

CA Final  
Paper-2

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**6<sup>th</sup> EDITION**

**VOLUME-2**

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## DIKSHA GOYAL

I took AFM classes from 1FIN for my CA Final preparation I liked Sriram Sir's teaching on Excel a lot. I used 1FIN material fully and made short notes while watching the videos. I used 1FIN app for MCQs both at Inter & Final level - they were extremely value adding. The animation feature is something I really loved. I still remember the Brinjal Farmer example for Forwards. I recommended 1FIN's classes to several of my friends.

## Sindhuri

Every concept was explained with crystal clarity, I feel way more confident now. Soo glad that I found your classes!!

## Maanu

The way of presentation is absolutely beautiful. It's easy to understand the concepts from the classes. Thanks for the session

## Shivaji Hari

Thank you so much for sharing your tips. You've completely changed my perspective and thought process. You are my true guru in every aspect since 3 years. Expressing my gratitude in words doesn't feel enough .

## Priya Namburi

I have cleared my CA final both groups in my first attempt. I would like to thank Suraj and Sriram sir. Because of their teaching it was easy to understand the core of the subject and I gained confidence. I scored 50+ in both. Their teaching style is the best

## Devika

Watching 1FIN classes was the best choice. I love how you break things down so well and explain clearly Sir.

## Sathya K

I cannot thank Indigo learn enough” The practical insights provided during lectures prepared me for the real exam...where I cleared the group with exemption in AFM with 82 marks. Special thanks to Sriram sir who cautioned me in each and every sum which really helped me to understand the concept. Thank you for the wonderful classes. I owe a lot!

## Ravi Pulavarthi

Sir nice very good explanation of theory

## **Rama Sesha Gopal**

I have scored 70 marks in AFM. I want to thank Sriram sir for this. Secondly, the P600+ has been a solid practice material and aided my preparation with detailed answers, questions from immediately ended exams. Thanks for making an impact in our lives... very grateful sir

## **Nikhil M**

Classes are amazing! Thankyou for explaining everything so clearly. I actually get the concepts now.

## **Prashant**

Superb classes! Perfect to achieve a strong grasp of the subject. I liked how they made learning fun.

## **Gayatri maniyam**

Honestly, these classes made a huge difference for me. I feel more confident with many topics now.

## **Srinivas P**

These were one of the best classes I have ever experienced. Great explanation, covering every topic right from basics to advanced. Glad I found 1FIN and your classes Sir.

## **Kavya S**

Omg Amazing classes thank you so much Sriram Sir

## **Nanditha**

The best class I have ever seen in my career. Satisfied

## **Painedi Adharsh**

Hi Sir, Your teaching was excellent. I watched your revision lectures whenever I had doubts. I'm pleased to share that I scored 71 marks in AFM. Thank you for your valuable guidance and support.

## **Bala**

AFM I got exemption sir 62. Thanks for your support sir ur videos helped me a lot in my preparation.

## **Shiva R**

Each and every topic was covered soo clearly. Thankyou soo much for the classes Sir, they were really very helpful!!

## **Asalamsha**

Classes were very useful for conceptual understanding

# Our Rankers

**AIR 1**



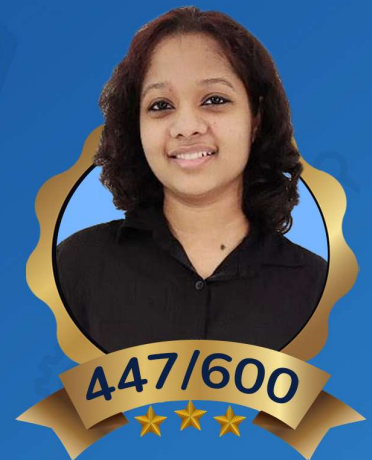
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1.

# ADVANCED FINANCIAL MANAGEMENT

## Question Bank - Volume 2

V 6.0 | April 2026 | 600 + Illustrations





Dear Students,

This compiler has been designed to help students appearing for the CA Final Advanced Financial Management (AFM) Paper in the **Nov'26 Exams** and thereafter to **SUCCEED LIKE NEVER BEFORE**. The Notes are updated with Questions and suggested solutions till Jan 2026 Exams

This Compiler is unique and special for following reasons,

- a) This compiler is **NOT** a copy paste of ICAI solutions - all the solutions as per what our faculty has solved in the class. You will not have issues of steps / answers being incorrect (like some other compilers / ICAI resources)
- b) It is designed in such a way that problems of all varieties are covered. There are no unnecessary duplication of similar variety of problems being solved multiple times - so using this compiler **saves time**
- c) The compiler has **600 + questions and answers** from all practical chapters and covers Past Exam papers, ICAI Study Material, RTPs, MTPs and even the Old Syllabus Practice Manual.
- d) We are also providing you with a quick reference **Formula Sheet** for your revision purposes

In the process of creating this compiler, despite our best intentions, some errors could have crept in. If you find any such errors, do reach out to us at [1fin.in/support](http://1fin.in/support) and we would be happy to correct them in the next version

This document is the **Sixth** version of compilation of our efforts. We will be coming out with the next version in late 2026 or early 2027 with updated RTPs, MTPs, and of course relevant updates for subsequent attempts including corrections if any 😊

We look forward to your success!!

Yours

Sriram Somayajula CA, CFA, ISB  
1FIN





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## Basic questions

### 1. Illustration

The price of a bond just before a year of maturity is \$ 5,000. Its redemption value is \$ 5,250 at the end of the said period. Interest is \$ 350 p.a. The Dollar appreciates by 2% during the said period. Calculate the rate of return.

(ICAI SM, Old PM)

**Solution:**

Particulars	Amount(\$)
Redemption Value of Bond	5250
Add: Interest P.a	350
Less: Price of bond one year ago	5000
Return	600

$$\text{Return} = \frac{\text{Capital Gains} + \text{Dividend/Interest}}{\text{Opening Investment}}$$

$$\text{Return} = \frac{600}{5000} = 12\%$$

**Thus, return for a US Bond investor is 12%.**

Return for a Non-US Investor is 12% + Impact of 2%,

$$= (1+12\%)(1+2\%) - 1$$

$$= (1.12)(1.02) - 1$$

$$= 1.1424 - 1$$

$$= 14.24\%$$

**Thus, return for Non-US Investor is 14.24%**

**Alternatively,** since principal return of \$ 5250 and return of \$350 will be valued at appreciated US Dollar of 2% (1+2%) and original investment will be valued at original rate (1), then return can also be calculated as:

$$\text{Return} = \frac{5250 \times 1.02 + 350 \times 1.02 - 5000}{5000}$$

$$\text{Return} = \frac{5712}{5000}$$

$$\text{Return} = 14.24\%$$

### 2. Illustration

Your forex dealer entered into a cross currency deal and sold US\$ 10,00,000 against Euro @ US\$ 1 = 1.4400 for Spot delivery. However, later during the day, the market became volatile and the dealer in compliance with his management's guidelines had to square - up the position when the quotations were:

Spot US \$ 1 INR 61.4300/4500

Spot US \$ 1 EURO 1.4250/4350

What will be the gain or loss in the transaction?

(MTP Oct'19, RTP Nov'14)

**Solution:**

Phase 1 of transaction: Sold USD and bought Euro at 1.4400 per USD





Since the forex dealer has squared of the position, the dealer will do the opposite of the previous transaction.

Phase 2 of transaction : Buy USD and sold Euro at 1.4350 per USD

Gain = 0.0050 Euro per USD

Since transaction involves US \$ 10,00,000 the total gain would be:

Gain = \$10,00,000 × 0.0050

= 5000 Euros

**Alternatively,**

Forex dealer sold USD and bought Euro at 1.44.

Thus, Number of Euros bought = \$10,00,000 × 1.4400

= 14,40,000 Euros

In the transaction of squaring of, amount of Euro sold for buying US \$10,00,000 will be done at \$1=1.4350 Euros

Hence, Euros sold = 14,35,000 (10,00,000 × 1.4350)

Thus, gain = 14,40,000 Euros -14,35,000 Euros

= 5000 Euros

Since dealer is based out of India, we need to calculate gain in INR as well.

The bank will sell USD at 1.4350 and will buy USD at INR 61.43,

Gain in INR =  $\frac{5000 \times 61.43}{1.4350}$

= Rs 2,14,041.81 or rounded off to 2,14,042.

### 3. Illustration

Your forex dealer had entered into a cross currency deal and had sold US \$ 10,00,000 against EURO at US \$ 1 = EURO 1.4400 for spot delivery.

However, later during the day, the market became volatile and the dealer in compliance with his management's guidelines had to square - up the position when the quotations were:

Spot US \$ 1            INR 31.4300/4500

1 month margin 25/20

2 months margin    45/35

Spot US \$ 1            EURO 1.4400/4450

1 month forward    1.4425/4490

2 months forward    1.4460/4530

What will be the gain or loss in the transaction?

(ICAI SM)





## Solution:

Phase 1 of the transaction: Sold \$10,00,000 and bought Euros at 1.44 Euro/Dollar.

Phase 2 of the transaction (Squaring of): Buy US \$ 10,00,000 and sell Euros.

Bank will buy Euro and sell dollars at 1.4450 Euros/Dollar. (Correspondingly customer will buy dollar and sell Euro at the same rate)

*Note that the transaction is spot delivery only, hence spot rates will only be considered. Forward rates are irrelevant.*

In simple words, customer sold US \$ at 1.44 Euros and bought back again from the market at 1.4450 Euros.

Hence, the loss is Euro 0.0050 per dollar .

Total loss = \$10,00,000 × 0.0050

=5000 Euros

The loss of 5000 Euros represents shorting, which means you have sold extra Euros which you don't have. Now in order to make good the loss, you have to buy back again 5000 Euros from the market.

**USD/EUR Quote : 1.4400/1.4450**

Rate which is applicable will be 1.4400 ( **Banker Bids to Buy the Base Currency**)

US \$ got =5000/1.4400

=\$3472.22

Since the dealer is based out of India as Cross currency rate are USD/EUR, loss will be calculated in INR terms.

USD/INR Quote : 31.4300/31.4500

Rate which is applicable will be 31.4500 as Customer has to Get INR Equivalent for \$3472.22, so banker will sell US \$ at 31.45 and give INR.

**Loss in INR =3472.22 × 31.45 =INR 1,09,201.40**

## 4. Illustration

**Edelweiss Bank Ltd. sold Hong Kong dollar 2 crores value spot to its customer at ₹ 8.025 and covered itself in the London market on the same day, when the exchange rates were US\$ 1 = HK \$ 7.5880 - 7.5920.**

**Local interbank market rates for US \$ were Spot US \$ 1 = ₹ 60.70-61.00**

**Calculate the cover rate and ascertain the profit or loss on the transaction. Ignore brokerage.**

**(Nov'14 QP)**

## Solution :

Given, Edelweiss Sold HKD 2 Crores at Rs 8.025.

In order to cover up the position, the bank needs to Buy same 2 Crores HKD and sell INR. Since direct rate is not given, Cross rate of HKD/INR needs to be found out. First Customer will sell INR and Buy USD and then will sell USD and get back HKD.





Rate	Bid	Ask
USD INR	60.70	61
USD HKD	7.588	7.592

Thus, HKD/INR = 61/7.588

Hence Cover rate is HKD/INR=8.039

Loss = 8.039-8.025 =0.014 per HKD (as Edelweiss sold at 8.039 and bought back same at 8.025).

Total Loss = 20,000,000 × 0.014=INR 2,80,000.

Hence total loss in INR is Rs 2,80,000.

## 5. Illustration

With relaxation of norms in India for investment in international market up to \$2,50,000, Mr. X to hedge himself against the risk of declining Indian economy and weakening of Indian Rupee during last few years, decided to diversify in the International Market. Accordingly, Mr. X invested a sum of Rs. 1.58 crore on 1.1.20x1 in Standard & Poor Index. On 1.1.20x2 Mr. X sold his investment. The other relevant data is given below:

	1.1.20x1	1.1.20x2
Index of Stock Market in India	7395	?
Standard & Poor Index	2028	1919
Exchange Rate (Rs./\$)	62.00/62.25	67.25/67.50

You are required to calculate:

- The return for a US investor.
- Holding Period Return to Mr. X.
- The value of Index of Stock Market in India as on 1.1.20x2 at which Mr. X would be indifferent between investment in Standard & Poor Index and India Stock Market.

(MTP Apr'19)

**Solution:**

$$(i) \quad \text{Return} = \frac{\text{Capital Gains+Dividend/Interest}}{\text{Opening Investment}}$$

$$\text{Return} = \frac{1919-2028}{2028} = -5.37\%$$

(ii) US \$ purchased by Mr. X for Rs 1.58 Crores

$$\text{\$ Got} = \frac{1,58,00,000}{\text{USD INR } 62.25}$$

$$\text{\$ Got} = \text{\$253,815.26}$$

Closing value of \$ investment of Mr. X

$$= 253815.26 \times (1-5.37\%)$$

$$= \text{\$240,185.38}$$

\$ remitted to India at a rate of 67.25

$$= 2,40,185.39 \times 67.25$$

$$= \text{Rs } 1,61,52,466.91$$

$$\text{Return} = \frac{1,61,52,466.91 - 1,58,00,00,000}{1,58,00,000} \times 100 = 2.23\%$$

Hence holding period return is 2.23%

(iii) Closing Indian Market index value for 2.23 % return from opening value of 7395 is computed as follows:

$$\text{Closing Value} = 7395 + 7395 \times 2.23\%$$

$$\text{Closing Value} = 7559.91$$





## 6. Illustration

Bharat Silk Limited, an established exporter of silk materials, has a surplus of US\$ 20 million as on 31st May 2015. The banker of the company informs the following exchange rates that are quoted at three different forex markets:

GBP/ INR	99.10	at London
INR/ GBP	0.01	at London
USD/ INR	64.10	at Mumbai
INR/ US\$	0.02	at Mumbai
USD/ GBP	0.65	at New York
GBP/ USD	1.5530	at New York

Assuming that there are no transaction costs, advise the company how to avail the arbitrage gain from the above quoted spot exchange rates.

(ICAI SM, RTP May'17)

**Solution:**

Relevant Rates are as follows :

Exchange Rate	Rate	Market
GBP INR	99.10	London
USD INR	64.10	Mumbai
GBP USD	1.5530	New York

**Note :** Other three rate given in the question are just inverse of these above three rates and are given in approximate values. Ignore those.

**Step 1** Convert US \$20 Million into INR at 64.10

	Bharat Silk would get = 20,000,000 × 64.10	=INR 1282 Million
--	--	-------------------

**Step 2** Convert the INR 1282 Million into GBP at 99.10

	Number of equivalent GBP=1282 Million/99.10	=GBP 12,936,427.85
--	---	--------------------

**Step 3** In order to get back the same \$ 20 Million, Sell GBP and get back USD at 1.5530

	Equivalent USD= GBP 12,936,427.85*1.5530	= US \$ 20,090,272.45
--	--	-----------------------

Thus, Arbitrage gain = \$ 20,090,272.45 - \$ 20,000,00  
= \$ 90,272.45

Hence Bharat Silk Limited would get Arbitrage gain of \$ 90,272.45 by following the above steps.

## 7. Illustration

You sold Hong Kong Dollar 1,00,00,000 value spot to your customer at ₹ 5.70 & covered yourself in London market on the same day, when the exchange rates were: US\$ 1 = H.K.\$ 7.5880 / 7.5920  
Local inter-bank market rates for US\$ were Spot US\$ 1 = ₹ 42.70/42.85

Calculate cover rate and ascertain the profit or loss in the transaction. Ignore brokerage.

[ICAI SM, similar Nov'20 QP (Old), Old PM]





## Solution :

Given, we Sold HKD 1 Crore at Rs 5.70.

In order to cover up the position, the bank needs to Buy same 1 Crore HKD and sell INR. Since direct rates are not given, Cross rate of HKD/INR needs to be found out. First Customer will sell INR and Buy USD and then will sell USD and get back HKD.

Rate	Bid	Ask
USD INR	42.70	42.85
USD HKD	7.588	7.5920

Thus, HKD/INR = 42.85/7.588

Hence Cover rate is HKD/INR = 5.647

Profit = 5.70 - 5.647 = 0.053 per HKD (as you sold at 5.70 and bought back same at 5.647).

Total profit = 10,000,000 × 0.053 = INR 5,30,000.

Hence total gain in INR is Rs 5,30,000.

## 8. Illustration

You, a foreign exchange dealer of your bank, are informed that your bank has sold a T.T. on Copenhagen for Danish Kroner 10,00,000 at the rate of Danish Kroner 1 = ₹ 6.5150. You are required to cover the transaction either in London or New York market. The rates on that date are as under:

Mumbai-London	₹ 74.3000	₹ 74.3200
Mumbai-New York	₹ 49.2500	₹ 49.2625
London-Copenhagen	DKK 11.4200	DKK 11.4350
New York-Copenhagen	DKK 07.5670	DKK 07.5840

In which market will you cover the transaction, London, or New York, and what will be the exchange profit or loss on the transaction? Ignore brokerages.

(ICAI SM, Old PM, MTP May'20 Old, RTP May'20 Old)

## Solution :

The two legs of the transaction will be,

1. USD INR - Buy USD, Sell INR and then Sell USD and Buy DKK.
2. GBP INR - Buy GBP, sell INR and then sell GBP and Buy DKK.

### Case 1 : USD INR

Rate	Bid	Ask
USD INR	49.25	49.2625
USD DKK	7.5670	7.5840

Since, the banker has sold DKK and has INR, they need to sell INR and get USD at 49.2625 (Banker Bids to Buy Base Currency)

$$\text{So, USD get} = \frac{10,00,000 \times 6.5150}{49.2625}$$

$$\text{USD get} = \$ 132,250.6978$$

Now by selling USD and get DKK at 7.5670

$$\text{DKK get} = 132,250.6978 \times 7.5670$$

$$= 10,00,741.030 \text{ DKK}$$

$$\text{Gain made} = 10,00,741.030 - 10,00,000 = 741.030 \text{ DKK}$$





Alternatively,

DKK INR = 49.2625/7.5670

=6.5102

So, Banker sold DKK at INR 6.5150 and bought back same at INR 6.5102.

