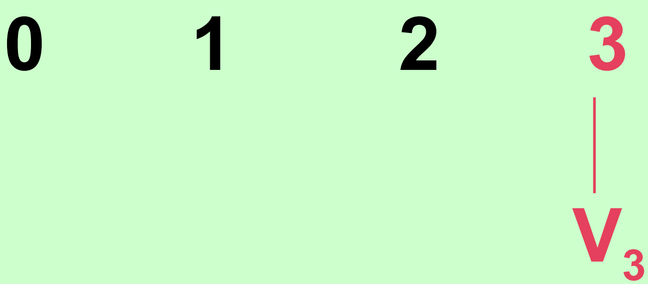
Note that we can now replace all dividends from Year 4 to infinity with the *value* at time t=3, V_3! Simpler!!



Growth Phases Model Example

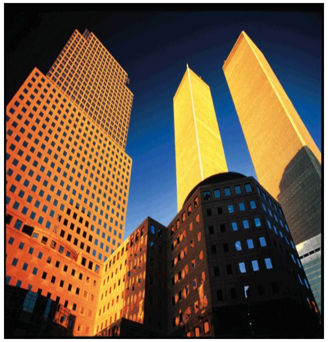


New Time Line



Where $V_3 = \dfrac{D_4}{k-g}$

Now we only need to find the first four dividends to calculate the necessary cash flows.



Growth Phases Model Example

Determine the annual dividends.

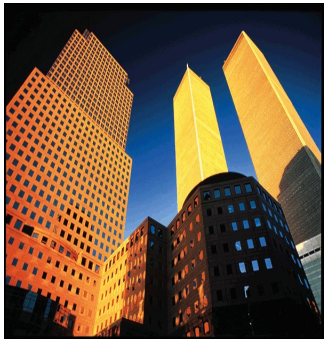
D_0 = $3.24 (this has been paid already)

$D_1 = D_0(1+g_1)^1 = \$3.24(1.16)^1 = \$3.76$

$D_2 = D_0(1+g_1)^2 = \$3.24(1.16)^2 = \$4.36$

$D_3 = D_0(1+g_1)^3 = \$3.24(1.16)^3 = \$5.06$

$D_4 = D_3(1+g_2)^1 = \$5.06(1.08)^1 = \$5.46$



Growth Phases Model Example

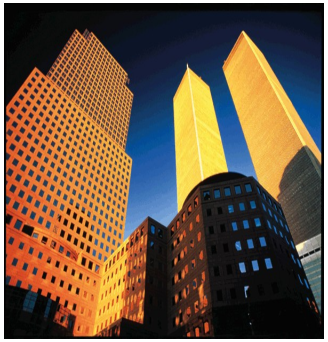
0	1	2	3
	3.76	4.36	5.06

Actual Values

0	1	2	3
			78

Where $\$78 = \dfrac{5.46}{.15 - .08}$

Now we need to find the present value of the cash flows.



Growth Phases Model Example

We determine the PV of cash flows.

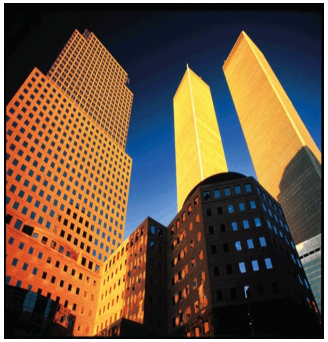
$PV(D_1) = D_1(PVIF_{15\%, 1}) = \$3.76\ (.870) = \$\underline{3.27}$

$PV(D_2) = D_2(PVIF_{15\%, 2}) = \$4.36\ (.756) = \$\underline{3.30}$

$PV(D_3) = D_3(PVIF_{15\%, 3}) = \$5.06\ (.658) = \$\underline{3.33}$

$P_3 = \$5.46\ /\ (.15 - .08) = \$78$ [CG Model]

$PV(P_3) = P_3(PVIF_{15\%, 3}) = \$78\ (.658) = \$\underline{51.32}$



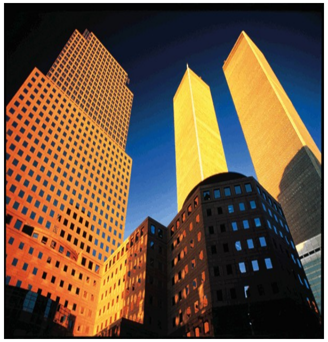
Growth Phases Model Example

Finally, we calculate the ***intrinsic value*** by summing all the cash flow present values.

$$V = \$3.27 + \$3.30 + \$3.33 + \$51.32$$

V = \$61.22

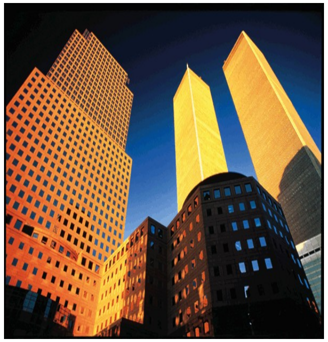
$$V = \sum_{t=1}^{3} \frac{D_0(1+.16)^t}{(1+.15)^t} + \left[\frac{1}{(1+.15)^n}\right]\left[\frac{D_4}{(.15-.08)}\right]$$



Solving the Intrinsic Value Problem using CF Registry

Steps in the Process (Page 1)

Step 1:	Press	CF			key
Step 2:	Press	2nd	CLR Work		keys
Step 3:	For *CF0* Press	0	Enter	↓	keys
Step 4:	For *C01* Press	3.76	Enter	↓	keys
Step 5:	For *F01* Press	1	Enter	↓	keys
Step 6:	For *C02* Press	4.36	Enter	↓	keys
Step 7:	For *F02* Press	1	Enter	↓	keys



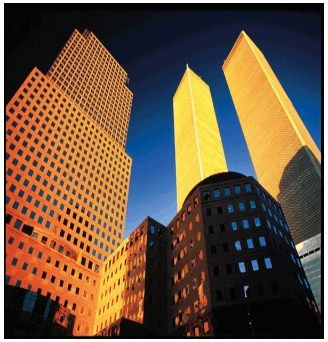
Solving the Intrinsic Value Problem using CF Registry

Steps in the Process (Page 2)

Step 8:	For *C03* Press	83.06	Enter	↓	keys
Step 9:	For *F03* Press	1	Enter	↓	keys
Step 10:	Press	↓	↓		keys
Step 11:	Press	NPV			
Step 12:	Press	15	Enter	↓	keys
Step 13:	Press	CPT			

RESULT: Value = $61.18!

