Chapter 7
Global Bond Investing

1. Bonds issued in the United States by a European corporation and denominated in U.S. dollars would be classified as foreign bonds. The correct answer, accordingly, is (b).

2. Each of the three statements is true.

3. a. Both types of bonds would provide some debt reduction for emerging countries. The amount of debt reduction would be visible immediately in the case of a discount bond. From then on, the emerging country would pay a market interest rate on the reduced principal. In the case of a par bond, though the redemption value would remain unchanged, the debt reduction would be obtained through a coupon rate reset well below the market rate.
   b. Both types of bonds would pay a lower coupon amount than the original. The coupon amount would be reduced for a discount bond because the market rate would be applied to a smaller principal. The interest payment would be reduced for a par bond because a below-market rate would be applied to the original principal.
   c. The final redemption value would be much greater for a par bond than for a discount bond. As a compensation for this, the coupon payments would be lower for the par bonds than for the discount bonds.

4. The market price of these bonds is a sum of: (1) the present value of the coupons in yen, with the discounting done based on the yen interest rate; and (2) the present value of the principal, converted to yen based on the spot exchange rate, with the discounting done based on the dollar interest rate.
   a. If the market interest rate on yen bonds drops significantly—that is, if the yen interest rate drops—the present value of the coupons should increase. Thus, the market price should increase.
   b. If the dollar drops in value relative to the yen—that is, the yen/dollar exchange rate drops—the principal in dollars converts to a lower yen amount. Thus, the market price should decrease.
   c. If the market interest rate on dollar bonds drops significantly—that is, if the dollar interest rate drops—the present value of the principal should increase. Thus, the market price should increase.

5. a. Full price = Clean price + Accrued interest.
   Clean price = 90%.
   Because straight international bonds denominated in any currency use the U.S. “30/360” day-count convention, accrued interest = 120/360 × 5% = 1.67%. So, full price = 90% + 1.67% = 91.67% of the par value of SFr 1,000 = SFr 916.70.
   b. Because the Swiss bond market also follows the U.S. “30/360” day-count convention, the answer won’t be different.
6. a. Because it is a zero-coupon bond, the YTM, \( r \), is calculated simply as follows:

\[
45 = \frac{100}{(1 + r)^9}
\]

so, \( 1 + r = 1.0928 \), \( r = 0.0928 \), or 9.28%.

b. Because it is a perpetual bond, the YTM, \( r \), is calculated simply as follows:

\[
108 = \frac{6}{r}
\]

so, \( r = 0.0556 \), or 5.56%.

7. a. In most European markets, the actual YTM would be reported after taking into account that the coupon frequency is semiannual. Thus, in most European markets, the YTM reported would be an annual YTM of \( (1 + 0.08/2)^2 - 1 = 0.0816 \), or 8.16%.

b. i. \( 103 = \frac{6}{1+r} + \frac{106}{(1+r)^2} \), \( r \) is the yield (European way).

So, \( r = 4.40\% \).

ii. \( 103 = \frac{6}{1+r'}^2 + \frac{6}{\left( \frac{1+r'}{2} \right)^4} \)

or, \( \left( 1 + \frac{r'}{2} \right)^2 = 1 + r \), \( r' \) is the yield (U.S. way).

So, \( r' = 4.35\% \).

8. a. Simple yield = \( \frac{\text{Coupon}}{\text{Current price}} + \frac{(100 - \text{Current price})}{\text{Current price}} \times \frac{1}{\text{Years of maturity}} \)

Simple yield for Bond A = \( \frac{11}{106.48} + \frac{(100 - 106.48)}{106.48} \times \frac{1}{4} = 8.81\% \)

Simple yield for Bond B = \( \frac{7}{93.52} + \frac{(100 - 93.52)}{93.52} \times \frac{1}{4} = 9.22\% \)

b. For Bond A, which is selling above par, the simple yield of 8.81% is less than the actual YTM of 9 percent. On the other hand, for Bond B, which is selling below par, the simple yield of 9.22 percent is more than the actual YTM of 9 percent. Thus, the simple yield understates the true yield for a bond priced over par and overstates it for a bond priced under par.

