

- Ø The term 'flat' on the floating leg quote, indicates that the Bank does not charge any commission on the floating leg. Therefore, bank charges 20 bps for transacting swap as a whole.
- (2) A buyer of swap pays 'Fixed' cash flows and receives 'Floating'. As per the quote, the buyer would pay 8.2% (higher of 8%, 8.2%) to the Bank and would receive '6M LIBOR' against it.
- (3) A seller of swap pays 'floating' cash flows and receives 'fixed'. As per the quote, the seller would pay '6M LIBOR' to the bank and would receive 8% (lower of 8%, 8.2%) against it.
- (4) Semi-annual Payment every six-month for buyer of Swap:

$$₹ 10,00,000 \times 8.20\% \times \frac{1}{2} = ₹ 41,000$$

- (5) Floating Rate Payment

$$\begin{aligned} &= N (\text{LIBOR}) \left( \frac{dt}{360} \right) \\ &= 10,00,000 \times 0.05 \times \frac{181}{360} \\ &= ₹ 25,138.89 \end{aligned}$$

- (6) Net Settlement

$$\text{Or, } ₹ 41,000 - ₹ 25,138.89 = ₹ 15,861.11$$

### **(III) OVERNIGHT INDEX SWAP**

#### **Question – 10**

Derivative Bank entered into a swap arrangement on a principal of ₹ 10 crores and agreed to receive MIBOR overnight floating rate for a fixed payment on the principal. The swap was entered into on Monday, 19<sup>th</sup> August, 2019 and was to commence on 20<sup>th</sup> August, 2019 and run a period of 7 days.

Respective MIBOR rates for Tuesday to Monday were:

8.15%,      7.98%,      7.95%,      8.12%,      8.15%,      7.75%.

If Fixed Rate of Interest is 8%, then evaluate

- (i) The nature of this swap arrangement.
- (ii) The Net Settlement amount.

**Note:**

- (1) Sunday is Holiday.
- (2) Work in rounded rupees and avoid decimal working.
- (3) Consider 365 days in a year.

**(RTP November – 2021)**

**Solution:**

**(I) Nature of Swap**

This swap is Plain Vanilla Overnight Index swap.

**(II) The Net Settlement Amount**

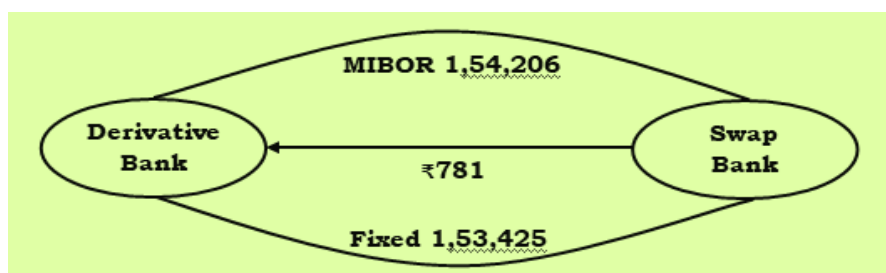
Fixed Rate Payment

$$= 10,00,00,000 \times 8\% \times 7/365$$

$$= ₹ 1,53,425$$

Floating Rate (MIBOR) Payment

Day	MIBOR	Calculation	Interest
Tuesday	8.15 %	$10,00,00,000 \times 8.15\% \times 1/365$	22,329
Wednesday	7.98 %	$10,00,22,329 \times 7.98\% \times 1/365$	21,868
Thursday	7.95 %	$10,00,44,197 \times 7.95\% \times 1/365$	21,790
Friday	8.12 %	$10,00,65,987 \times 8.12\% \times 1/365$	22,261
Sat. & Sun.	8.15 %	$10,00,88,248 \times 8.15\% \times 2/365$	44,697
Monday	7.75 %	$10,01,32,945 \times 7.75\% \times 1/365$	21,261
			1,54,206



In Settlement, ₹ 781 will be paid by swap bank to Derivative Bank (1,54,206 - 1,53,425) = 781.