Profit = 6.5150 - 6.5102

= **0.0048 INR per DKK or 4800 INR**

### Case 2 : GBP INR

Rate	Bid	Ask
GBP INR	74.3000	74.3200
GBP DKK	11.4200	11.4350

Since, the banker has sold DKK and has INR, they need to sell INR and get GBP at 74.3200 (Banker Bids to Buy Base Currency )

So, GBP get =  $\frac{10,00,000 \times 6.5150}{74.3200}$

GBP get = GBP 87,661.4639

Now by selling GBP and get DKK at 11.4200

DKK get = 87,661.4639 × 11.4200

=10,01,093.918 DKK

Gain made = 10,01,093.918 - 10,00,000 = **1093.918 DKK**

Alternatively,

DKK INR = 74.3200/11.4200

=6.5079

So, Banker sold DKK at INR 6.5150 and bought back same at INR 6.5079.

Profit = 6.5150 - 6.5079

= **0.0071 INR per DKK or 7100 INR**

### Summary :

Rate	Profit in DKK	Profit in INR
USD INR (Case 1)	741	4800
GBP INR (Case 2)	1093	7100

Since Profit is higher in Case 2 i.e., by following GBP INR route, the dealer has to cover via London.

### 9. Illustration

On January 28, 2013 an importer customer requested a Bank to remit Singapore Dollar (SGD) 2,500,000 under an irrevocable Letter of Credit (LC). However, due to unavoidable factors, the Bank could affect the remittances only on February 4, 2013. The inter-bank market rates were as follows:

	January 28, 2013	February 4, 2013
US\$ 1	₹ 45.85/45.90	₹ 45.91/45.97
GBP £ 1	US\$ 1.7840/1.7850	US\$ 1.7765/1.7775
GBP £ 1	SGD 3.1575/3.1590	SGD 3.1380/3.1390

The Bank wishes to retain an exchange margin of 0.125% Required:

How much does the customer stand to gain or lose due to the delay? (Note: Calculate the rate in multiples of 0.0001)

(ICAI SM, RTP Nov'18, MTP Apr'24, RTP Nov'19 Old, Old PM)





## Solution :

Case 1 : Transaction happening on 28<sup>th</sup> January :

Rate	Bid	Ask
USD INR	45.85	45.90
GBP USD	1.7840	1.7850
GBP SGD	3.1575	3.1590

First you (Banker) need to sell INR and get USD at 45.90 (Banker Bids to Buy Base Currency )

Then sell USD and get GBP at 1.7850.

Lastly sell GBP and get SGD at 3.1575.

Now to get SGD INR (No of INR required per SGD) =  $\frac{45.90 \times 1.7850}{3.1575}$

= 25.9482

Hence SGD/INR = 25.9482

+ Margin @ 0.125%

**SGD INR = 25.9806**

Case 2: Transaction on February 4<sup>th</sup>

Rate	Bid	Ask
USD INR	45.91	45.97
GBP USD	1.7765	1.7775
GBP SGD	3.1380	3.1390

Similar working to Case 1,

SGD INR =  $\frac{45.97 \times 1.7775}{3.1380}$

SGD INR = 26.0394

+ Margin @ 0.125%

**SGD INR =26.0719**

Now, Remittance in SGD = 2.5 Million

Exchange Rate on 28<sup>th</sup> Jan = 25.9806

Exchange Rate on 04<sup>th</sup> Feb = 26.0719

Loss to Customer( as Exchange rate is higher on 4<sup>th</sup> Feb than on 28<sup>th</sup> Jan) = INR remitted on Feb 4<sup>th</sup> - INR Could have been remitted on 28<sup>th</sup> Jan

= 2.5 Million × (26.0719 - 25.9806)

=2.5 Million × (0.0913)

= Rs 2,28,250

Hence loss to customer due to delay in remittance is Rs 2,28,250.

## 10. Illustration

Followings are the spot exchange rates quoted at three different forex markets:

USD/INR      48.30 in Mumbai

GBP/INR      77.52 in London

GBP/USD      1.6231 in New York

The arbitrageur has USD1,00,00,000. Assuming that there are no transaction costs, explain whether there is any arbitrage gain possible from the quoted spot exchange rates.

(ICAI SM, Old PM, MTP Oct'24, RTP May'20)





### Solution :

Two possible scenario which can be possible are :

1. Arbitrageur has \$ 100,00,000. First, he can sell USD and Get INR. Then Sell INR and get GBP. And then sell GBP and get USD.
2. Arbitrageur has \$ 100,00,000. First, he can sell USD and Get GBP. Then Sell GBP and get INR. And then sell INR and get USD.

In first case,

Step 1 : Sell USD \$ 100,00,000 and get INR at 48.30

INR get =  $100,00,000 \times 48.30$

= 483,000,000

Step 2 : Sell INR and get GBP at 77.52

GBP get =  $483,000,000/77.52$

= 6230650.1548

Step 3 : Sell GBP and Get USD at 1.6231

USD get =  $6230650.1548 \times 1.6231$

= \$ 10,112,968.2662

You sold US \$ 100,00,000 initially and get \$10,112,969.2662 at the end.

**So, profit = \$ 10,112,969.2662 - \$100,00,000**

**= \$112,969.2662**

In second case,

Step 1 : Sell USD \$ 100,00,000 and get GBP at 1.6231

GBP get =  $100,00,000/1.6231$

= 6161049.8429

Step 2 : Sell GBP and get INR at 77.52

INR get =  $6161049.8429 \times 77.52$

= 477,604,583.82

Step 3 : Sell INR and Get USD at 48.30

USD get =  $477,604,583.82/48.30$

= \$ 98,88,293.66

You sold US \$ 100,00,000 initially and get \$98,88,293.66 at the end.

**So, loss = \$ 111706.34**

Hence the first case is preferable as there is gain of \$112,969 as compared to loss in case 2.

*Note : In such type of questions, it is better to go with the order of question and solve accordingly. If you get doubt regarding which case to start with, do small rough work instead of doing whole calculation and proceed accordingly.*

### 11. Illustration

**In International Monetary Market, an international forward bid for December 15 on pound sterling is \$ 1.2816 at the same time that the price of IMM sterling future for delivery on December 15 is \$ 1.2806. The contract size of pound sterling is £ 62,500. How could the dealer use arbitrage in profit from this situation and how much profit is earned?**

**(ICAI SM)**

### Solution :

Given on December 15<sup>th</sup>,

Forward Contract 1 £ =1.2186 \$

Future Contract 1 £ =1.2806 \$

In order to get arbitrage gain, a dealer needs to :





Buy Future for 15 <sup>th</sup> December at	1.2806 \$
Sell Forward for 15 <sup>th</sup> December	1.2816 \$
Gain	0.001 \$/£
Total Contract size	62,500 £
Gain per lot of Pounds = 62,500 × 0.001	62.5 \$

## 12. Illustration

You have following quotes from Bank A and Bank B:

	Bank A	Bank B
SPOT	USD/CHF 1.4650/55	USD/CHF 1.4653/60
3 months	5/10	
6 months	10/15	
SPOT	GBP/USD 1.7645/60	GBP/USD 1.7640/50
3 months	25/20	
6 months	35/25	

Calculate:

- How much minimum CHF amount you have to pay for 1 million GBP spot?
- Considering the quotes from Bank A only, for GBP/CHF what are the Implied Swap points for Spot over 3 months? (ICAI SM, MTP Apr'23, MTP Mar'19)

Solution :

- Given Spot Rates,

Rate	Bank A	Bank B
USD CHF	1.4650/55	1.4653/60
GBP USD	1.7645/60	1.7640/50

Since CHF GBP quotes are not given, first we have to convert CHF to USD and then Convert USD to get GBP.

Step 1 : As per Banker Bids to Buy Base Currency,

We will exchange CHF to USD with Bank A at 1.4655 CHF per USD

Step 2: After getting USD, we will now exchange, USD to GBP with Bank B at 1.7650 USD per GBP.

In order to get 1 Million GBP,

USD \$ required = 1,000,000 × 1.7650 = \$ 1,765,000

Now, 1 \$ = 1.4655 CHF,

CHF required = 1,765,000 × 1.4655 = CHF 2,586,607.5

Thus, to get 1 Million pounds one needs to pay minimum of 2,586,607.5 CHF

- USD CHF 3M Forward,

Rate	Bid	Ask
Spot	1.4650	1.4655
Add :Forward Premium	0.0005	0.0010
Forward Rate	1.4655	1.4665

GBP USD 3M Forward,

Rate	Bid	Ask
Spot	1.7645	1.7660
Less :Forward Discount	0.0025	0.0020
Forward Rate	1.7620	1.7640



For GBP / CHF, similar to part i) above, we need to multiply ask to get ask points and similarly need to multiply both the bids to get bid points,

GBP CHF	Bid	Ask
	1.4655	1.4665
	×1.7620	×1.7640
<b>3M Forward</b>	=2.582211	=2.586906

Similarly spot rates can be found out as:

GBP CHF	Bid	Ask
	1.4650	1.4655
	×1.7645	×1.7660
<b>3M Spot</b>	=2.5849925	=2.588073

Now in order to calculate forward points, we need to subtract spot from forward.

GBP CHF	Bid	Ask
<b>Forward</b>	2.58221	2.58691
<b>Spot</b>	2.58499	2.58807
<b>Points</b>	-0.00278 ~ -0.0028	-0.00117 ~ -0.0012

Hence swap points will be 28/12.

### 13. Illustration

Citi Bank quotes JPY/USD 105.00-106.50 and Honk Kong Bank quotes USD/JPY 0.0090-0.0093.

- Are these quotes identical if not then how they are different?
- Is there a possibility of arbitrage?
- If there is an arbitrage opportunity, then show how would you make profit from the given quotation in both cases if you are having JPY 1,00,000 or US\$ 1,000.

(RTP Nov'20)

**Solution :**

Given,

	Citi Bank		Honk Kong Bank	
	Bid	Ask	Bid	Ask
<b>USD JPY</b>	105	106.50	=1/0.0093=107.53	=1/0.0090=111.11
<b>JPY USD</b>	=1/106.5 =0.0094	=1/105 = 0.0095	0.0090	0.0093

- a) The quotes are not identical as,

USD JPY 105/106.6 is a direct quote for Japanese resident and Indirect quote for US resident. And JPY USD 0.0090/0.0093 is a direct quote for USD Resident and Indirect quote for Japanese resident.

- b) Yes, there is possibility of arbitrage.

One can buy USD from Citi Bank and sell it to HK Bank.  
One can buy JPY from HK and sell It to Citi Bank.





c) When one has US \$ 1,000.

Step 1 :Buy Yen from Citi Bank and sell US \$ to HK Bank.

So, \$ 1000 = 107.53 × 1000 yen

=107,530 Yen

Step 2: Sell Yen to Citi Bank and buy US \$ from them at 106.50 Yen per USD.

So, 107,530 Yen will give = 107,530/106.50

= 1009.67\$

Hence one can make arbitrage gain of 9.67\$ ( 1009.67 \$ - 1000 \$) from this kind of transaction for every 1000 \$.

d) When one has Yen 1,000.

Step 1 :Sell Yen to Citi Bank and buy from them @ 106.50

So, Yen 100,000/106.50 = \$ 938.97

Step 2: Sell USD to HK Bank and buy from them at 107.53 Yen per USD.

So, \$ 938.97 will give = 938.97 × 107.53

= Yen 100,967.14

Hence one can make arbitrage gain of 967.14 Yen( 100.967 Yen - 100,000 Yen) from this kind of transaction for every 100,000 Yen.

#### 14. Illustration

**Given:**

**US\$ 1 = ¥ 107.31**

**£ 1 = US\$ 1.26**

**A\$ 1 = US\$ 0.70**

- (i) Calculate the cross rate for Pound in Yen terms
- (ii) Calculate the cross rate for Australian Dollar in Yen terms
- (iii) Calculate the cross rate for Pounds in Australian Dollar terms

*(RTP Nov'20 New & Old)*

**Solution :**

**Given,**

US \$ 1 = Yen 107.31, which can be written as Yen 107.31 per US \$.

£ 1 = US\$ 1.26, which can be written as \$ 1.26 per GBP.

A\$ 1 = US\$ 0.70, which can be written as US \$ 0.70 per A\$.

- i) Cross rate for pound in Yen = Number of yen per pound  
= 1 GBP = US \$1.26 and US \$ = Yen 107.31  
Hence Yen per pound = US \$ 1.26 × 107.31 = **Yen 135.21**
- ii) Cross rate for pound in A \$ = Number of yen per A\$  
= 1 A\$ = US \$0.70 and US \$ = Yen 107.31  
Hence Yen per Australian \$ = US \$ 0.70 × 107.31 = Yen 75.12
- iii) Cross rate for pound in A \$ = Number of Australian Dollars per GBP  
= 1 GBP = US \$1.26 and US \$0.70 = A\$ 1  
Hence Australian Dollar per GBP =  $\frac{1.26 \times 1}{0.70} = 1.8$  A\$





## 15. Illustration

USD 10,000 is lying idle in your Bank Account. You get the following quotes from the dealers:

Dealer	Quote
A	EUR/USD 1.1539
B	EUR/GBP 0.9094
C	GBP/USD 1.2752

Is there an opportunity of gain from these quotes?

(Nov'20 QP 4 marks)

**Solution :**

Relevant Rates are as follows :

Dealer	Rate
A	EUR/USD 1.1539
B	EUR/GBP 0.9094
C	GBP/USD 1.2752

Two possible scenario which can be possible are :

1. Arbitrageur has \$ 10,000. First, he can sell USD and Get EUR. Then Sell EUR and get GBP. And then sell GBP and get USD.
2. Arbitrageur has \$ 10,000. First, he can sell USD and Get GBP. Then Sell GBP and get EUR. And then sell EUR and get USD.

**In first case,**

Step 1 : Sell USD \$ 10,000 and get EUR at 1.1539 US \$ per EUR

EUR get =  $10,000 / 1.1539$

= 8,666.26

Step 2 : Sell EUR and get GBP at 0.9094 GBP per EUR

GBP get =  $8,666.26 \times 0.9094$

= GBP 7,881.10

Step 3 : Sell GBP and Get USD at 1.2752

USD get =  $7,881.10 \times 1.2752$

= \$ 10,049.98

You sold US \$ 10,000 initially and get \$10,049.98 at the end.

**So, profit = \$ 10,049.98 - \$10,000**

**= \$49.98**

**In second case,**

Step 1 : Sell USD \$ 10,000 and get GBP at 1.2752

GBP get =  $10,000 / 1.2752$

= 7841.91

Step 2 : Sell GBP and get EUR at 0.9094

EUR get =  $7841.91 / 0.9094$

= EUR 8,623.17

Step 3 : Sell EUR and Get USD at 1.1539

USD get =  $8,623.17 \times 1.1539$

= \$ 9,950.28

You sold US \$ 10,000 initially and get \$9,950.28 at the end.

**So, loss = \$ 49.72**

Hence the first case is preferable as there is gain of \$ 49.98 as compared to loss in case 2.





Note : In such type of questions, it is better to go with the order of question and solve accordingly. If you get doubt regarding which case to start with, do small rough work instead of doing whole calculation and proceed accordingly.

### Arbitrage, IRP, PPP related

#### 16. Illustration

On April 1, 3 months interest rate in the UK £ and US \$ are 7.5% and 3.5% per annum respectively. The UK £/US \$ spot rate is 0.7570. What would be the forward rate for US \$ for delivery on 30th June?

*(ICAI SM)*

Solution : Given,

UK £	7.5% P.a
US \$	3.5% P.a
USD/GBP	0.7570 £

As per Interest Rate Parity,

$$\text{Forward Rate (Se)} = \frac{\text{Current Spot rate (S0)} \times (1 + \text{Domestic Interest Rate (Dr)})}{(1 + \text{Foreign Interest Rate (Fr)})}$$

$$\text{So, } Se = \frac{0.7570 \times (1 + 7.5\%/4)}{(1 + 3.5\%/4)} = 0.7570 \times 1.01875/1.00875$$

USD GBP = 0.7645, i.e., 0.7645 GBP per 1 USD.

#### 17. Illustration

Given the following information:

Exchange rate - Canadian dollar 0.665 per DM (spot)

Canadian dollar 0.670 per DM (3 months)

Interest rates - DM 7% p.a., Canadian Dollar - 9% p.a.

What operations would be carried out to take the possible arbitrage gains?

*(ICAI SM, May'18 QP, MTP Apr'18 Old)*

Solution: Given, DM/CAD Spot = 0.665 and DM/CAD 3 Month Forward = 0.670

Interest Rate DM = 7% P.a and CAD = 9% P.a

$$\text{Depreciation of CAD as per Forward quote} = \frac{(0.670 - 0.665)}{0.665} = 0.75\% \text{ for 3 Months}$$

$$\text{Annualised Depreciation} = 0.75\% \times 4 = 3\% \text{ P.a.}$$

$$\text{Ideal Depreciation as per Interest rate} = \frac{1.09}{1.07} - 1 = 1.87\%$$

$$\text{Ideal DM/CAD Forward for 3 Months} = 0.665 \times \left(1 + \frac{1.87\%}{4}\right) = 0.6681$$

If Forward Premium is Greater than Interest Differential then borrow in Domestic Currency & Invest abroad, i.e Funds outflow

If forward premium is less than Interest differential then borrow in foreign currency & invest in Local currency i.e Funds inflow

**Step 1** Enter into 3 Month forward to sell 1 DM & get 0.670 CAD

**Step 2** Borrow 1000 (take any number) in CAD

**Step 3** Convert into DM at Spot  
= 1000/0.665=1503.76 DM

**Step 4** Invest 1503.76 DM @7% for 3 Months





<b>Step 5</b>	Have DM together with interest = 1503.76 + (1503.76 × 7% × 3/12 ) = 1503.76 + 26.3158 = 1530.0758 DM
<b>Step 6</b>	Sell DM and get CAD as per 3 M forward = 1530.76 × 0.670 = 1025.15 CAD
<b>Step 7</b>	Repay CAD loan with Interest = 1000 + 1000 × 9% × 3/12 = 1000 + 22.5 = 1022.5 CAD
<b>Step 8</b>	Profit = 1025.15 - 1022.5 = 2.65 CAD

### 18. Illustration

The following table shows interest rates for the United States Dollar and French Franc. The spot exchange rate is 7.05 Franc per Dollar. Complete the missing entries:

	3 Months	6 Months	1 Year
<b>Dollar interest rate (annually compounded)</b>	11½%	12¼%	?
<b>Franc interest rate (annually compounded)</b>	19½%	?	20%
<b>Forward Franc per Dollar</b>	?	?	7.5200
<b>Forward discount per Franc percent per year</b>	?	6.3%	?