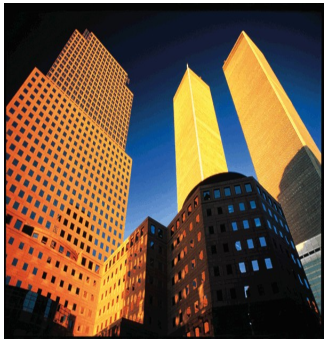
(Actual, rounding error in tables)



Calculating Rates of Return (or Yields)

Steps to calculate the rate of return (or yield).

1. Determine the expected **cash flows**.
2. Replace the intrinsic value (V) with the **market price (P_0)**.
3. Solve for the ***market required rate of return*** that equates the **discounted cash flows** to the **market price**.



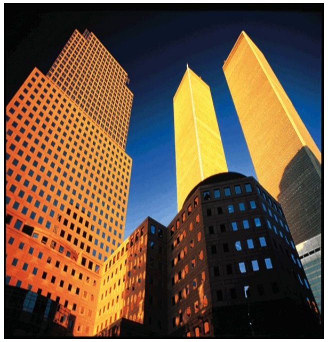
Determining Bond YTM

Determine the Yield-to-Maturity (YTM) for the coupon-paying bond with a finite life.

$$P_0 = \sum_{t=1}^{n} \frac{I}{(1 + \boxed{k_d})^t} + \frac{MV}{(1 + \boxed{k_d})^n}$$

$$= I\,(PVIFA_{\boxed{k_d},\,n}) + MV\,(PVIF_{\boxed{k_d},\,n})$$

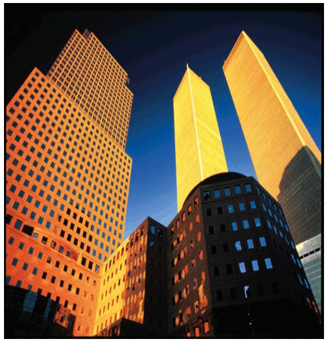
$$\boxed{k_d = YTM}$$



Determining the YTM

Julie Miller want to determine the YTM for an issue of outstanding bonds at *Basket Wonders (BW)*. *BW* has an issue of 10% annual coupon bonds with 15 years left to maturity. The bonds have a current market value of *$1,250*.

What is the YTM?



YTM Solution (Try 9%)

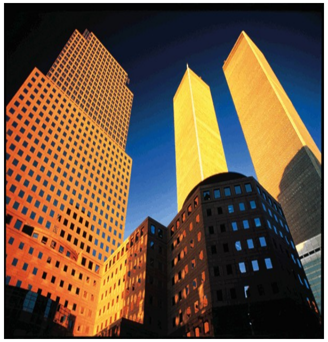
$\$1{,}250 \quad = \quad \$100(PVIFA_{9\%,15}) + \$1{,}000(PVIF_{9\%,\,15})$

$\$1{,}250 \quad = \quad \$100(8.061) + \$1{,}000(.275)$

$\$1{,}250 \quad = \quad \$806.10 + \$275.00$

$\quad\quad\quad\;\; \neq \quad$ **\$1,081.10**

[Rate is too high!]



YTM Solution (Try 7%)

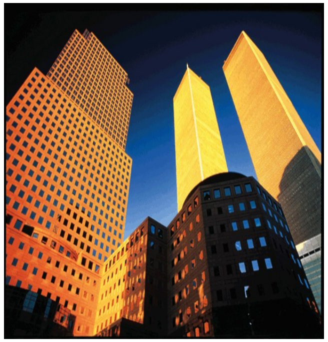
$\$1{,}250 \quad = \quad \$100(PVIFA_{7\%,15}) + \$1{,}000(PVIF_{7\%,15})$

$\$1{,}250 \quad = \quad \$100(9.108) + \$1{,}000(.362)$

$\$1{,}250 \quad = \quad \$910.80 + \$362.00$

$\neq \quad \$1{,}272.80$

[*Rate is too low!*]



YTM Solution (Interpolate)

.07 $1,273

X

$23

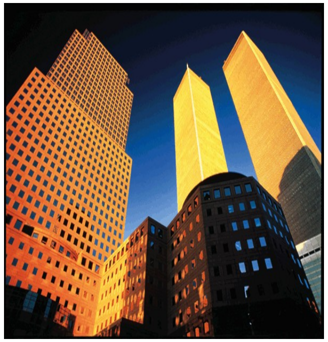
.02

IRR $1,250

$192

.09 $1,081

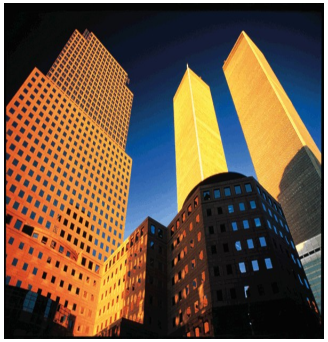
$$\frac{X}{.02} = \frac{\$23}{\$192}$$



YTM Solution (Interpolate)