**Note:** Saturday को (SATURDAY & SUNDAY) दो दिनों का INTEREST लेना है।

**Question - 11**

Derivative Bank entered into a plain vanilla swap through on OIS (Overnight Index Swap) on a principal of ₹ 10 crores and agreed to receive MIBOR overnight floating rate for a fixed payment on the principal. The swap was entered into on Monday, 2<sup>nd</sup> August, 2010 and was to commence on 3<sup>rd</sup> August, 2010 and run for a period of 7 days.

Respective MIBOR rates for Tuesday to Monday were:

7.75%,      8.15%,      8.12%,      7.95%,      7.98%,      8.15%.

If Derivative Bank received ₹ 317 net on settlement, calculate Fixed rate and interest under both legs.

**Notes:**

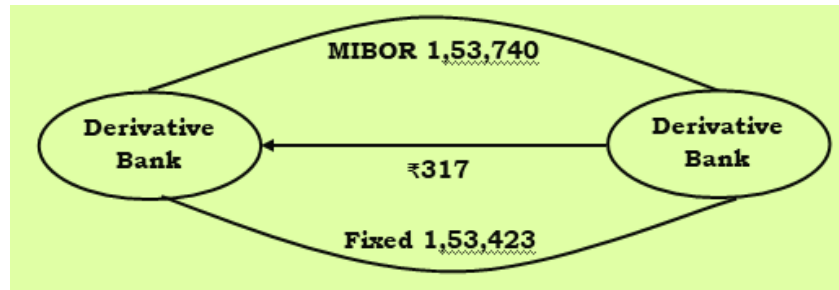
- (i) Sunday is Holiday.
- (ii) Work in rounded rupees and avoid decimal working.

**(Exam November - 2010, SM TYK - 05)**

**Solution:**

**(i) Calculation of floating Rate payment (MIBOR)**

Days	MIBOR	Calculation	Interest
Tuesday	7.75 %	$10,00,00,000 \times 7.75 \% \times 1/365$	21,233
Wednesday	8.15 %	$10,00,22,329 \times 8.15 \% \times 1/365$	22,333
Thursday	8.12 %	$10,00,44,197 \times 8.12 \% \times 1/365$	22,256
Friday	7.95 %	$10,00,65,987 \times 7.95 \% \times 1/365$	21,795
Sat. & Sun.	7.98 %	$10,00,88,248 \times 7.98 \% \times 2/365$	43,764
Monday	8.15 %	$10,01,32,945 \times 8.15 \% \times 1/365$	22,358
			1,53,740



$$\text{Fixed Rate Payment} = 1,53,740 - 317$$

$$= 1,53,423$$

$$\text{Rate of Interest} = \frac{1,53,423}{10,00,00,000} \times 100 \times \frac{365}{7}$$

$$= 8\% \text{ p.a.}$$

**(IV) TWO PARTY SWAP**

**Question – 12**

IB an Indian firm has its subsidiary in Japan and Zaki a Japanese firm has its subsidiary in India and face the following interest rates:

Company	IB	Zaki
INR floating rate	BPLR + 0.50%	BPLR + 2.50%
JPY (Fixed rate)	2%	2.25%

Zaki wishes to borrow Rupee Loan at a floating rate and IB wishes to borrow JPY at a fixed rate. The amount of loan required by both the firms is same at the current exchange rate. A financial institution may arrange a swap and requires 25 basis points as its commission. Gain, if any, is to be shared by the firms equally.

You are required to find out:

- (i) Whether a swap can be arranged which may be beneficial to both the firms?
- (ii) What rate of interest will the firms end up paying?

**(Exam November – 2020)**

**Solution:**

- (i) IB has absolute advantage in floating rate as well as fixed rate but it has comparative advantage in floating rate.

Hence,

\* IB should borrow at floating rate.

\* ZAKI should borrow at fixed rate.