(RTP Nov'23, Old PM)

**Solution :**

#### Forward franc per Dollar

As per Interest Rate Parity,

$$\text{Forward Rate (Se)} = \frac{\text{Current Spot rate (S0)} \times (1 + \text{Domestic Interest Rate (Dr)})}{(1 + \text{Foreign Interest Rate (Fr)})}$$

$$= \frac{7.05 \times (1 + 11.5\% \times \frac{3}{12})}{(1 + 11.5\% \times \frac{3}{12})} = 7.05 \times \frac{1 + 0.04875}{1 + 0.02875} = 7.187$$

I.e., 7.187 F Franc per USD

**Forward discount per Franc :** Indirect quote of Franc Forward

<b>Spot (\$ per FFR)</b>	1/7.05	= 0.141844
<b>Forward</b>	1/7.187	= 0.139139
<b>Discount</b>		= 0.002705
<b>Discount %</b>		= 0.002705 / 0.142844 = 1.907% (3months) Or 7.628% (Annualized)

#### French Franc Interest Rate :

Given \$ interest rate = 12.25% and discount rate = 6.3%

We know that Discount = (S-F)/S in indirect quote, and in direct quote,

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

So, substituting the value of Forward in Indirect quote, we get Discount =  $\frac{S - S(1+F)/(1+D)}{S}$

$$6.3\%/2 = 1 - \frac{1 + 12.25\% \times 6/12}{1 + D - \times 6/12}$$

$$1 - \frac{1.06125}{1 + 0.5D} = 3.15\%$$



$$1 + 0.5d = \frac{1.06125}{0.9695} \quad 0.5d = 0.09576$$

**D = 19.153%, thus domestic interest rate is 19.153%.**

Note: Discount will also be divided by two as both numerator and denominator's interest rate are also halved.

**Forward Franc per Dollar**

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

$$F = \frac{7.05 \times (1 + 19.153\%)/2}{(1 + 12.25\%)/2}$$

$$F = \frac{7.05 \times 1.095765}{1.06125} = 7.28 \text{ FFR}$$

**USD Interest Rate**

Spot = 7.05 and Forward = 7.52, Domestic = 20% and Foreign = ?

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

$$7.52 = \frac{7.05 \times 1.2}{(1 + F)} = 1 + F = \frac{8.46}{7.52}$$

**1 + F = 1.125, F = 12.5%**

**Forward Franc per Dollar,**

Discount = (S - F) / S, S = 7.05 and F = 7.52

Indirect quote, 1/S = 0.141844 and 1/F = 0.132978

Disc % = (0.141844 - 0.132978) / 0.141844 = **6.25%**

**Alternatively,**

Substituting the value of Forward in Indirect quote, we get Discount =

$$\frac{S - S(1+F)/(1+D)}{S}$$

$$\text{Discount} = 1 - \frac{(1+12.5\%)}{1+20\%} = 6.25\%$$

## 19. Illustration

**Spot rate 1 US \$ = ₹ 48.0123**

**180 days Forward rate for 1 US \$ = ₹ 48.8190**

**Annualised interest rate for 6 months - INR = 12%**

**Annualised interest rate for 6 months - US \$ = 8%**

**Is there any arbitrage possibility? If yes how an arbitrageur can take advantage of the situation, if he is willing to borrow ₹ 40,00,000 or US \$83,312.**

**(ICAI SM)**

**Solution :**

Theoretical forward as per Interest rate parity will be :

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

$$F = \frac{48.0123 \times (1 + 12\%)/2}{(1 + 8\%)/2}$$

**F = 48.9356 INR per USD**



Actual Forward = 48.8190 INR per USD

Another way to look at it is,

$$\text{Forward Premium} = \frac{48.8190 - 48.0123}{48.0123} \times 2 = 3.36\%$$

$$\text{Interest Rate differential} = \frac{1 + (12\%/2)}{1 + (8\%/2)} \times 2 = 3.84\%$$

Since Interest rate differential is higher than forward premium or forward premium is not fully reflecting the price, you buy in foreign currency. And hence in the above case we have borrowed in \$. Similarly, if Forward premium is higher than interest rate differential, you buy in local currency.

Step 1	Enter into 6 Month forward to Buy USD @ 48.8190
Step 2	Borrow 83,312 USD
Step 3	Convert USD into INR at spot = 83,312 × 48.0123 = INR 40,00,000
Step 4	Invest 40,00,000 INR @12% for 6 Months
Step 5	Have INR together with interest = 40,00,000 + 40,00,000 × 12% × 6/12 = 40,00,000 + 2,40,000 = 42,40,000 INR
Step 6	Sell INR and convert into USD as per 6 M forward @48.8190 = 42,40,000 / 48.8190 = 86,851.43 USD
Step 7	Repay USD loan with Interest = 83,312 + 83,312 × 8% × 6/12 = 83,312 + 3,332.48 = 86,644.48 CAD
Step 8	Profit = 86,851.43 - 86,644.48 = USD 206.95

## 20. Illustration

The rate of inflation in USA is likely to be 3% per annum and in India it is likely to be 6.5%. The current spot rate of US \$ in India is ₹ 43.40. Find the expected rate of US \$ in India after one year and 3 years from now using purchasing power parity theory.

[Nov'17 QP (Old)]

**Solution :**

As per PPP theory, exchange rate of country with higher interest rate will depreciate.

USD INR Theoretical forward :

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

$$\text{Spot after 1 year} = \frac{43.4 \times 1.065}{1.03} = \text{Rs } 44.88 \text{ per USD}$$

$$\text{Spot after 3 years} = \frac{43.4 \times 1.065^3}{1.03^3} = \text{Rs } 47.98 \text{ per USD}$$

## 21. Illustration

The rate of inflation in India is 8% per annum and in the U.S.A., it is 4%. The current spot rate for USD in India is ₹ 46. What will be the expected rate after 1 year and after 4 years applying the Purchasing Power Parity Theory?

(ICAI SM)

**Solution :**

As per PPP theory, exchange rate of country with higher interest rate will depreciate.

USD INR Theoretical forward :

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

$$\text{Spot after 1 year} = \frac{46 \times 1.08}{1.04} = \text{Rs } 47.77 \text{ per USD}$$

$$\text{Spot after 3 years} = \frac{46 \times 1.08^4}{1.04^4} = \text{Rs } 53.50 \text{ per USD}$$





## 22. Illustration

Following are the rates quoted at Mumbai for British Pound (£):

Spot (£/₹)	52.60/70	Interest Rates	India	London
3 m Forward	20/70	3 months	8%	5%
6 m Forward	50/75	6 months	10%	8%

Verify whether there is any scope for covered interest arbitrage if you can borrow in rupees.

(RTP May'16)

Solution :

Steps	What needs to be done	3M Forward	6M Forward
Step 1	Borrow INR , equivalent of 1000 GBP at spot of 52.70	INR 52,700 @ 8%	INR 52,700 @ 10%
Step 2	Convert INR to GBP	GBP 1000	GBP 1000
Step 3	Invest in FD in GBP	GBP 1000	GBP 1000
Step 4	On due date, get principal and interest back in GBP	$1000 \times (1+5\% \times 3/12)$ $=1000 \times (1 + 1.25\%)$ $=\text{GBP } 1012.5$	$1000 \times (1+8\% \times 6/12)$ $=1000 \times (1 + 1.4\%)$ $=\text{GBP } 1040$
Step 5	Convert GBP to INR (As per Banker Bids to Buy Base Currency)	Rate applicable = $52.60 + 20 = 52.80$ INR equivalent = $1012.5 \times 52.80 = \text{INR } 53,460$	Rate applicable = $52.60 + 50 = 53.10$ INR equivalent = $1040 \times 53.10 = \text{INR } 55,224$
Step 6	Repay INR loan together with interest	$=52700 + (1 + 8\% \times 3/12)$ $=52700 \times 1.02$ $= \text{INR } 53,754$	$52700 + (1 + 10\% \times 6/12)$ $=52700 \times 1.05$ $= \text{INR } 55,335$
Step 7	Net benefit/(loss)	$= 53,460 - 53,754$ $= (294)$	$= 55,224 - 55,335$ $= (111)$

Hence, there is no scope for covered interest arbitrage if one borrows in INR.

## 23. Illustration

Spot rate 1 US\$ = ₹ 68.50

USD premium on a six-month forward is 3%. The annualized interest in US is 4% and 9% in India. Is there any arbitrage possibility? If yes, how a trader can take advantage of the situation if he is willing to borrow USD 3 million.

[Nov'18 QP (Old)]

Solution :

Given, Spot USD INR = 68.50

6 M forward Premia = 3% on 68.50 = 2.055

Thus, 6 Month forward rate = 70.555

Interest rates : India = 9% and USA = 4%



6M interest rate differential =  $\frac{1+(9\%/2)}{1+(4\%/2)} = 1.0245$  i.e., 2.45%

Yes, arbitrage possibility exists as premia % is 3% and interest rate differential is 2.45%.

As per interest rate differential, ideal forward rate should be =  $68.5 \times (1 + 2.45\%) = \text{INR } 70.18$

Since market premia (3%) is higher than theoretical premia (2.45%), you borrow in domestic currency i.e., INR.

Step	Enter into 6 Month forward to Sell USD @ 70.555
1	
Step 2	Borrow INR equivalent of USD 3 Million @ spot of 68.5 = $30,00,000 \times 68.5 = 20,55,00,000$
Step 3	Convert INR into USD at spot = $20,55,00,000/68.5 = \text{USD } 3,000,0000$
Step 4	Invest 3,000,000 USD @4% for 6 Months
Step 5	Have USD together with interest = $3,000,000 + 3,000,000 \times 4\% \times 6/12$ = $3,000,000+60,000 = 3,060,000 \text{ USD}$
Step 6	Sell USD and convert into INR as per 6 M forward @ 70.555 = $3,060,000 \times 70.555 = \text{INR } 21,58,98,300$
Step 7	Repay INR loan with Interest = $20,55,00,000 + 20,55,00,000 \times 9\% \times 6/12$ = $20,55,00,000 + 92,47,500 = \text{INR } 21,47,47,500$
Step 8	Profit = $\text{INR } 21,58,98,300 - 21,47,47,500$ = <b>INR 11,50,800</b>

#### 24. Illustration

The US dollar is selling in India at ₹ 55.50. If the interest rate for 6 months borrowing in India is 10% per annum and the corresponding rate in USA is 4%.

- Do you expect that US dollar will be at a premium or at discount in the Indian Forex Market?
- What will be the expected 6-months forward rate for US dollar in India? And
- What will be the rate of forward premium or discount?

[ICAI SM, Nov'19 QP (Old)]

Solution :

i) USD at a premium as it has lower interest rate (4%) as compared to Indian interest rate (10%).

ii) Forward =  $\frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$

$$= 55.50 \times \frac{1+(10\%/2)}{1+(4\%/2)} = 55.50 \times 1.05/1.02$$

$$= 57.13$$

Forward premium/discount =  $(57.13-55.50)/55.50$

= **2.94%**

#### 25. Illustration

An Indian exporting firm, Rohit and Bros., would be covering itself against a likely depreciation of pound sterling. The following data is given:

Receivables of Rohit and Bros : £500,000



Spot rate : ₹ 56.00/£  
 Payment date : 3-months  
 3 months interest rate : India 12% PA

UK 5 % PA

What should the exporter do?

(ICAI SM, MTP Oct'18)

Solution :

A) If forward contracts are available

In order to protect against GBP INR forex volatility, Rohit & Bros should enter into a forward contract to sell GBP 500,000 after 3 months at a rate determined today in the forward market.

$$\text{Theoretical future spot} = 56 \times \frac{1+(12\% \times \frac{3}{12})}{1+(5\% \times 3/12)} = 56 \times \frac{1.03}{1.0125} = 56.97$$

If exporter hedges receivable @ 56.97 vs 56 spot, the gain would be =  $(56.97 - 56) \times 500,000 = \text{Rs } 4,83,951$

B) If forward contracts are not available

Steps	What needs to be done	3M Forward
Step 1	Borrow GBP @5%	=500,000/1.0125 = GBP 4,93,827
Step 2	Convert GBP to INR @ 56	INR = 4,93,827 × 56 = INR 2,76,54,312
Step 3	Invest in FD in INR	INR 2,76,54,312
Step 4	On due date, get principal and interest back in INR	$2,76,54,312 \times (1+12\% \times 3/12)$ = $2,76,54,312 \times (1 + 0.3\%)$ = INR 2,84,83,941
Step 5	Net benefit/(loss)	INR Equivalent at spot = $500,000 \times 56 = 2,80,00,000$ Gain = $2,84,83,941 - 2,80,00,000 = 4,83,941$

By doing these transactions of borrowings in pound and using export proceeds to repay, Rohit & Bros has made a gain of INR 4,83,941 which is locked in.

## 26. Illustration

Merry is a Forex Dealer with XYZ Bank. She notices following information relating to Canadian Dollar (CAD) and German Deutschmark (DEM):

Exchange rate - CAD 0.775 per DEM (spot)

CAD 0.780 per DEM (3 months)

Interest rates - DEM 7% p.a.; CAD 9% p.a.

- Assuming that there is no transaction cost, determine does the Interest Rate Parity holds in above quotations.
- If yes, then explain the steps that would be required to make an arbitrage profit if Merry is authorized to work with CAD 1 million for the same purpose. Also determine the profit that would be made in CAD.

Note: Ignore the decimal points in the amounts.

(MTP Oct'19 New and Old)

Solution :





Given,

Currency	Spot	Forward
DEM/CAD	0.775	0.780

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

$$F = 0.775 \times \frac{1+(9\%/4)}{1+(7\%/4)} = 0.775 \times 1.0225/1.0175$$

$$= 0.779$$

Hence, 3 Month theoretical forward price based on Interest rate parity (IRP), DEM/CAD is 0.779. Current quote of forward is 0.780.

Theoretical price is not equal to current quote.

Hence IRP does not hold true in the above quote.

Following steps needs to be undertaken to calculate profit if any, can be made:

<b>Step 1</b>	<b>Enter into 3 Month forward to Sell 1,312,904DEM @ 0.780</b>
<b>Step 2</b>	Borrow CAD 1 Million @ 9% spot of 0.775 per DEM
<b>Step 3</b>	Convert CAD into DEM at spot = 1,000,000/0.775 = DEM 1,290,323
<b>Step 4</b>	Invest 1,290,323 DEM @7% for 3 Months
<b>Step 5</b>	Have DEM together with interest = 1,290,323 + 1,290,323 × 7% × 3/12 = 1,290,323 + 22,581 = 1,312,904
<b>Step 6</b>	Sell DEM and convert into CAD as per 3 M forward @ 0.780 = 1,312,904 × 0.780 = CAD 10,24,065
<b>Step 7</b>	Repay CAD loan with Interest = 1,000,000 + 1,000,000 × 9% × 3/12 = 1,000,000 + 22,500 = CAD 1,022,500
<b>Step 8</b>	Profit = CAD 1,024,065 - 1,022,500 = <b>CAD 1,565</b>

So, Merry will make risk less profit of **CAD 1,565** by entering into above transactions.

## 27. Illustration

**Given the following information:**

**Exchange rate - Canadian dollar 0.665 per DM (spot)**

**Canadian dollar 0.670 per DM (3 months)**

**Interest rates - DM 7% p.a.**

**Canadian Dollar - 9% p.a.**

**What operations would be carried out to take the possible arbitrage gains?**

**(ICAI SM)**

**Solution :**

Given,

Currency	Spot	Forward
DEM/CAD	0.665	0.670

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$

$$F = 0.665 \times \frac{1+(9\%/4)}{1+(7\%/4)} = 0.665 \times 1.0225/1.0175$$

$$= 0.668 \text{ CAD per DEM}$$



Hence, 3 Month theoretical forward price based on Interest rate parity (IRP), DEM/CAD is 0.668. Current quote of forward is 0.670. Theoretical price is not equal to current quote.

Hence IRP does not hold true in the above quote.

Since the current forward quote is costlier than theoretical forward, we will sell actual forward and make arbitrage gain.

<b>Step 1</b>	<b>Enter into 3 Month forward to Sell DEM @ 0.670</b>
<b>Step 2</b>	Borrow CAD 1 Million @ 9% spot of 0.665 per DEM
<b>Step 3</b>	Convert CAD into DEM at spot = $1,000,000/0.665 = \text{DEM } 1,503,759.40$
<b>Step 4</b>	Invest 1,503,759.40 DEM @ 7% for 3 Months
<b>Step 5</b>	Have DEM together with interest $= 1,503,759.40 + 1,503,759.40 \times 7\% \times 3/12 = 1,503,759.40 + 26,315.79 = 1,530,075.19$
<b>Step 6</b>	Sell DEM and convert into CAD as per 3 M forward @ 0.670 $= 1,530,075.19 \times 0.670 = \text{CAD } 10,25,150.38$
<b>Step 7</b>	Repay CAD loan with Interest $= 1,000,000 + 1,000,000 \times 9\% \times 3/12$ $= 1,000,000 + 22,500 = \text{CAD } 1,022,500$
<b>Step 8</b>	Profit = $\text{CAD } 10,25,150.38 - 1,022,500 = \text{CAD } 2,650.38$

So, we can make risk less profit of **CAD 2,650.38** by entering into above transactions.

### 28. Illustration

On April 3, 2016, a Bank quotes the following:

Spot Rate (US \$ 1)	₹ 66.2525	₹ 67.5945
2 months ₹ swap points	70	90
3 months ₹ swap points	160	186

In a spot transaction, delivery is made after two days. Assume spot date as April 5, 2016.

Assume 1 swap point = 0.0001, You are required to:

- ascertain swap points for 2 months and 15 days. (For June 20, 2016),
- determine foreign exchange rate for June 20, 2016, and
- compute the annual rate of premium/discount of US\$ on INR, on an average rate.

