37011 Financial Markets Instruments

Whiteboard Tutorial 6

1. On July 20 a trader enters into a three-month forward agreement to buy 1,000 ounces of gold for $2,750.00 per ounce.

   (a) What is the value of the forward contract on July 20 to the trader?

   (b) If the spot price of gold is $2,800.00 on October 20, then what is the profit or loss for the trader?

   (c) If the spot price of gold is $2,600.00 on October 20, then what is the profit or loss?

2. Suppose that at time $t = 0$ shares in XYZ are trading at $S_0 = \$34.50$, the current three-month forward price is $F_0^* = \$35.20$, the three-month (continuously compounded) risk–free rate is 4.2% and XYZ shares do not pay any dividends in the next three months. Can you make a riskless profit, and if so, how?

3. Suppose shares in UVW are currently trading at $S_0 = \$52.50$, the three-month (continuously compounded) risk–free rate is 4.1% and UVW shares do not pay any dividends in the next three months.

   (a) What is the forward price and the value of a long forward contract at time $t = 0$?

   (b) If the UVW share price is $50.75 in one month's time and the two-month risk–free rate is 3.9%. what is the forward price in one month's time?

   (c) What is the value of the initial long forward contract in one month's time?

4. Consider a nine-month forward contract on USD 1,000,000. Assuming that the USD/AUD exchange rate is 0.6542, the nine-month US simple interest rate is 3.5% and the nine-month Australian simple interest rate is 4.25%, what is the forward exchange rate?

5. Consider a six-month forward contract on a stock index with a continuous dividend yield of 3% per annum. If the current level of the index is 4500 and the risk free rate is 4% continuously compounded, then what is the forward price? Assume that each point of the index equates to one dollar.

6. Suppose the spot price of gold is currently $2820.00 per ounce and the storage costs are $45.00 per ounce, per quarter, paid in advance. The continuously compounded risk–free rate is 4.5% per annum for all maturities. What is the nine-month forward price?

7. Suppose that shares in XYZ are currently trading at $220.50 and the company will pay a dividend of $5.00 per share in six months. If interest rates for all maturities are 4% continuously compounded, what is the nine-month forward price?

8. Consider a three-year 6% semiannual coupon bond with face value \$100,000. Assume that the forward contract matures just after the second coupon payment.

   (a) If the risk–free rate is 4.25% continuously compounded for all maturities, then what is the one-year forward price on the bond?

   (b) If the risk–free term structure of interest rates is instead given by the term structure that you extracted in Question 2 of Whiteboard Tutorial 2, then what is the one-year forward price on the bond? Use loglinear interpolation of discount factors where necessary.

9. A forward rate agreement (FRA) is an agreement to lend/borrow a certain amount for a certain interest rate (both fixed today) for a certain period of time starting at a certain time in the future. In the absence of any market imperfections, what is the simple interest rate that, if agreed on today for a three–month loan commencing in ten months' time, sets today's value of the agreement to zero? Assume the term structure that you extracted in Question 2 of Whiteboard Tutorial 2 and use loglinear interpolation of discount factors where necessary.

10. If you assume the term structure that you extracted in Question 2 of Whiteboard Tutorial 2 and use loglinear interpolation of discount factors where necessary, what is the term structure of instantaneous forward rates? Plot this term structure.