

Derivative Instruments

Paris Dauphine University - Master IEF (272)

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Exercises Chapter 6

Exercise 1 *Let x denote a rate that is quarterly compounded in actual/360. Let z denote the equivalent rate that is continuously compounded in actual/365.*

a) Compute z by first transforming x in a rate y that is continuously compounded rate in actual/360.

b) Compute z by first transforming x in a rate y' that is quarterly compounded rate in actual/365.

c) Compare the values obtained in a) and b) when $x = 25\%$. Compare it again when $x = 2.5\%$. Conclude.

Exercise 2 *It is January 9. The price of a Treasury bond with a 12% coupon that matures on October 12, in four years, is quoted as 102-07.*

What is the cash price?

Exercise 3 *A Eurodollar futures price changes from 96.76 to 96.82.*

What is the gain or loss to an investor who is long two contracts?

Exercise 4 (Done) *The 350-day LIBOR rate is 3% with continuous compounding and the forward rate calculate from a Eurodollar futures contract that matures in 350 days is 3.2% with continuous compounding.*

Estimate the 440-day zero rate.

Exercise 5 *It is January 30. You are managing a bond portfolio worth \$6 million. The duration of the portfolio in six months will be 8.2 years. The September Treasury bond futures price is currently 108-15, and the cheapest-to-deliver bond will have a duration of 7.6 years in September.*

How should you hedge against changes in interest rates over the next six months?

Exercise 6 Suppose that the Treasury bond futures price is 101-12. Which of the following four bonds is cheapest to deliver?

Bond	Price	Conversion Factor
1	125-05	1.2131
2	142-15	1.3792
3	115-31	1.1149
4	144-02	1.4026

Exercise 7 Suppose that the 300-day LIBOR zero rate is 4% and Eurodollar quotes for contracts maturing in 300, 398 and 489 days are 95.83, 95.62, and 95.48.

Calculate 398-day and 489-day LIBOR zero rates.

Assume no difference between forward and futures rates for the purposes of your calculations.

(Hint : The forward rates calculated from the Eurodollar futures are expressed with an actual/360 day count and quarterly compounding. The use of our formula then requires these rates to be expressed with continuous compounding and an actual/365 day count)

Exercise 8 (Done) On August 1 a portfolio manager has a bond portfolio worth \$10 million. The duration of the portfolio in October will be 7.1 years. The December Treasury bond futures price is currently 91-12 and the cheapest-to-deliver bond will have a duration of 8.8 years at maturity.

a) How should the portfolio manager immunize the portfolio against changes in interest rates over the next two months?

b) How can the portfolio manager change the duration of the portfolio to 3.0 years?

Exercise 9 The three-month Eurodollar futures price for a contract maturing in six years is quoted as 95.20. The standard deviation of the change in the short-term interest rate in one year is 1.1%.

Estimate the forward LIBOR interest rate for the period between 6.00 and 6.25 years in the future.