INTEREST RATE RISK MANAGEMENT

Topics covered:

- Interest rate swaps
- Structuring of swaps
- Forward rate of Interest
- Forward rate of Agreement (FRA)
- Interest rate caps, floors and collars
- Interest rate futures

Interest Rate Swaps

Q.1 Fox Ltd wants to raise fixed rate capital and Flax Ltd wants to raise floating rate capital. Both the companies intend to borrow $10 million. Upon enquiry with their respective bankers, they were able to extract the following quotes:

Company	Fixed rate	Floating rate
Fox Ltd	8.00%	LIBOR + 0.5%
Flax Ltd	6.50%	LIBOR

SCB Bank arranges a swap between Fox Ltd and Flax Ltd wherein Fox Ltd, Flax Ltd and SCB bank share the net gain arising out of the swap in the ratio of 4:4:2.
You are required to design the swap and quantify the amount of gains.

A.1 **Cost if no swap is not entered into.**

Fox Ltd Borrows at fixed rate	8%	
Flax Ltd borrows at floating rate	LIBOR	
Total Cost if no swap is entered into		8% + LIBOR

Cost if Swap is entered into.

Fox Ltd Borrows at floating rate	LIBOR + 0.50	
Flax Ltd borrows at fixed rate	6.50%	
Total Cost if swap is entered into		7% + LIBOR

Hence benefit due to swap = Cost without swap – Cost with swap
= 8.00% + LIBOR – 7.00% - LIBOR
= 8.00% - 7.00%
= 1% or 100 basis points

The benefit of 100 basis points to be shared as under:

Fox Ltd	40 basis points
Flax Ltd	40 basis points
SCB Bank	20 basis points

Now let us analyze the inflow / (outflow) of each of the entities involved in the swap to understand how they have gained:

FOX LTD		
Pay to Lenders – outflow	LIBOR + 0.50%	
Pay to SCB Bank – outflow	7.60%	
Receive from SCB Bank – inflow	LIBOR + 0.50%	
Net outflow: LIBOR + 0.50% + 7.60% - LIBOR – 0.50		7.60%
Cost of borrowing had Fox not entered into swap		8.00%
Savings due to swap to Fox Ltd		0.40%

FLAX LTD		
Pay to Lenders – outflow	6.50%	
Pay to SCB Bank – outflow	LIBOR – 0.40%	
Receive from SCB Bank – inflow	6.50%	
Net outflow: 6.50% + LIBOR -0.40% -6.50%		LIBOR – 0.40%
Cost of borrowing had Flax Ltd not entered into swap		LIBOR
Savings due to swap to Flax Ltd		0.40%

SCB Bank LTD		
Pay to Fox Ltd – outflow	LIBOR + 0.50	
Pay to Flax Ltd– outflow	6.50%	
Receive from Fox Ltd – inflow	7.60%	
Receive from Flax Ltd – inflow	LIBOR -0.40%	
Net Inflow: LIBOR -0.40%+7.60%-6.50% - LIBOR – 0.50%		0.20%

Q.2 Flip Ltd and Flop Ltd need to borrow ₹ 100 crores and they have been offered the following rates by their lenders:

	Fixed	Floating
Flip Ltd	15%	LIBOR + 3%
Flop Ltd	14%	LIBOR + 4%

There is another company Lucky Ltd which is into speculation business. Lucky Ltd is of the view that the LIBOR over the next one year is going to be 9.75%.

Flip Ltd thinks that the LIBOR over the next one year is going to be 12.25% and this being above the breakeven LIBOR of 12% it has decided to borrow on a fixed basis. A bilateral swap with Flop Ltd is possible under which Flip Ltd will receive LIBOR from Flop Ltd and pay 11.50% to Flop Ltd.

BOB Bank, a big bank which is an active player in the swap markets is providing a one-year open swap with a contract size of ₹ 1 crore at LIBOR vs 11% with settlement on quarterly basis.