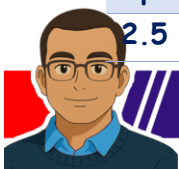
(ICAI SM, RTP Nov'22, MTP Mar'19, Old PM)

Solution :

Swap Points	Bid	Ask
2 Months	70	90
3 Months	160	186
2.5 Months	$= (160 + 70)/2$	$= (186 + 90)/2$
2.5 M Swap Points	=115	=138

Forward Rate	Bid	Ask
Spot	66.2525	67.5945
Add :Swap Points	115	138
Forward Rate	=66.2640	=67.6083

	Bid	Ask
Spot	66.2525	67.5945
2.5 M Forward	66.2640	67.6083





Premia	115	138
Average Rate	$(66.2525 + 66.2640)/2 = 66.2583$	$(67.5945 + 67.6083)/2 = 67.6014$
Implied Premia % (Annualized)	$= \frac{0.0115 \times 12}{66.2583 \times 2.5} \times 100 = 0.0833\%$	$= \frac{0.0138 \times 12}{67.6014 \times 2.5} \times 100 = 0.09799\%$

## 29. Illustration

The risk-free rate of interest rate in USA is 8% p.a. and in UK is 5% p.a. The spot exchange rate between US \$ and UK £ is 1\$ = £ 0.75. Assuming that interest is compounded on daily basis then at which forward rate of 2 year there will be no opportunity for arbitrage.

Further, show how an investor could make risk-less profit, if two years forward price is 1 \$ = 0.85 £.

Given  $e^{-0.06} = 0.9413$  &  $e^{-0.16} = 0.852$ ,  $e^{0.16} = 1.1735$ ,  $e^{-0.1} = 0.9051$

(ICAI SM, RTP May'12)

Solution :

We know that  $F = S \times e^{rt}$

USD/GBP = 0.75,

2 Year forward rate :  $F = S \times e^{dt} / e^{ft}$

$$F = 0.75 \times e^{5\% \times 2} / e^{8\% \times 2}$$

$$= 0.75 \times e^{5\% \times 2} \times e^{-8\% \times 2} = 0.75 \times e^{2(5\% - 8\%)} = 0.75 \times e^{-0.06}$$

$$= 0.75 \times 0.9413 = 0.7060$$

F = 0.7060 GBP per USD

Now, Forward rate USD/GBP = 0.850 and theoretical rate USD/GBP = 0.706

Since there is difference as per actual and theoretical forward, we will sell actual forward of 0.850 GBP per USD.

Step 1	Enter into 2 year forward to Sell GBP @ 0.85
Step 2	Borrow GBP 1000 @ 2% spot of 0.75 per GBP
Step 3	Convert GBP into USD at spot = 1,000/0.75 = USD 1,333.33
Step 4	Invest 1,333.33 USD @8% for 2 years
Step 5	Have USD together with interest = $1,333.33 \times e^{2 \times 0.08}$ = USD 1564.67
Step 6	Sell USD and convert into GBP as per 2 M forward @ 0.85 = $1564.67 \times 0.85 = \text{GBP } 1330$
Step 7	Repay GBP loan with Interest = $1,000 \times 1/e^{-0.1}$ = $1,000 / 0.9051 = \text{GBP } 1104.85$
Step 8	Profit = GBP 1330 - 1104.85 = <b>GBP 225.15</b>





An investor can make riskless profit of **GBP 225.15** for an investment of 1000 GBP over two years using given exchange rates and interest rates.

In study Material they have invested Present value of Theoretical forward i.e., PV of 0.706 for 2 years,  
Which comes out to 0.639 GBP. Even in that case profit will be proportionate of above working.  
i.e., Profit =  $225.15 \times 0.639/1000 = 0.1439$  GBP

In the question, it is not mentioned how much GBP you should borrow, in such scenario you can take any number and solve for the above steps.

### 30. Illustration

An Indian company obtains the following quotes

(Rs./\$) Spot : 35.90/36.10

3 - Months forward rate: 36.00/36.25

6 - Months forward rate: 36.10/36.40

The company needs \$ funds for six months. Determine whether the company should borrow in \$ or Rs.

Interest rates are :

3 - Month's interest rate : Rs. : 12%, \$ : 6%

6 - Month's interest rate : Rs. : 11.50%, \$ : 5.5%

Also determine what should be the rate of interest after 3-months to make the company indifferent between 3-months borrowing and 6-months borrowing in the case of:

- (i) Rupee borrowing
- (ii) Dollar borrowing

Note: For the purpose of calculation, you can take the units of dollar and rupee as 100 each.

(Nov'18 QP 8 marks, MTP Mar'21 New & Old, MTP May 20 Old)

**Solution :**

i) Borrowing in USD

Amount Borrowed	100
Interest @ 5.5% for 6 Months	2.75
USD to be repaid	102.75
Equivalent INR to be repaid (As per Banker Bids to Buy Base Currency)	= $102.75 \times 36.40$ = INR 3740.1

Assuming the company enters into a forward contract on Day 0.

INR borrowing

Amount Borrowed equivalent of USD 100	$100 \times 36.10 = 3610$
Add : Interest @ 11.5% for 6 Months	207.58
INR to be repaid	3817.58

Since, USD borrowing is cheaper as only INR 3740 has to be paid against INR 3817.58, the Indian company should borrow in USD.

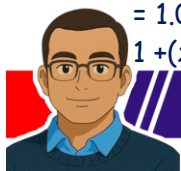
ii) INR Borrowing :

Let borrowing rate for months 4-6 be  $x\%$

Then,  $1 + (12\% \times 3/12) \times 1 + (x\% \times 3/12) = 1 + (11.5\% \times 6/12)$

$= 1.03 \times 1 + (x\% \times 3/12) = 1.0575$

$1 + (x\% \times 3/12) = 1.0267$





$$x\% = 0.0267 \times 4$$

$$x\% = 10.68\%$$

10.68 % is the rate at which 3M INR borrowing for months 4-6- and 3-Months INR borrowings for months 1-3 @12 % is same as 11.5% p.a for 6 Months.

USD Borrowing : Let borrowing rate for months 4-6 be x %

$$\text{Then, } (1 + 6\% \times 3/12) \times (1 + x\% \times 3/12) = (1 + 5.5\% \times 6/12)$$

$$= 1.015 \times (1 + x\% \times 3/12) = 1.0275$$

$$1 + (x\% \times 3/12) = 1.0123$$

$$x\% = 0.0123 \times 4$$

$$x\% = 4.93\%$$

Hence, 4.93 % is the rate at which 3M USD borrowing for months 4-6- and 3-Months USD borrowings for months 1-3 @6 % is same as 5.5% p.a for 6 Months.

### 31. Illustration

True Blue Cosmetics Ltd. is an old-line producer of cosmetics products made up of herbals. Their products are popular in India and all over the world but are more popular in Europe.

The company invoice in Indian Rupee when it exports to guard itself against the fluctuation in exchange rate. As the company is enjoying monopoly position, the buyer normally never objected to such invoices. However, recently, an order has been received from a whole-saler of France for FFR 80,00,000. The other conditions of the order are as follows:

- (a) The delivery shall be made within 3 months.
- (b) The invoice should be FFR.

Since company is not interested in losing this contract only because of practice of invoicing in Indian Rupee. The Export Manger Mr. E approached the banker of Company seeking their guidance and further course of action.

The banker provided following information to Mr. E.

- (a) Spot rate 1 FFR = ₹ 6.60
- (b) Forward rate (90 days) of 1 FFR = ₹ 6.50
- (c) Interest rate in India is 9% and in France is 12%.

Mr. E entered in forward contract with banker for 90 days to sell FFR at above mentioned rate. When the matter come for consideration before Mr. A, Accounts Manager of company, he approaches you.

You as a Forex consultant is required to comment on:

- (i) Whether there is an arbitrage opportunity exists or not.
- (ii) Whether the action taken by Mr. E is correct and if bank agrees for negotiation of rate, then at what forward rate company should sell FFR to bank. (RTP MAY 12)

(RTP May'12)

**Solution :**

i) FFR INR Spot = 6.6 and 90 days forward = 6.5

Interest rates - India = 9% and France =12%

Based on Interest rate parity, theoretical forward should be :

$$\text{Forward} = \frac{\text{Spot (S0)} \times (1 + \text{Domestic (Dr)})}{(1 + \text{Foreign (Fr)})}$$





$$F = 6.6 \times \frac{1.09}{1.12/4}; F = 6.6 \times 1.0225/1.03$$

F = INR 6.55 per FFR. Since theoretical and actual forward rates are different, arbitrage opportunity exists.

ii) If Mr. E enters into a transaction forward rate of INR 6.5 per FFR, they would be losing out :

$$= 8,000,000 \times 0.05(6.55 - 6.50) = \text{INR } 4,00,000$$

Instead, Mr. E should negotiate a rate of INR 6.55 per FFR for 8 million FFR delivery after 90 days.

### 32. Illustration

AMK Ltd. an Indian based company has subsidiaries in U.S. and U.K.

Forecasts of surplus funds for the next 30 days from two subsidiaries are as below:

U.S. \$12.5 million

U.K. £ 6 million

Following exchange rate information is obtained:

	\$/₹	£/₹
Spot	0.0215	0.0149
30 days forward	0.0217	0.0150

Annual borrowing/deposit rates (Simple) are available.

₹ 6.4%/6.2%

\$ 1.6%/1.5%

£ 3.9%/3.7%

The Indian operation is forecasting a cash deficit of ₹500 million. It is assumed that interest rates are based on a year of 360 days.

- (i) Calculate the cash balance at the end of 30 days period in ₹ for each company under each of the following scenarios ignoring transaction costs and taxes:
- Each company invests/finances its own cash balances/deficits in local currency independently.
  - Cash balances are pooled immediately in India and the net balances are invested/borrowed for the 30 days period.
- (ii) Which method do you think is preferable from the parent company's point of view?

(Old PM)

Solution :

- Each company invests in local currency independently
  -

Company	Amount in Mn Borrowing(-) and Surplus(+)	Interest	Closing Value (Amount in Mn + Interest)	INR Rate	Amount in INR
India	-INR 500	6.4%	500 + 2.66 = 502.66	1	-502.66
US	USD 12.5	1.5%	12.5 + 0.015625 = 12.515625	0.0217	=12.515625/0.0217 = 576.76
UK	GBP 6	3.7%	6 + 0.0185 = 6.0185	0.0150	=6.0185/0.0150 =401.23



Total Surplus in equivalent INR after 30 days = **INR 475.33**

c) Pooling of Money

Day 0 Amount Million	in	Exchange Rate	INR equivalent
INR -500		1	-500
USD 12.5		0.0215	=12.5/0.0215 = 581.40
GBP 6		0.0149	=6/0.0149 = 402.68

Surplus at Day 0 in INR equivalent = INR 484.08. Now this money is deposited in India for 30 days @ 6.2%.

Closing principal + interest =  $484.08 + 484.08 \times 6.2\% \times 1/12 = \text{INR } 486.58$

- ii) Pooling of surplus is better from parent point of view as closing value of surplus is higher @ INR 486.58 Million than INR 475.33 million.

### 33. Illustration

KGF Bank's Sydney branch has surplus funds of USD \$ 7,00,000 for a period of 2 months. Cost of funds to the bank is 6% p.a. They propose to invest these funds in Sydney, New York or Tokyo and obtain the best yield, without any exchange risk to the bank. The Following rates of interest are available at the three centres for investment of domestic funds there for a period of 2 Months.

Sydney 7.5% p.a.

New York 8% p.a.

Tokyo 4% p.a.

The market rates in Australia for US Dollars and Yen are as under:

Sydney on New York:

Spot 0.7100/0.7300

1 Months 10/20

2 Months 25/30

Sydney on Tokyo:

Spot 79.0900/79.2000

1 Months 40/30

2 Months 55/50

At which centre, will the investment be made & what will be the net gain to the bank on the invested funds?

[May'19 QP (Old)]

Solution :

Investment in USD	
Surplus	USD 700,000
Cost for 2 Months @6%	= $700,000 \times 6\% \times 2/12$ = USD 7000
Investment @8% for 2 Months	Interest = $700,000 \times 8\% \times 2/12$ = USD 9,333.33
Gain	= USD 9333.33 - USD 7000 = USD 2,333.33



### Investment in AUD

Surplus	USD 700,000		
Exchange Rate Applicable (As per Banker Bids to Buy Base Currency )	AUD USD 0.73		
Equivalent AUD	= 700,000/0.73 = AUD 958,904.11		
Cost for 2 Months @6%	= 700,000 × 6% × 2/12 = USD 7000		
Investment AUD @7.5% for 2 Months	Interest = 958,904.11 × 7.5% × 2/12 = AUD 11,986.30		
Total Value of Investment	= AUD 958,904.11 + 11,986.30 = AUD 970,890.41		
Exchange Rate applicable	AUD USD 0.7125 (0.7100+0.0025)		
Value of Investment in USD	= 970,890.41 × 0.7125 = USD 691,759.42		
Loss	= USD 707000 - USD 691,759.42 = <b>USD 15,240.58</b>		

### Investment in JPY

Surplus	USD 700,000		
Exchange Rate Applicable (As per Banker Bids to Buy Base Currency )	AUD USD = 0.73 AUD JPY = 79.09		
Equivalent JPY	= 700,000/0.73 × 79.09 = JPY 75,839,726.06		
Cost for 2 Months @6%	= 700,000 × 6% × 2/12 = USD 7000		
Investment JPY @4% for 2 Months	Interest = 75,839,726.06 × 4% × 2/12 = JPY 505,598.17		
Total Value of Investment	= JPY 75,839,726.06 + 505,598.17 = JPY 76,345,324.23		
Exchange Rate applicable	AUD YEN 79.195 (79.2000 - 0.0050) AUD USD 0.7125 (0.7100 + 0.0025)		
Value of Investment in USD	= 75,839,726.06 /79.195 × 0.7125 = USD 686,862.09		
Loss	= USD 707000 - USD 686,862.09 = <b>USD 20,137.91</b>		

Hence, KGF bank should invest the money in New York so that they make gain instead of loss in case of JPY and AUD.

### 34. Illustration

Suppose you are a treasurer of XYZ plc in the UK. XYZ have two overseas subsidiaries, one based in Amsterdam and one in Switzerland. The Dutch subsidiary has surplus Euros in the amount of 725,000 which it does not need for the next three months but which will be needed at the end of that period (91 days). The Swiss subsidiary has a surplus of Swiss Francs in the amount of 998,077 that, again, it will need on day 91. The XYZ plc in UK has a net balance of £75,000 that is not needed for the foreseeable future. Given the rates below, what is the advantage of swapping Euros and Swiss Francs into Sterling?

Spot Rate (€)	£0.6858- 0.6869
91-day Pts	0.0037 0.0040
Spot Rate (€)	CHF 2.3295- 2.3326
91-day Pts	0.0242 0.0228

Interest rates for the Deposits



**Amount of Currency**

**91-day Interest Rate % pa**

	£	€	CHF
0 - 100,000	1	$\frac{1}{4}$	0
100,001 - 500,000	2	$1\frac{1}{2}$	$\frac{1}{4}$
500,001 - 1,000,000	4	2	$\frac{1}{2}$
Over 1,000,000	5.375	3	1

Assume 360 days in a year

(RTP Nov'23, RTP Nov'20, RTP Nov'18 Old)

**Solution :**

Each company independently invest

Currency	Amount of Borrowing(-) and Surplus(+)	Interest Rate P.a	Closing Value (Amount in + Interest)	GBP Rate	Amount in GBP
GBP	75,000	1%	75000 + 189.583 = 75,189.583	1	75,189.583
EURO	725,000	2%	725,000 + 3665.28 = 728,665.28	0.6895 (0.6858+0.0037)	=728,665.28 × 0.6895 = 502,414.71
CHF	998,077	0.5%	998,077 + 1261.46 = 999,338.46	2.3098 (2.3326 -0.228)	=999,338.46/2.3098 = 432,651.49

Total equivalent value of surplus in GBP after 91 days = GBP 1,010,255.78

Now, computing all surplus into GBP and investing in GBP at spot

Amount in	Exchange Rate	GBP equivalent
GBP 75,000	1	75,000
EURO 725,000	0.6858	=725,000 × 0.6858 = 497,205
CHF 998,077	2.3326	=998,077/2.3326 = 427,881.76

Surplus at Day 0 in GBP equivalent =GBP 1,000,086.76. Now this money is deposited in GBP for 91 days @ 5.375% P.a.

Closing principal + interest = 1,000,086.76+ 1,000,086.76 × 5.375% ×91/360 = GBP 1,000,086.76 + GBP 13,587.98

=GBP 1,013,674.74

If CHF and EURO are swapped at day 0 and resulting amount is deposited in GBP, the end investment value including interest is higher by **GBP 3418.96** (1,013,674.74 - 1,010,255.78)

**35. Illustration**

The Treasury desk of a global bank incorporated in UK wants to invest GBP 200 million on 1st January, 2019 for a period of 6 months and has the following options:

(1) The Equity Trading desk in Japan wants to invest the entire GBP 200 million in high dividend yielding Japanese securities that would earn a dividend income of JPY 1,182 million. The dividends are





declared and paid on 29th June. Post dividend, the securities are expected to quote at a 2% discount. The desk also plans to earn JPY 10 million on a stock borrow lending activity because of this investment. The securities are to be sold on June 29 with a T+1 settlement and the amount remitted back to the Treasury in London.

- (2) The Fixed Income desk of US proposed to invest the amount in 6-month G-Secs that provides a return of 5% p.a.

The exchange rates are as follows:

Currency Pair	1 Jan 2019 (Spot)	30 Jun 2019 (Forward)
GBP - JPY	148.0002	150.0000
GBP- USD	1.28000	1.30331

As a treasurer, advise the bank on the best investment option. What would be your decision from a risk perspective? You may ignore taxation. (MTP May20)

[MTP Mar'21 New & Old, MTP May'20, Nov'18 QP (Old)]

Solution :

1)

Surplus Money in GBP	200 Million
Exchange rate applicable	GBP JPY 148.0002
Equivalent JPY (A)	=200 Mn × 148.0002 = JPY 29,600.04 Million
Add :Dividend (B)	JPY 1182 Million
Less: Reduction in price @ 2% on JPY 29,600 Million (C)	JPY (592.0008) Million
Add: Gain from stock lending (D)	JPY 10 Million
Net Investment at the end of 6 months (A+B-C+D)	<b>JPY 30,200.0392 Million</b>
Exchange rate applicable on conversion	GBP JPY 150
6 Months investment value in GBP	<b>GBP 201.33359 Mn</b>

2) Investment in US G Secs

Surplus amount in GBP	200 million
Exchange rate applicable	GBP USD 1.28
Equivalent USD	=200 Mn × 1.28 = USD 256 Mn
Investment in G Sec for 6 Months @ 5%	Interest = 256 Mn × 5% × 6/12 = 6.4 Mn
Investment value in USD	= 256 + 6.4 = USD 262.4 Mn
Exchange rate on conversion	GBP USD 1.30331
Equivalent GBP	= 262.4/1.30331 = <b>GBP 201.33353 Mn</b>

Gain from JPY Equities = 201.33359 - 210.33353 = **GBP 0.00006 Mn ~ GBP 60**

By investing in JPY Equities one can make 60 GBP over 6 Months. However, given the fact that 60 GBP is **very small** after investing in JPY equities as compared to US G secs, **one should invest in US G secs** considering investment in G Secs to **be less risky** as compared to JPY Equities.





