# END OF CHAPTER EXERCISES

## Chapter 8 : Forward Rates, Yield Curves And The Term Structure

### Investments : Spot and Derivatives Markets

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1. What is a Forward-Forward Agreement and how does it differ from a Forward Rate Agreement (FRA) ?

2. What is the (spot) yield curve and why is it useful ?

3. What are the two key features we require from a fitted yield curve?

4. The 1- year spot rate on US Treasury bonds (T-Bonds) is 9%, the 2- year spot rate is 9.5% and the 3-year spot rate is 10%.

   (a.) Calculate the implied one year ahead, 1-year forward rate, $f_{12}$. Explain why a 1-year forward rate of 9.6% would not be expected to prevail in the market.
   (b.) Calculate the forward rates $f_{23}$ and $f_{13}$. Is there any link between $f_{12}$, $f_{23}$ and $f_{13}$?
   (c.) Very briefly, mention one practical use for spot rates and one practical use of the forward rate concept.

5. If the EH holds, why might the yield curve be :

   (a.) flat
   (b.) upward sloping
   (c.) downward sloping
   (d.) what might cause a parallel shift in the yield curve ?
   (e.) the government implements a credible 'tight' monetary policy by raising short-term (e.g. 3-month) interest rates. Why might this result in a downward sloping yield curve ?

6. (a.) The bank offers to <u>borrow</u> $100 from <u>you</u> at an interest rate applicable between the end of year 1 and the end of year 2 at a rate of 13% (i.e. the forward rate). The spot rates for 1-year money and 2-year money are currently 10% p.a. and 12% p.a. respectively. Explain whether you would take the bank's offer.
   (b.) In principal, how can one calculate the forward rates $f_{13}$ (i.e. the rate of interest applicable between the end of year one and the end of year 3) and $f_{23}$.
   (c.) What are the practical uses of forward rates in finance ?

7. Quoted spot (interest) rates are as follows:

| Year | Spot Rate, per cent |
|---|---|
| 1 | $r_1 = 5.00$ |
| 2 | $r_2 = 5.40$ |
| 3 | $r_3 = 5.70$ |
| 4 | $r_4 = 5.90$ |
| 5 | $r_5 = 6.00$ |

(a.) What are the discount factors for each date (that is, the present value of $1 paid in year *t*)?

(b.) Calculate the PV and hence the fair price of the following 'Treasury Notes' (i.e. coupon paying bonds) all of which have a $1,000 par value.
   (i) 5% coupon, 2-year Note
   (ii) 5% coupon, 5-year Note
   (iii) 10% coupon, 5-year Note

(c.) What are the one year forward rates applicable between i) year 1 and year 2, ii) year 2 and year 3?