

Problemset 4 - Fixed Income

Problem 1

Consider Problem 1, problem set 1 again.

- a) Compute the duration, dollar duration and modified duration for the bond.
- b) Compute the approximate impact of a 30 basis point increase in the ytm on the price of the bond using an appropriate measure of duration.
- c) Compute the exact change in the price of the bond.
- d) Discuss why b) and c) differ.
The FED changes the short term interest rate so that $d(161) = 0.999$. All other values of the discount function remain unchanged.
- e) Compute the new price of the bond.
- f) Compute the corresponding change in the ytm of the 161 day zero.
- g) Discuss why this change in the yield curve is not something that we can easily hedge using duration.

The following problems are from the Midterm 2014:

Problem 2

The following table gives the yield to maturity (semi-annually compounding) of zero coupon bonds:

days	ytm
50	0.2
232	0.9
414	1.5
596	1.8

- a) Find the prices of zero coupon bonds of all maturities.

- b) Find the value of a bond (called bond A) with 596 days to maturity that pays 1% annual coupon with semi-annual coupon payments.

- c) Find the value of a bond (called bond B) with 596 days to maturity that pays 5% annual coupon with annual coupon payments. Assume that the first coupon payment will occur on date 232. Comment on the difference in price to the bond in b).

- d) The dollar durations of bonds A and B are 1.589 and 1.682 respectively. Compute the modified durations.

- d) Bond B is trading 30 cents below the price you found in b). Bond A is trading at the price you found in a). Describe a relative value trade designed to capture maximize profit. Assume that you can buy or sell (short) up to 1M of face value of each leg of the trade. Make the trade interest rate neutral.

- f) In a surprise announcement, the FED increases rates 50BP. Assume that the YTM on bond A and B both increase by 50BP. Compute the impact on the position d).

Problem 3

On the next pages are printouts of Bloomberg screens.

- a) What is the flat and dirty asking prices and the yield to maturity of a bond with May 2042 maturity?

- b) What would I have to pay to purchase 4M worth of face value of the May 2042 maturity at the asking price?

- c) Suppose that the May 2042 bond was issued at par. What has approximately been the change in YTM on this bond since issue?

T 3 5 08/15/43 199-22+ + 01 99-22/99-22+ 3.642/3.641 -- X --
 At 23:44 Op 99-22+ Hi 99-26+ Lo 99-20+ Prev 99-21+ BGN

United States 23:44 1) Actions 2) Tools 3) Settings Fixed Income Trading

4 Actives		5 Bills		6 Notes		7 TIPS		8 Strips		9 Sprds		10 Curves		11 FRN		12 Bfly		13 WT	
20	T/0-1	20	T/1-2	23	T/2-4	24	T/4-7	25	T/7-10	26	T/10-30								
		BidPx	/AskPx	AskYld	YlChg			AskYld	YlChg			BidPx	/AskPx	AskYld	YlChg				
31)	2 ³ / ₄ N23	100-20	/ 100-20+	2.674	+0.002	49)	5	537		124-09+	/ 124-10+	3.465	--						
32)	7 ¹ / ₂ N24	144-17	/ 144-19+	2.674	--	50)	4 ³ / ₈	238		113-31	/ 114-00	3.506	--						
33)	7 ⁵ / ₈ 225	146-08+	/ 146-11	2.704	--	51)	4 ¹ / ₂	538		116-03	/ 116-04	3.506	-0.002						
34)	6 ⁷ / ₈ 825	139-22+	/ 139-25	2.790	--	52)	3 ¹ / ₂	239		99-00+	/ 99-01+	3.558	--						
35)	6 226	131-10+	/ 131-12+	2.876	+0.002	53)	4 ¹ / ₄	539		111-26+	/ 111-27+	3.535	-0.002						
36)	6 ³ / ₄ 826	139-29	/ 139-31	2.901	--	54)	4 ¹ / ₂	839		116-06+	/ 116-07+	3.528	-0.002						
37)	6 ¹ / ₂ N26	137-15	/ 137-17+	2.934	--	55)	4 ³ / ₈	N39		114-01	/ 114-02	3.537	-0.002						
38)	6 ⁵ / ₈ 227	139-03	/ 139-05+	2.960	--	56)	4 ⁵ / ₈	240		118-14	/ 118-15	3.532	-0.002						
39)	6 ³ / ₈ 827	136-28+	/ 136-30	3.013	+0.002	57)	4 ³ / ₈	540		114-00+	/ 114-02	3.546	-0.002						
40)	6 ¹ / ₈ N27	134-09+	/ 134-10+	3.040	--	58)	3 ⁷ / ₈	840		105-06+	/ 105-08	3.567	-0.004						
41)	5 ¹ / ₂ 828	127-15+	/ 127-16+	3.119	+0.002	59)	4 ¹ / ₄	N40		111-26+	/ 111-28	3.557	-0.003						
42)	5 ¹ / ₄ N28	124-19+	/ 124-21	3.141	--	60)	4 ³ / ₄	241		120-26	/ 120-28	3.541	-0.003						
43)	5 ¹ / ₄ 229	124-18+	/ 124-20	3.169	--	61)	4 ³ / ₈	541		114-01	/ 114-02+	3.562	-0.002						
44)	6 ¹ / ₈ 829	135-26	/ 135-27	3.171	+0.002	62)	3 ³ / ₄	841		102-22+	/ 102-24	3.592	-0.002						
45)	6 ¹ / ₄ 530	138-05+	/ 138-07	3.205	+0.002	63)	3 ¹ / ₈	N41		91-08	/ 91-09+	3.625	-0.002						
46)	5 ³ / ₈ 231	127-06+	/ 127-07+	3.269	--	64)	3 ¹ / ₈	242		91-03+	/ 91-05	3.631	-0.003						
47)	4 ¹ / ₂ 236	116-06	/ 116-07	3.441	-0.001	65)	3	542		88-22+	/ 88-24	3.641	-0.002						
48)	4 ³ / ₄ 237	120-07+	/ 120-08+	3.463	--	66)	2 ³ / ₄	842		83-31	/ 84-00+	3.659	-0.002						

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
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T 3 05/15/42 Govt

Yield & Spread 7 Yields 3 Graphs 4 Pricing 3 Descriptive 95 Buy 96 Sell 97 Settings

Feedback

T 3 05/15/42 (912810QW1)

Price 88-23+ (88.734375)

Settle 03/07/14

Maturity 05/15/42

Street Convention 3.642453

Treasury Convention 3.642240

True Yield 3.642313

Equip 1 /Yr Compound 3.675621

Japanese Yield (Simple) 3.831000

Mmkt (Act/ 360)

Current Yield 3.380877

After Tax (Inc 43.400 % CG 23.80 %) 2.101625

Issue Price = 108.698. Non OID Bond with Mkt Discount

Risk

Duration 18.402

Modified Duration 18.073

Risk 16.204

Convexity 4.349

DV 01 on 100M 162

VW 0.031 0.00193

Invoice

Face 100 M

Principal 88,734.38

Accrued (112 Days) 928.18

Total (USD) 89,662.56

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