

## Financial Engineering and Risk Management

## Tutorial Questions: Swaps

1. Suppose the 1- and 2-year oil forward prices are \$22/barrel and \$23/barrel. The 1- and 2-year interest rates are 6% and 6.5%. Show that the new 2-year swap price is \$22.483.
2. Suppose that oil forward prices for 1-year, 2-years and 3-years are \$20, \$21 and \$22. The 1-year effective interest rate is 6%, the 2-year interest rate is 6.5% and the 3-year interest rate is 7%.
  - I. What is the 3-year swap price?
  - II. What is the price of a 2-year swap beginning in one year? (That is, the first swap settlement will be in 2 years and the second in 3 years.)
3. Companies A and B have been offered the following rates per annum on a \$20 million five-year loan:

	Fixed Rate	Floating Rate
<b>Company A</b>	5.0%	LIBOR+0.1%
<b>Company B</b>	6.4%	LIBOR+0.6%

Company A would prefer a floating-rate loan; company B prefers a fixed-rate loan. Design a swap that will net a bank, acting as intermediary, 0.1% per annum and that will appear equally attractive to both companies.

4. Company X wishes to borrow U.S. dollars at a fixed rate of interest. Company Y wishes to borrow Japanese yen at a fixed rate of interest. The amounts required by the two companies are roughly the same at the current exchange rate. The companies have been quoted the following interest rates, which have been adjusted for the impact of taxes:

	Yen	Dollars
<b>Company X</b>	5.0%	9.6%
<b>Company Y</b>	6.5%	10.0%

Design a swap that will net a bank, acting as intermediary, 50 basis points per annum. Make the swap equally attractive to the two companies and ensure that all foreign exchange risk is assumed by the bank.

5. A \$100 million interest rate swap has a remaining life of 10 months. Under the terms of the swap, six-month LIBOR is exchanged for 7% per annum (compounded semi-annually). The average of the bid–offer rate being exchanged for six-month LIBOR in swaps of all maturities is currently 5% per annum with continuous compounding. The six-month LIBOR rate was 4.6% per annum two months ago. What is the current value of the swap to the party paying floating? What is its value to the party paying fixed?
6. Explain the difference between the credit risk and the market risk in a financial contract.
7. Companies X and Y have been offered the following rates per annum on a \$5 million 10-year investment:

	Fixed Rate	Floating Rate
<b>Company X</b>	8.0%	<i>LIBOR</i>
<b>Company Y</b>	8.8%	LIBOR

Company X requires a fixed-rate investment; company Y requires a floating-rate investment. Design a swap that will net a bank, acting as intermediary, 0.2% per annum and will appear equally attractive to X and Y.

8. Company A, a British manufacturer, wishes to borrow U.S. dollars at a fixed rate of interest. Company B, a US multinational, wishes to borrow sterling at a fixed rate of interest. They have been quoted the following rates per annum (adjusted for differential tax effects):

	Sterling	US Dollars
<b>Company A</b>	11.0%	7.0%
<b>Company B</b>	10.6%	6.2%

Design a swap that will net a bank, acting as intermediary, 10 basis points per annum and that will produce a gain of 15 basis points per annum for each of the two companies.

9. Under the terms of an interest rate swap, a financial institution has agreed to pay 10% per annum and receive three-month LIBOR in return on a notional principal of \$100 million with payments being exchanged every three months. The swap has a remaining life of 14 months. The average of the bid and offer fixed rates currently being swapped for three-month LIBOR is 12% per annum for all maturities. The three-month LIBOR rate one month ago was 11.8% per annum. All rates are compounded quarterly. What is the value of the swap?