CHAPTER 14

Bond Prices and Yields

Bond Characteristics

- Bonds are debt. Issuers are borrowers and holders are creditors.
  - The indenture is the contract between the issuer and the bondholder.
  - The indenture gives the coupon rate, maturity date, and par value.

Bond Characteristics

- Face or par value is typically $1000; this is the principal repaid at maturity.
- The coupon rate determines the interest payment.
  - Interest is usually paid semiannually.
  - The coupon rate can be zero.
  - Interest payments are called “coupon payments”.

U.S. Treasury Bonds

- Note maturity is 1-10 years
- Bond maturity is 10-30 years

- Bonds and notes may be purchased directly from the Treasury.
- Denomination can be as small as $100, but $1,000 is more common.
- Bid price of 100:08 means 100 8/32 or $1002.50

Corporate Bonds

- Callable bonds can be repurchased before the maturity date.
- Convertible bonds can be exchanged for shares of the firm's common stock.
- Puttable bonds give the bondholder the option to retire or extend the bond.
- Floating rate bonds have an adjustable coupon rate

Preferred Stock

- Equity
- Fixed income

- Dividends are paid in perpetuity
- Nonpayment of dividends does not mean bankruptcy
- Preferred dividends are paid before common
- No tax break

Innovation in the Bond Market

- Inverse Floaters
- Asset-Backed Bonds
- Catastrophe Bonds
- Indexed Bonds
  - Treasury Inflation Protected Securities (TIPS).

Table 14.1 Principal and Interest Payments for a Treasury Inflation Protected Security

Time	Inflation in Year Just Ended	Par Value	Coupon Payment	+	Principal Repayment	=	Total Payment
0		$1,000.00					
1	2%	1,020.00	$40.80		$ 0		$ 40.80
2	3	1,050.60	42.02		0		42.02
3	1	1,061.11	42.44		1,061.11		1,103.55

Bond Pricing

$$P_B = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} + \frac{ParValue}{(1+r)^T}$$

P_B= Price of the bond

C_t = interest or coupon payments

T = number of periods to maturity

r = semi-annual discount rate or the semi-annual yield to maturity

Example 14.2: Bond Pricing

Price of a 30 year, 8% coupon bond
Interest rate = 10%.

$$\text{Price} = \sum_{t=1}^{60} \frac{\$40}{(1.05)^t} + \frac{\$1000}{(1.05)^{60}}$$

$$\text{Price} = \$810.71$$

Bond Prices and Yields

- Prices and yields (required rates of return) have an inverse relationship
- The bond price curve is convex w.r.t. interest rate (see Figure 14.3)
- The longer the maturity, the more sensitive the bond's price to changes in market interest rates

