NEW YORK UNIVERSITY
STERN SCHOOL OF BUSINESS
DEPARTMENT OF FINANCE

B40.3333 **Professor Edwin J. Elton**
Debt Instruments & Markets **Fall 1999**
Tisch 200

ASSIGNMENT I

Due Monday, September 20 at the start of class. Assignments will not be accepted late without prior arrangement. Like all arrangements in this course, it should b done and submitted as a group. One copy is sufficient, with all names listed on the first page or cover sheet.

1. The US Treasury 6 1/4s maturing August 15, 2000, were quoted at 98 23/32 for settlement September 10, 1996. Compute, using the appropriate convention, (I) the number of days since the previous coupon, (ii) accrued interest, (iii) the invoice price, and (iv) the yield.

2. Duke Power issued a corporate bond maturing August 15, 2004, with semi-annual coupon payments on every 15th of August and February in between, at an annual coupon rat of 6 1/4 percent. Bloomberg quoted a price of 94 for settlement on September 10, 1996. Compute, using the appropriate convention, (I) the number of days since the previous coupon, (ii) accrued interest, (iii) the invoice price, and (iv) the yield.

3. Chase Manhattan 8 3/4s of August 20, 2002, a dollar-denominated issue, was quoted by Bloomberg at 104 6/32 for settlement on September 10, 1996. Compute, using the appropriate convention, (I) the number of days since he previous coupon, (ii) accrued interest, (iii) the invoice price, and (iv) the yield.

4. You are given these prices for three US Treasuries:

Bond	Maturity (Years)	Coupon Rate (%)	Price
A	0.5	6.00	97
B	1.0	8.00	101
C	1.5	7.00	99

   (a) Construct combinations, or portfolios of these securities that replicate the cash flow of zeros with maturities of 0.5, 1.0, and 1.5 years.

   (b) Use the synthetic zero to compute their prices.

   (c) Use the prices of zeros to compute the first three discount factors, spot rates, and forward rates.

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ASSIGNMENT 2

Due Monday, October 4 at the start of class. Assignments will not be accepted late without prior arrangement. Like all arrangements in this course, it should be done and submitted as a group. One copy is sufficient, with all names listed on the first page or cover sheet.

1. Consider the spot rate curve:

Maturity (Years)	Spot Rate (%)
0.5	3.00
1.0	3.50
1.5	4.00
2.0	6.50

   (a) Use the spot rates to compute the price of a two-year 10% bond. What is its yield?

   (b) Compute the duration of the two-year bond using spot rates.

   (c) Construct a portfolio of zeros that replicates the two-year bond. Use the durations of the zeros and formula for the duration of a portfolio to compute the durations of the zeros and the formula for the duration of a portfolio to compute the duration of the two-year bond.

2. For the bonds in problem 1 above, if the yield of the six month was to rise 100 basis points and the assumptions of the duration formula used in problem 1 was maintained, by what percent do you estimate the price of the bond would fall?

3. Some fixed income fund managers take explicit positions not only on the direction of future movements in bond yields, but on changes in the slope and shape of the yield curve. The question is how you might position yourself to benefit from this yield curve "twist" or change in yield spreads using the zeros from the previous problem.

   (a) Describe a combination of 0.5- and 2.0-year zeros that has a total value of 1000 and benefits from a decline in $y_4 - y_1$. What is its duration?

Assignment 2 (continued)

4. Given the following information, find a profitable swap.

		Cash Flows		
Bond	**Price**	**1**	**2**	**3**
A	99	5	105	
B	98	6	6	106
C	100	7	7	108
D	97	5.5	5.5	105.5

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ASSIGNMENT 3

Due Monday, October 18 at the start of class. Assignments will not be accepted late without prior arrangement. Like all arrangements in this course, it should be done and submitted as a group. One copy is sufficient, with all names listed on the first page or cover sheet.

You are an investment manager in a large financial institution. One of your client sales persons has found a potential client. She believes that the client would like to consider immunization or cash flow matching for retired employers. The client is described as very knowledgeable but very busy. The sales person says she doubts he will read more than 2 pages. She believes that he is going to make the decision on cost and perceived expertise of the organization. Attached are the bonds the traders believe are candidates for inclusion.

Prepare your recommendations.