		.07	$1,273	
.02	X	IRR	$1,250	$23
		.09	$1,081	$192

$$\frac{X}{.02} = \frac{\$23}{\$192}$$

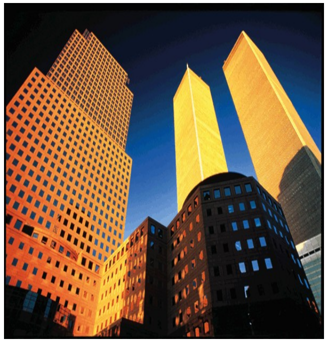


YTM Solution (Interpolate)

$$.02\left[\begin{array}{lll} X & \left[\begin{array}{ll} .07 & \$1273 \\ YTM & \$1250 \end{array}\right] & \$23 \\ & \begin{array}{ll} .09 & \$1081 \end{array} & \end{array}\right]\$192$$

$$X = \frac{(\$23)(0.02)}{\$192} \qquad X = .0024$$

$$YTM = .07 + .0024 = .0724 \text{ or } 7.24\%$$



YTM Solution on the Calculator

Inputs	15		-1,250	100	+$1,000
	N	I/Y	PV	PMT	FV
Compute		7.22% (actual YTM)			

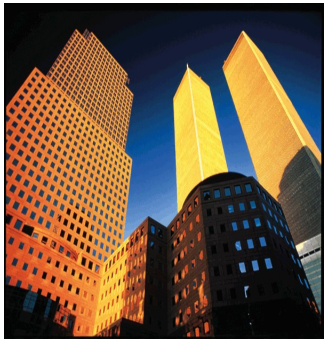
N: 15-year annual bond

I/Y: Compute -- Solving for the annual YTM

PV: Cost to purchase is $1,250

PMT: $100 annual interest (10% x $1,000 face value)

FV: $1,000 (investor receives face value in 15 years)



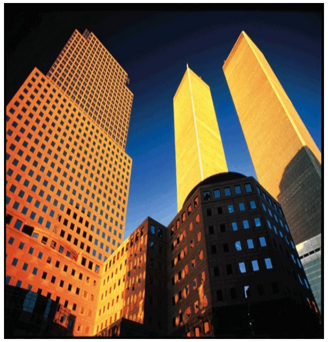
Determining Semiannual Coupon Bond YTM

Determine the Yield-to-Maturity (YTM) for the semiannual coupon-paying bond with a finite life.

$$P_0 = \sum_{t=1}^{2n} \frac{I / 2}{(1 + \boxed{k_d}/2)^t} + \frac{MV}{(1 + \boxed{k_d}/2)^{2n}}$$

$$= (I/2)(PVIFA_{\boxed{k_d}/2,\, 2n}) + MV(PVIF_{\boxed{k_d}/2,\, 2n})$$

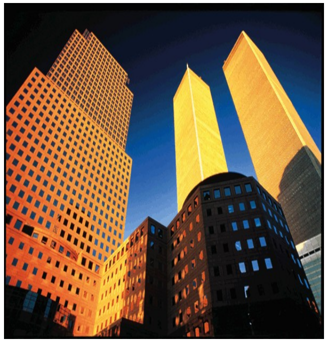
$$\boxed{[\,1 + (k_d / 2)\,]^2 - 1 = YTM}$$



Determining the Semiannual Coupon Bond YTM

Julie Miller want to determine the YTM for another issue of outstanding bonds. *The firm* has an issue of 8% semiannual coupon bonds with 20 years left to maturity. The bonds have a current market value of *$950*.

What is the YTM?



YTM Solution on the Calculator

Inputs	40		-950	40	+$1,000
	N	**I/Y**	**PV**	**PMT**	**FV**
Compute		4.2626% = (k_d / 2)			

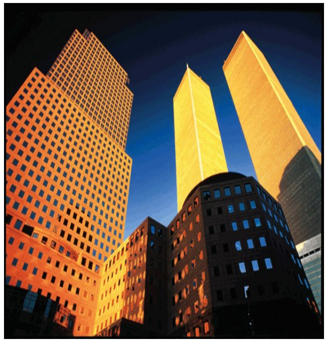
N: 20-year semiannual bond (20 x 2 = 40)

I/Y: Compute -- Solving for the semiannual yield now

PV: Cost to purchase is $950 today

PMT: $40 annual interest (8% x $1,000 face value / 2)

FV: $1,000 (investor receives face value in 15 years)



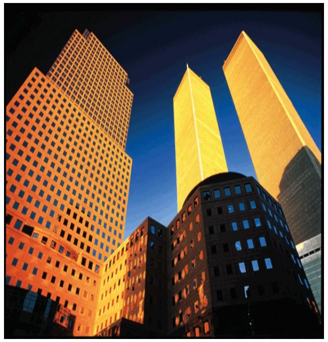
Determining Semiannual Coupon Bond YTM

Determine the Yield-to-Maturity (YTM) for the semiannual coupon-paying bond with a finite life.