Figure 14.3 The Inverse Relationship Between Bond Prices and Yields

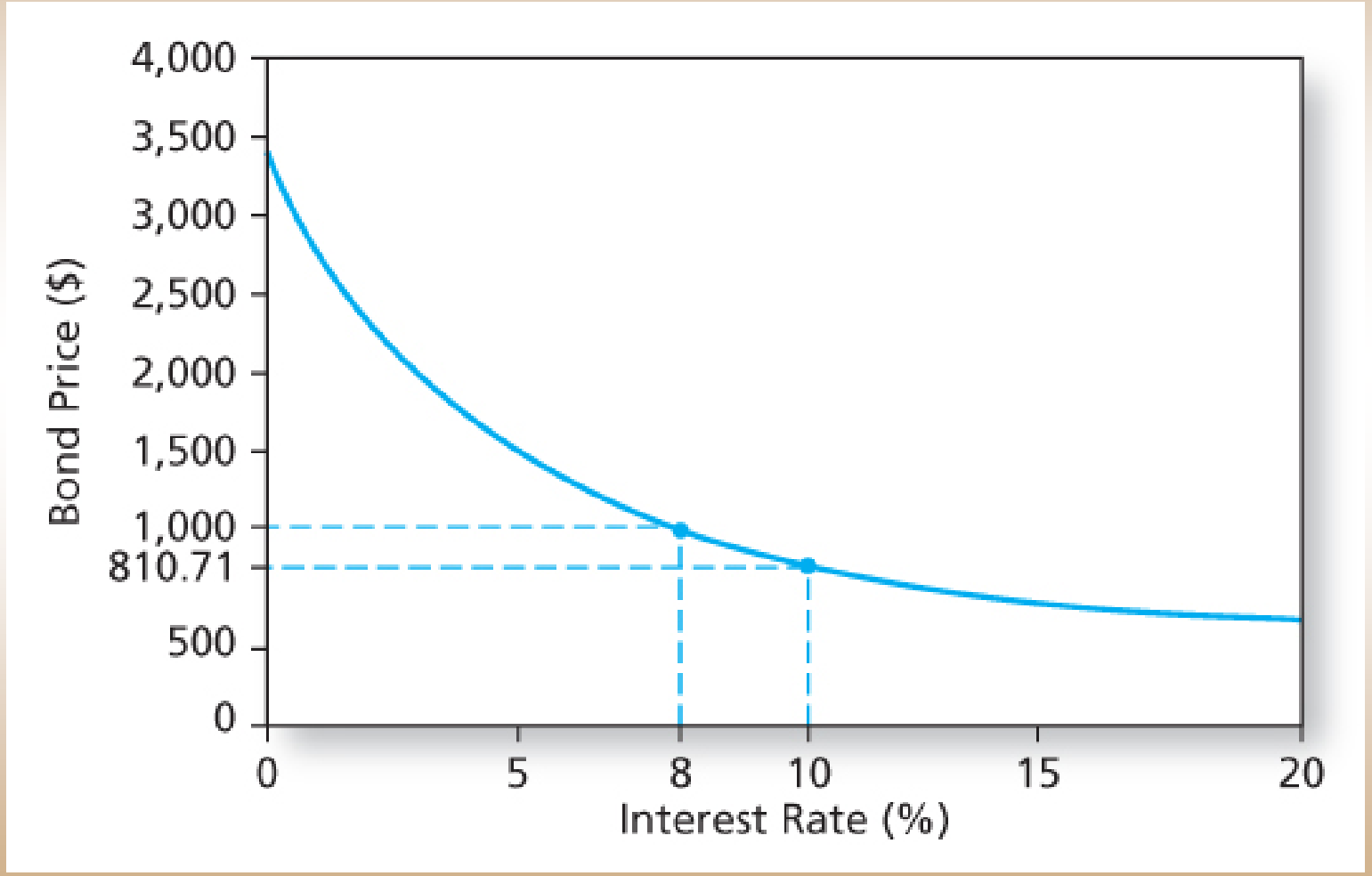


Table 14.2 Bond Prices at Different Interest Rates

Time to Maturity	Bond Price at Given Market Interest Rate				
	2%	4%	6%	8%	10%
1 year	1,059.11	1,038.83	1,029.13	1,000.00	981.41
10 years	1,541.37	1,327.03	1,148.77	1,000.00	875.35
20 years	1,985.04	1,547.11	1,231.15	1,000.00	828.41
30 years	2,348.65	1,695.22	1,276.76	1,000.00	810.71

Yield to Maturity

Yield To Maturity (YTM) = interest rate that makes the present value of the bond's payments equal to its price

Solve the bond formula for *r*

$$P_B = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} + \frac{ParValue}{(1+r)^T}$$

Yield to Maturity Example

Suppose an 8% coupon, 30 year bond is selling for $1276.76. What is its average rate of return?

$$\$1276.76 = \sum_{t=1}^{60} \frac{\$40}{(1+r)^t} + \frac{1000}{(1+r)^{60}}$$

r = __% per half year

Bond equivalent yield = __%

EAR = ((1+__)^2)-1 = __ %

YTM vs. Current Yield

YTM

- The YTM is the bond's internal rate of return.
- YTM is the interest rate that makes the present value of a bond's payments equal to its price.
- YTM assumes that all bond coupons can be reinvested at the YTM rate.

