# BondV.Docx Application to Bonds of Time Value Relations

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## Part BD Bond Valuation fundamentals

### BD1 Consol bond, what is its price

A consol bond pays forever two semiannual coupons at an annual coupon rate of 3.10% In other words, the initial principal never is reduced nor repaid. The yield-to-maturity is 5.20% and a coupon was paid yesterday. What is the bond price?

{ANSWER: E ; xlADDRESS: BondApps!$B$31 }

/\a. $542 b. $656 c. $448 d. $493 e. $596

### BD9 Find bond lifetime interest

The company today issues a 30-year $1,000 bond that carries a 5.40% annual coupon rate (semiannual coupons). Find the total interest that the company expects to pay over the lifetime of the bond.

{ANSWER: B ; xlADDRESS: BondApps!$B$148 }

/\a. $1,473 b. $1,620 c. $1,782 d. $1,217 e. $1,339

### BD10a Find price for a zero coupon

Today is a day in May 2525 and a zero coupon bond that matures in May 2535 has an annual yield-to-maturity of 4.11% (semiannual compounding). Find the bond price.

{ANSWER: C ; xlADDRESS: BondApps!$F$163; CLUES: #coupons = 20 }

/\a. $605 b. $806 c. $666 d. $732 e. $550

### BD10b Find ytm for a zero

Today is a day in May 2525 and a zero coupon bond that matures in May 2535 has a quoted price of 66.60 percent of par (semiannual compounding). Find the annual yield-to-maturity.

{ANSWER: A ; xlADDRESS: BondApps!$B$163; CLUES: #coupons = 20 }

/\a. 4.1% b. 3.4% c. 3.7% d. 3.1% e. 4.5%

### BD7a Find bond price given ytm in a simple setting

A 10-year bond with a 4.20% coupon rate was issued with a 3.03% yield to maturity. Find the bond price at time of issue.

{ANSWER: A ; xlADDRESS: BondApps!$B$62 }

/\a. $1,100 b. $1,210 c. $1,000 d. $826 e. $909

### BD7b Find ytm given price in a simple setting

A 10-year bond with a 4.20% coupon rate was issued at a price of $1,100 . Find the bond yield to maturity at time of issue.

{ANSWER: B ; xlADDRESS: BondApps!$F$62 }

/\a. 4.04% b. 3.03% c. 3.34% d. 3.67% e. 2.76%

### BD11a Find price (count dates to find #coupons)

Today is a day in September 2525 and a bond with annual coupon rate of 6.70% just yesterday paid a coupon. The bond matures in March 2543 and its annual yield-to-maturity equals 10.50% (semiannual compounding). Find the bond price.

{ANSWER: D ; xlADDRESS: BondApps!$B$181; CLUES: #coupons = 35}

/\a. $577 b. $845 c. $768 d. $698 e. $635

### BD11b Find ytm (count dates to find #coupons)

Today is a day in September 2525 and a bond with annual coupon rate of 6.70% just yesterday paid a coupon. The bond matures in March 2543 and its quoted bond price is 69.85 percent of par (semiannual compounding). Find the annual yield-to-maturity.

{ANSWER: D ; xlADDRESS: BondApps!$F$181; CLUES: #coupons = 35 }

/\a. 12.7% b. 11.6% c. 9.5% d. 10.5% e. 8.7%

### BD12a Find ytm and partition into AND(current yield, capital gain yield) (count dates to find #coupons)

Today is a day in September 2525 and a bond with annual coupon rate of 4.30% just yesterday paid a coupon. The bond matures in March 2532 and its quoted bond price is 83.32 percent of par (semiannual compounding). Find the current yield and capital gains yield.

{ANSWER: C ; xlADDRESS: BondApps!$F$199; CLUES: #coupons = 13; ytm = 7.60%}

/\a. the current yield equals 5.16% and capital gains yield is 2.80%

/\b. the current yield equals 5.94% and capital gains yield is 2.80%

/\c. the current yield equals 5.16% and capital gains yield is 2.44%

/\d. the current yield equals 5.94% and capital gains yield is 2.44%

/\e. the current yield equals 4.49% and capital gains yield is 2.80%

### BD12b Find and match ytm, current yield, capital gain yield (count dates to find #coupons)

Today is a day in September 2525 and a bond with annual coupon rate of 4.30% just yesterday paid a coupon. The bond matures in March 2532 and its quoted bond price is 83.32 percent of par (semiannual compounding). Find the yield-to-maturity, current yield and capital gains yield.

