*APPENDIX: Amortization of Bond Premiums and Discounts

The origin and calculation of bond premiums and discounts were discussed in Section 15.2. We will now look at the premiums and discounts from an accountant's perspective. The point of view and the schedules developed here provide the basis for the accounting treatment of bond premiums, discounts, and interest payments.

Amortization of a Bond's Premium

Bonds are priced at a premium when the coupon rate *exceeds* the yield to maturity required in the bond market. Suppose that a bond paying a 10% coupon rate is purchased three years before maturity to yield 8% compounded semiannually. The purchase price that provides this yield to maturity is $1052.42.

The accounting view is that a period's *earned interest* is the amount that gives the required rate of return on the bond investment. The interest payment after the first six months that would, by itself, provide the required rate of return (8% compounded semiannually) on the amount invested is

$$\frac{0.08}{2} \times \$1052.42 = \$42.10$$

The earned interest during the first six months from an accounting point of view is $42.10. The actual first coupon payment of $50 pays $50 − $42.10 = $7.90 more than is necessary to provide the required rate of return for the first six months.[7] The $7.90 is regarded as a refund of a portion of the original premium, leaving a net investment (called the bond's *book value*) of

$$\$1052.42 - \$7.90 = \$1044.52$$

This book value becomes the beginning investment for the next six months. You then apply the same line of reasoning to this amount in the second interval, and so on.

TIP

Calculation of Earned Interest

Earned interest is always calculated on the *book value* of the bond *after the previous coupon payment*. For the interest rate, use the *yield to maturity* that was "locked in" on the bond's date of purchase.

The effect of this treatment is to periodically *reduce* the book value of the bond (and the book value of the premium). After the final interest payment, the bond's book value will be reduced to the $1000 face value which is received along with the last interest payment. The process of reducing the premium in this way is called *amortization of the bond premium*. The details of the treatment of each coupon payment and the reduction of the bond premium are often tabulated in a bond premium amortization schedule. In the following example, we will develop a full amortization schedule for the bond used in the preceding discussion.

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[7] Individual bond investors view the "excess" interest each period as a partial offset for the $52.42 capital *loss* that they will incur when the bond is redeemed for its $1000 face value at maturity.

On his income tax returns, an individual investor reports the full coupon payments year by year as interest income. In the year the bond matures, he is allowed to claim the full $52.42 capital loss.

Example 15AA CONSTRUCTION OF A BOND PREMIUM AMORTIZATION SCHEDULE

Prepare a complete bond premium amortization schedule for the 10% coupon bond in the preceding discussion. It was purchased for $1052.42 on a date three years before maturity to yield 8% to maturity. How much of the $300 received in coupon payments over the three years would accountants treat as interest income?

Solution

Coupon number	Coupon payment	Interest on book value	Discount amortized	Book value of bond	Unamortized discount
0	—	—	—	$1052.42	$52.42
1	$ 50	$42.10 ①	$7.90 ②	1044.52 ③	44.52 ④
2	50	41.78	8.22	1036.30	36.30
3	50	41.45	8.55	1027.75	27.75
4	50	41.11	8.89	1018.86	18.86
5	50	40.75	9.25	1009.61	9.61
6	50	40.39	9.61	1000.00	0.00
	$300	$247.58	$52.42		

① Interest on book value = 0.5 × Yield rate × Book value after previous coupon payment
         = 0.04 × $1052.42 = $42.10
② Premium amortized = Coupon payment − Interest on book value = $50 − $42.10 = $7.90
③ New book value = Previous book value − Premium amortized = $1052.42 − $7.90 = $1044.52
④ Unamortized premium = Current book value − Face value = $1044.52 − $1000 = $44.52

Of the $300 received in coupon interest payments, accountants would treat $247.58 as interest income during the three years. The remaining $52.42 would be treated as a refund of the bond's premium.

Amortization of a Bond's Discount

Bonds are priced at a discount when the coupon rate is *less* than the yield to maturity required in the bond market. Suppose that a bond paying a 10% coupon rate is purchased three years before maturity to yield 12% compounded semiannually. The purchase price that provides this yield to maturity is $950.83.

The accounting view is that a period's *earned interest* is the amount that gives the required rate of return on the bond investment. The interest payment after the first six months that would, by itself, provide the required rate of return (12% compounded semiannually) on the amount invested is

$$\frac{0.12}{2} \times \$950.83 = \$57.05$$

The earned interest during the first six months from an accounting point of view is $57.05. The actual first coupon payment of $50 is $7.05 *less* than the amount needed to provide the required rate of return for the first six months.[8] The $7.05

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[8] Individual bond investors recognize that the interest "deficiency" each period will ultimately be offset by the $49.17 capital *gain* they will realize when the bond is redeemed for its $1000 face value at maturity.

deficiency is converted to principal, giving an increased investment or *book value* of

$$\$950.83 + \$7.05 = \$957.88$$

This book value becomes the beginning investment for the next six months. You then apply the same line of reasoning to this amount in the second interval, and so on.

