

HW 9.1 - 9.2 (b) Key

1. The following table shows the forward prices of wheat (per bushel):

Years to Expiration	Forward Price
1	8.40
2	8.80

The following table shows the spot rates of interest:

Term to Maturity (Years)	Spot Rate
1	5.9%
2	6.2%

Find the 2-year prepaid swap price for wheat. [19 #06]

- ☒ A) \$15.73 B) \$16.05 C) \$16.36 D) \$16.68 E) \$16.99

$$P = \frac{8.40}{1.059} + \frac{8.80}{(1.062)^2} = 15.73$$

2. The following table shows the forward prices of wheat (per bushel):

Years to Expiration	Forward Price
1	8.20
2	8.80
3	9.20

The following table shows the spot rates of interest:

Term to Maturity (Years)	Spot Rate
1	4.7%
2	5.3%
3	$r\%$

Suppose that the 3-year prepaid swap price for wheat is \$23.58. Find the 2-year swap price on a forward swap that begins at the end of year 1 (but is entered into today). [19 #08]

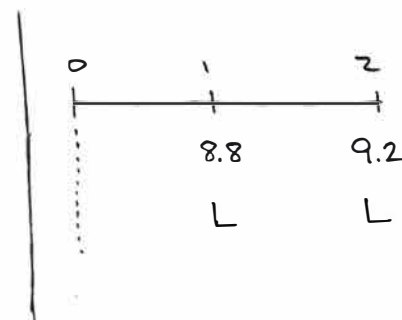
- [A] \$8.99 B) \$8.27 C) \$8.45 D) \$8.63 E) \$8.81

$$3 \text{ yr swap: } 23.58 = \frac{8.2}{1.047} + \frac{8.8}{(1.053)^2} + \frac{9.2}{(1+r)^3}$$

$$r = 5.604\%$$

$$2 \text{ yr swap: } \frac{8.8}{(1.053)^2} + \frac{9.2}{(1.056)^3} = \frac{L}{(1.053)^2} + \frac{L}{(1.056)^3}$$

$$L = \boxed{8.99}$$



3. Suppose that, in a two-year interest rate swap, the floating rate for each year is determined as the one-year rate at the beginning of the year, but payments are made at the end of the year. According to the relevant yield curve for the swap, the one-year spot rate of interest is 6%, and the two-year spot rate of interest is 6.5%. Find the appropriate fixed rate for the two-year swap. [19 #10]

- [A] 6.48% B) 6.10% C) 6.22% D) 6.35% E) 6.61%

$$1 = \frac{R}{1.06} + \frac{R}{(1.065)^2} + \frac{1}{(1.065)^2}$$

$$R = \boxed{6.484\%}$$

4. Alfred will need to sell 5,000 bushels of wheat at the end of each year for the next 3 years.

His cost to produce the wheat will be 8.55 per bushel in the first year, and will increase by 2.3% each subsequent year. Alfred's costs are payable at the end of the year.

Alfred would like to use a commodity swap with annual payments to hedge the risk of prices moving in the next 3 years.

He would like for his annual payments under the swap to increase by 2.3% per year to better match the costs he will experience.

Given the forward prices for wheat and prices for zero coupon bonds, what is Alfred's swap payment at the end of the 3rd year? [19-a1]

Maturity Year	1	2	3
Wheat forward price	8.67	8.80	8.94
Price of 1 dollar zero coupon bond	0.943	0.882	0.805

- $\frac{1}{1+(1.023)}$ $\frac{1}{(1.023)^2}$ $\frac{1}{(1.023)^3}$
 [A] 45,039 B) 44,814 C) 45,264 D) 45,489 E) 45,714

$$\begin{array}{c}
 0 \qquad 1 \qquad 2 \qquad 3 \\
 | \quad | \quad | \quad | \\
 \hline
 8.67 \qquad 8.80 \qquad 8.94 \\
 \times \qquad \times(1.023) \qquad \times(1.023)^2 \\
 \times [0.943 + (1.023)(0.882) + (1.023)^2(0.805)]
 \end{array}$$

$$\begin{aligned}
 & \times [0.943 + (1.023)(0.882) + (1.023)^2(0.805)] \\
 & = [8.67(0.943) + 8.8(0.882) + 8.94(0.805)]
 \end{aligned}$$

$$X = 8.60727$$

$$5000 \times (1.023)^2 = \boxed{45,039}$$

5. You enter into a swap that will begin one year from today.

The swap has a 4-year term and will pay you annual coupons based on 1 year LIBOR in exchange for 9.32%.

If the following annual effective LIBOR spot rates represent current market conditions, what is x such that today's market value of the swap is 0? [19-a2]

Year	Spot Rate
1	0.069
2	0.075
3	x
4	0.086
5	0.089

- [A] 0.080 B) 0.073 C) 0.075 D) 0.078 E) 0.082

$$\begin{array}{c}
 0 \qquad 1 \qquad 2 \qquad 3 \qquad 4 \qquad 5 \\
 | \quad | \quad | \quad | \quad | \quad | \\
 \hline
 \text{II} \qquad R \qquad R \qquad R \qquad R+1
 \end{array}$$

$$R = 0.0932$$

$$\frac{1}{1.069} = \frac{R}{(1.075)^2} + \frac{R}{(1+x)^3} + \frac{R}{(1.086)^4} + \frac{R}{(1.089)^5} + \frac{1}{(1.089)^5}$$

$$x = \boxed{7.979\%}$$