Valuation of Bonds/Debentures, Preference Shares

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Bond Valuation

- Important Terms: Security Descriptor, Coupon Rate, Par Value (or Issue Price), Maturity Value, Period, Credit Rating.
- Types of Bonds: Treasury Bills, Central & State Government Securities, Bank Securities, Statutory Corporation Bonds, PSU Securities, Municipal Bonds, Institutional Bonds, Corporate Securities.

Bond Valuation

- The Value of any bond or any asset, real or financial – is equal to the present value of the cash flows expected from it.
- Hence, determining the value of a bond requires – (a) an estimate of expected cash flows; (b) an estimate of the required return.

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.

Important Bond/Debenture Terms

- The bond's coupon rate is the stated rate of interest; the annual interest payment divided by the bond's face value.

- The discount 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.

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

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

or $I\,(PVIFA_{k_d, \infty})$

$$V = I / k_d \quad [\textit{Reduced Form}]$$

Perpetual Bond Example

AVP is a Perpetual Bond has a Dh. 1,000 face value and provides a 16% coupon. The appropriate discount rate is 10%. What is the value of the perpetual bond?

I = Dh 1,000 × (0.16) = Dh 160.

k_d = 10%.

$V = I / k_d$ [*Reduced Form*]

= Dh 160 / 10% = Dh 1600.

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

Dipesh Food Bonds (DFB) has a Dh.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 = Dh.80 ($PVIFA_{10\%, 30}$) + Dh.1,000 ($PVIF_{10\%, 30}$) =
Dh.80 (9.427) + Dh.1,000 (.057)

= Dh.754.16 + Dh.57.00
= Dh.811.16.

Another Example

- Security Descriptor: NIRM12
- Issued by: Nirma Ltd.
- Maturity Date: 25-03-2014
- Coupon Rate: 8.60% (annual payments)
- Issue Date: 27-03-2002
- Issue Price: Dh. 100.00
- Current Credit Rating: ICRA AA+
- What is its value if your expected rate of return is 11%?

Source of Information: www.nseindia.com

96 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.

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

Zero-Coupon (or Deep-Discount) Bond Example

DATE Bond has a Dh.1,000 face (i.e., maturity) value and a 30-year life. The appropriate discount rate is 10%. What is the value of the *zero-coupon bond*?

$$V = Dh.1{,}000\ (PVIF_{10\%,\ 30})$$
$$= Dh.1{,}000\ (.057)$$
$$= Dh.57.00$$

Another Example

- Security Descriptor: ICIC10B
- Issued by: ICICI
- Maturity Date: 31-03-2014
- Coupon Rate: 0
- Issue Date: 31-03-2008
- Issue Price: Dh. 100.00
- Maturity Price: Dh. 165.00
- What is its value if your expected rate of return is 10%?

Source of Information: www.nseindia.com

102 Semiannual Compounding

Most bonds *in the Bond markets* (including International) pay interest twice a year.

Adjustments needed:

(1) Divide k_d by 2

(2) Multiply n by 2

(3) Divide I by 2

Preferred Shares Valuation

Preferred Stock is a type of stock that promises a (usually) fixed dividend.

Preference shares has preference over common equity shares in the payment of dividends and claims on assets.

Perpetual 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

Preference Shares of Yogi Fan Belts Ltd. has an 8%, Dh.100 par value issue outstanding. The appropriate discount rate is 10%. What is the value of the preferred stock?

Div_P = Dh.100 (8%) = Dh.8.00.

k_P = 10%.

$V = Div_P / k_P$ = Dh.8.00 / 10%

= Dh.80

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.

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

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

k_d = YTM

Determining the YTM

Vijay wants to determine the YTM for an issue of outstanding bonds (par value is Dh.1000) of *DATE*. *DATE* has an issue of 10% annual coupon bonds with 4 years left to maturity. The bonds have a current market value of *Dh.1,250*.

What is the YTM?