The effect of this amortization procedure is to periodically *increase* the book value of the bond and to simultaneously *reduce* the book value of the discount. After the final interest payment, the bond's book value will reach the $1000 face value which is received along with the last interest payment. The process of reducing the discount in this way is called *amortization of the bond discount.* The details of the treatment of each coupon payment and the reduction of the bond discount are often tabulated in a bond discount amortization schedule. In the following example, we will develop a full amortization schedule for the bond used in the preceding discussion.

Example 15AB   CONSTRUCTION OF A BOND DISCOUNT AMORTIZATION SCHEDULE

Prepare the complete bond discount amortization schedule for the 10% coupon bond in the preceding discussion. It was purchased for $950.83 on a date three years before maturity to yield 12% to maturity. Even though $300 is received in coupon payments over the three years, what total interest income would accountants recognize for the three years?

Solution

The effect of this amortization procedure is that accountants treat both the $300 from the coupon payments and the original discount as interest revenue during the three years. There is no capital gain or loss in the third year because the face value payment equals the book value of the bond on the redemption date.

Coupon number	Coupon payment	Interest on book value	Discount amortized	Book value of bond	Unamortized discount
0	—	—	—	$950.83	$49.17
1	$ 50	$ 57.05	$ 7.05	957.88	42.12
2	50	57.47 ①	7.47 ②	965.35 ③	34.65 ④
3	50	57.92	7.92	973.27	26.73
4	50	58.40	8.40	981.67	18.33
5	50	58.90	8.90	990.57	9.43
6	50	59.43	9.43	1000.00	0.00
Total:	$300	$349.17	$49.17		

① Interest on book value = 0.5 × Yield rate × Book value after previous coupon payment
  = 0.06 × $957.88 = $57.47
② Discount amortized = Interest on book value − Coupon payment
  = $57.47 − $50 = $7.47
③ New book value = Previous book value + Discount amortized
  = $957.88 + $7.47 = $965.35
④ Unamortized discount = Face value − Current book value
  = $1000 − $965.35 = $34.65

(In contrast, individual investors will report, for tax purposes, $100 of interest income each year plus a $49.17 capital gain in the year the bond matures.)

You can *directly* obtain the book value of a bond after any interest payment without working through an amortization schedule. The book value equals the present value of the *remaining* interest and face value payments from the bond, discounted at the bond's yield to maturity. Use this approach to obtain an intermediate book value in the construction of a *partial* amortization schedule for a bond premium or discount.

EXERCISE 15A

Answers to the odd-numbered problems are at the end of the book.
Note: **Unless otherwise indicated, assume that:**
- **Bond interest is paid semiannually.**
- **Bonds will be redeemed at their face value at maturity.**
- **Market rates of return and yields to maturity are compounded semi-annually.**

Calculate the purchase price and construct a bond premium amortization schedule for each of the bonds described in Problems 1 through 4. Determine the total interest that will be recorded for accounting purposes from the purchase date until maturity.

••**1.** A $1000 face value, 9% coupon, five-year bond is purchased three years before maturity to yield 8% compounded semiannually until maturity.

••**2.** A $5000 face value bond with an 11% coupon is purchased $3\frac{1}{2}$ years before maturity to yield 9.5% to maturity.

••**3.** The yield to maturity on a $1000 face value, 10% coupon, 20-year bond purchased with 12 years remaining until maturity is 8.8%. Show details of the first three and the last three coupon interest payments in a partial amortization schedule.

••**4.** A $10,000 face value, 13% coupon bond is purchased $16\frac{1}{2}$ years before maturity at a price that will yield 10% until maturity. Show details of the first three and the last three coupon payments in a partial amortization schedule.

Calculate the purchase price and construct a bond discount amortization schedule for each of the bonds described in Problems 5 through 8. Determine the total interest that will be recorded for accounting purposes from the purchase date until maturity.

••**5.** A $1000 face value, 8% coupon bond is purchased three years before maturity to yield 9.5% compounded semiannually until maturity.

••**6.** A $5000 face value, 9% coupon, 10-year bond is purchased $2\frac{1}{2}$ years before the maturity date at a price that will yield 11% until maturity.

••**7.** The yield to maturity on a $1000 face value, 8.5% coupon bond purchased with 11 years remaining until maturity is 10.4%. Show details of the first three and the last three coupon interest payments in a partial amortization schedule.

••**8.** A $10,000 face value, 8.6% coupon, 25-year bond is purchased $14\frac{1}{2}$ years before maturity at a price that will yield 10% until maturity. Show details of the first three and the last three coupon payments in a partial amortization schedule.