



# **ACTUARY PROGRAM**

# **ASSIGNMENT COVER SHEET**

**THIS FORM MUST BE AT THE FRONT OF EACH ASSIGNMENT**  
**CANDIDATES MUST KEEP A COPY OF THEIR ASSIGNMENT**

**Candidate to complete the following section (and update details in header and footer):**

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| <b>CANDIDATE NUMBER:</b><br><br><b>222XXX</b>                  | <b>COURSE:</b><br><br><b>Asset Liability Management</b> |
| <b>DATE DUE:</b> Monday 15 August 2022 at 9.00pm (Sydney Time) |   |

- Please ensure that your candidate number and course name is located on the header and footers of each page of the assignment.
- Save as a word document, that is, file type .docx
- By submitting your assignment, you are implicitly stating that the work is your own.
- Remember that an important aspect of being a professional actuary is to always act with integrity. Committing plagiarism by copying another person's work or not properly referencing other sources used in your assignment is a breach of the Integrity principle under the Actuaries Institute's Code of Conduct.



### Part B Assignment

(Total 10 marks)

**Q1** You are considering an investment in the corporate bonds issued by a company whose equity securities and corporate bonds are listed on the stock exchange **(7 marks)**

**(a) Describe the sources of return to investors from the corporate bonds (2 marks)**

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**Answer is**

The sources of return to investors of corporate bonds are the contracted cash flows including the coupons and principal, or the sale of the bonds if they are not held until maturity. Since the company's corporate bonds are listed on the stock exchange, it is possible for the investor to trade them.

**(b) Explain the two main sources of risks to the returns when investing in corporate bonds (2 marks)**

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**Answer is**

1. Credit risk – The company who issued the corporate bonds may fail to meet their obligations of paying the investors with the agreed cash flows. This could be shortfalls in the agreed interest payments or a default on the principal repayment at maturity.
2. Interest rate risk – The rise in the interest rates due to expectations about inflation or monetary policy may lead to a fall in the bond price. This would result in a lower return if the bond was sold before maturity.

**(c) Describe measures that can be used to quantify the risks (3 marks)**

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**Answer is**

Credit ratings can be used to estimate the probability of default which directly impacts the payments of coupons or principal. These ratings (e.g., AAA, B) are assigned by credit rating agencies and can indicate lower likelihoods of default by the debtor. The credit spread is the additional expected return available on the security which is also useful for the investor. By using these ratings, the investor can quantify the credit risk and evaluate the suitability of their investment in the bonds.



The following measures can be used to understand interest rate risk. Duration is the weighted average time to receiving the cash flows where the weights are the present value of the cashflows. Modified duration is the proportional first derivative of price with respect to yield. This measures the sensitivity of the price of the security to a change in the interest rates. Convexity is the proportional second derivative of price with respect to yield. It is a measure of the degree of the curve between bond prices and yields. However, convexity and duration together can provide an accurate approximation of the price-yield relationships.

The yield curve plots the yield to maturity (YTM) against the term to maturity for similar credit rated securities. The shape of the curve can represent the term structure of interest rates. A higher YTM will imply a greater risk must be taken on by the investor. Spot rates can also reflect the term structure of interest rates. The spot rate is the YTM expected to be earned when holding a zero coupon bond of the specified period.

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**Q2 Justify which 3 characteristics that you would pay most attention to when evaluating an investment in a corporate bond. (3 marks)**

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**Answer is**

1. I would first focus on the **security** of the underlying issuer and how risky they are because this will be a major factor that needs to align with my investment risk profile. Since debt is ranked above shareholder equity for repayment in the case of a wind-up, which can be preferable for my investment. This company is listed on a stock exchange, which means market trends can also affect the price. These bonds are also more liquid than compared to private securities. If they are an international company, I will need to research the sovereign or political risks associated with the other government.
2. The **term** of the corporate bond will be very important to consider because a longer term means I am exposed to the risks associated with the company for a longer period. My personal investment time horizon could relate to liabilities that need to be matched partially or as a whole. If the bond is long-term, I may have to consider the lower marketability of corporate bonds which can make it difficult to exit before maturity if this is required.
3. The final characteristic evaluated is the **yield** of the corporate bond because ultimately, I will be seeking a higher yield compared to securities with lower risk (e.g. government bonds). The yield to maturity can be calculated as:



# Asset Liability Management

## Semester 2 2022 Sample Assignment 1

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Yield = required risk free real yield + expected inflation + bond risk premium.

The corporate bond will need to exceed inflation rates, otherwise the coupon and principal's real value will reduce over time.

**END OF PART B ASSIGNMENT**