{ANSWER: B ; xlADDRESS: BondApps!$B$199; CLUES: #coupons = 13; ytm = 7.60%}

/\a. the capital gains yield equals 5.16%

/\b. the yield-to-maturity equals 7.60%

/\c. the yield-to-maturity equals 2.44%

/\d. the current yield equals 7.60%

/\e. the current yield equals 2.44%

### BD12c Find OR(current yield, capital gain yield) (count dates to find #coupons)

Today is a day in September 2525 and a bond with annual coupon rate of 4.30% just yesterday paid a coupon. The bond matures in March 2532 and its annual yield-to-maturity equals 7.60% (semiannual compounding). Find the capital gains yield.

{ANSWER: B ; xlADDRESS: BondApps!$J$199; CLUES: #coupons = 13; price = 83.32}

/\a. 3.57% b. 2.44% c. 3.25% d. 2.68% e. 2.95%

### BD18 Find coupon rate providing comparable ytm

Bond X has annual coupon rate of 6.80%, 11 coupons remain until maturity, and its price is $850 . Premium bond Z with price of $1,150 also has 11 coupons remaining. Which statement best describes whether the yield-to-maturity is larger for bond X or for Z?

{ANSWER: B ; xlADDRESS: BondApps!$B$301; CLUES: ytmX = 10.45%; breakeven coupon for Z = $70.55 }

/\a. If the coupon rate for Z is smaller than 17.4% then X definitely has the bigger YTM

/\b. If the coupon rate for Z is bigger than 17.4% then Z definitely has the bigger YTM

/\c. If the coupon rate for Z equals 11.5% then X and Z have the same YTM

/\d. Two choices, A and C, are correct

/\e. None of the A-B-C choices are correct

### BD13a Find counteroffer price (count dates to find #coupons)

Today is a day in October 2525 and a bond with annual coupon rate of 11.20% just yesterday paid a coupon. The bond matures in April 2542 and its quoted bond price is 132.39 percent of par (semiannual compounding). You wish to make a bid such that your promised rate of return is 10 basis points greater than the quoted annual yield-to-maturity. Find the price as percent of par that you offer for the bond.

{ANSWER: B ; xlADDRESS: BondApps!$B$216; CLUES: N = 33; original ytm = 7.70% }

/\a. 98.62 b. 131.26 c. 144.38 d. 119.32 e. 108.48

### BD13b Find and(ytm, counteroffer)

Today is a day in October 2525 and a bond with annual coupon rate of 11.20% just yesterday paid a coupon. The bond matures in April 2542 and its quoted bond price is 132.39 percent of par (semiannual compounding). You wish to make a bid such that your promised rate of return is 10 basis points greater than the quoted annual yield-to-maturity. Find the quoted yield-to-maturity and the price as percent of par that you offer for the bond.

{ANSWER: A ; xlADDRESS: BondApps!$F$216; CLUES: N = 33 }

/\a. the quoted is 7.70% and the counteroffer price is 131.26

/\b. the quoted is 6.70% and the counteroffer price is 131.26

/\c. the quoted is 6.70% and the counteroffer price is 114.14

/\d. the quoted is 7.70% and the counteroffer price is 114.14

/\e. the quoted is 8.86% and the counteroffer price is 131.26

### BD14 Find selling price after N coupons, constant ytm

A bond with a coupon rate of 7.00% has a price that today equals $1,060.64 . The $1,000 bond pays coupons every 6 months, 11 coupons remain, and a coupon was paid yesterday. Suppose you buy this bond at today’s price and hold it so that you receive 7 coupons. You sell the bond upon receiving that last coupon. Find the selling price if the bond’s yield-to-maturity remains constant.