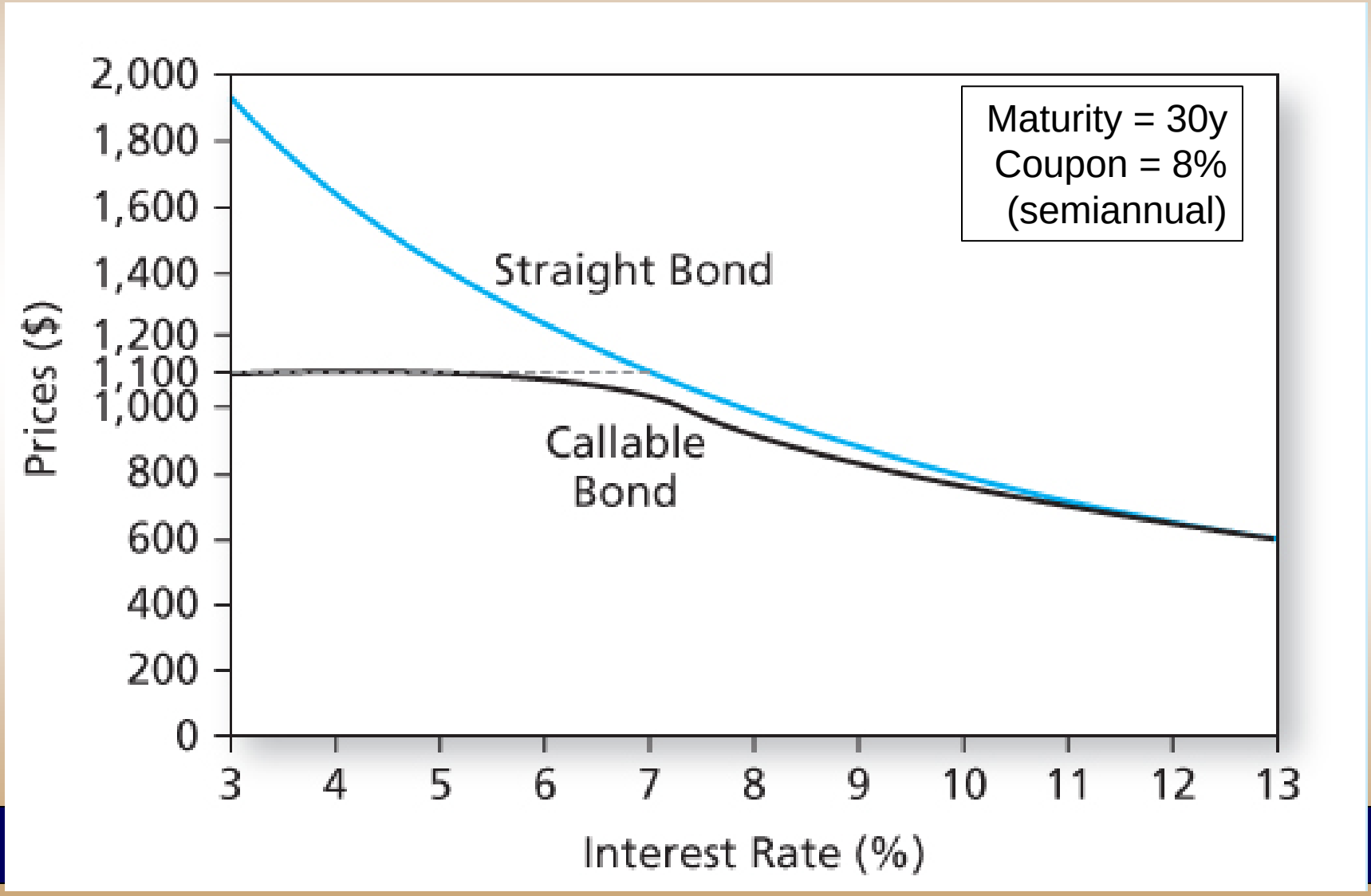
Current Yield

- The current yield is the bond's annual coupon payment divided by the bond price.
- For bonds selling at a premium, coupon rate > current yield>YTM.
- For discount bonds, relationships are reversed.

Yield to Call

- If interest rates fall, price of straight bond can rise considerably.
- The price of the callable bond is flat over a range of low interest rates because the risk of repurchase or call is high.
- When interest rates are high, the risk of call is negligible and the values of the straight and the callable bond converge.