9. a. Expected price change = \( -7.5 \times 0.05\% = -0.375\% \). Given that the time horizon is just the next few minutes, this is also the expected return over the next few minutes.

b. i. Expected price change = \( -7.5 \times -0.30\% = 2.25\% \).

ii. Because the time horizon is one year, the estimated expected return = \( 4 + 2.25 = 6.25\% \).

iii. Risk premium = \( 6.25 - 2.5 = 3.75\% \).
10. a. In theory, because U.S. Treasury bonds entail no default risk, a corporate bond’s credit spread could be measured by comparing its YTM with that of a Treasury bond that has identical cash flows. However, the problem is that such a Treasury bond will rarely exist. Moreover, the comparison would not take into account liquidity differences between the Treasury bond and the corporate bond.

b. Let \( y \) be the yield on the corporate bond. There are two possibilities at year-end. One, the corporation defaults (0.5% chance), and the investor gets nothing. Two, the corporation does not default (99.5% chance), and the investor gets \((100 + y)\%\). Equating the expected payoff on the corporate bond to that on the identical default-free bond, we have

\[
104 = 0.005 \times 0 + 0.995 \times (100 + y)
\]

so, \( y = 4.52\% \).

Let \( m \) be the credit spread on the corporate bond. Then, \( y = 4\% + m \). So, \( m = 0.52\% \).

11. a. The breakeven exchange rate is the forward rate, which can be computed using the interest rate parity relation. Because the exchange rate is given in £:€ terms, the appropriate expression for the interest rate parity relation is

\[
F = S \frac{(1 + r_e)}{(1 + r_f)} (\text{that is, } r_e \text{ is a part of the numerator and } r_f \text{ is a part of the denominator}).
\]

Accordingly, the break-even rate is

\[
F = 1.5408 \frac{1 + 0.045}{1 + 0.052} = 1.5305
\]

b. Because the euro appreciated more relative to the pound than what the break-even rate implied, the euro investment would have turned out to be better. Of course, this is in hindsight.

12. If the interest rate on Swiss francs increases, the bond price will go down. Also, a depreciation of the Swiss franc relative to the euro is undesirable for the French investor. Finally, the bonds are corporate bonds with a credit risk. Thus, the correct answer is (e).

13. a. Because the model indicates that the Swiss franc will become stronger relative to the U.S. dollar than as indicated by the forward rate, the investor would be better off hedging the currency risk. If he doesn’t hedge, he expects to receive SFr 135 for every US$100 that he gets one year later. If he hedges using a forward contract, he will receive SFr 146 for every US$100 that he gets one year later.

b. Hedged return = foreign yield – \( D \times \Delta \)foreign yield + Domestic cash rate – Foreign cash rate = 4.5% – 6 \times (– 0.15%) + 1% – 2% = 4.4%.

c. Risk premium in Swiss franc = Expected hedged return to the Swiss investor – Swiss franc cash rate = 4.4% – 1% = 3.4%.
   Risk premium for the U.S. investor = Expected return to the U.S. investor – Dollar cash rate = \([4.5% – 6 \times (– 0.15%)]\) – 2% = 3.4%.

14. The statement is correct. First, within a particular market, the prices of different straight bonds are highly correlated, because they all tend to move up or down when the interest rate in that market moves down or up. However, the prices of bonds in different markets need not be highly correlated, because the interest rates may move in different directions in different markets. Second, the bonds in a particular market are denominated in the same currency. Thus, all bonds within the market are influenced similarly by the exchange rate movements of their currency relative to the domestic currency of the investor. However, currency movements across different markets would be different.
15. a. The coupon paid on September 1 is based on the rate set on March 1, which is 5%. Because the coupon is semiannual, the coupon paid is 5% of $1,000/2 = $25.

b. As per the yield curve on September 1, the six-month rate is 4.75%. Thus, the new value of the coupon set on September 1 is 4.75% of $1,000/2 = $23.75.

c. On December 1, three months have elapsed since September 1, and three months are remaining until the next reset date of March 1, 2008. We know that on this next reset date three months later, the bond will be worth 100%. Then it will pay a coupon of 2.375% (as set on September 1). The three-month rate on December 1 is 4.25%. Hence the present value of the FRN on December 1 is

\[ V = \frac{1,000 + 23.75}{1 + 4.25\%/4} = 1,012.99. \]

