

**Assignment 2 : Financial Computing**

**\*\* Please note that no mark will be given if the answer does not follow the question requirements.**

**Question 1 – Requirements (80%)**

The objective of this question is to test your understanding of

- financial modeling of yield curve construction process from different rate sources
- to derive the discount factors of individual tenors from available financial instrument market rate, bootstrapping process and zero coupon yields computation

You are provided with the liquid market instruments of HKD market: Cash Rates, FRA Rates and Swap Rates in below table.

Instrument	Tenor	Mid Rate
CASH	1Wk	0.468%
CASH	1M	0.367%
CASH	2M	0.417%
CASH	3M	0.417%
FRA	1x4	0.480%
FRA	2x5	0.490%
FRA	3x6	0.500%
FRA	6x9	0.520%
SWAP	1Y	0.530%
SWAP	2Y	0.620%
SWAP	3Y	0.583%
SWAP	4Y	0.645%

Please Use Excel spreadsheet to build the HKD yield curve financial model based on the methodology introduced in the lecture. The model assumption listed out below.

- Base date is 17 Aug 2020
- Day to Spot is 2
- Day/Year convention is ACT / 365
- Linear interpolation
- Holiday effect is ignored
- Zero coupon rate is assumed to be compounded on yearly basis

The basic Excel Operators (e.g. + - \* / ^ etc) can be used. No Excel macro or programming is allowed in the spreadsheet model. No Excel function is allowed except SUM(), EDATE() and vlookup(). No rounding, all discount factors display to 6 decimal points, zero coupon rates display to 3 decimal points in percentage.

You are required to show clearly the following sections in your Excel financial model:

- 1) The rate source table (3.5%)
- 2) The Cash rate discount factor for tenors per Appendix 1 (14%)
- 3) The The FRA discount factor for tenors per Appendix 1 (14%)
- 4) The Swap discount factor for tenors per Appendix 1 (31.5%)
- 5) The discount factor and zero coupon rate per Appendix 2 (7%)
- 6) Appropriate use of vlookup function for bootstrapping of FRA and IRS discount factors (10%)

**APPENDIX 1 - Tenor of respective Financial Instrument**

Cash Rate		FRA		Swap			
From	To	From	To	From	To	From	To
19/08/20	19/08/20	19/09/20	19/12/20	19/08/20	19/11/20	19/08/22	19/11/22
19/08/20	26/08/20	19/10/20	19/01/21	19/11/20	19/02/21	19/11/22	19/02/23
19/08/20	19/09/20	19/11/20	19/02/21	19/02/21	19/05/21	19/02/23	19/05/23
19/08/20	19/10/20	19/02/21	19/05/21	19/05/21	19/08/21	19/05/23	19/08/23
19/08/20	19/11/20			19/08/21	19/11/21	19/08/23	19/11/23
				19/11/21	19/02/22	19/11/23	19/02/24
				19/02/22	19/05/22	19/02/24	19/05/24
				19/05/22	19/08/22	19/05/24	19/08/24

**APPENDIX 2 - Yield Curve result per below date**

Date	Date
19/08/20	19/08/21
26/08/20	19/11/21
19/09/20	19/02/22
19/10/20	19/05/22
19/11/20	19/08/22
19/12/20	19/11/22
19/01/21	19/02/23
19/02/21	19/05/23
19/05/21	19/08/23
	19/11/23
	19/02/24
	19/05/24
	19/08/24

**Question 2 – Requirements (20%)**

The objective of this question is to test your understanding of valuation of fixed rate financial instrument.

You are provided with a HKD fixed rate financial instrument with 3 year maturity in the following terms:

Notional amount = HKD 1 million

Trade date = 17 Aug 2020

Day to Spot = 2

Maturity date = 19 Aug 2023

Paid at fixed interest rate = 0.583% p.a

Fixed interest payment frequency = quarterly, ACT/365

The notional of the financial instrument will be redeemed at par at maturity date.

Based on the HKD yield curve result from Question 1, please compute the price (% of Par) of the above financial instrument on trade date as of **17 August 2020**.

You are required to provide only the financial instrument valuation model using Excel based on the methodology introduced in the lecture. Please indicate clearly all the cash flow period covered in your valuation model (marks will be counted for each correct cash flow period indicated)

The financial model is based on the assumptions of linear interpolation, holiday effect is ignored. No rounding is required in your calculation.

**Hints:**

1) You need to calculate the present value of all future cash flow derived from the financial instrument.

2) Price quote in % of Par

= (amount paid to buy the financial instrument / face notional of the financial instrument) x 100.