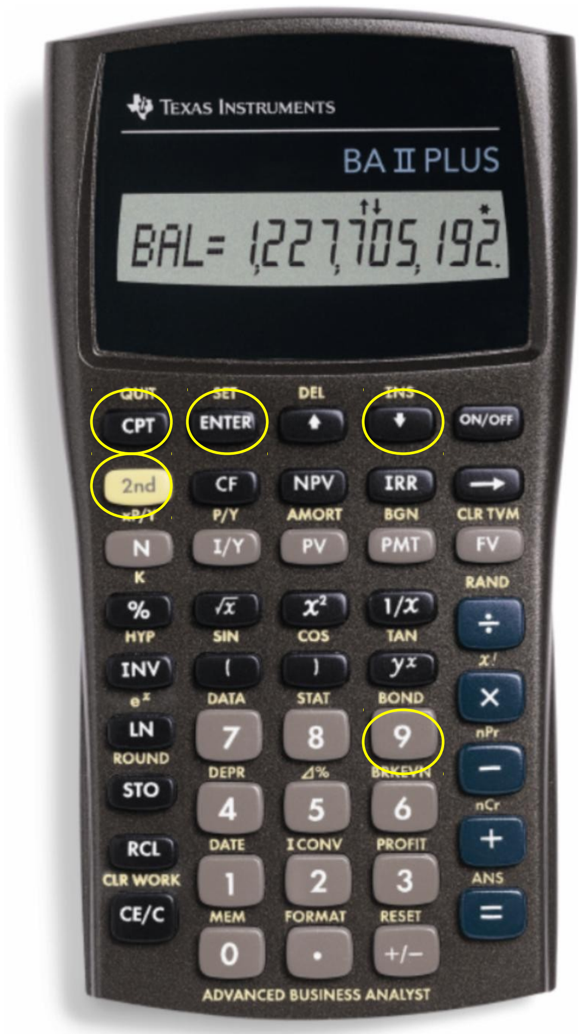
$$[\,1 + (k_d\,/\,2)\,]^2 - 1 = YTM$$

$$[\,1 + (.042626)\,]^2 - 1 = .0871$$

or 8.71%

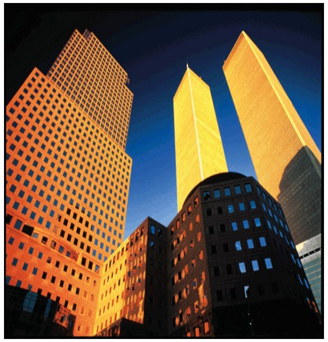


Solving the Bond Problem



Press:

2^{nd}	Bond		
12.3100	ENTER		↓
8	ENTER		↓
12.3120	ENTER		↓
↓	↓	↓	↓
95	ENTER		↑
CPT			



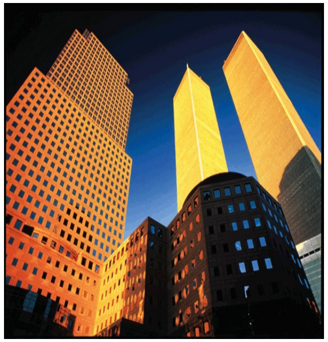
Determining Semiannual Coupon Bond YTM

This technique will calculate k_d. You must then substitute it into the following formula.

$$[\,1 + (k_d / 2)\,]^2 - 1 = YTM$$

$$[\,1 + (.0852514/2)\,]^2 - 1 = .0871$$

or 8.71% (same result!)

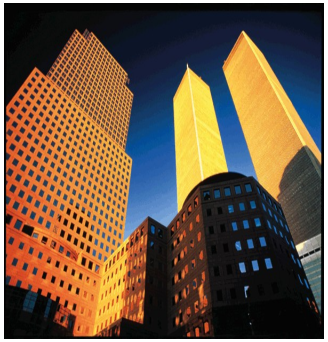


Bond Price-Yield Relationship

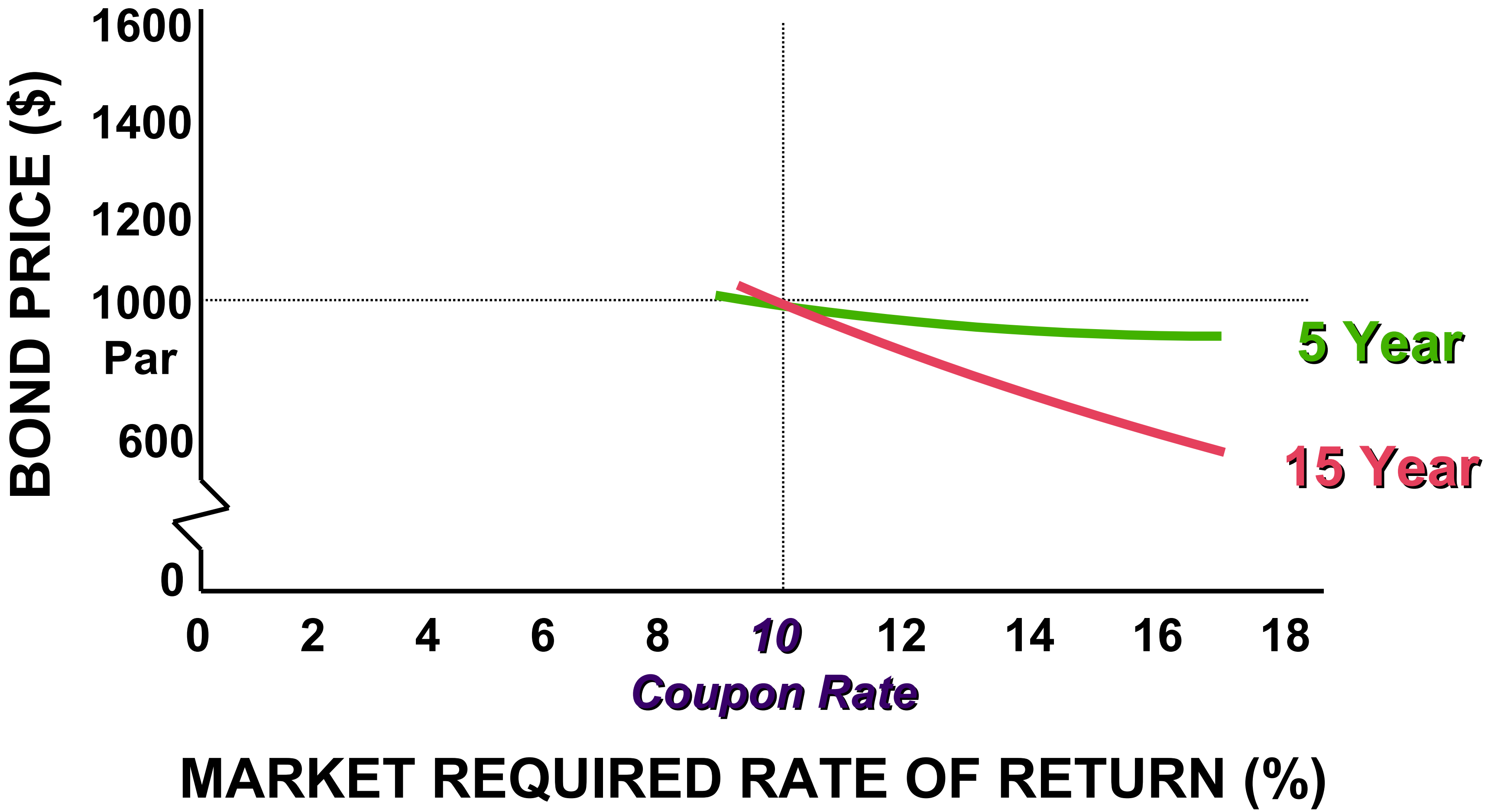
Discount Bond -- The market required rate of return exceeds the coupon rate (Par > P_0).