Total potential gain

= Difference in floating rate – Difference in fixed rate

= 2% – 0.25% = 1.75%

(-) Commission = 0.25%

Net gain = 1.50%

Effective Cost

IB =  $2 - (1.5 \times 1/2) = 1.25\%$

ZAKI =  $BPLR + 2.5 - (1.5 \times 1/2) = BPLR + 1.75$

- (ii) Interest Rate Payable

**IB**

Interest paid on loan	BPLR + 0.5%
Commission ( $0.25 \times 1/2$ )	0.125%
Received from Zaki	– BPLR + 0.5%
Paid to ZAKI ( $1.25 - 0.125\%$ )	1.125%
Effective Cost	<u>1.25%</u>

**ZAKI**

Interest paid on loan	2.25%
Commission	0.125%
Paid to IB	BPLR + 0.50%
Received from IB	<u>– 1.125%</u>

Effective Cost

BPLR + 1.75

**Question – 13**

IF an Indian firm has its subsidiary in Singapore and SF a Singapore firm has its subsidiary India and face the following interest rates:

Company	IF	SF
INR Floating Rate	BPLR + 0.5%	BPLR + 1.5%
SGD (Fixed Rate)	3%	3.50%

SF wishes to borrow Rupee loan at a floating rate and IF wishes to borrow SGD at a fixed rate. The amount of loan required by both the companies is same at the current exchange rate. A Bank arranges a swap and requires 50 basis points as its commission, which is to be shared equally. IF requires a minimum gain of 20 basis points and SF requires a minimum gain of 10 basis points for structuring the deal. The Bank is very keen to structure the deal, even if, it has to forego a part of its commission.

You are required to find out

- (i) Whether there are any advantages available to IF and SF?
- (ii) Whether a swap can be arranged which may be beneficial to both the firms?
- (iii) What rate of interest will they end up paying? Show detailed working.

**(Exam May – 2023)**

**Solution:**

- (i) IF has absolute advantage in floating rate as well as fixed rate but it has comparative advantage in floating rate.

Hence,

- \* IF should borrow at floating rate.
- \* SF should borrow at fixed rate.

Total potential gain

$$\begin{aligned} &= \text{Difference in floating rate} - \text{Difference in fixed rate} \\ &= 1\% - 0.5\% = 0.5\% \end{aligned}$$

(-) Commission	= 0.2%
Net gain	<u>= 0.3%</u>
Effective Cost	
IF = 3% - 0.20%	= 2.8%
SB = BPLR + 1.5% - 0.10%	= BPLR + 1.4%

**(ii) Design**

**IF**

Interest paid on loan	BPLR + 0.5%
Commission	0.10%
Received from SF	- BPLR + 0.5%
Paid to SF (2.8% - 0.10%)	2.7%
Effective Cost	<u>2.8%</u>

**SF**

Interest paid on loan	3.5%
Commission	0.10%
Paid to IF	BPLR + 0.5%
Received from IF	- 2.7%
	<u>BPLR + 1.4%</u>

**Question - 14**

A Inc. and B Inc. intend to borrow \$ 200,000 and ₹200,000 in ₹ respectively for a time horizon of one year. The prevalent interest rates are as follows:

<b>Company</b>	<b>₹ Loan</b>	<b>\$ Loan</b>
A Inc	5%	9%
B Inc	8%	10%

The prevalent exchange rate is \$1 = ₹120.

They entered in a currency swap under which it is agreed that B Inc will pay A Inc @ 1% over the ¥ Loan interest rate which the later will have to pay as a result of the agreed currency swap whereas A Inc will reimburse interest to B Inc only to the extent of 9%. Keeping the exchange rate invariant, quantify the opportunity gain or loss component of the ultimate outcome, resulting from the designed currency swap.

