

MATH 2600/STAT 2600, Theory of Interest

FALL 2013

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Homework Sheet 7

Due: Thursday 27th November

1. Calculate the modified duration and Macauley duration of a 12-year bond with semi-annual coupons at coupon rate 8%, if it is purchased for a yield of:
 - (a) $j_2 = 2\%$.
 - (b) $j_2 = 12\%$.
 - (c) $j_2 = 22\%$.
2. A company expects to receive \$4,000,000 in 2 years time, and pay out \$13,000,000 in 6 years time. If the current spot rates are as in the following table:

Term(years)	2	6	7	8
rate	3.5%	4.6%	4.8%	5%

- (a) find a way for the company Reddington immunise these cash-flows by buying zero-coupon bonds with maturities in 7 or 8 years.
 - (b) Is the immunisation in (a) a full immunisation?
3. Assume a flat term structure of 4.6%. A company has issued a 20-year bond with face value \$120,000 and semi-annual coupon rate 6%. It plans to immunise these liabilities with two payments in 3 and 17 years. Calculate these two payments.
 4. The current term structure has the following yields on zero-coupon bonds:

Term(years)	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
rate	2.1%	2.8%	3.5%	3.9%	4.3%	4.6%

Calculate the modified duration of a 9% semi-annual 3-year bond, based on a parallel shift in the term structure.