

3.2 Bootstrapping

[Apologies that there are typos in this question. Please note the corrections in bold]

Suppose that on 12-Aug-2019, you collect the following bonds in country X. Currency units are CU. Accrued interest is based on the ICMA Act/Act convention.

Coupon	Maturity	Price(CU)
Zero	1-Feb-2020	99.5
3.65	1-Oct-2020	103.2
5.2	1-Jul-2022	102.21
7	1-Jul-2030	103

Use bootstrapping to estimate the spot rates (semi-annually compounded, ICMA) for the following maturities:

- (a) **12-Feb-2020**
- (b) 12-Aug-2020
- (c) 12-Feb-2021
- (d) 12-Aug-2021

Your valuation date is 12-Aug-2019 (i.e., the date when the rates in the table were current).

SOLUTION

- (a) First solve for the df for 1-Oct-2020. This can be done using goal seek in a spreadsheet. Set a guess for the unknown df, estimate dfs for earlier coupon dates using interpolation (including with the guessed df for the maturity date), and then use goal seek to find the value of the guess that sets the bond value equal to its quoted price. We get 0.99082.

Interpolate between 1-Feb-2020 and 1-Oct-2020 to get the df for 12-Feb-2020. This gives a df of 0.99481. This is equivalent to a spot interest rate (semi-annual ICMA) of 1.04328 percent.

- (b) Interpolate between 1-Feb-2020 and 1-Oct-2020 to get the df for 12-Aug-2020. This gives a df of 0.99168. This is equivalent to a spot interest rate (semi-annual ICMA) of 0.83740 percent.

- (c) First solve for the df for 1-Jul-2022. This can be done using goal seek in a spreadsheet. Set a guess for the unknown df, estimate dfs for earlier coupon dates using interpolation (including with the guessed df for the maturity date), and then use goal seek to find the value of the guess that sets the bond value equal to its quoted price. We get 0.87989.

Interpolate between 1-Oct-2020 and 1-Jul-2022 to get the df for 12-Feb-2021. This gives a df of 0.96752. This is equivalent to a spot interest rate (semi-annual ICMA) of 2.21342 percent.

- (d) Interpolate between 1-Oct-2020 and 1-Jul-2022 to get the df for 12-Aug-2021. This gives a df of 0.93605. This is equivalent to a spot interest rate (semi-annual ICMA) of 3.33170 percent.