**(Exam May – 2011, SM TYK – 06)**

**Solution:**

**A Incorporation**

**Today**

Borrow yen from bank	+ ¥ 2,40,00,000
Yen transfer to B incorporation	– ¥ 2,40,00,000
\$ Transfer from B Incorporation	+ \$ 2,00,000
	\$ 2,00,000

**After 1 year**

Interest paid to bank (¥ 2,40,00,000 × 5%)	– ¥12,00,000
Interest transferred from B incorporation (¥ 2,40,00,000 × 5%)	+ 14,40,000
Interest transferred to B Incorporation (\$2,00,000 × 9%)	– \$ 18,000
	– \$ 18,000 + ¥ 2,40,000

$$\begin{aligned} \text{Net Interest paid in \$} &= \$18,000 - \left( \frac{¥ 2,40,000}{120} \right) \\ &= \$16,000 \end{aligned}$$

$$\text{Effective Cost} = \frac{\$ 1,600}{\$ 2,00,000} \times 100 = 8\%$$

$$\text{Without Swap} = 9\%$$

$$\text{Gain} = 1\%$$

**B Incorporation**

**Today**

Borrow \$ from Bank	+	\$ 2,00,000
Transfer \$ to A Inc.	-	\$ 2,00,000
Transfer ¥ from A Inc.		¥ 2,40,00,000
		¥ 2,40,00,000

**After 1 Year**

Interest paid to bank (\$ 2,00,000 × 10%)	-	\$ 20,000
Interest transfer from A Inc. (\$ 200000 × 9%)	+	\$ 18,000
Interest transfer to A Inc. (¥ 2,40,00,000 × 5%)	-	¥ 14,40,000
		- ¥ 14,40,000 - \$2,000

Interest paid in ¥ = ¥ 14,40,000 + (\$ 2,000 × 120)  
= ¥ 16, 80,000

Effective Cost =  $\frac{¥ 16,80,000}{¥ 2,40,00,000} \times 100$   
= 7%

Without Swap = 8%

Gain = 1%

**PART 5: CAP, COLLAR & FLOOR**

**Question – 15**

MPD Ltd. issues a ₹ 50 Million Floating Rate Loan on July 1, 2018 with resetting of coupon rate every 6 Months equal to LIBOR + 50 bps.

MPD is interested in an Interest rate Collar Strategy of selling a Floor and buying a cap. MPD buys the 3 years cap and sell 3 years Floor as per the following details on July 1, 2018:

Principal Amount	₹ 50 Million
Strike Rate	5% for Floor & 8% for Cap

## INTEREST RATE RISK MANAGEMENT

Reference Rate	6 months LIBOR
Premium	NIL, since premium paid for cap = premium received for Floor

The Reset dates & Interest rates p.a., on that dates are:

Reset Date	LIBOR(%)
31/12/2018	7.00
30/06/2019	8.00
31/12/2019	6.00
30/06/2020	4.75
31/12/2020	4.25
30/06/2021	5.25

Using the above data, you are required to determine:

- (i) Effective Interest paid out at each six reset dates, (Round off to the nearest rupee)
- (ii) Average overall effective rate of interest p.a. (round off to 2 decimals)

**(Exam May – 2022)**

### **Solution:**

#### **(i) Calculation of Effective Cost**

Reset Date	LIBOR	Date of payment	No. of days	Intt paid (L+0.50%)	Cap Receipt	Floor payment	Net
31/12/2018	7%	30/06/2019	181	18,59,589	0	0	18,59,589
30/06/2019	8%	31/12/2019	184	21,42,466	0	0	21,42,466
31/12/2019	6%	30/06/2020	182	16,16,120	0	0	16,16,120
30/06/2020	4.75%	31/12/2020	184	13,19,672	0	62,842	13,82,514
31/12/2020	4.25%	30/06/2021	181	11,77,740	0	1,85,959	13,63,699
30/06/2021	5.25%	31/12/2021	184	14,49,315	0	0	14,49,315
			1,096				98,13,703

**(ii)** Average Annual Rate =  $\frac{98,13,703}{5,00,00,000} \times 100 \times \frac{365}{1,096} = 6.54\% \text{ P.a.}$

#### **Question – 16**

A textile manufacturer has taken floating interest rate loan of ₹ 40,00,000 on 1<sup>st</sup> April, 2012. The rate of interest at the inception of loan is 8.5% p.a. interest is to be paid every year on 31<sup>st</sup> March, and the duration of loan is four years. In the month of October 2012, the Central bank of the country release following projections about the interest rates likely to prevail in future.