

9. SWAPS (PART OF FUTURES CHAPTER)

1. Here we use simple bootstrapping to find the 3-year spot rate.

ONE YEAR

$$100 = \frac{100}{1.05}$$

TWO YEAR

$$100 = \frac{5.25}{1.05} + \frac{105.25}{(1+R_2)^2}$$

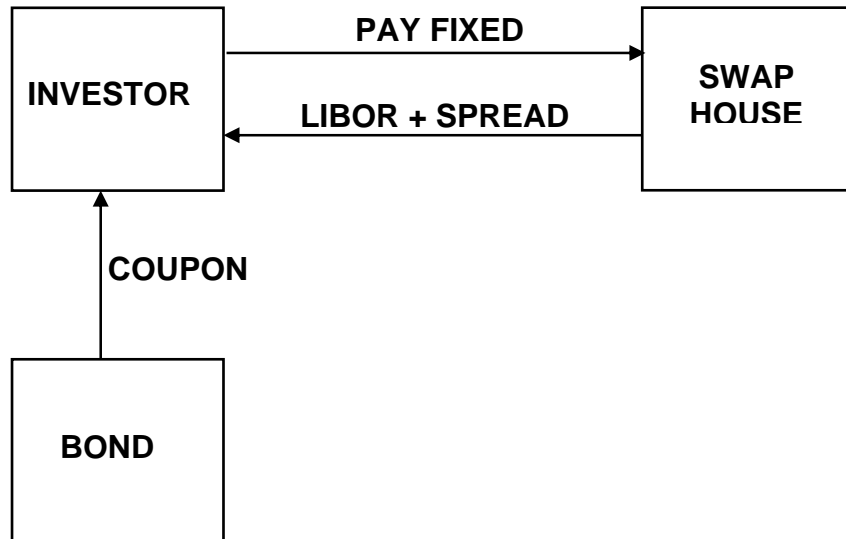
$$R_2 = 5.256579\%$$

THREE YEAR

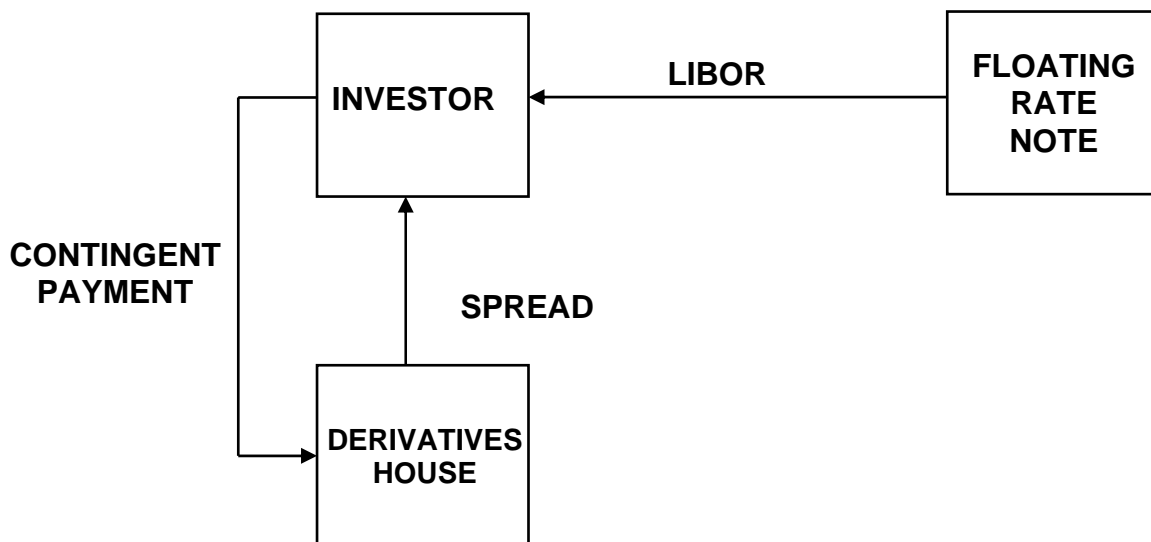
$$100 = \frac{5.5}{1.05} + \frac{5.5}{(1.05256574)^2} + \frac{105.5}{(1+R_3)^3}$$

$$R_3 = \underline{\underline{5.51868\%}}$$

ASSET SWAP



CREDIT DEFAULT SWAP



11. First we calculate the number of days between September 15, 2000 and March 15, 2001 - this is 181 days.

$$\text{LIBOR PAYMENT} = \$100,000,000 \times 0.062 \times \frac{181}{360}$$

$$= \$3,117,222.222$$

$$\text{INDEX CAPITAL GAIN} = \$100,000,000 \times \left[\frac{1525 - 1450}{1450} \right]$$

$$= \$5,172,413.79$$

$$\text{DIVIDEND YIELD ON INDEX} = \$100,000,000 \times 0.02 \times \frac{181}{365}$$

$$= \$991,780.82$$

Hence the net payment to the receiver of the equity return will be:

$$\$5,172,413.79 + \$991,780.82 - \$3,117,222.22$$

$$= \$3,046,972.39$$

12. First we estimate the one, two and three year discount factors:

$$\frac{1}{1.10} = 0.90909091$$

$$\frac{1}{(1.10)(1.11)} = 0.81900082$$

$$\frac{1}{(1.10)(1.11)(1.1225)} = 0.72962211$$

Then we can find the three year per swap rate by finding the coupon yield on a three year bond priced at par.

$$100 = C(0.90909091) + C(0.81900082) + C(0.72962211) + 100(0.72962211)$$

$$C = 11.001194\%$$

13. First we estimate the forward discount factors

$$\frac{0.953674}{0.977995} = 0.975132$$

$$\frac{0.924535}{0.977995} = 0.945337$$

$$\frac{0.888487}{0.977995} = 0.908478$$

Then we solve the simple equation

$$100 = F(0.975132 + 0.945337 + 0.908478) + 100(0.908478)$$

$$F = \underline{3.2352\%}$$

14. We note that the period May 15, 2004 – November 15, 2004 is 184 days and USD LIBOR is quoted on a 360 day year basis.

$$\begin{aligned} \text{LIBOR PAYMENT} &= \$100,000,000 \times 0.025 \times \frac{184}{360} \\ &= -\$1,277,777.78 \end{aligned}$$

$$\begin{aligned} \text{DIVIDEND YIELD} &= \$100,000,000 \times 0.01 \times \frac{184}{365} \\ &= \$504.109.59 \end{aligned}$$

$$\begin{aligned} \text{CAPITAL GAIN} &= \$100,000,000 \times \left[\frac{940 - 900}{900} \right] \\ &= \$4,444,444.44 \end{aligned}$$

Hence the net payment to the investor by the bank is

$$\begin{aligned} &\$4,444,444.44 + \$504,109.59 - \$1,277,777.78 \\ &= \$3,670,776.25 \end{aligned}$$