Figure 14.4 Bond Prices: Callable and Straight Debt



Realized Yield versus YTM

- Reinvestment Assumptions
- Holding Period Return
  - –Changes in rates affect returns
  - –Reinvestment of coupon payments
  - –Change in price of the bond

Figure 14.5 Growth of Invested Funds

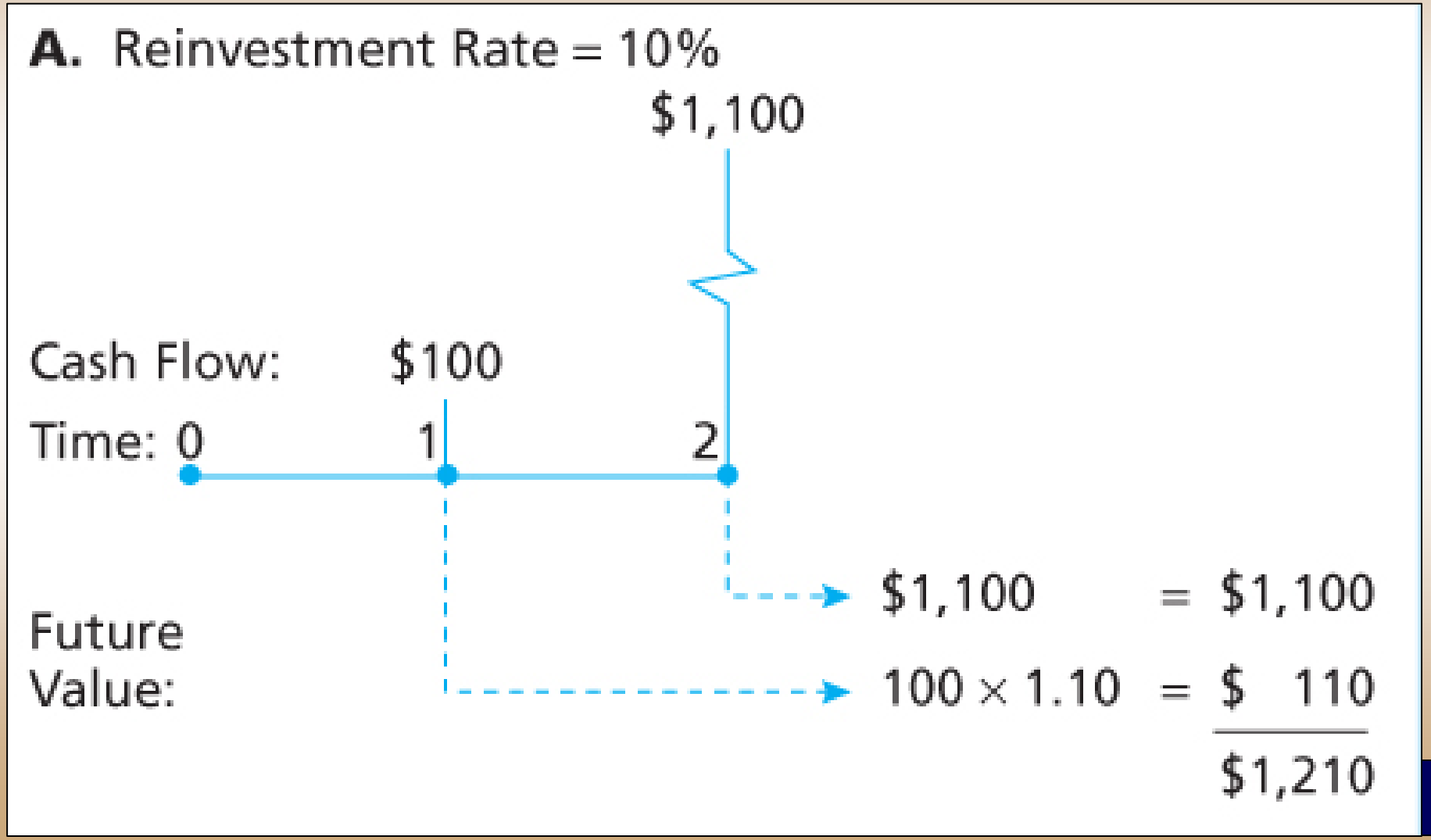