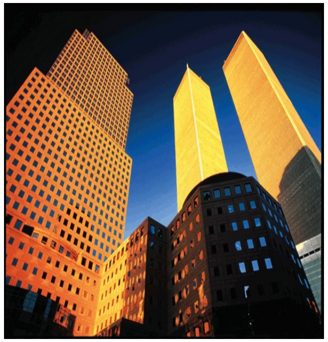
Premium Bond -- The coupon rate exceeds the market required rate of return (P_0 > Par).

Par Bond -- The coupon rate equals the market required rate of return (P_0 = Par).



Bond Price-Yield Relationship

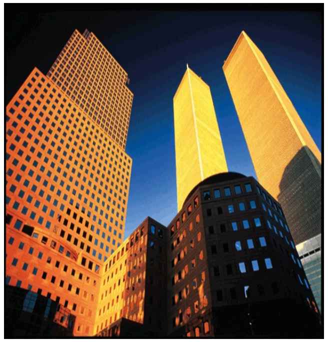




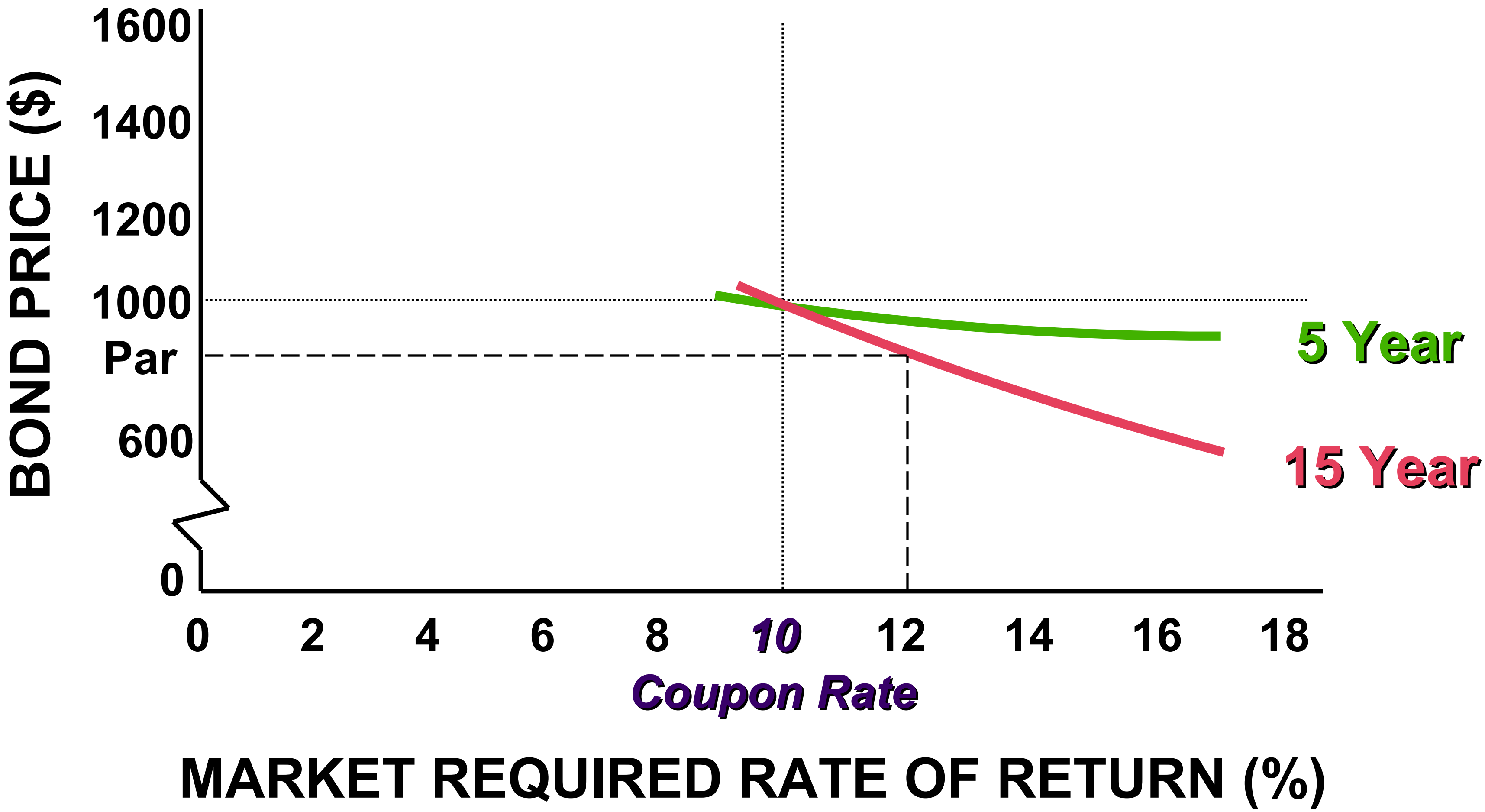
Bond Price-Yield Relationship

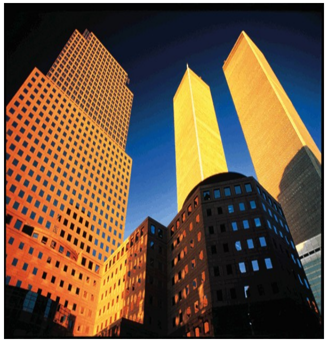
When interest rates ***rise***, then the market required rates of return ***rise*** and bond prices will ***fall***.

Assume that the required rate of return on a 15-year, 10% coupon-paying bond ***rises*** from 10% to 12%. What happens to the bond price?