{ANSWER: B ; xlADDRESS: BondApps!$B$230; CLUES: ytm = 5.70% }

/\a. $700 b. $1,024 c. $770 d. $931 e. $846

### BD16a Find coupon rate given price and ytm (count dates to find #coupons)

Today is a day in December 2525 and a bond with annual yield-to-maturity of 6.90% just yesterday paid a coupon. The bond matures in December 2536 and its quoted bond price is 73.33 percent of par (semiannual compounding). Find the annual coupon rate.

{ANSWER: B ; xlADDRESS: BondApps!$B$263; CLUES: #coupons = 22; coupon = $17.00 }

/\a. 2.8% b. 3.4% c. 3.1% d. 2.6% e. 2.3%

### BD16b Find AND(coupon rate, current yield) given price and ytm (count dates to find #coupons)

Today is a day in December 2525 and a bond with annual yield-to-maturity of 6.90% just yesterday paid a coupon. The bond matures in December 2536 and its quoted bond price is 73.33 percent of par (semiannual compounding). Find the annual coupon rate and today’s current yield.

{ANSWER: D ; xlADDRESS: BondApps!$F$263; CLUES: #coupons = 22; coupon = $17.00 }

/\a. coupon rate equals 2.96% and current yield is 4.64%

/\b. coupon rate equals 2.96% and current yield is 4.03%

/\c. coupon rate equals 3.91% and current yield is 4.03%

/\d. coupon rate equals 3.40% and current yield is 4.64%

/\e. coupon rate equals 3.91% and current yield is 4.64%

*BD15m Multipart single-setup*

A bond with yield-to-maturity of 10.80% and 23 coupons remaining until maturity has a price today of $930 .

{xlADDRESS: BondApps!$B$246 }

### BD15am Find coupon rate given price and ytm

Find the bond’s annual coupon rate.

{ANSWER: E ; xlADDRESS: BondApps!$B$246 }

/\a. 10.7% b. 14.2% c. 11.8% d. 12.9% e. 9.7%

### BD15bm Find current yield today given price and ytm

Find today’s annual current yield.

{ANSWER: C ; xlADDRESS: BondApps!$F$246 }

/\a. 11.5% b. 8.6% c. 10.5% d. 9.5% e. 12.6%

### BD15cm Find current yield in N periods given price and ytm

Find the current yield that is expected after 15 coupons have been received (assume scientific amortization and constant *YTM*).

{ANSWER: B ; xlADDRESS: BondApps!$J$246 }

/\a. 11.1% b. 10.1% c. 9.2% d. 12.2% e. 13.4%

### BD17a Find annual capital gains yield for last coupon before maturity (count dates to find #coupons)

Today is a day in March 2525 and a bond with annual yield-to-maturity of 10.30% just yesterday paid a coupon. The bond matures in September 2535 and its quoted bond price today is 74.69 percent of par (semiannual compounding). For the six months that conclude with September 2535, find the annual capital gains yield (assume scientific amortization and constant *YTM*).

{ANSWER: B ; xlADDRESS: BondApps!$B$280; CLUES: #coupons = 21; coupon = $24.50; price(N-1)= $988.42 }

/\a. 3.53% b. 3.88% c. 4.69% d. 4.27% e. 3.20%

### BD17b Find annual capital gains yield these periods: AND(today, last semiannum); (count dates to find #coupons)

Today is a day in March 2525 and a bond with annual yield-to-maturity of 10.30% just yesterday paid a coupon. The bond matures in September 2535 and its quoted bond price today is 74.69 percent of par (semiannual compounding). Contrast the annual capital gains yield today with the annual capital gains yield for the six months that conclude with September 2535 (assume scientific amortization and constant *YTM*).

{ANSWER: D ; xlADDRESS: BondApps!$F$280; CLUES: #coupons = 21; coupon = $24.50; price(N-1)= $988.42 }

/\a. today’s annual capital gains is 2.15% and the future one is 4.46%

/\b. today’s annual capital gains is 1.62% and the future one is 4.46%

/\c. today’s annual capital gains is 1.62% and the future one is 3.88%

/\d. today’s annual capital gains is 1.87% and the future one is 3.88%

/\e. today’s annual capital gains is 1.87% and the future one is 4.46%

### BD2 Treasury bond issued at par, what is change in ytm given change in price

A 20-year Treasury bond was issued yesterday at par (i.e., at its $1,000 face value). Its coupon rate is 4.80%. Today, its price increased $23.10 . By how many basis points did the yield-to-maturity change?