The following are the actual LIBOR at the end of each quarter:

Quarter 1 9%
Quarter 2 15%
Quarter 3 13%
Quarter 4 11%

Required:

a. Evaluate various options available to Flip Ltd. Advise Flip Ltd on the best course of action and also show the actual settlement at the end of each quarter; and

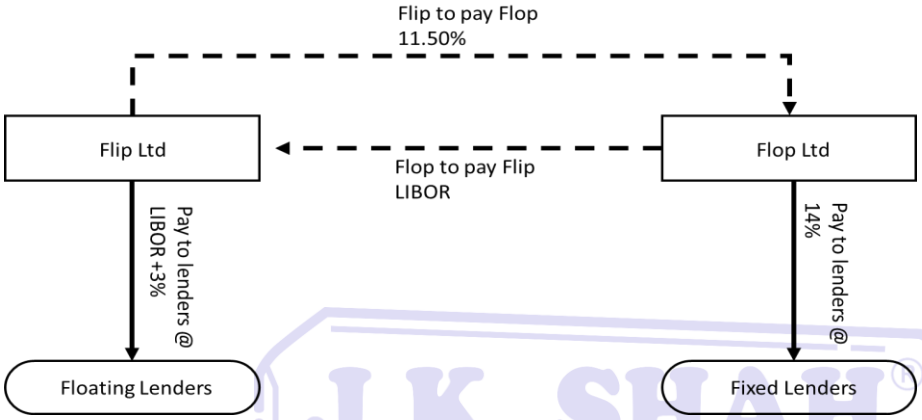
b. Decide the best strategy for Lucky Ltd and show the profit / loss if any at the end of each quarter per year of contract.

A.2 Evaluation of Options available to Flip Ltd for borrowing at fixed rates

The following 3 options are available to Flip Ltd:

i. **Flip Ltd can directly borrow at fixed rate on its own at 15%**

ii. **Flip Ltd can borrow at floating rate and then enter into a bilateral swap with Flop Ltd as under:**

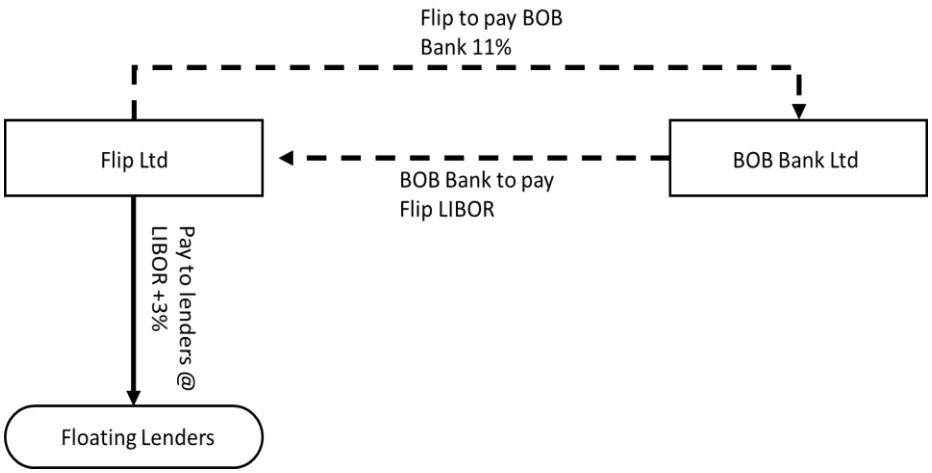


In this case the net cost of borrowings for Flip Ltd will be as under:

Pay to Lenders – outflow	LIBOR + 3%
Pay to Flop Ltd – outflow	11.50
Receive from Flop Ltd – inflow	LIBOR
Net outflow LIBOR + 3% + 11.50% - LIBOR	 14.50%

By entering into a bilateral swap, Flip Ltd is able to bring down its fixed cost of borrowing to 14.50%.

iii. **Flip Ltd can borrow at floating rate and then enter into an open swap @ LIBOR vs 11%:**



In this case the net cost of borrowing for Flip Ltd will be as under:

Pay to Lenders – outflow	LIBOR + 3%
Pay to BoB Bank Ltd – outflow	11%
Receive from BOB Bank Ltd – inflow	LIBOR
Net outflow LIBOR + 3% + 11% - LIBOR	 14%

In this case the net cost of borrowing for Flip Ltd works out at 14% and therefore this is the best option as it has the lowest cost of all the other alternatives.