Bond Price-Yield Relationship

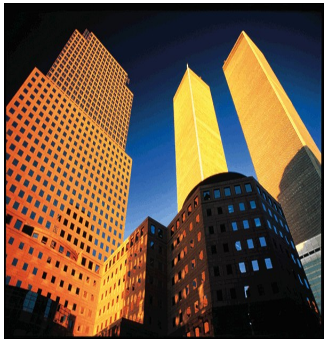




Bond Price-Yield Relationship (Rising Rates)

The required rate of return on a 15-year, 10% coupon-paying bond has *risen* from 10% to 12%.

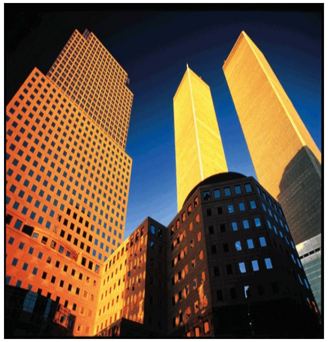
Therefore, the bond price has *fallen* from $1,000 to $864.



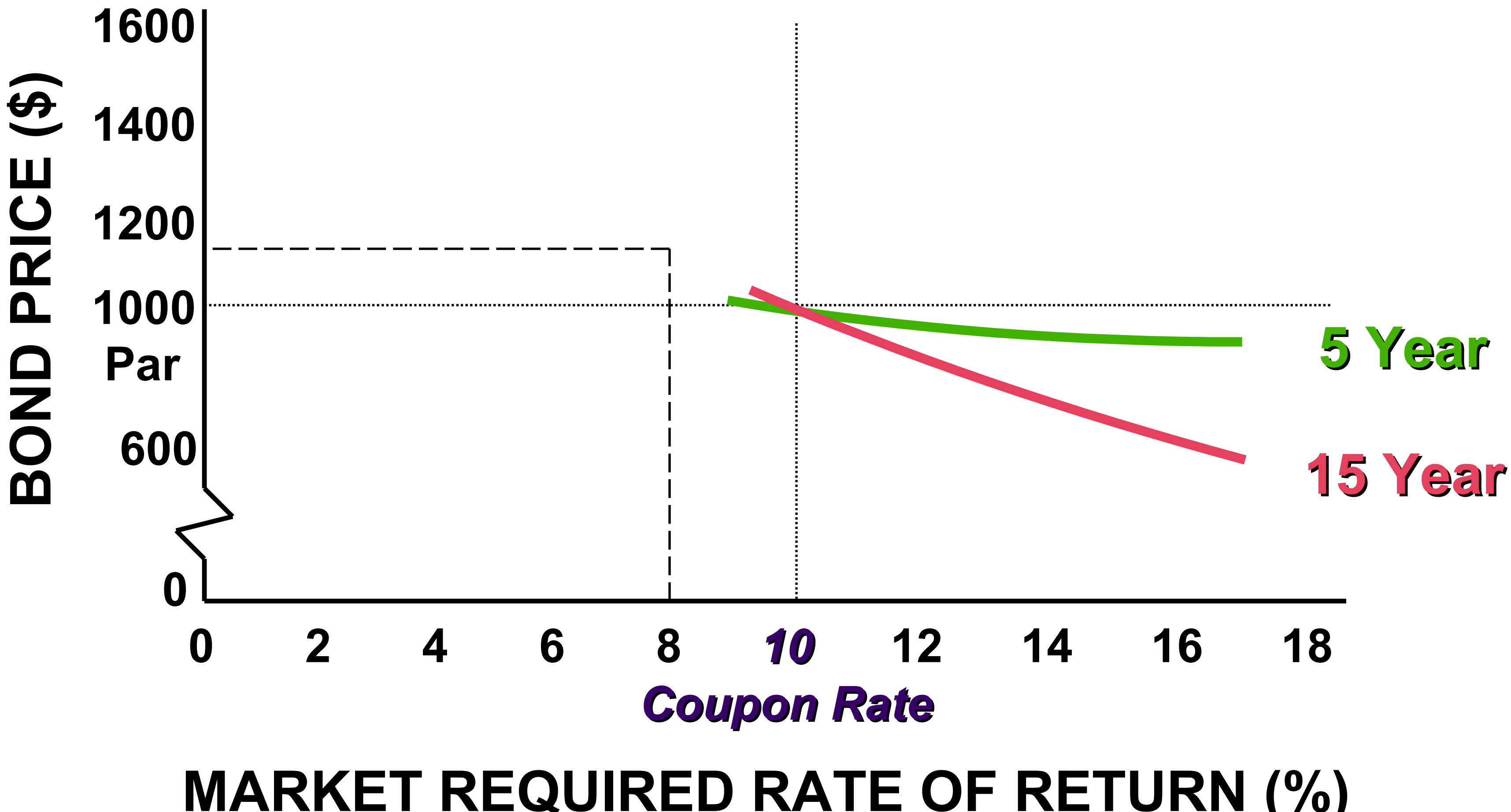
Bond Price-Yield Relationship

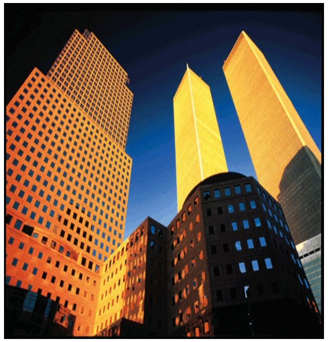
When interest rates ***fall***, then the market required rates of return ***fall*** and bond prices will ***rise***.

