

Question 1: Fixed Income Valuation and Analysis

(30 points)

You are a fixed-income fund manager and are considering investing in a 3-year bond issued by an automaker Company. The bond is issued at par and pays an annual coupon of 2.3%, representing a spread of 0.3% over the 2.0% yield on 3-year government bonds. It is non-callable, and is rated AA.

Your Credit Analysis Team confirms this rating. The Credit Analysis Team has provided a matrix showing the expected distribution of ratings in one year hence to illustrate how ratings change in response to changing creditworthiness (Table 1). According to the expectation, there is a 79% probability that a AAA bond will remain AAA one year hence, a 20% probability it will be downgraded to AA, and a 1% probability it will be downgraded to A.

Table 2 looks at current credit spreads broken down by term to maturity. The team expects spreads to be largely unchanged over the next year.

Table 1: Expected ratings changes (Credit Analysis Team)

Rating in 1 year	AAA	AA	A	BBB	BB	B	Default
Current rating							
AAA	79.0%	20.0%	1.0%	0.0%	0.0%	0.0%	0.0%
AA	1.0%	89.0%	9.0%	1.0%	0.0%	0.0%	0.0%
A	0.0%	3.0%	79.0%	17.0%	1.0%	0.0%	0.0%
BBB	0.0%	0.0%	5.0%	74.0%	20.0%	1.0%	0.0%
BB	0.0%	0.0%	0.0%	10.0%	60.0%	29.0%	1.0%
B	0.0%	0.0%	0.0%	0.0%	15.0%	50.0%	35.0%
Default	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Table 2: Current spreads, by term to maturity and rating (1 bp = 0.01%)

	1 years	2 years	3 years	4 years	5 years
AAA	10bp	15bp	20bp	25bp	30bp
AA	20bp	25bp	30bp	40bp	50bp
A	25bp	40bp	55bp	70bp	80bp
BBB	70bp	90bp	110bp	125bp	140bp

- Your performance benchmark is the government bond index. List three risks your portfolio would be subjected to if you include this bond in your portfolio. (6 points)
- Assuming that the ratings change expectations (Table 1) are maintained for the foreseeable future and that probabilities of ratings changes are independent across years calculate the probability of default for the automaker Company’s bond in its three years to maturity. (Round off your answer to the fourth decimal place.) (6 points)

- c) Assume that spreads change according to the rating in one year's time as shown in Table 2. Assume that in 1 year's time the yield on 2-year government bonds has risen to 3% and the automaker Company's bond rating has been downgraded to BBB. Calculate the yield, price and holding period rate of return over the next year for the bond (Show the price and the percent rate of return rounded off to the third decimal place). (6 points)
- d) The data below contains the holding period rate of returns for the automaker Company's bond at different rating levels one year from now. Calculate the expected rate of return for the one-year from now holding period using the expected ratings changes in Table 1. (Calculate the expected rate of return as a percentage, rounding off to the third decimal place.) (6 points)

	Rate of return (simple)
AAA rating	0.677%
AA rating	0.489%
A rating	0.207%
BBB rating	(Answer from c)%

- e) The cumulative default rate calculated in b) is small in comparison to the 0.3% spread. Even if a borrower defaults, a certain percentage of the funds can be recovered, so this discrepancy is actually very large. Also, the calculations of expected 1-year holding period rate of returns for the automaker Company's bond in d) are quite good compared to those for the government bond. List three factors that contribute to the large discrepancy between the default forecast and the current spread, and the spread in the expected rate of return on the automaker Company's bond against the government bond.

(6 points)