Presuming that Flip Ltd adopts the strategy suggested i.e. borrow at floating rates and enter into an open swap the actual settlement at the end of each quarter will be as under:

Quarter 1: LIBOR SET AT 9% P.A.

	₹ in crores	₹ in crores
Pay to Lenders (9%+3%) x 100 crores x 3/12----------[A]	3.00	
Pay to BOB Ltd 11% x 100 crores x 3/12 ----------[B]	2.75	
Receive from BOB bank LIBOR: 9% x 100 x 3/12 ---------[C]	2.25	
Net Borrowing cost for quarter 1…… [A +B-C]		**3.50**

Quarter 2: LIBOR SET AT 15% P.A.

	₹ in crores	₹ in crores
Pay to Lenders (15%+3%) x 100 crores x 3/12----------[A]	4.50	
Pay to BOB Ltd 11% x 100 crores x 3/12 ----------[B]	2.75	
Receive from BOB bank LIBOR: 15% x 100 x 3/12 ---------[C]	3.75	
Net Borrowing cost for quarter 1…… [A +B-C]		**3.50**

Quarter 3: LIBOR SET AT 13% P.A.

	₹ in crores	₹ in crores
Pay to Lenders (13%+3%) x 100 crores x 3/12----------[A]	4.00	
Pay to BOB Ltd 11% x 100 crores x 3/12 ----------[B]	2.75	
Receive from BOB bank LIBOR: 13% x 100 x 3/12 ---------[C]	3.25	
Net Borrowing cost for quarter 1…… [A +B-C]		**3.50**

Quarter 4: LIBOR SET AT 11% P.A.

	₹ in crores	₹ in crores
Pay to Lenders (11%+3%) x 100 crores x 3/12----------[A]	3.50	
Pay to BOB Ltd 11% x 100 crores x 3/12 ----------[B]	2.75	
Receive from BOB bank LIBOR: 11% x 100 x 3/12 ---------[C]	2.75	
Net Borrowing cost for quarter 1…… [A +B-C]		**3.50**

(b) **Strategy for Lucky Ltd**

Lucky Ltd is a speculator and its view is that interest rates will be 9.75% p.a. At the same time BOB Bank Ltd is giving a open quote of LIBOR vs 11%. In such a case the suggested strategy for Lucky Ltd will be to sell a FRA whereby it will receive a fixed rate of 11% and pay floating rate of LIBOR. If the said strategy is adopted by Lucky Ltd the profit or loss for each quarter will be as under:

Quarter	Lucky to pay LIBOR	Lucky to receive	Net to receive (Pay)	Amount ₹ crores	Working for Amount
1	9%	11%	2%	0.05	₹ 10 crores x 2% x 3/12
2	15%	11%	-4%	-0.1	₹ 10 crores x 4% x 3/12
3	13%	11%	-2%	-0.05	₹ 10 crores x 2% x 3/12
4	11%	11%	0%	0	₹ 10 crores x 0% x 3/12
	Net loss for the year			-0.1	

Q.3 ABS Bank has entered into a plain vanilla swap through on Overnight Index Swap (OIS) on a principal of Rs. 5 crore and agreed to receive MIBOR overnight floating rate for a fixed payment on the principal. The swap was entered into on Monday, 24th July 2017 and was to commence on 25th July, 2017 and run for a period of 7 days.

Respective MIBOR rates for Tuesday to Monday were: 8.70%, 9.10%, 9.12%, 8.95%, 8.98% and 9.10%.

If Punjab Bank received Rs. 266 net on settlement, calculate Fixed rate and interest under both legs.

Notes:

i. Sunday is a Holiday.
ii. Workout in rounded rupees and avoid decimal working.
iii. Consider a year consists of 365 days.