### 36. Illustration

India Imports Co. purchased USD 100,000 worth of machines from a firm in New York, USA. The value of the rupee in terms of the Dollar has been decreasing. The firm in New York offers 2/10, net 90 terms. The spot rate for the USD is ₹ 55; the 90 days forward rate is ₹ 56.

- Compute the Rupee cost of paying the account within the 10 days.
- Compute the Rupee cost of buying a forward contract to liquidate the account in 90 days.
- The difference between part a and part b is the result of the time value of money (the discount for prepayment) and protection from currency value fluctuation. Determine the magnitude of each of these components.

(RTP Nov'17)

#### Solution:

i) INR cost for payment in 10 days. USD amount to be paid = 100,000

Discount if paid within 10 days = 2%

Assuming USD INR will be at INR 55 for this 10-day period, then USD cost will be  
= USD 100,000 - 2% = USD 98,000

Equivalent INR = 98,000 × 55 = **INR 53,90,000**

ii) Forward rate = INR 56 per USD

Amount payable = USD 100,000

INR Equivalent to be paid = 56 × 100,000 = **INR 56,00,000**

iii) Difference between i) and ii) = 56,00,000 - 53,90,000 = INR 2,10,000

Out of these 2,10,000 :

**Time value of money impact** = USD 2,000 × INR 55 = INR 1,10,000

**Protection against fluctuation of Exchange rate** = INR 56 - INR 55 ) × 100,000 = INR 100,000

### 37. Illustration

H Ltd. is an Indian firm exporting handicrafts to North America. All the exports are invoiced in US\$. The firm is considering the use of money market or forward market to cover the receivable of \$50,000 expected to be realized in 3 months time and has the following information from its banker:

#### Exchange Rates

Spot ₹ / \$ 72.65/73

3-m forward ₹ / \$ 72.95/73.40

The borrowing rates in US and India are 6 % and 12% p.a. and the deposit rates are 4% and 9% p.a. respectively.

- Which option is better for H Ltd.?
- Assume that H Ltd. anticipates the spot exchange rate in 3-months time to be equal to the current 3-months forward rate. After 3-months the spot exchange rate turned out to be ₹/\$: 73/73.42. What is the foreign exchange exposure and risk of H Ltd.?

[Nov'19 QP (Old)]

#### Solution :

i) Forward Cover cost

Given, USD INR 72.95/73.40

Total amount required after 3 months = USD 50,000 × 72.95 = **INR 36,47,500**

Money Market Transaction



Borrow in USD such that loan + Interest = USD 50,000

Let loan taken be x and interest rate applicable is 6%

Loan to be borrowed	$X + x \times 6\% \times 3/12 = 50,000$ $1.015x = 50,000$ $X = 49,261.08$
Convert USD to INR : Exchange rate applicable USD INR 72.65	INR equivalent = $49,261.08 \times 72.65$ = INR 35,78,817.73
Invest INR in INR deposits @ 9% for 3 months	Interest = $35,78,817.73 \times 9\% \times 3/12$ = 80,523.40
Total value of Investment after 3 months	= INR 35,78,817.73 + 80,523.40 = <b>INR 36,59,341.13</b>

Money market hedge is better for the exported by **INR 11,841.13** ( INR 36,59,341.13 - 36,47,400).

ii) If H Ltd does not hedge believing that future spot will be equal to forward, then their exposure will be USD 50,000.

The risk will be difference of expected spot and actual spot.

= USD 50,000  $\times$  0.05 ( 73 - 72.95) = INR 2,500

INR 2,500 is the gain by taking risk and keeping USD 50,000 exposure open

### 38. Illustration

ABC Ltd. of UK has exported goods worth Can \$ 5,00,000 receivable in 6 months. The exporter wants to hedge the receipt in the forward market. The following information is available:

Spot Exchange Rate Can \$ 2.5/£

Interest Rate in UK 12%

Interest Rate In Canada 15%

The forward rates truly reflect the interest rates differential. Find out the gain/loss to UK exporter if Can \$ spot rates (i) declines 2%, (ii) gains 4% or (iii) remains unchanged over next 6 months.

(ICAI SM, MTP Apr'18 Old, MTP Aug'18 Old, Old PM)

Solution :

Given, Current Spot GBP CAD = 2.5, Interest rate UK 12% and CAD = 15%

Forward for Indirect quote =  $\frac{\text{Spot (S0)} \times (1 + \text{Foreign (Fr)})}{(1 + \text{Domestic (Dr)})}$

$$F = 2.5 \times \frac{1+15\%/2}{1+12\%/2} = 2.5 \times \frac{1.075}{1.06}$$

F= 2.5354 CAD per GBP

Exchange Rate	Forward Rate	2% Decrease from 2.5	4% Increase from 2.5	Unchanged
GBP CAD	2.5354	2.55 (2 $\times$ 1.02)	2.4 (2.5 $\times$ 0.96)	2.5
Spot	2.5	2.5	2.5	2.5
Gain/(loss) if forward contract is entered	-	2.5354	2.5354	2.5354
Gain/(loss)		Gain = GBP 197,207.54 - GBP 196,078.43 (500,000/2.5354 - 500,000/2.55) = <b>GBP 1129.11</b>	Loss = GBP 208,333.33 - GBP 197,207.54 = <b>GBP 11,025.79</b>	Loss = GBP 200,000 - GBP 197,207.54 = <b>GBP 2792.46</b>





### 39. Illustration

JKL Ltd., an Indian company has an export exposure of JPY 10,000,000 receivable August 31, 2014. Japanese Yen (JPY) is not directly quoted against Indian Rupee.

The current spot rates are:

INR/US \$ = ₹62.22  
JPY/US\$ = JPY 102.34

It is estimated that Japanese Yen will depreciate to 124 level and Indian Rupee to depreciate against US \$ to ₹65.

Forward rates for August 2014 are

INR/US \$ = ₹ 66.50  
JPY/US\$ = JPY 110.35

- (i) Calculate the expected loss if the hedging is not done. How will the position change if the firm takes forward cover?  
(ii) If the spot rates on August 31, 2014, are:

INR/US \$ = ₹ 66.25  
JPY/US\$ = JPY 110.85

Is the decision to take forward cover justified?

(ICAI SM, RTP May'24, RTP Nov'18 Old, Old PM)

**Solution :**

Given spot rates : INR/US \$=₹62.22

JPY/US\$=JPY 102.34

INR 62.22 = JPY 102.34

INR 1 = 102.34/62.22 = 1.6448 JPY

Thus INR JPY = 1.6448 and similarly JPY INR = 1/1.6448 = 0.6080

Exchange Rate	Spot	Estimate 31/08	Forward 31/08	Actual 31/08
USD INR	62.22	65	66.50	66.25
USD JPY	102.34	124	110.35	110.85
JPY INR	0.6080	0.5242	0.6026	0.5977

- i) If hedging not done, 10 Million JPY will get 0.5242 INR per JPY against spot of 0.6080.

So, the loss will be 10 Mn × (0.6080 - 0.5242)

= **INR 8,38,000**

- ii) Forward cover

Loss = 10 Mn × (0.6026 - 0.6080)INR per JPY = **INR 54,000**

Because of hedging, loss will come down from INR 8,38,000 to INR 54,000, i.e., reduction of INR 7,84,000.

- iii) If actual spot is USD INR 66.25 and USD JPY 110.85

Then gain/loss = 10 Mn × (0.5977 - 0.6080) INR per JPY

**Loss = INR 103,000**

In case forward cover is taken, the loss is 54,000 as against loss of INR 103,000 in no forward cover.

Hence the decision to take forward cover is **justified**.





#### 40. Illustration

The following 2-way quotes appear in the foreign exchange market:

	Spot	2-months forward
RS/US \$	₹46.00/₹46.25	₹47.00/₹47.50

Required:

- How many US dollars should a firm sell to get ₹ 25 lakhs after 2 months?
- How many Rupees is the firm required to pay to obtain US \$ 2,00,000 in the spot market?
- Assume the firm has US \$ 69,000 in current account earning no interest. ROI on Rupee investment is 10% p.a. Should the firm encash the US \$ now or 2 months later?  
(ICAI SM, May-25 Similar 4M, Similar Nov'22 QP 8 marks, RTP May'19 Old, Old PM)

Solution :

- No of USD to sell to get INR 25,00,000 =  $25,00,000 / 47 = \text{USD } 53,191.49$
- INR required to buy USD 2,00,00 = INR 92,50,000

Convert USD to INR at spot = USD 69000 × 46  
= INR 31,74,000

Deposit INR @ 10% for 2 months	Interest = $31,74,000 \times 10\% \times 2/12$ = 52,900
Total value of investment after 2 months	= 31,74,000 + 52,900 = INR 32,26,900
Convert back to USD at 2 Month forward	= $32,26,900 / 47.50$ = USD 67,934.74

Since the final amount is lower than initial deposit by USD 1065.26 (69000 - 67934.74), it is not worth pursuing this strategy of using idle USD funds for INR deposit.

#### 41. Illustration

Z Ltd. importing goods worth USD 2 million, requires 90 days to make the payment. The overseas supplier has offered a 60 days interest free credit period and for additional credit for 30 days an interest of 8% per annum.

The bankers of Z Ltd offer a 30 days loan at 10% per annum and their quote for foreign exchange is as follows:

	₹
Spot 1 USD	56.50
60 days forward for 1 USD	57.10
90 days forward for 1 USD	57.50

You are required to evaluate the following options:

- Pay the supplier in 60 days, or
- Avail the supplier's offer of 90 days credit.

(ICAI SM, RTP Nov'21, Old PM)

Solution:

- Pay supplier in 60 days and avail bank loan @10% P.a for 30 days and payments are made at forward rates.

USD 2 Million 60 days forward @57.10 = INR 11.42 Crores paid on 60<sup>th</sup> day.

Interest on 11.42 crores for 30 days @ 10% =  $11.42 \text{ cr} \times 10\% \times 30/365 = \text{INR } 9,38,630$ .

Total amount =  $11,42,00,000 + 9,38,630 = \text{INR } 11,51,38,630$ .





ii) 90-day credit from supplier

Base payable = USD 2 Mn and 30-day supplier interest @8%  
 Interest =  $2\text{Mn} \times 8\% \times 30/365 = \text{USD } 13,150.68$   
 Total USD outflow = 2,013,150.68  
 INR equivalent @57.5 = **INR 11,57,56,164**

It is **better to pay the supplier in 60 days** and take bank loan for 30 days as the outflow in that case is less than 90 days supplier credit.

**42. Illustration**

DEF Ltd. has imported goods to the extent of US\$ 1 crore. The payment terms are 60 days interest-free credit. For additional credit of 30 days, interest at the rate of 7.75% p.a. will be charged.

The banker of DEF Ltd. has offered a 30 days loan at the rate of 9.5% p.a. Their quote for the foreign exchange is as follows:

Spot rate INR/US\$	62.50
60 days forward rate INR/US\$	63.15
90 days forward rate INR/US\$	63.45

Which one of the following options would be better?

- (i) Pay the supplier on 60th day and avail bank loan for 30 days.
- (ii) Avail the supplier's offer of 90 days credit.

*(ICAI SM, MTP Sept'22, MTP Apr'22, MTP Oct'20 Old)*

**Solution :**

- i) Pay supplier in 60 days and avail bank loan @9.5% P.a for 30 days and payments are made at forward rates.

USD 1 Crore 60 days forward @63.15 = INR 63.15 Crores paid on 60<sup>th</sup> day.  
 Interest on 63.15 crores for 30 days @ 9.5% =  $63.15 \text{ cr} \times 9.5\% \times 30/360 = \text{INR } 49,99,375.$   
 Total amount = 63,15,00,000 + 49,99,375 = **INR 63,64,99,375.**

- ii) 90-day credit from supplier

Base payable = USD 1 Cr and 30-day supplier interest @7.75%  
 Interest =  $1 \text{ Cr} \times 7.75\% \times 30/360 = \text{USD } 64,583.33$   
 Total USD outflow = 10,064,583.33  
 INR equivalent @63.45 = **INR 63,85,97,812.5**

It is **better to pay the supplier in 60 days** and take bank loan for 30 days as the outflow in that case is less than 90 days supplier credit.

**43. Illustration**

Following information relates to AKC Ltd. which manufactures some parts of an electronics device which are exported to USA, Japan & Europe on 90 days credit terms.

Cost and Sales information

	Japan	USA	Europe
Variable cost per unit	₹225	₹395	₹510
Export sale price per unit	Yen 650	US\$10.23	Euro 11.99
Receipts from sale due in 90 days	Yen 78,00,000	US\$1,02,300	Euro





95,920

**Foreign exchange rate information:**

	Yen/₹	US\$/₹	Euro/₹
Spot market	2.417-2.437	0.0214-0.0217	0.0177-0.0180
3 months forward	2.397-2.427	0.0213-0.0216	0.0176-0.0178
3 months spot	2.423-2.459	0.02144-0.02156	0.0177-0.0179

Advise AKC Ltd. by calculating average contribution to sales ratio whether it should hedge its foreign currency risk or not. (ICAI SM, Nov'19 QP 8 marks, MTP Aug'18)

Solution :

Particulars	Yen	USD	EURO
Receipt due for Sale	7.8 Million	102,300	95,920
Price/unit	JPY 650	USD 10.23	EURO 11.99
No of units sold = Receipt/ Price per unit	12,000	10,000	8,000
Cost/unit in INR	225	395	510
Total Cost in INR	27,00,000	39,50,000	40,80,000

Revenue in INR by hedging

Revenue in Foreign Currency	7.8 Million	102,300	95,920
Exchange rate applicable	2.427 JPY per INR	0.0216 USD per INR	0.0178 EURO per INR
Total Revenue in INR	32,13,844.25	47,36,111	53,88,764
Total cost in INR	27,00,000	39,50,000	40,80,000
Contribution = Revenue - variable cost	5,13,844.25	786,111	13,08,764

Total Contribution = 26,08,719 and total sales = 1,33,38,719 | Contribution % = 19.55%

Without Hedging,  
Revenue in Foreign Currency

Revenue in Foreign Currency	7.8 Million	102,300	95,920
Exchange rate applicable	2.459 JPY per INR	0.02156 USD per INR	0.0179 EURO per INR
Total Revenue in INR	31,72,021	47,44,898	53,58,659
Total cost in INR	27,00,000	39,50,000	40,80,000





Contribution =	4,72,021	794,898	12,78,659
Revenue -			
variable cost			

Total Revenue = 1,32,75,578 and total contribution = 25,45,578 | **Contribution % = 19.17%**  
 Since contribution % is better on hedging, the Co AKC Ltd is advised to hedge.

#### 44. Illustration

An exporter is a UK based company. Invoice amount is \$3,50,000. Credit period is three months. Exchange rates in London are:

Spot Rate (\$/£) 1.5865 - 1.5905  
 3-month Forward Rate (\$/£) 1.6100 - 1.6140

Rates of interest in Money Market:

Deposit	Loan
\$ 7%	9%
£ 5%	8%

Compute and show how a money market hedge can be put in place. Compare and contrast the outcome with a forward contract.

(ICAI SM, RTP May'19)

Solution :

Money market hedge :

Borrow in USD such that loan + Interest = USD 3,50,000	Let loan taken be x and interest rate applicable is 9%
Loan to be borrowed	$X + x \times 9\% \times 3/12 = 3,50,000$ $1.0225x = 3,50,000$ $X = 3,42,298.29$
Convert USD to GBP : Exchange rate applicable USD INR 1.5905	GBP equivalent = $3,42,298.29/1.5905$ = GBP 215,214.27
Invest GBP in deposits @ 5% for 90 days	Interest = $215,214.27 \times 5\% \times 90/360$ = GBP 2,690.18
Total value of Investment after 3 months	= GBP 215,214.27 + 2,690 = <b>GBP 217,904.45</b>

In case forward contract is entered into :  
 Exchange rate applicable : GBP USD = 1.6140  
 GBP realized =  $3,50,000/1.6140 = 2,16,852.54$

The money market results in GBP realization of 217,904.45 Vs 2,16,852.54 from a forward contract .  
 Hence the money market hedge is better by GBP 1051.9

#### 45. Illustration

Gibraltar Limited has imported 5000 bottles of shampoo at landed cost in Mumbai, of US \$ 20 each. The company has the choice for paying for the goods immediately or in 3 months time. It has a clean overdraft limited where 14% p.a. rate of interest is charged.

Calculate which of the following method would be cheaper to Gibraltar Limited.





- (i) Pay in 3 months' time with interest @ 10% p.a. and cover risk forward for 3 months.  
(ii) Settle now at a current spot rate and pay interest of the overdraft for 3 months. The rates are as follows:

Mumbai ₹ / \$ spot : 60.25-60.55  
3 months swap points : 35/25

(ICAI SM, MTP May'20)

**Solution :**

i) Pay after 3 months

Total amount = 5000 × USD 20 = USD 100,000

Interest @10% P.a. for 3 Months = USD 2500

Total payable = USD 102,500

Forward rate applicable: 60.55- 0.25= 60.30

**Total INR Payable = 102,500 × 60.30= INR 61,80,750**

ii) Pay on spot and avail Overdraft @14% for 3 Months

Amount payable in USD = 100,000

Spot Rate = 60.55

Amount in INR = 100,000 × 60.55 = 60,55,000

O/D interest @14% for 3 Months on 60.55 Lakhs = 60,55,000 × 14% × 3/12= 2,11,925

**Total outflow = INR 62,66,925**

Since Option 1 is cheaper by INR 86,175, Gibraltar Ltd should go for it.

#### 46. Illustration

Sun Ltd. is planning to import equipment from Japan at a cost of 3,400 lakh yen. The company may avail loans at 18 percent per annum with quarterly rests with which it can import the equipment. The company has also an offer from Osaka branch of an India based bank extending credit of 180 days at 2 percent per annum against opening of an irrevocable letter of credit.