Figure 14.5 Growth of Invested Funds

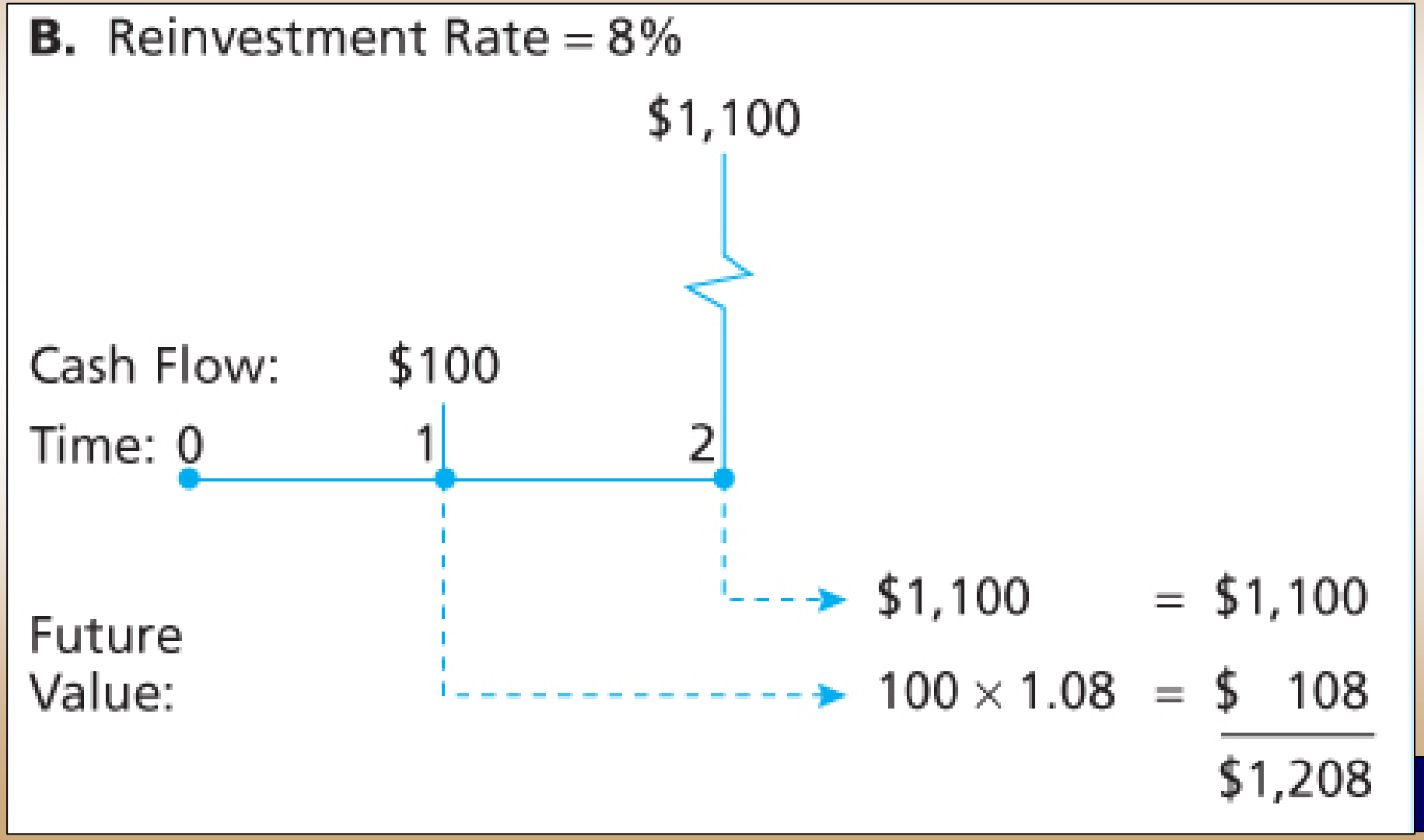
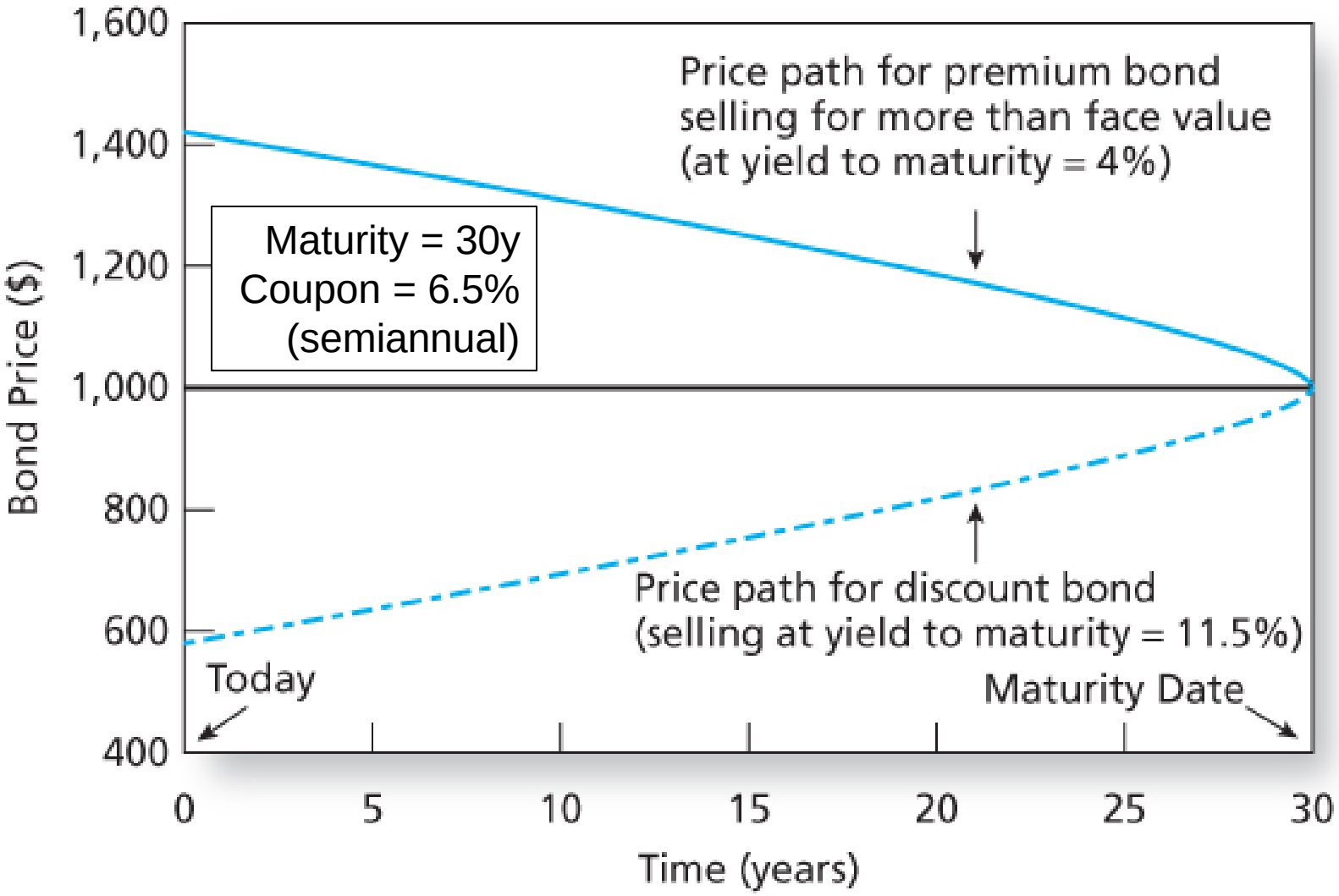


Figure 14.6 Prices over Time of 30-Year Maturity, 6.5% Coupon Bonds



YTM vs. HPR

YTM

- YTM is the average return if the bond is held to maturity
- YTM depends on coupon rate, maturity, and par value
- All of these are readily observable in the market

HPR

- HPR is the rate of return over a particular investment period
- HPR depends on the bond's price at the end of the holding period, an unknown future value
- HPR can only be forecasted

Figure 14.7 The Price of a 30-Year Zero-Coupon Bond over Time