A.3

Date	Day	Principal (₹)	MIBOR	Interest for the day (₹)	Closing balance (₹)
25-07-2019	Tuesday	5,00,00,000	8.70%	11,918	5,00,11,918
26-07-2019	Wednesday	5,00,11,918	9.10%	12,469	5,00,24,387
27-07-2019	Thursday	5,00,24,387	9.12%	12,499	5,00,36,886
28-07-2019	Friday	5,00,36,886	8.95%	12,269	5,00,49,155
29-07-2019	Saturday (#)	5,00,49,155	8.98%	24,627	5,00,73,782
30-07-2019	Sunday		-		
31-07-2019	Monday	5,00,73,782	9.10%	12,484	5,00,86,266

(#) Note: Interest calculated for 2 days (i.e. Saturday & Sunday)

Principal at the beginning	5,00,00,000	
Principal at the end	5,00,86,266	
∴ Floating interest rate received		86,266
Less: Net Amount received on the swap		266
∴ Net Fixed interest payment		86,000

Hence fixed rate of interest:

$$\frac{86000}{50000000} x100 \times \frac{365}{7} = 8.97\%$$

Forward Rate of Interest

Q.4 Consider the following data for Government Securities:

Face value	Coupon rate (%)	Maturity (Years)	Current Price (Rs.)
1,00,000	0	1	91,000
1,00,000	12	2	97,000
1,00,000	12.50	3	97,500
1,00,000	12	4	97,900

A.4 **1 Year rate**

The 1-year Government securities is a Zero-Coupon Bond which is very similar to a Treasury bill. These are upfront discounted instruments – meaning they are issued at discount and redeemed at par. The yield on such instruments are calculated as under:

$$\text{Yield} = \frac{\text{Face Value} - \text{Price}}{\text{Price}} \times 100 \times \frac{365}{n}$$

$$\text{Yield} = \frac{100000 - 91000}{91000} \times 100 \times \frac{365}{365}$$

Yield = 9.89%

2 year forward rate

$$97000 = \frac{12000}{1.0989} + \frac{112000}{1.0989(1+r_2)}$$

$r_2 = 18.40\%$

3 year forward rate:

$$97500 = \frac{12500}{1.0989} + \frac{12500}{(1.0989)(1.1840)} + \frac{112500}{(1.0989)(1.1840)(1+r_3)}$$

$r_3 = 13\%$

4 year forward rate

$$97900 = \frac{12000}{1.0989} + \frac{12000}{(1.0989)(1.1840)} + \frac{12000}{(1.0989)(1.1840)(1.13)} + \frac{112000}{(1.0989)(1.1840)(1.13)(1+r_4)}$$

r_4 = 9.46%

Forward Rate Agreements (FRAs) and Arbitrage

Q.5 The following market data is available:

Spot 1 $ = ¥ 116

Deposit	USD	Yen
3 months	4.50%	0.25%
6 months	5.00%	0.25%

Forward Rate Agreement (FRA) for ¥ is Nil.

1. What should be 3 months FRA at 3 months forward?
2. The 6 & 12-month LIBORS are 5% and 6.5% respectively. A bank is quoting 6/12 FRA at 6.50 - 6.75%. Is any arbitrage opportunity available? Calculate profit in such case.

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A.5 **Calculation of 6 months FRA at 6 months forward for deposits (i.e. 6/12 FRA)**

£ 1 invested for 6 months @ 3% p.a. will amount to £ 1.015

£ 1 invested for 12 months @ 4% p.a. will amount to £ 1.04

∴ 6/12 FRA for deposits will be: £ 1.015(1+r) = £ 1.04

∴ r = 2.46% for 6 months or 2.46% x 2 = 4.93% p.a.

