
Question 1: Fixed Income Analysis and Valuation**(41 points)**

You have started working as a fixed income analyst. On the first day in the office you are confronted with the following EURO-denominated bond portfolio:

Bond	Coupon	Time to Maturity	Price	Rating	Duration
X	3.50%	1 year	100.49%	AAA	1.00
Y	5.00%	2 years	100.94%	AA	1.95
Z	8.50%	3 years	106.81%	A	2.77

Note: Coupon is payable annually. Assume “30/360” daycount-convention.

- a) To start with you are asked to answer some basic questions based on the bond portfolio given in the table above.
- a1) Compute the spot rates (also called ‘discount’ or ‘zero rates’) for years 1, 2 and 3. For this question, do not take into account that the bonds have different ratings. Round your answer to the second decimal point and show your calculations. (6 points)
- a2) Which bond has the highest convexity? (Give a short explanation, no calculation required) (3 points)
- b) In your next assignment, you are working on some performance and structuring scenarios related to bond Y above.
- b1) Compute the break-even discount rate after 1 year for one year investments so that the holding rate of return of bond Y is exactly zero. (5 points)
- Assume now that bond Y would be putable after 1 year (strike at 100%). The ‘option-adjusted-spread’ stands at 145 basis points (or 1.45%) p.a. The yield spread of **that putable** bond Y over straight government bonds is 95 basis points.
- b2) Calculate the value of the embedded put option in basis points p.a. (4 points)
- b3) All other things being equal, how does the value of such putable bonds react to increasing interest rate volatilities? (4 points)
- c) Give six risk factors you have to keep in mind when considering an investment in a subordinated, callable fixed-coupon bond which is denominated in a foreign currency? (6 points)
- d) Assume there is a 2-year par bond in USD which offers a coupon of 6%. Currently, the Euro trades at 1.34 USD. Now assume that bond Y is, again, straight bonds (i.e. with no embedded option).

- d1) Compute the break-even EUR/USD exchange rate so that the holding period return of the USD bond after one year is equal to the return of bond Y. Assume that in one year the 1-year EUR- and USD-discount rates are constant at 3.00% and 4.00% respectively.
(Note: first calculate the holding period returns of the USD bond and bond Y at constant interest and exchange rates; then determine the EUR/USD exchange rate so that the two returns are exactly the same). (9 points)
- d2) What holding period rate of return of the USD bond – compared to bond Y - do you expect when selling all USD coupons and the redemption proceeds forward against the EUR? No calculations are required for this question (note: default risk of USD bond and bond Y is the same, i.e. both have same default probability and recovery value). (4 points)