YTM Solution (Try 9%)

Dh.1,250 = Dh.100($PVIFA_{9\%,4}$) + Dh.1,000($PVIF_{9\%,4}$)

Dh.1,250 = Dh.100(3.240) + Dh.1,000(.708)

Dh.1,250 = Dh.324 + Dh.708

= Dh.1,032

[*Rate is too high!*]

YTM Solution (Try 5%)

Dh.1,250 = Dh.100($PVIFA_{5\%,4}$) + Dh.1,000($PVIF_{5\%,4}$)

Dh.1,250 = Dh.100(3.546) + Dh.1,000(0.823)

Dh.1,250 = Dh.354.60 + Dh.823.00

= Dh.1,177.60

[*Rate is high!*]

YTM Solution (Interpolate)

$$.04 \left[X \left[\begin{matrix} .05 & Dh.1177 \\ YTM & Dh.1250 \\ .09 & Dh.1032 \end{matrix} \right] Dh.-73 \right] Dh.145$$

$$X = \frac{(Dh.-73)(0.04)}{Dh.145}$$

$$X = .0201$$

YTM = .0500 - .0201 = .0299 or 2.99%

Another Example

- Security Descriptor: GRSM12
- Issued by: Grasim Industries Ltd.
- Maturity Date: 17-03-2014
- Coupon Rate: 12.60% (annual payments)
- Issue Date: 17-03-2008
- Issue Price: Dh. 100.00
- Maturity Price: Dh. 105.00
- Current Credit Rating: CARE AA+
- Current Market Price: 116.62
- What is its yield-to-maturity?

