

MATH 2600/STAT 2600, Theory of Interest

FALL 2013

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Homework Sheet 6

Due: Thursday 21st November.

- The current term structure has the following semi-annual yields on zero-coupon bonds:

Term(years)	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
rate	1%	1.4%	1.5%	2.5%	2.7%	2.8%	2.8%	2.9%

How much should be paid for a \$100 face-value bond with semi-annual coupons, maturing at par in 4 years time, with:

- 2% annual coupon rate?
 - 6% annual coupon rate?
 - 11% annual coupon rate?
- What are the yields to maturity for the bonds in Q.1 (a) and (b)?
 - For the term structure in Q. 1, which of the one-year periods whose forward rates can be determined from the spot rates given has the largest implied forward rate?
 - The spot-rates for 1, 2 and 3 year strip bonds are 3%, 3.5% and 3.6% annually. You have the opportunity to borrow or lend money at these rates, and you also have the opportunity to arrange to borrow money in two year's time for one year, at an annual rate of 3.6%, or to lend money in two years time for one year at an annual rate of 3.4%. Can you construct an arbitrage possibility?
 - Mrs. Bale is borrowing \$350,000 at a variable rate of prime+1.3%. She is making interest-only payments annually. She makes a forward rate agreement with the bank, so that the interest rate for the third year (starting two years from now) will be 5%. In two years time, the prime rate is 2%. How much money does she need to pay the bank
 - If the payment is due at the begining of the year?
 - If the payment is due at the end of the year?
 - Mr. and Mrs. Chapman can borrow at 3% on the fixed-rate market, or at prime+1.8% on the variable rate market. Mr. Dodd can borrow at 5% on the fixed-rate market, or at prime+3.5% on the variable rate market. Mrs. Ellerman arranges swaps with both of them so that Mr. and Mrs. Chapman can borrow \$600,000 at prime+1.7% and Mr. Dodd can borrow

\$600,000 at 4.9%. How much spread income does Mrs. Ellerman make on this transaction?

7. The current term structure has the following annual yields on zero-coupon bonds:

Term(years)	1	2	3	4	5	6	7	8
rate	4.8%	4.7%	5.2%	5.4%	5.6%	5.7%	5.6%	5.7%

Mrs. Foley has a floating rate loan of \$1,200,000, with annual interest-only payments. She wishes to exchange this for a fixed rate over the next 8 years (i.e. she wants to pay the same interest rate over the next 8 years). What should this rate be?

8. For the spot rates from Q. 7, what is the at-par yield of a 7-year bond with annual coupons?