Arbitrage opportunity

Since another bank is quoting a 6/12 FRA as 2.75% - 3.25%, arbitrage profits can be made by entering into a 6/12 FRA to borrow at 3.25% as under:

		Inflow	Outflow
Day 1	Borrow £ 100 for 6 months @ 3.50% p.a. which will amount to a liability of £ 101.75	£ 100	
	Invest £ 100 @ 4% p.a. for 12 months		£ 100
	Enter into a 6/12 FRA to borrow £ 101.75 @ 3.25% p.a.		
Day 180	Receive on FRA borrowing	£ 101.75	
	Repay borrowings of day 1 £ 100 plus interest @ 3.50% p.a. for 6 months		£ 101.75
Day 360	Investment matures and we receive	£ 104	
	Repay FRA borrowings £ 101.75 + Interest @ 3.25% p.a. for 6 months		£ 103.40
	Total	£ 305.75	£ 305.15

Hence arbitrage profits of £ 0.60 can be made per £ 100.

Q.6 Good Ltd and Bad Ltd are two companies listed on the National Stock exchange. Both the companies' approach ANZ Bank for Forward Rate Agreement. Both the companies are looking to borrow a sum of ₹ 100 crores after 2 years for a period of 1 year. Good Ltd has a better credit rating than Bad Ltd. The Bank has conducted its own research and derived the yield curve of both the companies as under:

Year	Good Ltd	Bad Ltd
1	3.86%	4.12%
2	4.20%	5.48%
3	4.48%	5.78%

(i) What is the rate that the Bank should quote to Good Ltd and Bad Ltd for a 24/36 FRA?

(ii) Suppose bank offers interest rate guarantee for a premium of 0.1% of the amount of loan, you are required to calculate the interest payable by Good Ltd if interest rate in 2 years turns out to be (a) 4.50% or (b) 5.50%

A.6

(i) Calculation of 24/36 FRA quote to be given

24 / 36 FRA indicates a borrowing after 2 years for a period of 1 year which is nothing but the third year. Therefore, to provide a 24/36 FRA quote, the bank will need to find out the rate applicable for the third year.

24/36 FRA quote for Good Ltd:

$(1+0.0448)^3 = (1+0.0420)^2 (1+r_3)$

$\therefore r_3 = 5.04\%$

Bank will quote 5.04% for a 24/36 FRA

24/36 FRA quote for Bad Ltd:

$(1+0.0578)^3 = (1+0.0548)^2 (1+r_3)$

$\therefore r_3 = 6.38\%$

Bank will quote 6.38% for a 24/36 FRA

(ii) Interest rate guarantee

Interest rate guarantee is like an option on interest rates. Since the forward rate for the 3rd year has been calculated as 5.04% for Good Ltd, the bank will guarantee the interest rate for Good ltd at 5.04%. If the actual interest turns out to above 5.04%, Good Ltd will exercise its option and borrow from the bank at 5.04%. If, on the other hand, the actual interest rates on the date of borrowing turns out to be less than 5.04%, Good Ltd will allow the option to lapse and instead borrow from the market at the lower rates.

		Actual Interest rates	
		4.50%	**5.50%**
Action taken by Good Ltd		Lapse	Exercise
Borrow money	₹ 100 crores x 4.50%	₹ 4.50 crores	₹ 5.04 crores
	₹ 100 crores x 5.04%		
Premium paid (Cost)	₹ 100 crores x 0.10%	₹ 0.10 crores	₹ 0.10 crores
Total cost of borrowing		**₹ 4.60 crores**	**₹ 5.14 crores**

Interest Rate Caps, Floors and Collars

Q.7 Starwell Finance Ltd is a company engaged in consumer finance. It issues a £ 10 million floating rate loan on July 1, 2013 with resetting of coupon rate every 6 months equal to LIBOR + 50bps. The company is interested in creating a collar strategy by buying a cap and selling a floor. Starwell buys the 3 years cap and sells 3 years Floor as per the following details on July 1, 2013:

Notional amount	£ 10 million
Reference rate	6-month LIBOR
Strike rate	4% for Floor and 7% for Cap
Premium	0 (it is to be presumed that premium paid for cap = premium received on the floor)

The LIBOR on Various reset dates are as under:

Reset date	LIBOR (%)
31-12-2013	6.00
30-06-2014	7.50
31-12-2014	5.00
30-06-2015	4.00
31-12-2015	3.75
30-06-2016	4.25

Using the above data, you are required to determine:

a. Effective interest paid out at each reset date.

b. The average overall effective rate of interest p.a.