**Additional information:**

Present exchange rate ₹ 100 = 340 yen

180 day's forward rate ₹ 100 = 345 yen

Commission charges for letter of credit at 2 per cent per 12 months.

Advice the company whether the offer from the foreign branch should be accepted.

[ICAI SM, RTP May'23, Jan'21 QP (Old), RTP Nov'19 Old]

**Solution :**

**Option 1 : Borrow in INR and Buy**

Cost of equipment JPY 3400 Lakhs

INR JPY rate = 340 JPY per 100 INR

Cost of equipment in INR = 3400 Lakhs/340 × 100 = INR 1,000 lakhs

Interest @18% P.a for 6 Months with quarterly rests = 1000 lakhs × (1+18%/4)<sup>2</sup> = **INR 1092.025 Lakhs**

**Option 2 : Open LC and get JPY Funding @2%**

Interest payable to foreign bank on due date and LC commission @2% P.a. is payable.

LC Value in JPY = 3400 Lakhs

Spot on opening date = 340 JPY per 100 INR

LC Value = 1000 Lakhs

LC commission = 1000 Lakhs × 2% × 180/365 = INR 9,86,301; If TVM is considered for the LC commission, it would be ₹ 9,86,301 × (1+18%/4)<sup>2</sup> = ₹ 10,77,065

Interest on credit by bank = JPY 3400 Lakhs × 2% × 180/365 = JPY 33,53,425 (due on repayment date)

Forward rate = JPY 345 per INR 100



Interest in forward rate = JPY 33,53,425 / 345 × 100 = INR 9,72,007

Loan amount = JPY 3400 lakhs / 345 × 100 = INR 985.51 lakhs

Total amount paid in Option 2 = 985.51 Lakhs + 9.86 Lakhs ( or 10.77 Lacs) + 9.72 Lakhs = **INR 1005.09 Lakhs or ( ₹1006.001 Lacs)**

Hence, option 2 is better than option 1 by 86.94 Lakhs (1092.025 Lakhs - 1005.09 Lakhs)

If FV of LC commission is considered, then too option 2 is better than option 1 by ₹ 86.025 Lakhs (1092.025 Lakhs - 1006.001 Lakhs)

Company is advised to accept the LC offer from foreign branch of local bank.

#### 47. Illustration

Your bank's London office has surplus funds to the extent of USD 5,00,000/- for a period of 3 months. The cost of the funds to the bank is 4% p.a. It proposes to invest these funds in London, New York or Frankfurt and obtain the best yield, without any exchange risk to the bank. The following rates of interest are available at the three centres for investment of domestic funds there at for a period of 3 months.

London	5 % p.a.
New York	8% p.a.
Frankfurt	3% p.a.

The market rates in London for US dollars and Euro are as under:

##### London on New York

Spot	1.5350/90
1 month	15/18
2 months	30/35
3 months	80/85

##### London on Frankfurt

Spot	1.8260/90
1 month	60/55
2 months	95/90
3 months	145/140

At which centre, will investment be made & what will be the net gain (to the nearest pound) to the bank on the invested funds?

(ICAI SM, RTP Nov'21, RTP May'18 New & Old, MTP Sept'23)

Solution :

Investment in GBP

Surplus	USD 500,000
Exchange Rate Applicable (Banker Bids to Buy Base Currency )	1.5390 \$ per 1 GBP
Equivalent GBP	= 500,000 / 1.5390 = GBP 324,886.29
Cost for 3 Months @4%	= 500,000 × 4% × 3/12 = USD 5000
Investment @5% for 3 Months	Interest = 324,886.29 × 5% × 3/12 = GBP 4061.08
Total Investment value	= GBP 324,886.29 + 4061.08 = <b>GBP 328,947.37</b>





No of GBP required after 3 months to repay USD 505,000	Relevant Exchange rate = $1.5350 + .0080 = 1.5430$ USD per 1GBP = $505,000/1.5430 = \text{GBP } 327,284.51$
Gain	= $\text{GBP } 328,947.37 - \text{GBP } 327,284.51 = \text{GBP } 1662.86$

Investment in USD	
Surplus	USD 500,000
Cost for 3 Months @4%	= $500,000 \times 4\% \times 3/12 = \text{USD } 5000$
Investment @8% for 3 Months	Interest = $500,000 \times 8\% \times 3/12 = \text{USD } 10,000$
Net gain	$\text{USD } 10000 - \text{USD } 5000 = \text{USD } 5,000$
Exchange Rate applicable after 3 months	GBP USD 1.5475 (1.5390+0.0085)
Value of Gain in GBP	= $5000/1.5475 = \text{GBP } 3,231.02$

Investment in EURO	
Surplus	USD 500,000
Exchange Rate Applicable (Banker Bids to Buy Base Currency )	GBP USD 1.5390 GBP EURO 1.8260
Equivalent EURO	= $500,000/1.5390 \times 1.8260 = \text{EURO } 593,250$
Cost for 3 Months @4%	= $500,000 \times 4\% \times 3/12 = \text{USD } 5000$
Investment EURO @3% for 3 Months	Interest = $593,250 \times 3\% \times 3/12 = \text{EURO } 4449.375$
Total Value of Investment	= $\text{EURO } 593,250 + 4449.375 = \text{EURO } 597,699.375$
Exchange Rate applicable	GBP EURO 1.8150 (1.8290 -0.140)
Value of Investment in GBP	= $597,699.375/1.8150 = \text{GBP } 329,310.95$
Equivalent GBP required to repay USD 505,000 Loan	= $\text{GBP } 327,284.51$ (As calculated above)
Loss	= $\text{GBP } 329,310.95 - \text{GBP } 327,284.51 = \text{GBP } 2026.44$

Hence, the bank is advised to invest in USD to get best returns.

#### 48. Illustration

XP Pharma Ltd. has acquired an export order for ₹ 10 million for formulations to a European company. The Company has also planned to import bulk drugs worth ₹ 5 million from a company in UK. The proceeds of exports will be realized in 3 months from now and the payments for imports will be due after 6 months from now. The invoicing of these exports and imports can be done in any currency i.e., Dollar, Euro, or Pounds sterling at company's choice.

The following market quotes are available.

Spot Rate	Annualized Premium
₹ / \$ 67.10/67.20	\$ — 7%
₹ / Euro 63.15/63.20	Euro — 6%
₹ /Pound 88.65/88.75	Pound — 5%





Advice XP Pharma Ltd. about invoicing in which currency. (Calculation should be upto three decimal places).

(July'21 QP 8 marks, MTP Oct'23)

Solution :

Exports :

Spot	Equivalent Foreign Currency	Forward Rate	Equivalent INR	Gain
67.10	INR 1,00,00,000/67.10 = USD 149031.3	= 67.1 + 67.1 × 7% ×3/12 = 68.274	=149031.3 × 68.274 =101,75,000	175,000
63.15	INR 1,00,00,000/63.15 = EURO 158353.13	= 63.15 + 63.15 × 6% ×3/12 = 64.097	= 158353.13 ×64.097 = 10149960.57	149,960.57
88.65	INR 1,00,00,000/88.65 = 112,803.16	88.65 + 88.65 × 5% × 3/12 =89.758	= 112,803.16/89.758 =10,124,986.03	124,986.03

Imports:

Spot	Equivalent Foreign Currency	Forward Rate	Equivalent INR	Loss
67.20	INR 50,00,000/67.20 = USD 74404.76	= 67.2 + 67.2 × 7% ×6/12 = 69.595	= 74404.76 × 69.595 =5174479.034	174,479.034
63.20	INR 50,00,000/63.20 = EURO 79113.92	= 63.20 + 63.20 × 6% ×6/12 = 65.096	= 79,113.92 ×65.096 = 5149999.73	149,999.73
88.75	INR 50,00,000/88.75 = 56338.03	88.75 + 88.75 × 5% × 6/12 =90.969	= 56,338.03 ×90.969 = 5,125,014.25	125,014.25

Hence, Imports should be denominated in Pounds and Exports in Dollar as they are best possible combination of loss and gain respectively on account of Forward Premia

#### 49. Illustration

A US investor chose to invest in Sensex for a period of one year. The relevant information is given below.

Size of investment (\$)	20,00,000
Spot rate 1 year ago (₹/\$)	42.50/60
Spot rate now (₹/\$)	43.85/90
Sensex 1 year ago	3,256
Senex now	3,765
Inflation in US	5%
Inflation in India	9%

- Compute the nominal rate of return to the US investor.
- Compute the real depreciation /appreciation of Rupee.
- What should be the exchange rate if relevant purchasing power parity holds good?
- What will be the real return to an Indian investor in Sensex?

[RTP May'22, Jan'21 QP (Old)]

Solution :





i)

Amount invested	= 20,00,000
Exchange rate applicable on conversion	42.50
Equivalent INR	=20,00,000 × 42.5 = INR 85,000,000
Return for Sensex in one year	= (Closing - opening + dividend)/opening = (3765-3256)/3256 × 100 = 15.633 %
Value of investment in INR after one year	= 85,000,000 × (1 + 15.633%) = INR 98,287,776
Equivalent USD converted	98,287,776/43.90 = 2238901.51
Gain in USD	2238901.51 - 2,000,000 = 238,901.51
Gain %	=238,901.51/2,000,000 × 100 = <b>11.95%</b>

Assuming no taxes and transaction costs

ii)

	Bid	Ask
Spot	42.50	42.60
Forward	43.85	43.90
Inflation in India	9%	9%
Depreciation % in 1 year	$(43.85-42.50)/42.50 \times 100 = 3.17\%$	$((43.90-42.60)/42.60) \times 100 = 3.05\%$
Ideal Depreciation % in 1 year	$(1.09/1.05 - 1) \times 100 = 3.81\%$	$(1.09/1.05 - 1) \times 100 = 3.81\%$
Real appreciation	$=(1.0317/1.0381) - 1 = 0.62\%$	$=(1.0305/1.0381) - 1 = 0.73\%$

iii)

	Bid	Ask
Spot	42.50	42.00
Interest Rate	5%	9%
Exchange Rate based on PPP = $\text{Spot} \times (1 + d)/(1 + f) =$		
Exchange rate based on PPP	$42.50 \times 1.09/1.05 = 44.12$	$42.60 \times 1.09/1.05 = 44.22$

iv)

Return on Sensex in INR terms	<b>15.633%</b>
Indian Inflation	<b>9%</b>
Real Return	$1.15637/1.09 - 1 = 6.085\%$

## 50. Illustration

TT Ltd. is planning to hedge its foreign exchange risk. It has made a purchase on 1st April 2021 for which it has to make a payment of US \$1 Lakh on 30/09/2021. The present exchange rate is 1 US \$ = ₹ 73. It can purchase forward US \$ at ₹ 74. TT Ltd. will have to make an upfront premium @ 1% of the forward amount purchased. The cost of the funds to the company is 10% p.a.

In the following situations, compute the Gain/(Loss) the TT Ltd. will make if they hedge with exchange rate on 30/09/2021 as:





- i. ₹ 76/US \$
- ii. ₹ 70/US \$
- iii. ₹ 79/US \$

Note: Calculation to be done on monthly basis.

(Dec'21 QP)

Solution :

Assumption : The upfront premia paid is included in INR 74 of forward exchange rate that the company agrees to buy USD for from the bank.

Total amount in USD = 100,000

Spot USD INR = 73 and 6M forward = USD INR 74

Upfront premia paid 1% of forward contract =  $1\% \times 74 = 0.74$

Add :Cost of funds @10% P.a.=  $0.74 \times 10\% \times 6/12 = 0.037$

All in forward cost =  $74 + 0.74 + 0.037 = \text{INR } 74.777$

Exchange Rate	Spot as on 30/09/202		
	76	70	79
All in Forward Rate	74.777	74.777	74.777
Gain/(loss)	= 76 - 74.777 = 1.223	= 70 - 74.777 = (4.777)	= 79 - 74.777 = 4.223
Total USD	1,00,000	1,00,000	1,00,000
Gain/(loss) in INR due to forward contract	= 1.223 × 100,000 = 1,22,300	=(4.777) × 1,00,000 = (4,77,700)	=4.223 × 100,000 = 4,22,300

### 51. Illustration

Interest rates for 3 months in USA and Canada are as follows:

Currency	Borrow	Interest
US \$	4%	2.5%
Canadian \$	4.5%	3.5 %
Can \$/ US \$ spot	1.235	1.240
3 months forward	1.255	1.260

Advice, the currency in which borrowing, and lending for 3 months needs to be done for the US company. Take 3 months = 90/360 days.

[Jan'21 QP (Old)]

Solution :

Assuming, the US company has US \$1000. This is invested at 2.5% in US , then return would be =  $1000 \times 2.5\% \times 90/360 = \text{USD } 6.25$

Total value of investment at end =  $1000 + 6.25 = \text{USD } 1006.25$

Investment in CAD :

	Deposit	Borrow
Exchange rate applicable (Banker Bids to Buy Base Currency)	USD CAD 1.235	USD CAD 1.240
Equivalent CAD	= $1000 \times 1.235$ = 1235 CAD	= $1000 \times 1.24$ = 1240 CAD





Interest earned/paid on depositing/borrowing	= $1235 \times 3.5\% \times 90/360$ = 10.806 CAD	= $1240 \times 4.5\% \times 90/360$ = 13.95 CAD
Total value of investment at end/ to be repaid	= $1235 + 10.806$ CAD = 1245.806 CAD	= $1240 + 13.95$ CAD = 1253.95 CAD
Exchange rate on conversion Equivalent USD	USD CAD 1.260 = $1245.806/1.260$ = <b>USD 988.735</b>	USD CAD 1.255 = $1253.95/1.255$ = <b>USD 999.16</b>

Hence, the company should invest in US (USD 1006.25) as investing in CAD results in loss (USD 988.735)  
Assuming the US Company borrows USD 1000 at 4%. Interest paid =  $1000 \times 4\% \times 90/360$  = USD 10  
Amount to be repaid =  $1000 + 10$  = USD 1010

In case of borrowing, **Borrowing in CAD is better** as repayment amount is lower( USD 999.16) than in case of direct US \$ (USD 1010)

### Forwards

#### 52. Illustration

On 1st June 2015 the bank enters into a forward contract for 2 months for selling US\$ 1,00,000 at ₹ 65.5000. On 31st July 2015 the spot rate was ₹ 65.7500/65.2500. Calculate the amount to be debited in the customer's account.

*(ICAI SM)*

**Solution :**

The amount debited to customers account =  $USD\ 1,00,000 \times 65.5000$  = INR 65,50,000

#### 53. Illustration

In March, 2009, the Multinational Industries make the following assessment of dollar rates per British pound to prevail as on 1.9.2009:

\$/Pound	Probability
1.60	0.15
1.70	0.20
1.80	0.25
1.90	0.20
2.00	0.20

- (i) What is the expected spot rate for 1.9.2009?
- (ii) If, as of March 2009, the 6-month forward rate is \$ 1.80, should the firm sell forward its pound receivables due in September, 2009?

*(ICAI SM)*

**Solution :**

$$E(R) = \sum P_i \times X_i$$

USD per GBP	Probability	Probability Exchange Rate
1.6	0.15	0.24
1.7	0.20	0.34
1.8	0.25	0.45
1.9	0.20	0.38
2	0.20	0.40
	Total	<b>1.81</b>





So, expected spot USD per GBP = 1.81 on 1<sup>st</sup> sept 2009  
6M forward = GBP USD 1.80 and expected spot = 1.81

If Multinational industries have GBP Receivables, then assuming that they are American firm based on the information provided, they will need to convert GBP receivable to USD.

It is better not to enter into the GBP forward @1.80 USD per GBP because expected rate is higher i.e., 1.81 USD per GBP.

#### 54. Illustration

A company is considering hedging its foreign exchange risk. It has made a purchase on 1st July, 2016 for which it has to make a payment of US\$ 60,000 on December 31, 2016. The present exchange rate is 1 US \$ = ₹ 65. It can purchase forward 1 \$ at ₹ 64. The company will have to make an upfront premium @ 2% of the forward amount purchased. The cost of funds to the company is 12% per annum.

In the following situations, compute the profit/loss the company will make if it hedges its foreign exchange risk with the exchange rate on 31st December 2016 as:

- (i) ₹ 68 per US \$
- (ii) ₹ 62 per US \$
- (iii) ₹ 70 per US \$
- (iv) ₹ 65 per US \$

(ICAI SM)

**Solution :**

*Assumption :* The upfront premia is paid in addition to the forward rate agreed. **Alternatively**, you can also assume the upfront premia paid is included in the forward rate and compute gain/loss as per Question 50.

Forward rate = INR 64 per USD and contract is of USD 60,000

Total forward contract value = 60,000 × 64 = INR 38,40,000

Upfront premia to be paid = 2%

Upfront premia = 38,40,000 × 2% = INR 76,800

Cost of funds @12% P.a. = 76,800 × 12% × 6/12 = INR 4608

Total cost of entering into forward = INR 81,408

Exchange Rate	Spot as on 30/09/202			
	68	62	70	65
<b>Forward Rate</b>	64	64	64	64
<b>Gain/(loss)</b>	= 68-64 = 4	= 62- 64 = (2)	=70- 64 = 6	=65 -64 = 1
<b>Total USD</b>	60,000	60,000	60,000	60,000
<b>Gain/(loss) in INR due to forward contract</b>	= 4 × 60,000 = 2,40,000	=(2) × 60,000 = (1,20,000)	=6 × 60,000 = 3,60,000	=1 × 60,000 = 60,000
<b>Less : premia and cost of funds</b>	(81408)	(81408)	(81408)	(81408)
<b>Net Gain/(loss)</b>	158,592	(201,408)	278,592	(21,408)





## 55. Illustration

An importer customer of your bank wishes to book a forward contract with your bank on 3<sup>rd</sup> September for sale to him of SGD 5,00,000 to be delivered on 30<sup>th</sup> October.

The spot rates on 3<sup>rd</sup> September are USD/INR 49.3700/3800 and USD/SGD 1.7058/68. The swap points are:

	USD / INR		USD/SGD
Spot/September	0300/0400	1 <sup>st</sup> month forward	48/49
Spot/October	1100/1300	2 <sup>nd</sup> month forward	96/97
Spot/November	1900/2200	3 <sup>rd</sup> month forward	138/140
Spot/December	2700/3100		
Spot/January	3500/4000		

Calculate the rate to be quoted to the importer by assuming an exchange margin of 5 paisa.

