Financial Mathematics (Tutor Worksheet)

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Time: 1 hour **Number of Pages: 2**
May 2025

Instructions

- This sheet is compiled from past material with minor adjustments and mainly for your own practice.
- Your workings are very important and earn part marks in excel assessments.
- Label columns and make sure your work is understandable.
- Aim to learn more than you already know.
- **Note:** The mark allocations in this sheet are not a true reflection of the actual marking standard.

Good luck and do your best! Remember, the goal is to test your own understanding and identify areas that need revision.

Q1 A company, Ragoomy-Candye (Pvt) Ltd, has drafted three possible fixed interest bonds with terms of 10 years, 15 years and 25 years for issue. Ragoomy-Candye wants to consider the interest rate sensitvity for each bond.
The bonds offer different coupons which are paid half-yearly, the first coupon to be paid in 6 months time.

The coupon rates, redemption rates and spot rates to use are set out in the following document: RC-DevelopmentSheet.xlsx.

(a) Calculate the duration of each bond. (8)

Ragoomy-Candye decided to privately issue all the proposed bonds and will continue monitoring the development.

Ragoomy-Candye specifically forecasts that fifteen years after issue, immediately after the coupon payment then due, the company will default on the 25-year bond.
As a result, bond holders will be unable to sell their holdings since the bonds were privately issued so there is no liquid secondary market.

Ragoomy-Candye offers two options to the holders of the defaulted 25-year bond:

Option 1: the term of the bond remains at the original term of 25 years, no further coupons will be paid and the bond will be redeemed at 105%.

Option 2: coupons will be immediately reduced to 1.25% per annum, and the term of the bond will be extended by 5 years.

As a result of the default, bond holders expect a 0.5% risk premium over spot rates currently used, which remain the same as the assumed rates of above in "Q1a".

(b) Calculate the present value for the defaulted bond under both options at time 15. (8)

(c) Calculate the duration of the bond at time 15 under the original conditions and under each of options 1 and 2. (4)

[**20**]

"Remember, preparation is the key to success! Take your time, read each question carefully, and trust in your knowledge. Good luck!"