Source of Information: www.nseindia.com

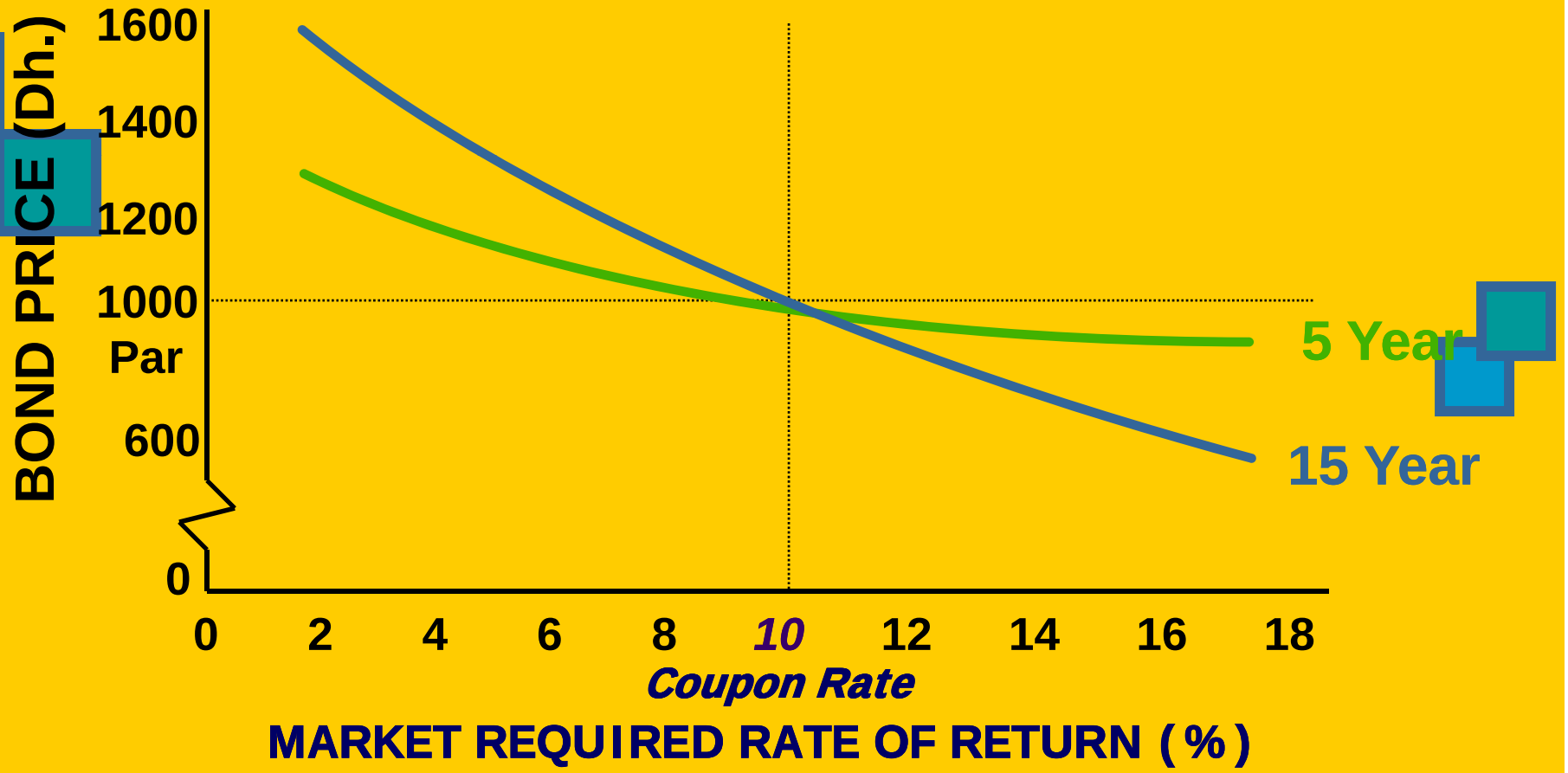
9.5 Bond Price-Yield Relationship

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

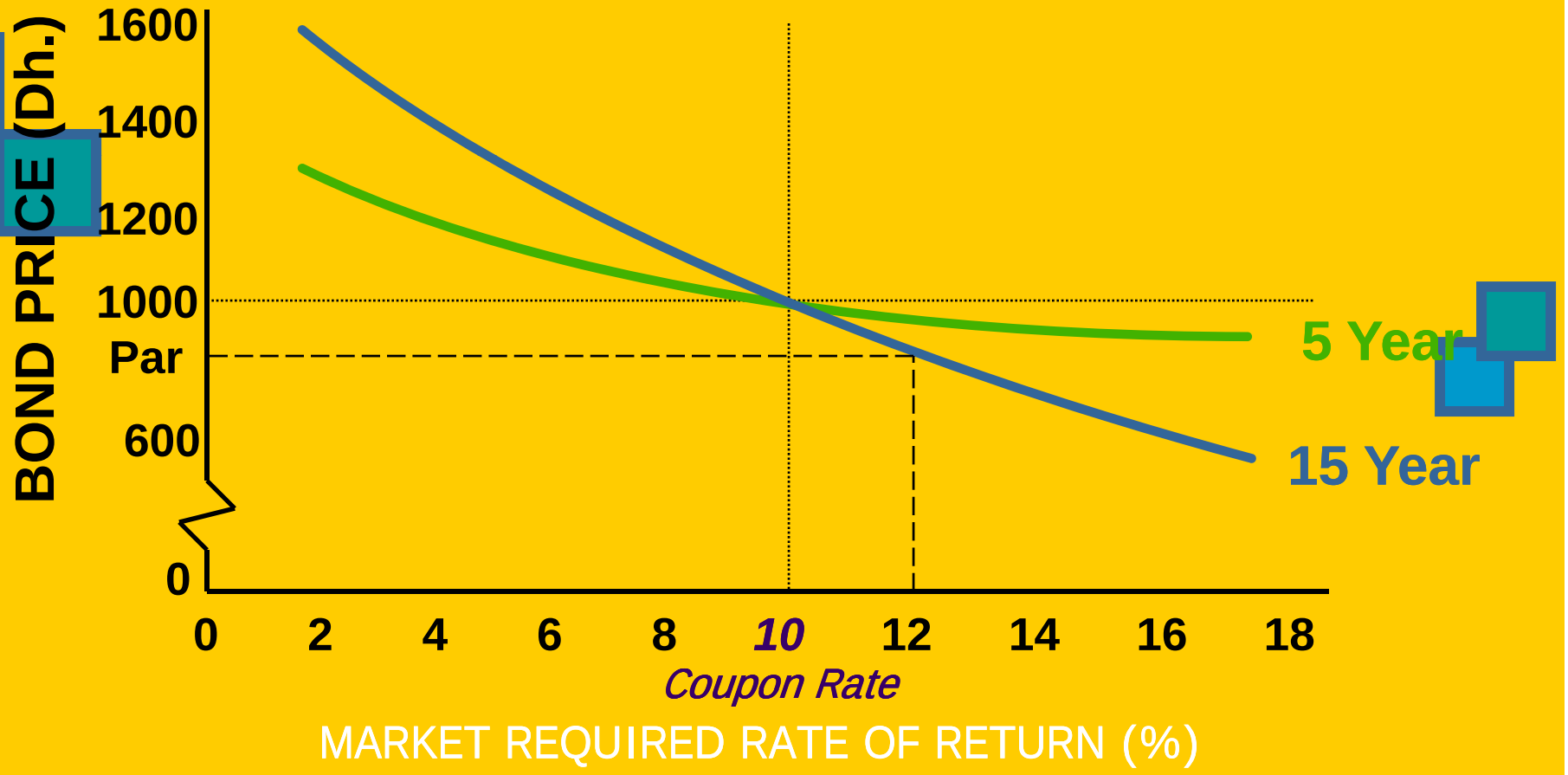


Bond Price-Yield Relationship