[ICAI SM, May'18 QP (Old), RTP May'20 Old]

**Solution :**

*Assumption :* The forward points for USD INR and USD SGD are for delivery of currency as on 30<sup>th</sup> October.

	USD INR	USD SGD
Spot	49.37/38	1.7058/1.7068
Relevant Spot	49.38	1.7058
Add: Forward Points	0.13	0.0096
	49.51	1.7154
Add : Margin	0.05	
	49.56	

USD INR = 49.56 and USD SGD = 1.7154

On comparing both exchange rates, we get SGD 1.7154 = INR 49.56

So, 1 SGD = 49.56/1.7154 INR = 28.8912

Hence, SGD INR = 28.8912 ( This Working is made on real world assumption that margin is usually quoted in Indian markets for USDINR and not on other crosses). If Margin is added to SGD instead of USD, then solution will be ₹49.51 /1.7154 = ₹28.8621 + 5 paise = ₹28.9121

## 56. Illustration

XYZ Ltd. is an export-oriented business house based in Mumbai. The Company invoices in customers' currency. Its receipt of US \$ 1,00,000 is due on September 1, 2009.

Market information as at June 1, 2009 is:

Exchange Rates		Currency Futures		
US \$/₹		US \$/₹	Contract size	₹4,72,000
Spot	0.02140	June	0.02126	
1 Month Forward	0.02136	September	0.02118	
3 Months Forward	0.02127			

	Initial Margin	Interest Rates in India
June	₹ 10,000	7.50%
September	₹ 15,000	8.00%





On September 1, 2009 the spot rate US\$ ₹ is 0.02133 and currency future rate is 0.02134. Comment which of the following methods would be most advantageous for XYZ Ltd.

- (a) Using forward contract
- (b) Using currency futures
- (c) Not hedging currency risks.

It may be assumed that variation in margin would be settled on the maturity of the futures contract.

[RTP May'19, ICAI Old PM, May'19 QP (Old)]

**Solution :**

- a) Total inflow using a forward contract @0.02127 USD per INR, so 1 Lakh receivable after 3 months = USD 100,000/0.02127 = INR 47,01,457.45
- d) Inflow if no hedging is done , INR equivalent of USD 100,000 @ 0.02133 = 100,000/0.02133 = INR 46,88,232.54

Using currency futures :

INR receivable @3M future rate = USD 100,000/0.02118 = INR 47,21,435.31  
 Each lot is for Rs 4,72,000, then the number of contracts would be = 47,21,435.31/4,72,000 = 10.003 ~10 Lots  
 i.e., 10 Lots of futures contracts are entered into, each lot being INR 4,72,000.

**i) Cost of Funds**

Initial margin of INR 15,000 given in the question is for each contract. So, total margin deposited = 10 × 15,000 = IR 1,50,000  
 Cost @8% for 3m on 1,50,000 = 150,000 × 8% × 3/12= 3000

**ii) Transaction at Spot :**

USD 100,000 converted to INR at spot rate of @0.02133 USD per INR = 100,000/0.02133 = INR 46,88,232.54

**iii) Gain/loss in net cash settlement**

Gain = (0.02134 -0.02118 ) USD per INR × 10 Lots × 4,72,000 = USD 755.2  
 INR equivalent of gain of USD 755.2 @ 0.02133 = 755.2/0.02133 = INR 35,405.53

So net cashflow from future contract = 46,88,232.54 + 35,405.53 - 3000 = **INR 47,20,638.07**

Option	Amount (INR)
Forward Contract	47,01,457.45
No hedging	46,88,232.54
Currency Futures	47,20,638.07

Hence, comparing the above the three options, future contract is better of all and hence it is advised to hedge using futures.





## 57. Illustration

A company operating in Japan has today effected sales to an Indian company, the payment being due 3 months from the date of invoice. The invoice amount is 108 lakhs yen. At today's spot rate, it is equivalent to ₹ 30 lakhs. It is anticipated that the exchange rate will decline by 10% over the 3 months period and in order to protect the yen payments, the importer proposes to take appropriate action in the foreign exchange market. The 3 months forward rate is presently quoted as 3.3 yen per rupee. You are required to calculate the expected loss and to show how it can be hedged by a forward contract.

(ICAI SM, Sep-25 Similar -4M, Dec'21 QP, MTP Mar'19 Old)

### Solution :

Spot rate : 108 Lakhs JPY = 30 Lakhs INR, so 3.6 JPY is equal to 1 INR

Hence, INR JPY = 3.6

If a forward contract is entered into then Cashflow will be as follows :

Purchase value @spot of JPY 3.6 per INR = INR 30,00,000

Forward contract rate = JPY 3.3 per INR = JPY 108,00,000

Equivalent INR as per forward contract =  $108,00,000/3.3 = \text{INR } 32,72,727.27$

If no forward contract is entered, then the exchange rate applicable = 3.6 JPY -10% = 3.24 JPY per INR

Equivalent INR =  $108,00,000/3.24 = \text{INR } 33,33,333.33$

Difference between hedging and not hedging =  $33,33,333.33 - 32,72,727.27 = \text{INR } 60,606.06$

Hence, if a forward contract is entered into, then the loss is reduced by INR 60,606.06

## 58. Illustration

ABC Technologic is expecting to receive a sum of US\$ 4,00,000 after 3 months. The company decided to go for future contract to hedge against the risk. The standard size of future contract available in the market is \$1000. As on date spot and futures \$ contract are quoting at ₹ 44.00 & ₹ 45.00 respectively. Suppose after 3 months the company closes out its position, futures are quoting at ₹ 44.50 and spot rate is also quoting at ₹ 44.50. You are required to calculate effective realization for the company while selling the receivable. Also calculate how company has been benefitted by using the future option.

(ICAI SM)

### Solution :

Spot rate USD INR	44
3M Future USD INR	45
USD Receivable	400,000
Lot size	1000
Number of contracts	= USD 400,000/1000 = 400 Contracts
Company closes out contract at USD INR	44.50
Gain on 400 contracts of USD 1000 each	= $(45 - 44.50) \times 400 \times 1000$ = INR 2,00,000
Equivalent INR realized	= $400,000 \times 44.5$ = INR 1,78,00,000
Add : Gain on Future	INR 200,000
Total cash flow	= 1,80,00,000
Effective realization rate	= $1,80,00,000 / \text{USD } 400,000$ = INR 45 per USD



Because of entering into future contract, the company has realized receivable at INR 45 instead of spot rate of 44.5 INR per USD. Due to this, the company has gained INR 2,00,000 (0.5 × 400,000 USD)

### 59. Illustration

JKL Ltd. is an export business house. The company prepares invoice in customers' currency. Its debtors of US \$. 20,000,000 is due on April 1, 2017. Market information as at January 1, 2017 is:

Exchange rates US\$/INR		Currency Futures US \$/INR	
Spot	0.016667	Contract size: 31,021,218	
1- month forward	0.016529	1- month	0.016519
3- month forward	0.016129	3- month	0.016118

	Initial Margin	Interest rates in India
1- month	₹ 32,500	7%
3- month	₹ 50,000	8%

On April 1, 2017; the spot rate US\$/INR is 0.016136 and currency future rate is 0.016134. Which of the following methods would be most advantageous to JKL Ltd.?

- Using forward contract
- Using currency futures
- Not hedging the currency risk

[Similar ICAI SM, May'23 QP 10 marks, RTP May'21 New & Old, MTP Apr'22, MTP Mar'19, Nov'17 QP (Old)]

**Solution :**

- Total inflow using a forward contract @0.016129 USD per INR, so 200 Lakh receivable after 3 months = USD 20,000,000/0.016129 = INR 124,00,02,480.
- Inflow if no hedging is done, INR equivalent of USD 20,000,000 @ 0.016136 = 20,000,000/0.016136 = INR 123,94,64,551.31

Using currency futures :

INR receivable @3M future rate @ 0.016118 = INR 31021218 × 0.016118 = USD 500,000  
Each lot is for Rs 31,021,218, then the number of contracts would be = 20,000,000/5,00,000 = 40 Lots  
i.e., 40 Lots of futures contracts are entered into, each lot being INR 31,021,218

**Cost of Funds**

Initial margin of INR 50,000 given in the question is for each contract. So, total margin deposited = 40 × 50,000 = INR 20,00,000

Cost @8% for 3m on 20,00,000 = 20,00,000 × 8% × 3/12= INR 40,000

**Transaction at Spot :**

USD 20,000,000 converted to INR at spot rate of @0.016136 USD per INR = 20,000,000/0.016136 = INR 123,94,64,551.31

**Gain/loss in net cash settlement**

Gain = (0.016134 - 0.016118 ) INR × 40 Lots × 31,021,218 = USD 19853.58





INR equivalent of gain of USD 19853.58 @ 0.016136 =  $19853.58 / 0.016136 = \text{INR } 12,30,390.40$   
 So net cashflow from future contract =  $123,94,64,551.31 + 12,30,390.40 - 40,000 = \text{INR } 124,06,54941.71$

Option	Amount (INR)
Forward Contract	124,00,02,480
No hedging	123,94,64,551.31
Currency Futures	124,06,54941.71

Hence, comparing the above the three options, future contract is better of all and hence it is advised to hedge using futures.

## 60. Illustration

ABC Co. have taken a 6-month loan from their foreign collaborators for US Dollars 2 million. Interest payable on maturity is at LIBOR plus 1.0%. Current 6-month LIBOR is 2%.

Enquiries regarding exchange rates with their bank elicits the following information:

Spot USD 1                ₹ 48.5275  
 6 months forward       ₹ 48.4575

- (i) What would be their total commitment in Rupees if they enter into a forward contract?  
 (ii) Will you advise them to do so? Explain giving reasons.

(ICAI SM)

Solution :

i)

Loan Value	USD 2,000,000
Interest rate applicable	6M LIBOR + 1% = 2% + 1% = 3%
Interest cost	$2,000,000 \times 3\% \times 6/12$ = USD 30,000
Total commitment	= Principal + interest = USD 2,000,000 + USD 30,000 = USD 2,030,000
Forward Contract rate USD INR	48.4575
INR equivalent	= USD 2,030,000 × 48.4575 = INR 9,83,68,725

ii) Yes, ABC Co should hedge.

Here market expectation is dollar will depreciate. India has higher interest /inflation rate than US, implying that ₹ will ideally depreciate. So, company should take advantage of this and hedge exposure.

## 61. Illustration

Excel Exporters are holding an Export bill in United States Dollar (USD) 1,00,000 due 60 days hence. They are worried about the falling USD value which is currently at ₹ 45.60 per USD. The concerned Export Consignment has been priced on an Exchange rate of ₹ 45.50 per USD. The Firm's Bankers have quoted a 60-day forward rate of ₹ 45.20.

Calculate:

- (i) Rate of discount quoted by the Bank  
 (ii) The probable loss of operating profit if the forward sale is agreed to.



**Solution :**

i) Rate of discount = Forward - Spot  
 = 45.2 - 45.6  
 = (0.40)  
**Annualized Discount % =  $0.40/45.60 \times 365/60 = 5.336\%$**

ii) Probable loss/USD = Forward rate - Pricing rate  
 = 45.2 - 45.5 = 0.30/USD  
 Total consignment value = USD 100,000  
**Total loss = INR  $0.30 \times 100,000 = \text{INR } 30,000$**   
**Loss (%) = Loss/ original value of shipment**  
 =  $30,000/45.5 \times 100,000$   
 = **0.659%**

**62. Illustration**

An Indian importer has to settle an import bill for \$ 1,30,000. The exporter has given the Indian importer two options:

- (i) Pay now without any interest charges.  
 (ii) Pay after three months with interest at 5 percent per annum.

The importer's bank charges 15 percent per annum on overdrafts. The exchange rates in the market are as follows:

Spot rate (₹/\$) : 48.35/ 48.36

3-Months forward rate (₹/\$) : 48.81/ 48.83

The importer seeks your advice. Give your advice.

(ICAI SM, RTP Nov'19)

**Solution:**

i) Cost of import when paid on spot = USD 1,30,000 × 48.36  
 = INR 62,86,800  
 Add : Interest on OD @15% =  $62,86,800 \times 15\% \times 3/12 = 2,35,755$   
**Total cost of import after 3 Months = INR 65,22,555**

ii) Cost of import with 3 months forward

Output value	USD 130,000
Add : 5% P.a interest	USD 1625
Total USD payable	USD 131,625
3 Month forward exchange rate	48.83
Equivalent INR payable after 3 months	= USD 131,625 × 48.83 = INR 64,27,248

Hence it is better to take supplier credit at 5% P.a and pay using 3 month forward.





## 63. Illustration

Zaz plc, a UK Company is in the process of negotiating an order amounting € 2.8 million with a large German retailer on 6 months credit. If successful, this will be first time for Zaz has exported goods into the highly competitive German Market. The Zaz is considering following 3 alternatives for managing the transaction risk before the order is finalized.

- Mr. Peter the Marketing head has suggested that in order to remove transaction risk completely Zaz should invoice the German firm in Sterling using the current €/£ average spot rate to calculate the invoice amount.
- Mr. Wilson, CE is doubtful about Mr. Peter's proposal and suggested an alternative of invoicing the German firm in € and using a forward exchange contract to hedge the transaction risk.
- Ms. Karen, CFO is agreed with the proposal of Mr. Wilson to invoice the German first in €, but she is of opinion that Zaz should use sufficient 6 month sterling future contracts (to the nearest whole number) to hedge the transaction risk.

Following data is available

Spot Rate	€ 1.1960 - €1.1970/£
6 months forward points	0.60 - 0.55 Euro Cents
6 month future contract is currently trading at	€ 1.1943/£
6 month future contract size is	£62,500
After 6 month Spot rate and future rate	€ 1.1873/£

You are required to

- Calculate (to the nearest £) the £ receipt for Zaz plc, under each of 3 above proposals.
- In your opinion which alternative you consider to be most appropriate.

(ICAI SM, RTP May'21, RTP May'20 Old)

Solution:

a) Option 1: Billing in GBP @ Spot rate

Applicable exchange rate	GBP EURO 1.1965
Order size	EURO 2.8 million
GBP Invoiced	=EURO 2.8 Mn/1.1965 =GBP 2,340,158.80

Option 2: Forward contract

Original Contract Value = EURO 2.8 Million

Exchange rate	Bid	Ask
Spot	1.1960	1.1970
Less :Forward Points	0.0060	0.0055
Forward Rate	1.1900	1.1915

Exchange rate applicable (As per Banker Bids to Buy Base Currency) = 1.1915

GBP realized after 6 months from a forward hedge = EURO 2,800,000/1.1915= GBP 2,349,979.02.

Option 3: Futures Contract

Future Rate

GBP EURO 1.1943





Total EURO to be sold	EUR 2.8 Million
Equivalent GBP	GBP 2,344,469.51
Lot Size	GBP 62,500
No of lot size	2344469.51/62,500 = 37.51 Lots ~ 37 Lots
Total Hedge quantity	=37 × GBP 62500 = GBP 2,312,500
Future Settlement Rate	GBP EURO 1.1873
Future Original contract rate	GBP EURO 1.1943
Loss	GBP EURO 0.0070
Future net settlement value : Loss	=2312500 × 0.0070 = EUR 16187.5
Loss in GBP	16187.5/1.1873 = GBP 13633.88
Amount realized in spot	= GBP 2.8 Million/1.1873 = GBP 2,358,291.92
Total Cashflow	= 2,358,291.92 - 13,633.88 = <b>GBP 2,344,658.05</b>

b) On comparing Option 1,2 and 3, Option 2 (forward contract ) is the best option.

#### 64. Illustration

Columbus Surgical Inc. is based in US, has recently imported surgical raw materials from the UK and has been invoiced for £ 480,000, payable in 3 months. It has also exported surgical goods to India and France.

The Indian customer has been invoiced for £ 138,000, payable in 3 months, and the French customer has been invoiced for € 590,000, payable in 4 months. Current spot and forward rates are as follows:

£ / US\$

Spot: 0.9830 - 0.9850

3 months forward: 0.9520 - 0.9545

US\$ / €

Spot: 1.8890 - 1.8920

4 months forward: 1.9510 - 1.9540

Current money market rates are as follows:

UK: 10.0% - 12.0% p.a.

France: 14.0% - 16.0% p.a.

USA: 11.5% - 13.0% p.a.

You as Treasury Manager are required to show how the company can hedge its foreign exchange exposure using Forward markets and Money markets hedge and suggest which the best hedging technique is.

(ICAI SM)

Solution:

	3 Month Exposure	4M exposure
Export Receivable	GBP 138,000	EURO 590,000
Import Payable	GBP 480,000	



<b>Net Exposure after 3 months</b>	<b>GBP 342,000 Payable</b>	<b>EURO 590,000 Receivable</b>
------------------------------------	----------------------------	--------------------------------

GBP Payable exposure in Forward market = GBP 342,000

Exchange rate applicable : USD GBP 0.9520

Equivalent USD which need to be paid =  $GBP\ 342,000 / 0.9520 = \text{USD } 359,243.70$

Money Market Hedge :

**Borrow in USD loan @13% P.a**

**Let loan taken be x and interest rate applicable is 2.5%**

<b>Deposit</b>	$X + x \times 10\% \times 3/12 = 342,000$ $1.025x = 342,000$ $X = 333,658.54$
<b>Make a deposit in GBP</b>	GBP 333,658.54
<b>Convert USD to GBP : Exchange rate applicable USD GBP 0.9830</b>	USD equivalent = $333,658.54 / 0.9830$ = USD 339,428.83
<b>Get out GBP proceeds with interest</b>	342,000
<b>Make payment in GBP</b>	GBP 342,000
<b>Borrowing repayment</b>	Repayment = $339,428.83 + 339,428.83 \times 13\% \times 3/12 = \text{USD } 350,460.26$

So, for import payment, money market hedges are better suited as outflow is only USD 350,460.26 as compared to outflow of USD 359,243.70 in forward contract.

