Chapter 17
Corporate Bonds

Concept Questions

1. The four main types are debentures, mortgage bonds, collateral trust bonds, and equipment trust certificates.

2. A bond refunding is a call in which an outstanding issue is replaced with a lower coupon issue. The point is simply to replace a relatively high coupon issue with a lower coupon issue. All bond refundings involve a call, but not all calls involve a refunding. For example, an issue may be called, but not replaced.

3. Call protection refers to the period during which the bond is not callable, typically five to ten years for a corporate bond. The call premium is the amount above par the issuer must pay to call the bond; it generally declines to zero through time.

4. A put bond gives the owner the right to force the issuer to buy the bond back, typically either at face value or according to a preset price schedule. Obviously, the put feature is very desirable from the owner’s perspective, but not the issuer’s.

5. All else the same, a callable bond will have a higher coupon rate (because buyers don’t like call features and, therefore, demand a higher coupon); a putable bond will have a lower coupon rate (because buyers like put features).

6. A convertible bond converts into the issuer’s stock. An exchangeable bond converts into the stock of some other entity. Typically, with an exchangeable bond, the issuer already owns the stock into which the issue can be converted.

7. Event risk refers to a sudden decline in credit quality resulting from a significant structural or financial change. The put feature is intended to protect holders against event risk; it works great as long as the issuer has the financial strength to fulfill its obligation to buy back the issue on demand.

8. The advantage is that the coupon adjusts up when interest rates rise, so the bond’s price won’t fall (at least not nearly as much as it would have). It cuts both ways, however. The coupon will fall if interest rates decline, so the owner will not experience the gains that otherwise would have occurred.

9. Effective duration is a more accurate measure of interest rate risk because it measures the actual price change for a given change in yield after accounting for any embedded options. By contrast, Macaulay and Modified duration are only approximations and do not account for the price effects of embedded options.

10. Some examples of embedded options in bonds are: 1) Put bonds have a put option feature that gives the bondholder the right to sell the bond back to the issuer at a preset price. The put feature makes the bond more valuable to the bondholder so a put bond has a higher price than a comparable non-putable bond. 2) Convertible bonds have a call option feature that gives the bondholder the right to buy stock from the issuer at a preset price. The call option makes the bond more valuable to the bondholder so a convertible bond has a higher price than a comparable non-convertible bond. 3) Callable bonds have a call option feature that gives the issuer the right to buy the bonds back from the bondholder at a preset price. The call feature makes the bond less valuable to the bondholder so a callable bond has a lower price than a comparable non-callable
11. The critical distinction lies in their credit ratings when they were first issued. Original issue junk refers to a bond that had a credit rating below investment grade when it was first issued. A fallen angel had a credit rating of investment grade when it was first issued, but has since fallen to below investment grade.

12. Conceptually, they are the same thing. A put bond gives the owner the right to force the issuer to buy the bond back, typically at face value. An extendible bond gives the owner the right to receive face value on the extension date or receive another bond. In both cases, the owner can have either face value or a bond. In practice, put bonds can be put on multiple dates (usually the coupon dates); whereas, an extendible bond may only have one extension date. Also, if an extendible bond is extended, the new bond may not have the same coupon.

13. Because of the negative convexity effect, callable bonds cannot rise in value as far as noncallable bonds, so they do have less interest rate sensitivity. Also, a callable bond may “mature” sooner than an otherwise identical noncallable issue (because it is called), so this shorter effective maturity also means less interest rate sensitivity. Unfortunately, the smaller interest rate sensitivity is almost all on the upside, so it is not a good thing.

14. A refunding provision restricts the ability of an issuer to call their bonds. Such a provision specifies that the issuer cannot call their bonds for the purpose of refunding their debt with a new bond issue. Since this is the most common reason that bonds are called, i.e., for a refunding. A bond issue with a refunding provision is far less likely to be called by its issuer than a comparable callable bond without a refunding provision.

15. The floating coupon in this case acts like a rocket booster, magnifying the gains and losses that occur from changes in interest rates.

**Core Questions**

1. $1,000/40 = $25
2. $1,000/34 = 29.41
3. $1,000/55 = 18.18
4. $60 \times $18 = $1,080
5. $15 \times $82 = $1,230
6. $832/$62 = 13.42
7. 110\% - 3 \times 2\% = 104\%
8. \[ P = 1,030.06 = 35(PVIFA_{3.725\%,10}) + 1000(PVIFA_{3.725\%,10}) + CP(PVIFA_{3.725\%,10}); C = 70.00 \]
9. The minimum value is the larger of the conversion value or the intrinsic bond value. The conversion value is \(20 \times 46 = 920\). To calculate the intrinsic bond value, note that we have a face value of $1,000 (by assumption), a semiannual coupon of $35, an annual yield of 9 percent (4.5 percent per half-year), and 10 years to maturity (20 half-years). Using the standard bond pricing formula from our previous chapter, the bond’s price if it were not convertible is $869.92. Thus, this convertible bond will sell for at least (if not more than) $920.

10. You can convert or tender the bond (i.e., surrender the bond in exchange for the call price). If you convert, you get stock worth \(35 \times 40 = 1,400\). If you tender, you get $1,100 (110 percent of par). It’s a no-brainer: convert.

**Intermediate Questions**

11. Duration to maturity = \((1.03/0.06) - [(1.03 + 30(0.08 - 0.06)) / (0.06 + 0.08(1.03^{60} - 1))]\) = 13.555 years
Duration to call = \((1.03/0.06) - [(1.03 + 5(0.08 - 0.06)) / (0.06 + 0.08(1.03^{10} - 1))]\) = 4.254 years

The duration to call is the more relevant number in this case. With interest rates lower than the coupon rate, it is very likely the company will call the bond in five years and refinance at a lower interest rate. However, if interest rates rise to 8 percent or higher in the next five years, the bond will likely not be called.

AIMR suggested answers:

12. Conversion value = \(40 \times 22 = 880\); Conversion price = \(1,050 / 22 = 47.73\)

13. An increase in the stock price volatility increases the bond price. The conversion option on the stock becomes more valuable. An increase in interest rate volatility decreases the bond value. The chance of the bond being called increases, causing the value of the call option on the bond to become more valuable.

14. Conversion price = \(980 / 25 = 39.20\)
One-year bond return = \((1,125 + 40 - 980) / 980 = 18.88\%\)
One-year stock return = \((45 - 35) / 35 = 28.57\%\)

15. The two components are the straight bond value (its value as a bond) and the option value (the value associated with the potential conversion into equity).

The increase in equity price does not affect the straight value of the Ytel convertible but does increase the call option component value significantly, because the call becomes deep in the money when the equity price is compared to the convertible’s conversion price.

The increase in interest rates decreases the straight value component (bond values decrease as interest rates increase) of the convertible bond and increases the value of the equity call option (call option values increase as interest rates increase), though this increase may be small or unnoticeable when compared to the change in the option value resulting from the increase in the equity price.