

## Homework 4. Quantitative Methods for fixed Income Securities

### CHAPTER 3 Yield to Maturity (Tuckman)

3.13. In October 15, 2016, the **forward-rate curve** for **quarterly compounding** is

$$f(i/4) = 0.0175 + 0.00125 \times (i-1)/4, \quad i = 1, 2, \dots, 120.$$

- Calculate and plot the discount curve.
- Calculate and plot the swap rate curve.
- Consider the 10-year **receiver's** swap initiated in October 15, 2016. If one year later, the **forward-rate curve** becomes

$$f(i/4) = 0.019 + 0.001 \times (i-1)/4, \quad i = 1, 2, \dots, 120,$$

what will be the P&L of the swap?

- [Continued from 3.13] Suppose a trader buys an FRA (i.e., to pay fixed and receive float) on the two-year maturity 3m LIBOR for \$1m notional in October 15, 2016, what will be his P&L a year later?
- A state lottery advertises a jackpot of \$1,000,000. In the fine print it is written that the winner receives 40 annual payments of \$25,000. If the term structure is flat at 6%, what is the true value of the jackpot?
- Assume that the term structure of monthly compounded rates is flat at 3.25%. Find the monthly payment of a 30-year, 5 million dollar mortgage.

### CHAPTER 6

6.3 Calculate the DV01 and modified duration for each of the following bonds as of May 15, 2001:

<i>Coupon</i>	<i>Maturity</i>	<i>Yield</i>	<i>Price</i>
8.75	5/15/2020	5.9653%	131-12 <sup>7</sup> / <sub>8</sub>
8.125	5/15/2021	5.9857%	124-24 <sup>1</sup> / <sub>8</sub>

6.14. On May 15, 2001, the price of the 6.75s of May 15, 2005, was 106-21<sup>1</sup>/<sub>8</sub>.

Compute the yield and, at its yield, use  $\Delta y = 10$  bps to

- compute DV01;
- compute duration; and
- compute convexity.

For a yield change of 25 basis points, estimate price using duration and convexity; and compare with actual change.