Assume that the required rate of return on a 15-year, 10% coupon-paying bond ***falls*** from 10% to 8%. What happens to the bond price?



Bond Price-Yield Relationship

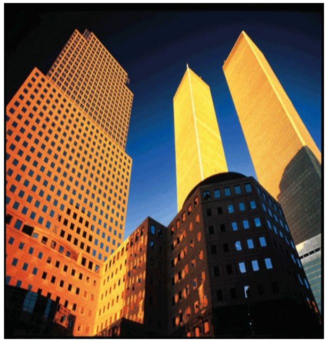




Bond Price-Yield Relationship (Declining Rates)

The required rate of return on a 15-year, 10% coupon-paying bond has *fallen* from 10% to 8%.

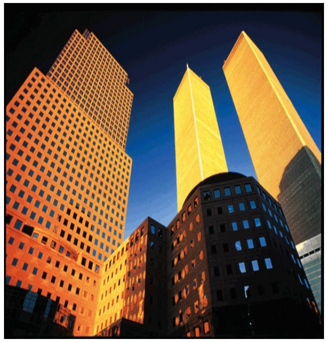
Therefore, the bond price has *risen* from $1,000 to $1,171.



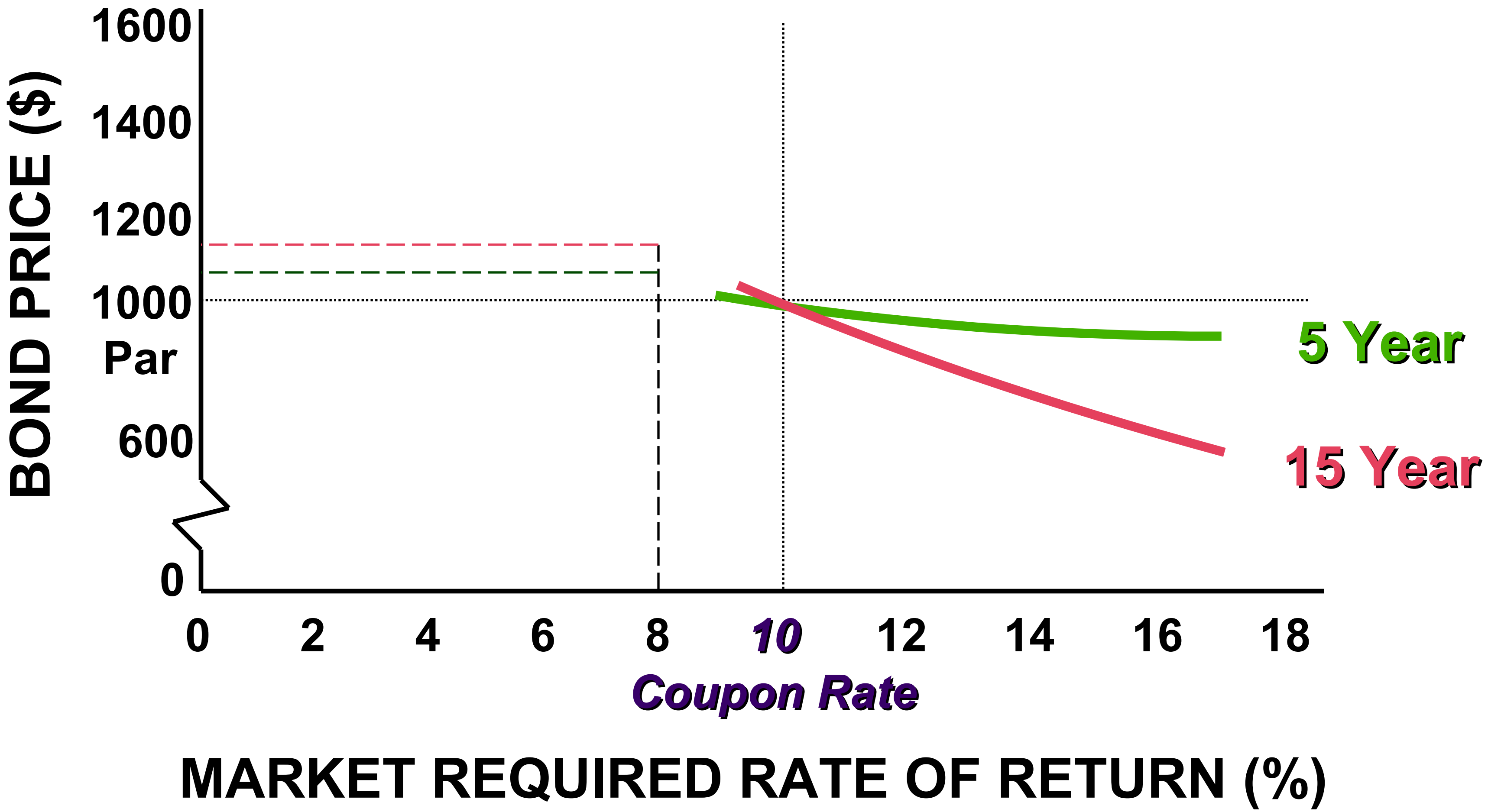
The Role of Bond Maturity

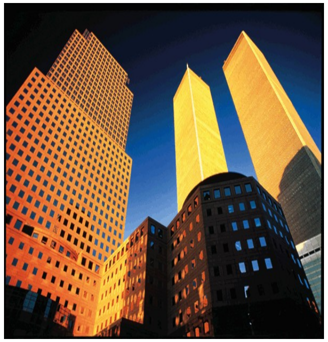
The longer the bond maturity, the greater the change in bond price for a given change in the market required rate of return.