<b>Export Receivable of 4 Months</b>	EURO 590,000
<b>Exchange rate applicable</b>	EURO USD 1.9510
<b>USD received on realised export receivable using a 4 month forward</b>	= $590,000 \times 1.9510$ = USD 1,151,090
<b>Amount realised</b>	<b>USD 1,151,090</b>

**Borrow in EURO @16% for 4 months**

**Let loan taken be x and interest rate applicable is 16%**

<b>Convert EURO to USD @spot of 1.8890</b>	= $560,144.31 \times 1.8890$ = USD 1,058,112.60
<b>Put USD into deposits @11.5% for 4 months</b>	= $1,058,112.60 \times 11.5\% \times 4/12$ = USD 40,560.98
<b>Get deposit along with interest</b>	<b>USD 1,098,673.58</b>
<b>Original EURO loan</b>	$X + x \times 16\% \times 4/12 = \text{EURO } 590,000$ $1.0533x = 590,000$ $X = 590,000 / 1.0533 = 5,60,144.31$
<b>Interest on EURO loan @16%</b>	= $590,000 - 560,144.31 = \text{EURO } 29,855.69$
<b>Repay EURO loan along with interest</b>	EURO 590,000

In this case of receivable, company is better of **using forward contract** of realising USD 1,151,090 instead of USD 1,098,673.58 from money market hedge.

## 65. Illustration

The current spot exchange rate is \$1.35/£ and the three-month forward rate is \$1.30/£. According to your analysis of the exchange rate, you are quite confident that the spot exchange rate will be \$1.32/£ after 3 months.





- (i) Suppose you want to speculate in the forward market then what course of action would be required and what is the expected dollar Profit (Loss) from this speculation?
- (ii) What would be your Profit (Loss) in Dollar terms on the position taken as per your speculation if the spot exchange rate turns out to be \$1.26/£.

Assume that you would like to buy or sell £1,000,000.

(RTP Nov'20 New & Old)

Solution :

GBP USD	USD per GBP
Spot	1.35
3 M forward	1.30
3 M future spot exchange	1.32
3 M future spot actual	1.26

i) Expected speculative gain = GBP 1,000,000 × (1.32-1.30)

Profit will be = 1,000,000 × 0.02  
= USD 20,000

ii) If spot falls to GBP USD 1.26,

Loss will be = 1,000,000 × (1.30 -1.26)  
= USD 40,000

## 66. Illustration

M/s. Sky products Ltd., of Mumbai, an exporter of sea foods has submitted a 60 day bill for EUR 5,00,000 drawn under an irrevocable Letter of Credit for negotiation. The company has desired to keep 50% of the bill amount under the Exchange Earners Foreign Currency Account (EEFC). The rates for ₹/USD and USD/EUR in inter-bank market are quoted as follows :

	₹/ USD	USD/EUR
Spot	67.8000/ 8100	1.0775 /0800
1 month forward	10/11 Paise	0.20/0.25 Cents
2 months forward	21/22 Paise	0.40/0.45 Cents
3 months forward	32/33 Paise	0.70/0.75 Cents

Transit Period is 20 days. Interest on post shipment credit is 8% p.a.

Exchange Margin is 0.1%. Assume 365 days in a year. You are required to calculate:

- (i) Exchange rate quoted to the company  
(ii) Cash inflow to the company  
(iii) Interest amount to be paid to bank by the company.

(Jan'21 QP)

Solution :

Exchange Rate	Bid	Ask
USD INR Spot	67.80	67.81
2 M Forward Points	0.21	0.22
	68.01	68.03
EUR USD	1.0775	1.0800
Forward Points	0.0040	0.0045
	1.0815	1.0845





INR Rate	68.01
Less: Margin @ 0.1%	- 0.06801
	= 67.9420
EUR USD	1.0815
EUR INR	= 67.9420 × 1.0815
	= 73.4793

Note : Alternatively, since margin is given as %, you can also find EUR INR by multiplying 68.01 and 1.0815 and then deduct the margin. However, if margin is given in paisa then you have to deduct with rupee only first.

- i) Exchange rate quoted to company = EUR INR 73.4793  
 ii) Cash inflow to the company : 50% EEFC and 50% converted to INR

Amount converted to INR = EUR 500,000 × 50% = 250,000  
 Equivalent INR = EUR 250,000 × 73.4793 = INR 1,83,69,825

- iii) Interest amount is on post shipment credit since LC is Usance LC for 60 days. Post shipment credit is also for 60 days.

Interest = 1,83,69,825 × 8% × 60/365 = INR 2,41,575.78

ICAI Solution: Interest = 1,83,69,825 × 8% × 80/365 = INR 3,22,101

## 67. Illustration

ZX Ltd. has made purchases worth USD 80,000 on 1st May 2020 for which it has to make a payment on 1st November 2020. The present exchange rate is INR/USD 75. The company can purchase forward dollars at INR/USD 74. The company will have to make an upfront premium @ 1 per cent of the forward amount purchased. The cost of funds to ZX Ltd. is 10 per cent per annum.

The company can hedge its position with the following expected rate of USD in foreign exchange market on 1st May 2020:

	Exchange Rate	Probability
(i)	INR/USD 77	0.15
(ii)	INR/USD 71	0.25
(iii)	INR/USD 79	0.20
(iv)	INR/USD 74	0.40

You are required to advise the company for a suitable cover for risk.

(Nov'20 QP 8 marks, RTP Nov'24, MTP Mar'23)

Solution :

Assumption :

- i) The upfront premia paid is not included forward exchange rate that the company agrees to buy USD for from the bank.  
 ii) The given expected exchange rates with probabilities are expected spot rates on 1 Nov 20

Total amount in USD	80,000
Forward Rate USD INR	74
Total payable	= 80,000 × 74 = INR 59,20,000



Add: Premia paid upfront @1%	= INR 59,20,000 ×1% = INR 59,200
Add: Interest lost @10% P.a for 6 Months	= 59,200 × 10% × 6/12 = INR 2,960
<b>Total Cash outflow</b>	<b>= INR 59,82,160</b>

Do not hedge and leave exposure open:

Exchange Rate (1)	Probability (2)	= 1 × 2
77	0.15	11.55
71	0.25	17.75
79	0.20	15.80
74	0.40	29.60
<b>Expected USD INR</b>		<b>=74.70</b>
<b>Expected Cash outflow</b>	80,000 × 74.70 <b>= INR 59,76,000</b>	

Expected spot rate results in lower outflow and hence company is advised to leave its exposure unhedged.

### 68. Illustration

Mr. Mammen, an Indian investor invests in a listed bond in USA. If the price of the bond at the beginning of the year is USD 100 and it is USD 103 at the end of the year. The coupon rate is 3% payable annually.

Find the return on investment in terms of home country currency if:

- USD is Flat.
- USD appreciates during the year by 3%.
- USD depreciates during the year by 3%.
- Indian Rupee appreciates during the year by 5%.
- Will your answer differ if Mr. Mammen invests in the bond just before the interest payable?

[RTP May'22, MTP Oct'22, Jul'21 QP (Old)]

**Solution :**

*Assumption :*

- Investment is made at USD 100
  - Interest is received during the year.
- If USD is flat, return is computed as follows :
 
$$\text{Return} = (\text{Capital Gain} + \text{Dividend}) / \text{Opening}$$

$$= 103 - 100 + (100 \times 3\%) / 100 = 3 + 3/100 = 6\%$$
  - USD appreciated by 3% which means INR depreciates, thus more INR will be given.
 
$$\text{Return} = 1.06 \times 1.03 - 1 = 9.18\%$$
  - USD Depreciated by 3% which means INR appreciates, thus fewer INR will be refunded.
 
$$\text{Return} = 1.06 \times (1 - 0.03) - 1 = 1.06 \times 0.97 - 1 = 2.82\%$$
  - INR appreciates by 5% which means USD depreciates, thus fewer INR will be refunded.
 
$$\text{Return} = 1.06 \times (1 - 0.05) - 1 = 1.06 \times 0.95 - 1 = 0.7\%$$
  - No answer will not defer, if Mr Mammen invests just before interest payment.





## 69. Illustration

Humata Ltd., a Japanese Corporation, has sold goods today to Peacock Ltd., an Indian company for an amount of JPY 74 lakhs. The payment will be due in three months from the date of invoice. At today's spot rate, it is equivalent to INR 50 lakhs. It is anticipated that the INR will decline by 10% over the 3-months period and in order to protect the Yen payments, Peacock decides to take appropriate action in the foreign exchange market. The 3-months forward rate is presently quoted at JPY/INR 1.44.

You are required to calculate:

- The expected loss to the importer and
- Impact of hedging by a forward contract.

[Dec'21 QP (Old)]

**Solution :**

i) Total Payable : JPY 74

Payable in spot exchange rate of INR 50 Lakhs

INR JPY (No of JPY per INR) = 74 Lakhs/50 Lakhs = 1.48

INR is expected to depreciate by 10% which means less JPY is required for 1 INR

INR JPY Spot after 3 months = 1.48 - (1-10%) = 1.48 × 0.90 = 1.332

Hedging is done INR JPY 3 month forward @1.44

74 Lakhs JPY @ 1.44 JPY per INR = INR Value of remittance

= 74/1.44 = INR 51.389 Lakhs

Expected loss = Payment value - Initial value

= 51.389 Lakhs - 50 Lakhs = **INR 1.389 Lakhs**

- If no hedging is done then, exchange rate after 10% depreciation of INR would be 1.332  
The payment of 74 Lakh JPY would be = 74/1.332 = INR 55.555 Lakhs  
The total loss would have been = 55.555 Lakhs - 50 lakhs = **INR 5.555 Lakhs**

Hence, because of hedging the loss is reduced by **INR 4.166 Lakhs** ( 5.555 Lakhs - 1.389 Lakhs)

### Exposure

## 70. Illustration

Following are the details of cash inflows and outflows in foreign currency denominations of MNP Co. an Indian export firm, which has no foreign subsidiaries:

Currency	Inflow	Outflow	Spot rate	Forward rate
US \$	4,00,00,000	2,00,00,000	48.01	48.82
French Franc (FFR)	2,00,00,000	80,00,000	7.45	8.12
U.K. £	3,00,00,000	2,00,00,000	75.57	75.98
Japanese Yen	1,50,00,000	2,50,00,000	3.20	2.40

- Determine the impact of net exposure of each foreign currency in terms of Rupees.
- Are any of the exposure positions offsetting to some extent?

(ICAI SM, Old PM)

**Solution :**

*Assumptions:*

- All inflows and outflows are for same date and can be netted off.
- The forward rate pertains to the same tenure for which there are exposures.





Currency	Inflow (Million)	Outflow (Million)	Net Exposure (Million) FC Inflow	Spot Exchange rate	Net Exposure (INR) Million Inflow
USD	40	20	20	48.01	960.20
FFR	20	8	12	7.45	89.40
GBP	30	20	10	75.57	755.70
JPY	15	25	-10	3.20	-32.00
					1773.40

Currency	Net exposure (FC inflow in Million)	Spot	Forward	Premium=Forwa rd - Spot	INR Million (Premium × Net exposure)
USD	20	48.01	48.82	0.81	16.20
FFR	12	7.45	8.12	0.67	8.04
GBP	10	75.57	75.98	0.41	4.10
JPY	-10	3.20	2.40	-0.8	+8.00
					36.34

- ii) Yes, in all currencies inflows and outflows can be netted. W.r.t Yen payables, since we are seeing INR appreciation it also results in a gain

### 71. Illustration

Shanti exported 200 pieces of designer jewellery to USA at \$ 200 each. To manufacture and design this jewellery she imported raw material from Japan of the cost of JP¥ 6000 for each piece. The labour cost and variable overhead incurred in producing each piece of jewellery are Rs. 1,300 and Rs. 650 respectively.

Suppose Spot Rates are:

Rs./ US\$ Rs. 65.00 - Rs. 66.00

JP¥/ US\$ JP¥ 115 - JP¥ 120

Shanti is expecting that by the time the export remittance is received, and payment of import is made the expected Spot Rates are likely to be as follows:

Rs./ US\$ Rs. 68.90 - Rs. 69.25

JP¥/ US\$ JP¥ 105 - JP¥ 112

You are required to calculate the resultant transaction exposure.

(MTP Oct'21 New & Old, MTP Mar'16)

Solution :

Initial exposure and profit based on exchange rates at the time of transaction

	No of units	Per unit rate	Exchange Rate	Total Value in INR
Export	200	USD 200	USD INR 65	26,00,000
Import	200	JPY 6000	JPY INR 66/115 (WN 1)	-6,88,695.65
Labour + variable cost	200	1950	1	-3,90,000
Profit				15,21,304.35



Transaction exposure:

Payable JPY = JPY 12,00,000r

Receivable USD = USD 40,000

Revised foreign exchange rates :

USD INR = 68.90/69.25

USD JPY = 105/112

Exposure Type	Foreign Currency	Foreign Currency Amount	Original Exchange Rate	Revised Exchange Rate	Difference	Impact
Import	JPY	12,00,000	66/115	69.25/105	-0.0856	-102,732.91
Export	USD	40,000	65	68.90	+3.90	+156,000
						+53,267.08

Revised profit = original profit + impact of changes in exchange rate on the transaction exposure  
 = 15,21,304.35 + 53,267.08 = **15,74,571.43**

W/N 1 : JPY INR (No of INR per JPY)

Given USD INR = 65/66 and USD JPY = 115/120

INR JPY = INR/USD × USD/JPY = 66 × 1/115 = 66/115

## 72. Illustration

M/s Omega Electronics Ltd. exports air conditioners to Germany by importing all the components from Singapore. The company is exporting 2,400 units at a price of Euro 500 per unit. The cost of imported components is S\$ 800 per unit. The fixed cost and other variables cost per unit are ₹ 1,000 and ₹ 1,500 respectively. The cash flows in Foreign currencies are due in six months. The current exchange rates are as follows:

₹/Euro 51.50/55

₹/S\$ 27.20/25

After six months the exchange rates turn out as follows:

₹/Euro 52.00/05

₹/S\$ 27.70/75

- A. You are required to calculate loss/gain due to transaction exposure.  
 B. Based on the following additional information calculate the loss/gain due to transaction and operating exposure if the contracted price of air conditioners is ₹ 25,000:  
 (i) the current exchange rate changes to

₹/Euro 51.75/80

₹/S\$ 27.10/15

(ii) Price elasticity of demand is estimated to be 1.5

(iii) Payments and receipts are to be settled at the end of six months.

(ICAI SM, MTP Mar'19 Old)

Solution :

### Part A

Transaction	Foreign Currency	FC Units	A/C units	Total FC	INR per EUR	INR
Export	EURO	500	2400	12,00,000	51.5	6,18,00,000
Import	SGD	800	2400	19,20,000	27.25	(5,23,20,000)
Local Expense	INR	2500	2400	60,00,000	1	(0,60,00,000)
Profit						34,80,000



Transaction exposure : Receivable EURO 12,00,000

Payable SGD 19,20,000

Impact of changes in exchange rates on transaction exposures

Exposure Type	Foreign Currency	Foreign Currency Amount	Original Exchange Rate	Revised Exchange Rate	Difference	Impact
Export	EURO	12,00,000	51.5	52	+0.5	+600,000
Import	SGD	19,20,000	27.25	27.75	(0.5)	(9,60,000)
						(3,60,000)

Revised profit = original profit + impact of changes in exchange rate on the transaction exposure  
 = 34,80,000 + ( 3,60,000) = 31,20,000

**Part B:**

Based on revised sale price

Revised spot on date of crystallisation of exposure is as follows:

Transaction	Foreign Currency	Cost/Units	A/C units	Exchange Rate	INR
Export	EURO	25000	2400	1	6,00,00,000
Import	SGD	800	2400	27.15	(5,21,28,000)
Local Expense	INR	2500	2400	1	(60,00,000)
Profit					18,72,000

Hence revised profit on revised spot = INR 18,72,000

Contracted price = INR 25,000 and current spot = EUR 51.75/80

Implied EURO Price = EURO 483.09

Currency	Earlier	Current
INR	25000	25000
EUR	51.50	51.75
Price in EURO	485.47	483.09

There is reduction in price of EURO by 0.49%

Reduction in price by 0.49% will increase the demand by 0.7246% (0.49 × 1.5)

New quantity demanded will be = 2400 × (1+0.7246%) = 2417 Units

Transaction	Foreign Currency	Cost/Units	A/C units	Exchange Rate	INR
Export	INR	25000	2417	1	6,04,25,000
Import	SGD	800	2417	27.75	(5,36,74,000)
Local Expense :Variable	INR	1500	2417	1	(36,25,500)
Local Expense :Fixed					(24,00,000)
Revised Profit					7,42,100

Profit has reduced from INR 18,72,000 to INR 7,42,100, i.e., reduction of INR 11,29,900





## 73. Illustration

Sun Limited, an Indian company will need \$ 5,00,000 in 90 days. In this connection, following information is given below:

Spot Rate - \$1 = ₹ 71

90 days forward rate of \$1 as of today = ₹ 73.

Interest Rates are as follows:

Particulars	US	India
90 days Deposit Rate	2.50%	4.00%
90 days Borrowing Rate	4.00%	6.00%

A call option on \$ that expires in 90 days has an exercise price of ₹ 74 and a premium of Re. 0.10. Sun Limited has forecasted the spot rates for 90 days as below:

Future Rate	Probability
₹ 72.50	25%
₹ 73.00	50%
₹ 74.50	25%

Which of the following strategies would be the most preferable to Sun Limited:

- A Forward Contract;
- A Money Market hedge;
- An Option Contract;
- No Hedging.

Show your calculations in each case.

(May'19 QP 8 marks, Similar ICAI SM, MTP Apr'18)

Solutions:

- i) **Forward Contract:** At forward rate of INR 73 per 1 USD

The total payable of USD 500,000 in INR terms =  $500,000 \times \text{Rs } 73 = \text{INR } 3,65,00,000$

- ii) **Money Market :**

Borrow INR for 90 days @6% PA ( WN 2)	₹3,52,82,505
Convert USD to INR @spot of 71	₹3,52,82,505 / ₹71 per \$ = \$ 4,96,936.69
Principal (WN 1)	\$ 4,96,936.69
Interest @2.5% P.a for 90 days (	\$3,063.31
Principal + Interest of USD deposit	\$500,000
Get USD	\$500,000
Repay INR loan + 6% Interest p.a WN 3)	₹3,58,04,492.75

WN 1: USD 500,000 after 90 days @2.5% pa

Let original investment be x.

$$x \times (1 + 2.5\% \times 90/365) = 500,000$$

$$1.00616 \times x = 500,000$$

$$x = 500,000 / 1.00616 = 4,96,936.69$$

WN 2: ₹ Required to be borrowed =  $4,96,936.69 \times 71$



W.N 3: INR Repayment = ