

Problem 1

Principal : 100 mil

Discount rate (OIS) : 2,7%

Fixed rate : 4% semi annually

Floating rate : 2,4% to 3%

Floating payments

$$\text{First payment} = 100 \text{ mil} \cdot \frac{2,4\%}{2} = 1,2 \text{ mil}$$

$$\text{Second payment} = 100 \text{ mil} \cdot \frac{3\%}{2} = 1,5 \text{ mil}$$

Fixed payments:

$$\text{Payments}_{4 \text{ month}} = \left(\frac{4\%}{2} \right) 100 \text{ mil} = 2 \text{ mil}$$

$$\text{Payment}_{10 \text{ month}} = \frac{4\%}{2} \cdot 100 = 2 \text{ mil}$$

Cash flow

$$t_4 = 2 \text{ mil} - 1,2 \text{ mil} = 0,8 \text{ mil}$$

$$t_{10} = 2 \text{ mil} - 1,5 \text{ mil} = 0,5 \text{ mil}$$

Discounted cash flow

$$t_4 = 0,8 e^{-0,027 \cdot 1/3} = 0,793$$

$$t_{10} = 0,5 e^{-0,027 \cdot 5/6} = 0,489$$

$$PV = 0,293 + 0,484 = 1,282 \text{ mil}$$

Total value of swap for the floating : 1.28 mil

Total value of swap for the fixed : -1.28 mil

Problem 2

UK risk free-rate : 7%
 US risk free-rate : 4%
 Period : 15 month
 Exchange rate : 1.55
 sterling : 20 £ mil at 10% per annum
 USD : 30 \$ mil at 6% per annum

Payments

$$T_{\text{year}} \begin{cases} 10\% \cdot 20 \text{ £} = \text{£} 2 \text{ mil} \\ 6\% \cdot 30 \$ = \$ 1.8 \text{ mil} \end{cases}$$

$$PV_{\text{USD}} = \frac{1.8 \cdot 1}{(1 + 0.04)^{1/4}} + \frac{31.8 \cdot 1}{(1 + 0.04)^{5/4}} = 32.061$$

$$PV_{\text{GBP}} = \frac{2 \cdot 1}{(1 + 0.07)^{1/4}} + \frac{22 \cdot 1}{(1 + 0.07)^{5/4}} = 22.182$$

Total value,

$$PV \text{ Receipts} - PV \text{ Payments} = 32.061 - (22.182 \cdot 1.55) = -2.321 \text{ mil}$$

Party paying USD: 2.321 mil

Problem 3

Principal : 10 mil
 Fixed rate : 4% per annum every 6 months
 Period : 5 years
 Forward rate_{6m} : 2% per annum
 Libor_{3m} : 3% per annum
 Default risk : 1.5% per annum

Lost cash flow,

$$\text{year 3} : (0.04 \cdot 10 \text{ mil} \cdot 0.5) - (0.03 \cdot 10 \cdot 0.5) = 50000$$

$$\text{year 3.5} : 200,000 - 0.02 \cdot 10 \cdot 0.5 = 100,000$$

$$\text{year 4} : 100,000$$

$$\text{year 4.5} : 100,000$$

$$\text{year 5} : 100,000$$

$$PV = 50,000 + 100,000 \left(e^{-0.018 \cdot 0.5} + e^{-0.018 \cdot 1} + e^{-0.018 \cdot 1.5} + e^{-0.018 \cdot 2} \right) = \$441,120$$

Hw3.4

Friday, September 27, 2024 12:05 PM

Problem 4

$$\text{Received} : 100 \text{ mil} \cdot 3\% = 3 \text{ mil}$$

$$\text{Paid} : 100 \text{ mil} \cdot 3,4\% = 3,4 \text{ mil}$$

$$PV_{\text{fixed}} = \frac{3 \text{ mil}}{1 + 0,034} + \frac{3 \text{ mil}}{(1 + 0,034)^2} = 5,7 \text{ mil}$$

$$PV_{\text{float}} = \frac{3,4}{(1 + 0,034)^1} + \frac{3,4}{(1 + 0,034)^2} = 6,46 \text{ mil}$$

$$\text{Swap value} = 5,7 - 6,46 = -0,76 \text{ mil} = -760 \text{ USD}$$