Assume that the required rate of return on both the 5- and 15-year, 10% coupon-paying bonds *fall* from 10% to 8%. What happens to the changes in bond prices?



Bond Price-Yield Relationship



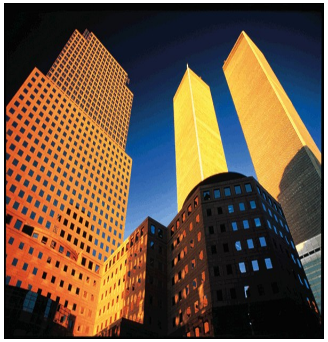


The Role of Bond Maturity

The required rate of return on both the 5- and 15-year, 10% coupon-paying bonds has *fallen* from 10% to 8%.

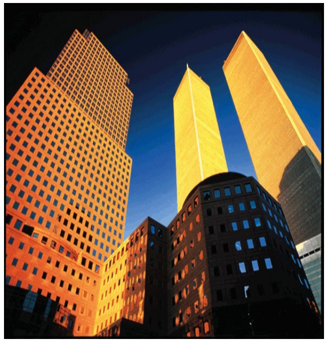
The 5-year bond price has *risen* from $1,000 to $1,080 for the 5-year bond (+8.0%).

The 15-year bond price has *risen* from $1,000 to $1,171 (+17.1%). ***Twice as fast!***



The Role of the Coupon Rate

For a given change in the market required rate of return, the price of a bond will change by proportionally more, *the <u>lower</u> the coupon rate*.

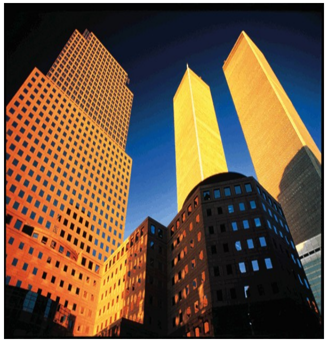


Example of the Role of the Coupon Rate

Assume that the market required rate of return on two equally risky 15-year bonds is 10%. The coupon rate for Bond H is 10% and Bond L is 8%.

What is the rate of change in each of the bond prices if market required rates fall to 8%?

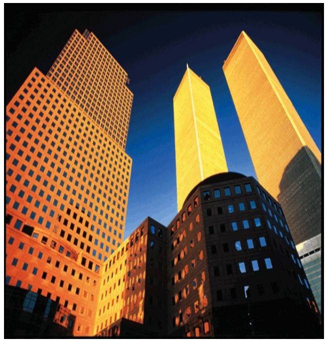
Example of the Role of the Coupon Rate



The price on Bonds H and L prior to the change in the market required rate of return is $1,000 and $848, respectively.

The price for Bond H will rise from $1,000 to $1,171 (+17.1%).

The price for Bond L will rise from $848 to $1,000 (+17.9%). ***It rises faster!***



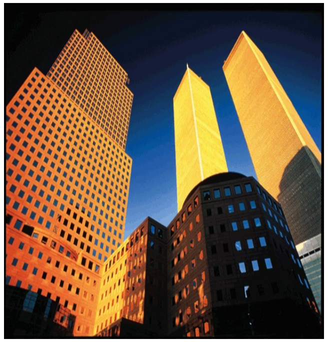
Determining the Yield on Preferred Stock

Determine the yield for preferred stock with an infinite life.

$$P_0 = Div_P \,/\, k_P$$

Solving for k_P such that

$$k_P = Div_P \,/\, P_0$$

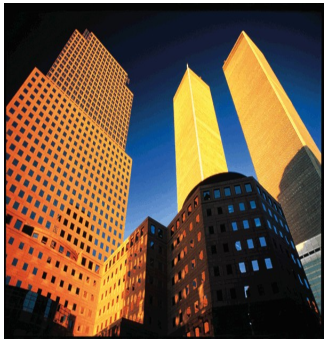


Preferred Stock Yield Example

Assume that the annual dividend on each share of preferred stock is *$10*. Each share of preferred stock is currently trading at *$100*. What is the *yield* on preferred stock?

$$k_p = \$10 / \$100.$$

$$k_p = 10\%.$$



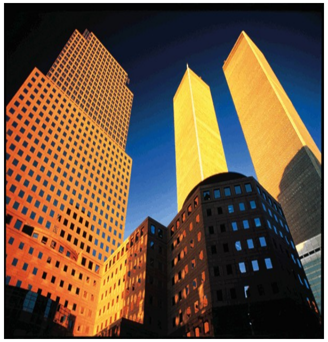
Determining the Yield on Common Stock

Assume the constant growth model is appropriate. Determine the yield on the common stock.

$$P_0 = D_1 / (k_e - g)$$

Solving for k_e such that

$$k_e = (D_1 / P_0) + g$$



Common Stock Yield Example

Assume that the expected dividend (D_1) on each share of common stock is *$3*. Each share of common stock is currently trading at *$30* and has an expected growth rate of *5%*. What is the *yield* on common stock?

$$k_e = (\$3 / \$30) + 5\%$$

$$k_e = 15\%$$