A.7 The company purchases a cap at 7% and sells a floor at 4%. As a buyer of a cap, the company will be compensated if the interest rate goes above 7% and as a seller of a floor the company will have to pay compensation if the interest rate goes below 4%.

Reset date	LIBOR (%)	Received on cap (7%)	Amt paid on floor (4%)	Effective LIBOR (%)	Cost of borrowing: Effective LIBOR +50 bps	Interest payment
31-12-2013	6.00	-	-	6.00	6.50	325000
30-06-2014	7.50	0.50	-	7.00	7.50	375000
31-12-2014	5.00	-	-	5.00	5.50	275000
30-06-2015	4.00	-	-	4.00	4.50	225000
31-12-2015	3.75	-	0.25	4.00	4.50	225000
30-06-2016	4.25	-	-	4.25	4.75	237500
						1662500

Average annual effective interest rate per annum will be computed as under:

$$\frac{1662500}{10000000} \times \frac{12}{36} \times 100 = 5.54\% \text{p.a}$$

Q.8 XYZ Ltd borrows £ 20 million for a period of 24 months at a floating rate of 6M LIBOR + 10%. The company anticipates a rise in LIBOR; hence it proposes to buy a cap option from its bankers at the strike rate of 9%. The lumpsum premium is 1% for the entire reset periods and the fixed rate of interest is 8%. The actual position of LIBOR during the forthcoming reset periods are as under:

Reset period	**LIBOR**
1	10.00%
2	10.50%
3	11.00%

You are required to show how far interest rate risk is hedged through cap option.
For calculation work out figures at each stage up to four decimal points and amount nearest to £. It should be part of working notes.

A.8 The lumpsum premium payable by the company is 1% of £ 2,00,00,000 = £ 2,00,000.

Since the floating rate benchmark being used is 6-month LIBOR, it is an indication that the interest is payable every 6 months. Therefore, to find the savings due to cap during every 6-month reset period, we need to allocate the lumpsum instalments over the reset periods. There are many ways to allocate this lumpsum premium over the reset periods – simple average, weighted average, and Equated Instalment basis. In this case we have decided to use the Equated instalment basis.

Equated Instalment = Lumpsum Premium ÷ $PVAF_{4\%, 4 \text{ periods}}$
= £ 2,00,000 ÷ 3.63
= £ 55096

Now, let us calculate the savings due to swap:

Reset period	LIBOR	Cap rate	Receipt on cap	Amount received on cap	Premium allocated	Savings due to cap
1	10.00%	9.00%	1%	100000.00	55096.00	44904.00
2	10.50%	9.00%	1.50%	150000.00	55096.00	94904.00
3	11.00%	9.00%	2.00%	200000.00	55096.00	144904.00
			Total Savings due to swap			284712.00

Note:

Amounts received on cap:

For Reset period 1:

$$= \frac{20000000 \times 0.01 \times 6}{12} = £100000$$

For Reset period 2:

$$= \frac{20000000 \times 0.0150 \times 6}{12} = £1,50,000$$

For Reset Period 3:

$$= \frac{20000000 \times 0.02 \times 6}{12} = £2,00,000$$

Point to ponder: It is possible to have a view that to find the actual effective savings we should reduce a sum of £ 55096 representing the 4th EMI from the savings as shown above. In such a case the savings from cap will be £ 284712– £ 55096 = £ 229616.

Interest Rate Futures

Q.9 Agrifoods India Ltd is engaged in a highly seasonal business. It is expecting that it is likely to have a surplus of ₹ 100 crores in 2 months' time (i.e. June 2020) and the company is likely to have this surplus for a period of 3 months. As per the policy of the company, the surplus amount will be kept invested for the duration of the surplus. However, it is worried that the interest rates will fall in the intervening period. Currently the interest rates are 5%. To protect itself from the falling rates of interest the company wishes to use interest rate futures which are being traded on the exchange. The following information is available from the exchange:

3-month June 2020 futures	7% (₹ 93.00)
3-month Sept 2020 futures	8% (₹ 92.00)

The contract size is ₹ 5,00,000. The following assumptions may be made:

a. all the future contracts expire on the last day of the future month; and
b. The borrowing date coincides with the expiry date of the futures.