If the bond is quoted as a clean price plus accrued interest, the accrued interest on December 1 is equal to 1.1875% (or three months of a coupon of 4.75%), or $11.875. Hence, the clean price would be

\[ P_c = 1,012.99 - 11.875 = 1,001.12, \text{ or } 100.11%. \]

16. Under the “freezing” method, the LIBOR is assumed to stay forever at 6%. Under this assumption, the FRN has an annual fixed coupon of 6.5% (“frozen” LIBOR + original spread). So, the semiannual coupon is 3.25%. The annual market-required yield is 6 + 1/7 = 7%. So, the semiannual yield is 3.50%. Because the value of a perpetual bond is given by \( P = C/r \), the new value of the FRN should be

\[ P = 3.25/3.50 = 0.9286, \text{ or } 92.86%. \]

17. a. Let \( x \) be the coupon rate. The fair interest rate \( x \) on the bond should be found by equating the present yen value of all cash flows to the issue value of ¥150 million. The cash flows are as follows:

- Coupons in years 1 and 2, of ¥150x million. The discount rate for these would be the yen yield.
- Principal repayment at maturity of $1.36 million. The discount rate for this would be the dollar yield. The dollar present value of this zero-coupon dollar bond is then translated into yen using the spot exchange rate of ¥110.29 per $.

So, to get the fair interest rate, we have in million yen,

\[ 150 = \frac{150x}{1.03} + \frac{150x}{1.03^2} + \frac{1.36}{1.07^2} \times (110.29) \]

\[ x = 6.62%. \]

b. Because the coupon is 6% and the face value is 100% of the issue value, the percentage price can be computed as follows:

\[ P = \frac{6%}{(1.03)} + \frac{6%}{(1.03)^2} + \frac{100%}{(1.07)^2} = 98.82%. \]
18. a.  i. The net coupon for the combination of three bonds is

\[ 2 \times (12.75\% - \text{LIBOR}) + 2 \times \text{LIBOR} - 6.5\% = 19\% \]

or 6.333% per bond compared with 6.75% on a straight bond. Thus, the net coupon per bond is lower for the combination.

ii. The net coupon for the combination of two bonds is

\[ \text{LIBOR} + 0.25\% + 12.75\% - \text{LIBOR} = 13\% \]

or 6.5% per bond compared with 6.75% on a straight bond. Thus, the net coupon per bond is lower for the combination.

b. The net coupon for the combination of the two bonds is

\[ 6.75\% + 2 \times \text{LIBOR} - 6.50\% = 2 \times \text{LIBOR} + 0.25\% \]

or \( \text{LIBOR} + 1/8\% \) per bond compared with \( \text{LIBOR} + 1/4\% \) on the plain FRN.

19. a. The currency-option bond can be replicated by a straight one-year A$ bond redeemed at A$1,000 with an \( x \) percent coupon plus an option to exchange A$1,000 \((1 + x)\) for US$1,000\((1 + x)/1.82\).

The value of the option is 2 U.S. cents per A$, which is A$0.0364, based on the exchange rate of A$1.82 per US$. To be issued according to market conditions on the bond and options market, the coupon rate \( x \) percent of the currency-option bond should be such that the issue price of this bond is equal to the present value of a fixed A$1,000\((1 + x)\) received in one year plus the present value of the currency option:

\[
1,000 = \frac{1,000 \times (1 + x\%)}{1.08} + 1,000 \times (1 + x\%) \times 0.0364
\]

so, \( x = 0.03915 \), or 3.915%.

b. The value of the currency-option bond is the sum of the present value of a straight one-year A$ bond redeemed at A$1,000 with a 3.4% coupon plus the value of the put option on the A$.

\[
V = \frac{1,000 \times (1 + 0.034)}{1.08} + 1,000 \times (1 + 0.034) \times 0.0364 = \text{A$99.05}
\]

20. a. The final payment will be 120. So, the expected yield, \( r \), is given in the following equation:

\[
100 = \frac{120}{(1+r)^2}
\]

hence, \( r = 9.54\% \).

b. The bond can be decomposed as the sum of a zero-coupon bond plus a two-year at-the-money call on the CAC index. The present value of this guaranteed bond is equal to

\[
P = \frac{100}{1.06^2} + 11 = 100\%
\]

so, the bond is fairly valued.