Foundations of Finance, Fall, 2008
Prof. Joel Hasbrouck
Problem set 3 W DUE IN CLASS WEDNESDAY NOVEMBER 19

Although you may discuss these problems with others, you should calculate everything yourself (just to make sure that you can get your calculator to give the same answers that everyone else is getting). Your solutions must be written up by yourself: you must turn in the original. If you won't be in class on the day the problem set is due, you can fax me a pdf, and turn in the original at the next meeting.

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1. A $1,000 par, 8% annual coupon bond with a 15 year maturity has a yield to maturity of 15%.
   a. What is its market price? 1,000 fv; 80 pmt; 15 n; 15 i/yr; pv→590.68
   b. What would be its yield to maturity if the market price were $650? 1,000 fv; 80 pmt; 15 n; –650 pv; i/yr 13.58%
2. A $1,000 par, 13% annual coupon bond matures in 15 years, but is callable at par in 10 years. If its market price is $1,125, what is the yield to worst? ytm: –1,125 pv; 1,000 fv; 130 pmt; 15 n; i/yr→11.24
   y to call: 10 n; i/yr→10.89. The bond is selling above its call price, so the yield to worst is the yield to call.
3. A $1,000 par, 14% annual coupon bond matures in 5 years. If it is selling in the market at $750, what is its duration? (You can use a spreadsheet for this one.)

	t	CF(t)	PV of CF(t)	PV x t
	0	-750		
	1	140	113.92	113.92
	2	140	92.69	185.38
	3	140	75.42	226.26
	4	140	61.37	245.47
	5	1140	406.61	2033.03
		Totals:	750.00	2804.06
ytm:		22.9%		

You can get the ytm as: -750 pv; 140 pmt; 5 n; 1000 fv; i/yr→22.9% The duration is D = –804.06/750 = 3.74 years

4. Suppose that prices of $100-par zero-coupon bonds A, B, and C are as given in the table

Bond	Maturity (years)	Price (% of par)	ytm
A	1	93	7.53%
B	2	86	
C	3	78	

Start of year	1-yr forward rate	Price of bond C at start of the year
1		78
2		
3		

In the left table, fill in the missing entries for ytm. In the right table, fill in the missing entries for the forward rates and the prices of C at the start of each year. What is the holding period return for Bond C over the second year?

Here is the filled-in sheet:

Bond	Maturity (years)	Price (% of par)	ytm	Year	1-yr fwd rate	Price of bond C, start of year
A	1	93	7.53%	1	7.53%	78.00
B	2	86	7.83%	2	8.14%	83.87
C	3	78	8.63%	3	10.26%	90.70

To get the ytm on bond B: –86 pv; 100 fv; 2 n; i/yr→7.83%

To get the ytm on bond C: –78 pv; 100 fv; 3 n; i/yr→8.63%.

To get the forward rate in the second year, solve $(1.0783)^2 = (1.0753)(1+f)$

To get the forward rate in the third year, solve $(1.0863)^3 = (1.0783)^2(1+f)$

The price of bond C at the start of the second year is 100/(1.0814)(1.1026), and at the start of the third year, 100/1.1026; 83.87→90.70 is an 8.14% return (note that this = the 1yr fwd rate over year 2).