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

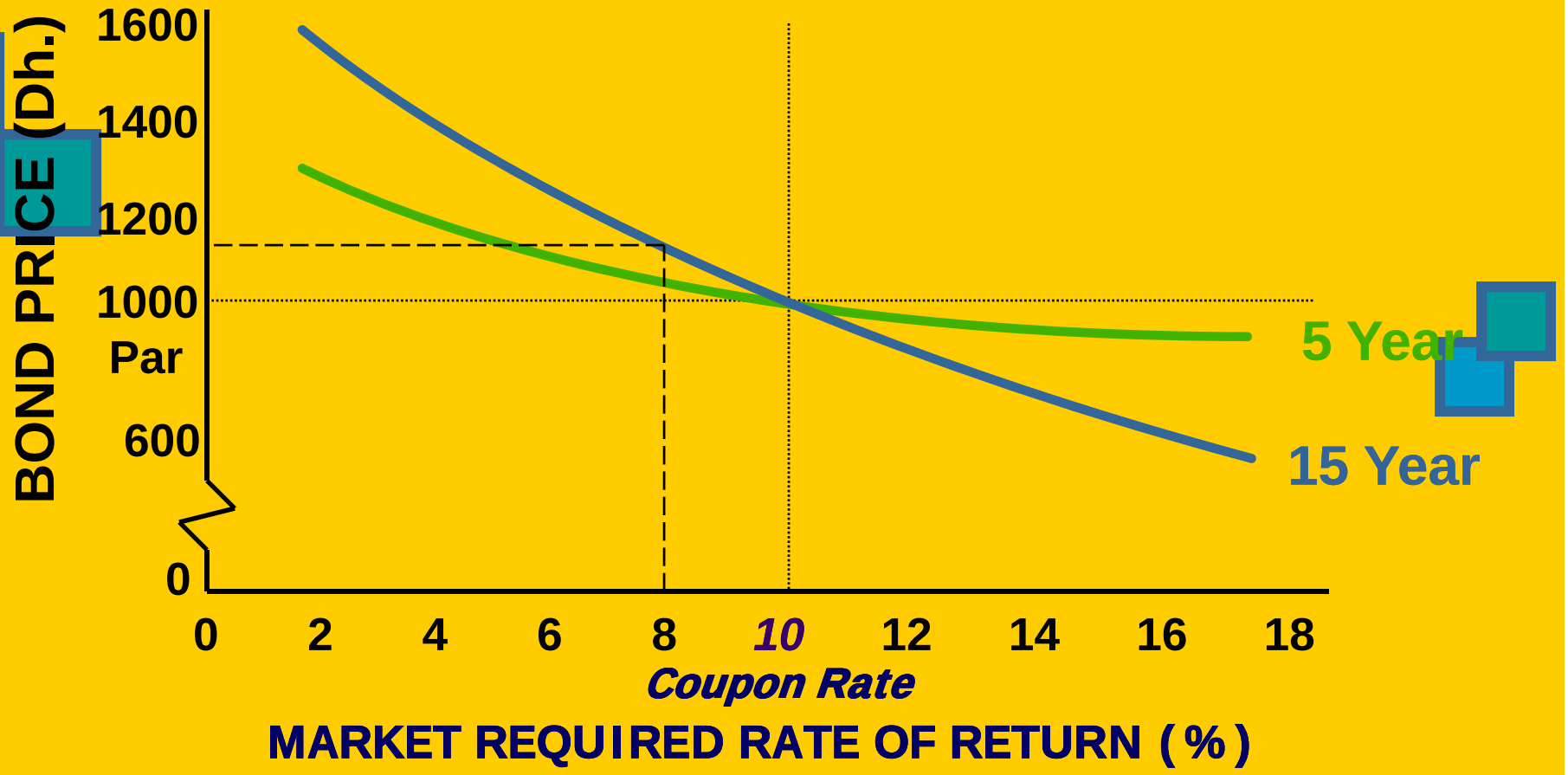


Bond Price-Yield Relationship

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

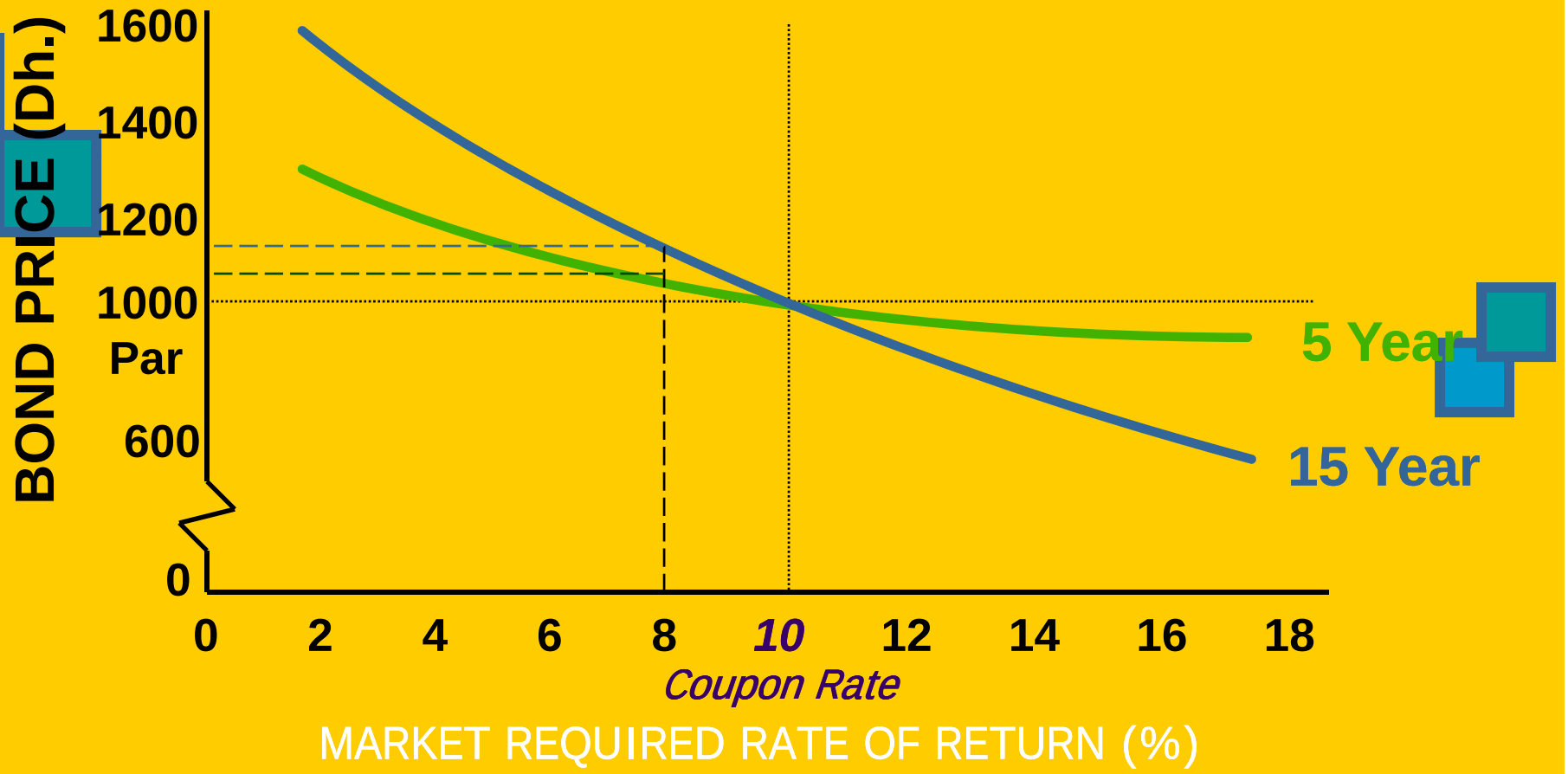


The Role of Bond Maturity

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 Dh.1,000 to Dh.1,080 for the 5-year bond (+8.0%).

The 15-year bond price has *risen* from Dh.1,000 to Dh.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 *lower the coupon rate*.