Assignment 3 (continued)

Year	Pension Liability (Millions)
1/2	20
1	18
1 1/2	16
2	14
2 1/2	12
3	12
3 1/2	12

BONDS
(**All Non-Callable Governments**)

Invoice Price	Yield to Maturity	Coupon	Maturity (in half years)
97.2	9.89	4	1
85.09	10.45	2	4
88.47	10.59	6	6
101.17	9.15	10	3
75.02	12.4	6	11
74.74	13.45	8	15
105.42	12.85	14	15
105.36	12.82	14	14
115.83	12.38	16	13
115.09	12.36	16	12
107.8	11.0	14	8
107.73	11.9	14	10
89.47	11.75	8	7
89.14	11.46	8	8
58.07	13.42	4	14
57.43	13.08	4	15
97.64	11.11	10	5
98.59	10.56	10	6
101.14	9.62	12	1
104.01	7.76	12	2
77.86	12.02	6	10
75.02	12.40	6	11
101.77	11.44	12	8
101.52	11.56	12	9
103.33	10.45	12	5
102.74	10.91	12	6

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ASSIGNMENT 4

Due Monday, November 1 at the start of class. Assignments will not be accepted late without prior arrangement. Like all arrangements in this course, it should be done an submitted as a group. One copy is sufficient, with all names listed on the first page or cover sheet.

1. Given the following tree for one period bond prices and spots:

$r_{001} = 5$
$r_{002} = 6$
$r_{003} = 6.5$

Period	$\underline{r_{001}}$
1	5
2	4,8
3	3,5,9

   a. What are the prices on the branches of the tree?

   b. What are the risk neutral probabilities?

   c. What is the value of a European put option on a two year zero at $991 in one year?

2. Consider the following interest rates:

$r_{01} = 6$

$r_{02} = 7$

Period	$\underline{r_{001}}$
1	6
2	6, 9

Assignment 4 (continued)

a. What are the risk neutral probabilities?

b. Is this arbitrage free?

c. What is the value of a European put on a one year bond at time 1 with an exercise price of 920?

3. Given he following spot rats and the standard deviation of one year rates equal to .15, find the interest rate tree for one year rates and two year rates using the Salomon model.

$r_{01} = 8$

$r_{02} = 9$

$r_{03} = 10$

Then value a European put on a one year pure discount bond at 900 at time 2.

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ASSIGNMENT 5

Due Monday, November 15 at the start of class. Assignments will not be accepted late without prior arrangement. Like all arrangements in this course, it should be done and submitted as a group. One copy is sufficient, with all names listed on the first page or cover sheet.

1. Our objective is to value an inverse floater issued by Barclay's Bank, maturing August 15, 2000, and paying:

Rate = 14 - 6-month LIBOR

every 6 months. Today's date is August 15,1996 and we would like to assess the note's value. We estimate spot rates at:

Maturity (Years)	Spot Rate
0.5	3.38
1.0	3.62
1.5	3.98
2.0	4.29
2.5	4.59
3.0	4.86
3.5	5.20
4.0	5.45

a. Design a combination of traditional instruments that reproduce the cash flows of the inverse floater.

b. Use the estimated spot rates to compute the values of the components and of the note itself.

c. What is the duration of the note?

d. This note, like others, has an implicit lower limit on the payment rate of zero: if 6-month LIBOR exceeds 14, the note pays nothing. Describe qualitatively how this feature might effect the interest sensitivity of the not at high interest rates. How might this change your calculation of the note's value above?

Assignment 5 (continued)

2. Using the same spot rates as in the previous problem:

   a. Compute swap rates for semi-annual interest rate swap with maturities 2,3, and 4 years.

   b. Consider a four-year swap with no interest payments the first two years. What is a fair coupon rate for the following three years?

3. The English subsidiary of an American industrial firm issued 10M of five-year floating rate notes one year ago, but with the English economy heating up is now concerned that interest rates might rise and is thinking of locking in a fixed rate now.

   (a) Describe qualitatively how the firm might use an interest rate swap to modify the form of its interest payments.

   (b) Compute, using your answer to the previous problem, the duration of the fixed rate side swaps with maturities 2,3, and 4 years.

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ASSIGNMENT 6

Due Monday, November 29 at the start of class. Assignments will not be accepted late without prior arrangement. Like all arrangements in this course, it should be done and submitted as a group. One copy is sufficient, with all names listed on the first page or cover sheet.

1. Assume the spread between AAA and BAA is 1%. Also assume Altman's data is accurate concerning the distribution of defaults. How much would historic defaults have to change to justify the current spreads if you are risk neutral?