{ANSWER: E ; xlADDRESS: BondApps!$B$48 }

/\a. -13 b. -16 c. -15 d. -12 e. -18

### BD8 find price of zero coupon given shock tonight to ytm

Today is July 1, 2525, and a zero coupon bond matures on December 31, 2532. You buy the bond today at its price of $539 . World events tonight cause all interest rates to decrease 80 basis points. What is the new bond price?

{ANSWER: D ; xlADDRESS: BondApps!$B$18 }

/\a. $692 b. $520 c. $472 d. $572 e. $629

### BD21a Find change in price given tonight's shock

A 30-year Treasury bond was issued yesterday at par (i.e., at its $1,000 face value). Its coupon rate is 8.20%. World events tonight cause all interest rates to decline 25 basis points. What is the new bond price?

{ANSWER: C ; xlADDRESS: BondApps!$B$348 }

/\a. $935 b. $850 c. $1,028 d. $702 e. $773

### BD21b Find percentage change in price given tonight's shock

A 30-year Treasury bond was issued yesterday at par (i.e., at its $1,000 face value). Its coupon rate is 8.20%. World events tonight cause all interest rates to decline 25 basis points. What is the percentage change tonight in the bond price?

{ANSWER: E ; xlADDRESS: BondApps!$F$348 }

/\a. 2.6% b. 2.1% c. 3.1% d. 2.3% e. 2.8%

### BD21c Find price change and increase or decrease

A 30-year Treasury bond was issued yesterday at par (i.e., at its $1,000 face value). Its coupon rate is 8.20%. World events tonight cause all interest rates to decline 25 basis points. What is the change tonight in the bond price?

{ANSWER: D ; xlADDRESS: BondApps!$J$348 }

/\a. the price rises $25 tonight

/\b. the price falls $21 tonight

/\c. the price falls $25 tonight

/\d. the price rises $28 tonight

/\e. the price falls $28 tonight

*Multiple setup (BD4m)*

Bonds A and Z are zero coupon securities with maturities of 2 1/2 years and 9 1/2 years, respectively. The current yield to maturity for each bond is 7.20%.

{xlADDRESS: BondApps!R105C1 ; CLUES: initial prices: A = $838 ; Z = $511 }

### BD4am What are prices for two zero coupon bonds

What are the bond’s prices?

{ANSWER: C ; xlADDRESS: BondApps!$B$114 }

/\a. the prices for bonds A and Z equal $729 and $511 , respectively.

/\b. the prices for bonds A and Z equal $729 and $444 , respectively.

/\c. the prices for bonds A and Z equal $838 and $511 , respectively.

/\d. the prices for bonds A and Z equal $634 and $444 , respectively.

/\e. the prices for bonds A and Z equal $634 and $511 , respectively.

### BD4bm Find price percentage changes for two zero coupon bonds given changing ytm

If interest rates overnight were to rise 145 basis points, how do the prices for the two bonds change?

{ANSWER: C ; xlADDRESS: BondApps!$F$114 }

/\a. percentage price changes for bonds A and Z equal -2.98% and -12.41%, respectively.

/\b. percentage price changes for bonds A and Z equal -2.59% and -12.41%, respectively.

/\c. percentage price changes for bonds A and Z equal -3.43% and -12.41%, respectively.

/\d. percentage price changes for bonds A and Z equal -3.43% and -14.27%, respectively.

/\e. percentage price changes for bonds A and Z equal -2.98% and -14.27%, respectively.

### BD19a Find ROR for horizon analysis and changing ytm

A bond with annual coupon rate of 6.00% and price of $1,080 just yesterday paid a coupon. A total of 25 coupons remain to be paid. Suppose you buy the bond at today’s price, hold it and receive 8 coupons, and then sell the bond. Find the annual rate of return throughout the investment horizon if at the time you sell the bond its yield-to-maturity has decreased a total of 300 basis points.

{ANSWER: D ; xlADDRESS: BondApps!$B$318; CLUES: new ytm = 2.13%; price = $960.96 }

/\a. 11.9% b. 10.8% c. 14.4% d. 9.8% e. 13.1%

### BD19b Find AND(priceN, ROR) for horizon analysis and changing ytm

A bond with annual coupon rate of 6.00% and price of $1,080 just yesterday paid a coupon. A total of 25 coupons remain to be paid. Suppose you buy the bond at today’s price, hold it and receive 8 coupons, and then sell the bond. If at the time you sell the bond its yield-to-maturity has decreased a total of 300 basis points find the bond selling price and annual rate of return throughout the investment horizon.

{ANSWER: C ; xlADDRESS: BondApps!$F$318; CLUES: new ytm = 2.13% }

/\a. the bond selling price is $1,495 and annual *ROR* equals 11.3%

/\b. the bond selling price is $1,719 and annual *ROR* equals 11.3%

/\c. the bond selling price is $1,300 and annual *ROR* equals 9.8%

/\d. the bond selling price is $1,719 and annual *ROR* equals 9.8%

/\e. the bond selling price is $1,495 and annual *ROR* equals 9.8%

### BD20a Find ytm next year that gives 0% 1-year ror

A bond with annual coupon rate of 5.80% and price of $920 just yesterday paid a coupon. A total of 15 coupons remain to be paid. You intend to buy the bond at today’s price, hold it one year and receive two semiannual coupons, and then sell the bond. Your actual one-year rate of return on the bond investment depends on next year’s interest rate. Find next year’s yield-to-maturity that makes the actual rate of return equal zero percent.

{ANSWER: C ; xlADDRESS: BondApps!$B$333; CLUE: ytm(0) = 7.20%; next year price: $862 }

/\a. 9.48% b. 7.83% c. 8.62% d. 7.12% e. 10.43%

### BD20b Find Δytm next year that gives 0% 1-year ror

A bond with annual coupon rate of 5.80% and price of $920 just yesterday paid a coupon. A total of 15 coupons remain to be paid. You intend to buy the bond at today’s price, hold it one year and receive two semiannual coupons, and then sell the bond. Your actual one-year rate of return on the bond investment depends on next year’s interest rate. Find the change in yield-to-maturity that makes the actual rate of return equal zero percent.

{ANSWER: E ; xlADDRESS: BondApps!$F$333; CLUE: ytm(0) = 7.20%; next year price: $862 }

/\a. if the ytm increases 107 basis points then the actual ROR = 0%

/\b. if the ytm decreases 107 basis points then the actual ROR = 0%

/\c. if the ytm decreases 123 basis points then the actual ROR = 0%

/\d. if the ytm increases 123 basis points then the actual ROR = 0%

/\e. if the ytm increases 142 basis points then the actual ROR = 0%

*Multiple setup (BD3m)*

A bond with a coupon rate of 7.90% has a yield-to-maturity that today equals 6.40%. The $1,000 bond pays coupons every 6 months, 21 coupons remain, and a coupon was paid yesterday. Suppose you buy this bond and hold it so that you receive 6 coupons. You sell the bond upon receiving that last coupon.

{xlADDRESS: BondApps!R70C1 ; CLUES: original price = $1,113 }

### BD3am Find this seasoned bond’s price

When you buy this bond today, what is its price?

{ANSWER: E ; xlADDRESS: BondApps!$B$82 }

/\a. $920 b. $1,225 c. $1,012 d. $837 e. $1,113

### BD3bm Find this seasoned bond’s price when you later sell it (constant ytm)

When you sell the bond say that its yield-to-maturity still equals its original value. What will be the bond’s price when you sell it?

{ANSWER: D ; xlADDRESS: BondApps!$F$82 }

/\a. $989 b. $1,197 c. $1,317 d. $1,088 e. $899

### BD3cm Find this seasoned bond’s price when you later sell it (changing ytm)

Suppose that when you sell the bond its yield-to-maturity has decreased by 210 basis points. What will be the bond’s price when you sell it?

{ANSWER: A ; xlADDRESS: BondApps!$J$82 }

/\a. $1,229 b. $1,799 c. $1,487 d. $1,635 e. $1,352

### BD3dm Find ROR on seasoned bond investment given you later sell at a different ytm

Suppose that when you sell the bond its yield-to-maturity has decreased by 210 basis points. What would have been your annual rate of return for the bond investment?

{ANSWER: C ; xlADDRESS: BondApps!$N$82 }

/\a. 6.9% b. 7.6% c. 10.1% d. 9.2% e. 8.4%

### BD6 Partition the total return

What is the annual capital gains yield expected over the next year for the following bond if interest rates remain constant: 4.60% coupon rate; 10 full years to maturity (semi-annual coupons); $775 current price.

{ANSWER: C ; xlADDRESS: BondApps!$B$97 }

/\a. 1.78% b. 2.37% c. 1.96% d. 2.61% e. 2.16%

### BD5a Riding the yield curve problem; 2-year horizon

The yield-to-maturity for a zero coupon bond is 6.00% for a 1-year bond, 6.68% for a 2-year bond, and 7.07% for a 3-year bond. You wish to make a 2-year investment and obviously can buy the 2-year bond and hold it to maturity. Suppose, however, that you think the yield curve will remain the same throughout the future. You can pursue an alternative strategy of buying a 3-year bond, holding it for 2 years, and selling it when it has one year remaining to maturity. Relative to the 2-year yield-to-maturity, by how many basis points does this alternative strategy enhance your average annual rate of return? (Assume, if necessary, that you can buy fractions of bonds.)

{ANSWER: D ; xlADDRESS: BondApps!$B$136 }

/\a. 123 b. 136 c. 102 d. 93 e. 112

### BD5b Riding the yield curve problem; 1-year horizon, 1 vs. OR(2,3) year bond

The yield-to-maturity for a zero coupon bond is 9.70% for a 1-year bond, 10.38% for a 2-year bond, and 10.96% for a 3-year bond. You wish to make a 1-year investment and obviously can buy the 1-year bond and hold it to maturity. Suppose, however, that you think the yield curve will remain the same throughout the future. You can pursue an alternative strategy of buying a 3-year bond, holding it for 1 year, and selling it when it has 2 years remaining to maturity. Relative to the 1-year yield-to-maturity, by how many basis points does this alternative strategy enhance your average annual rate of return? (Assume, if necessary, that you can buy fractions of bonds.)

{ANSWER: B ; xlADDRESS: BondApps!$F$136 }

/\a. 182 b. 242 c. 220 d. 267 e. 200

### BD5c Riding the yield curve problem; 1-year horizon, 1 vs. AND(2,3) year bond

The yield-to-maturity for a zero coupon bond is 6.90% for a 1-year bond, 7.53% for a 2-year bond, and 8.00% for a 3-year bond. You think the yield curve will remain the same throughout the future. You wish to make a 1-year investment, that is, buy a bond today and sell it in one year. You can pursue three alternative strategies, call them S1, S2, and S3. For strategy S1, you buy the 1-year bond and hold it to maturity, in which case your annual rate of return obviously is 6.90%. For S2, buy a 2-year bond today and sell it when it has 1 year remaining to maturity. For S3, buy a 3-year bond today and sell it when it has 2 years remaining to maturity. What are your average annual rates of return for strategies S2 and S3? (Assume, if necessary, that you can buy fractions of bonds.)

{ANSWER: A ; xlADDRESS: BondApps!$J$136 }

/\a. Strategy S2 earns 8.16% and strategy S3 earns 8.94% .

/\b. Strategy S2 earns 7.10% and strategy S3 earns 7.78% .

/\c. Strategy S2 earns 6.17% and strategy S3 earns 7.78% .

/\d. Strategy S2 earns 6.17% and strategy S3 earns 8.94% .

/\e. Strategy S2 earns 8.16% and strategy S3 earns 7.78% .

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