

END OF CHAPTER EXERCISES

Chapter 5 : Short Term Interest Rate Futures

Financial Engineering : Derivatives And Risk Management

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1. Briefly explain what kind of contract you would use to hedge the following cash (spot) market positions :
 - (a.) It is 1st January and you expect to receive \$10m in 2 months time which you wish to place on deposit at a fixed rate of interest for a further 5 months.
 - (b.) It is 1st January and you are "long" commercial bills which have 170 days to maturity. You are thinking of selling the commercial bills in the cash market in 2 months time.

What are the risks in the hedge you have chosen?
2. It is the 1st January and you are going to take out a 2-year US dollar loan in 2 months time for \$5m, with payments linked to the 180-day commercial paper rate +100 basis points. Carefully explain the steps you might take to hedge this position using the minimum variance hedge ratio and an appropriate futures contract. What are the risks in the hedge?
3. Briefly explain whether you would undertake a long or short futures hedge in the following circumstances:
 - (a.) you plan to purchase a bond in 30 days time
 - (b.) you plan to borrow money in 2 months time
 - (c.) you hold a floating rate bond which you want to hold to maturity
4. The quoted IMM index on a US T-bill *futures* is $Q = 90.00$ (futures discount rate $d_f = 10\%$). The futures contract matures in 30 days. A 120-day T-bill is also available with a discount rate $d = 10\%$ (Day count is 'actual/360'). What is the implied repo rate (with continuous compounding) ? What arbitrage opportunities exist if the actual repo rate is $r = 10.3\%$ (continuously compounded)?
5. On 20th January a US Corporate Treasurer realises that she will have to issue \$1m of commercial paper (present value today \$9,650,000) with a maturity of 180 days on 25th June. The September Eurodollar futures IMM index is at 92.00. (Note : The Eurodollar price quote conventions are the same as for US, T-bills.) How can she hedge this exposure?
6. On 10th November, the US T-bill *futures* contract expiring on 28th December (+48 days) was priced at 94.00 (IMM Index). The T-bill maturing on 28th December had a

yield of 9%. The T-bill maturing on 29th March has a *discount rate* of 7%. There are 139 days between 10th November and 29th March. Determine the implied repo rate (use discrete compounding). Can you make an arbitrage profit ?

7. The 9-month spot interest rate is 10% pa and the 6-month interest rate is 9% pa (both continuously compounded). What is the futures price for a contract which delivers a 90-day T-bill with a face value of \$1m in 6 months time? What is the IMM quoted index?