HW5 solutions

1. The forward exchange price is the current price marked up 8 months

$$F(0, 2/3) = (1.03)^{2/3}\, 80$$

2. The long position indicates we are obligated to buy. Consider liquidating the security right after we buy it. Do this by shorting a forward. Thus the value @ time $t = 3/12$ in time $T = 8/12$ is

$$V_{tT} = F\left(\tfrac{3}{12}, \tfrac{8}{12}\right) - F\left(0, \tfrac{8}{12}\right)$$

$$= 70\,(1.03)^{5/12} - 80\,(1.03)^{8/12}$$

Marking back the value to time $t = 3/12$

$$V_t = \frac{1}{(1.03)^{5/12}}\left\{F\left(\tfrac{3}{12}, \tfrac{8}{12}\right) - F\left(0, \tfrac{8}{12}\right)\right\}$$

$$= 70 - 80\,(1.03)^{3/12}$$

3. The forward exchange price, to purchase the security @ $T = \frac{15}{12}$, is known to be $F(0, \frac{15}{12})$. We make one payment today and 1 @ $T = \frac{15}{12}$, which must add up to F. Thus –

$$P_0 (1.03)^{\frac{15}{12}} + 60 = F(0, \tfrac{15}{12})$$

$$\therefore \quad P_0 = 80 - 60(1.03)^{-\frac{15}{12}}$$

4. To eval Forward w/ security w/ dividend, we must take the value of the dividend out of the Exchange price:

$$F(0, \tfrac{9}{12}) = 80(1.03)^{\frac{9}{12}} - 5(1.03)^{\frac{8}{12}}$$

5. Again let us eval Forward by removing value of the dividends:

$$F(0,2) = 80(1.03)^2 e^{-(.06)(2)}$$

6. The current exchange rate is $\frac{\$1}{¥7}$

$$\rho_0 = \frac{1}{7}\ ; \ B_{¥}(0, \tfrac{3}{2}) = (1.04)^{-\frac{3}{2}}\ ; \ B_{\$}(0, \tfrac{3}{2}) = (1.01)^{-\frac{3}{2}}$$

The forward price:

$$F = \$\frac{1}{7}\left(\frac{1.04}{1.01}\right)^{3/2} 1200$$

7. We can determine the ~~current cost of~~ cost ¥1200 at the maturity date, it is

$$\rho_{3/2} = \frac{1}{6}$$

$$(\text{Price})_{3/2} = \frac{1}{6}\, 1200$$

Thus the value of the long position is

$$(\text{Price})_{3/2} - F = \left\{\frac{1}{6} - \frac{1}{7}\left(\frac{1.04}{1.01}\right)^{3/2}\right\} 1200$$