Explain how Agrifoods India Ltd can hedge its interest rate exposure using interest futures if in 2 months' time the interest rate has fallen to 2%.

A.9

a. Since the company is a Lender (or an investor), it will buy interest futures.
b. Since the Lending (investing) is proposed to take place in June 2020, it will buy futures expiring in June 20.
c. Since the Lending (investing) is for 3 months, it will buy 3-month futures expiring in June 2020.
d. The total lending (investing) is for ₹ 100,00,00,000 and the lot size is ₹ 5,00,000 the number of lots of 3-month March futures to be sold: ₹ 100,00,00,000 ÷ ₹ 5,00,000 = 2000
e. The position of the company, if on the date of actual lending (investing), the rate of interest actually turns out as 2%:

Today	Buy 2000 lots of 3-month June 20 futures @	7%
Jun 30	Square off (Sell 3-month June 20 futures @ (#)	2%
	Profit / (Loss) on futures	5%
	Cash inflow / (outflow) on settlement of futures	
	₹ 100,00,00,000 x 0.05 x 3/12	₹ 1,25,00,000
	Interest receivable on Lending (Investing)	
	₹ 100,00,00,000 x 0.02 x 3/12	₹ 50,00,000
	Net inflow on Lending (Investing)	**₹ 1,75,00,000**

(#) On the maturity date, the futures price will be equal to the spot price – principle of convergence.

Hence, by entering a futures contract at 7%, the company has been able to freeze his interest income on lending (Investing) at

$$\frac{1,75,00,000}{100,00,00,000} \times 100 \times \frac{12}{3} = 7\%\%$$

Q.10 Today is 1st January 2020. On preparing the cash flow forecast for the year 2020, the Chief Financial Officer (CFO) of Bright Ltd realises that the company would be required to borrow a sum of ₹ 10 crores on 31st March 2020 for a period of 3 Months. Currently the interest rates are being quoted at 8%. However, the CFO is worried that the interest rates might rise in the intervening period beginning today up to the date of borrowing. 3-Month Interest futures expiring on 31st March (henceforth referred to as March futures) are being traded in the market at 14%. The contract size is ₹ 10 lakhs. You are required to:

a. Show how the CFO can hedge his position using interest rate futures.
b. Illustrate your answer if the actual interest for 3 months borrowing on 31st March is (a) 12% (b) 14% and (c) 16%

A.10

a. Since the company is a borrower, it will sell interest futures.
b. Since the borrowing is proposed to take place in March 2020, it will sell futures expiring in March 20.
c. Since the borrowing is for 3 months, it will sell 3-month futures expiring in March 2020.
d. The total borrowing is for ₹ 10,00,00,000 and the lot size is ₹ 10,00,000 the number of lots of 3-month March futures to be sold: ₹ 10,00,00,000 ÷ ₹ 10,00,000 = 100

		Interest rates prevailing on 31st Mar 2020		
		12%	**14%**	**16%**
Jan 1	Sell 100 lots of 3-Month March 20 futures @	14%	14%	14%
Mar 31	Square off (Buy 3-month Mar 20 futures @ (#)	12%	14%	16%
	Profit / (Loss) on futures	(2%)	-	2%
	Cash inflow / (outflow) on settlement of futures			
	₹ 10,00,00,000 x 0.02 x 3/12	(₹ 5,00,000)	-	
	₹ 10,00,00,000 x 0.02 x 3/12			₹ 5,00,000
	Interest payable on Borrowings			
	₹ 10,00,00,000 x 0.12 x 3/12	(₹ 30,00,000)		
	₹ 10,00,00,000 x 0.14 x 3/12		(₹ 35,00,000)	
	₹ 10,00,00,000 x 0.16 x 3/12			(₹ 40,00,000)
	Net outflow on borrowings	**(₹35,00,000)**	**(₹35,00,000)**	**(₹35,00,000)**

(#) On the maturity date, the futures price will be equal to the spot price – principle of convergence.

Hence, by entering a futures contract, the CFO has been able to freeze his outflow on account of borrowings to ₹ (₹35,00,000) irrespective of the rate of interest that prevails on the date of borrowing. In other words, the cost of borrowing has been frozen at:

$$\frac{35,00,000}{10,00,00,000} \times 100 \times \frac{12}{3} = 14\%$$

Q.11 Apollo Ltd is likely to need £ 72 million in two months' time for a period of 4 months. The company is of the opinion that interest rates could rise in the intervening period. Currently the LIBOR is at 8.5%. The company can borrow money at LIBOR + 0.75. The company fears that the interest rates could rise by 190 bps (1.90%) by the time of the date of borrowing. Pound Interest futures are traded on the London International Financial Futures and Options Exchange (LIFFE) and the following 3-month future quotes are available:

3-month December futures	£ 91.40 (8.60%)
3-month March futures	£ 91.10 (8.90%)
3-month June futures	£ 90.75 (9.25%)

The future contracts expire at the end of the contract month. The contract size is £ 500,000. It is Jan 1st, 2020 today and the borrowing is due on 29 Feb 2020.

You are required to advise the company on the strategy to be adopted and show the financial effect if by 29th Feb 2020, LIBOR increases by 190 bps (1.90%) and the March futures increases by 170 bps (1.70%).

A.11

a. Since the company is a borrower, it will sell interest futures.

b. Since the borrowing is proposed to take place on 29th Feb 2020, ideally the company would have preferred selling the February futures. But since the February futures are not being quoted it will opt for futures which expire immediately following the February futures which in this case is March future. Accordingly, the company will sell futures expiring in March 20.

c. Since the borrowing is for 4 months, ideally the company would prefer selling 4-month futures. But since the futures being traded are 3-month futures, the company will sell appropriate amount of 3-month futures to protect a 4-month borrowing which will be calculated as under:

$$720 \times \frac{4}{12} = futures \times \frac{3}{12}$$

Or Futures = £ 960 lacs.

Hence the company will have to sell £ 960 lacs of 3-month futures to protect a 4-month borrowing of £ 720 lacs.

d. The total futures to be sold is £960 lacs and the lot size is £ 500,000, the number of lots of 3-month March futures to be sold: £ 960 ÷ £ 5 lacs= 192 lots

Today	Sell 192 lots of 3-month March 20 futures @	8.90%
Feb 29	Square off (buy 3-month Mar 20 futures @ (note 1)	10.60%
	Profit / (Loss) on futures	1.70%
	Cash inflow / (outflow) on settlement of futures	
	£ 960 lacs x 1.70% x 3/12	£ 4.08 lacs
	Interest payable on borrowing	
	£ 720 lacs x (8.50% + 1.90% + 0.75%) x 4/12; or £ 720 lacs x 11.15% x 4/12 (note 2)	(£ 26.76)
	Net outflow on borrowing	**(£ 22.68)**

Therefore, by entering into interest futures, the company's borrowing cost is now 9.45% as under

$$\frac{22.68}{720} \times 100 \times \frac{12}{3} = 9.45\%$$

Note 1:

it is given that by Feb 29th the March futures has increased by 170 bps – this implies that on Feb 29th, the March 2020 futures would be trading at 8.90% + 1.70% = 10.60%.

Note 2:

The current LIBOR is given as 8.50%. It is also given that by 29th Feb 2020, the LIBOR increases by 190 bps. Hence LIBOR on 29th Feb 2020 will be 8.50% + 1.90% = 10.40%. Further, the company can borrow at LIBOR + 0.75. Therefore, the applicable rate for the company on the date of borrowing will be 10.40% + 0.75% = 11.15%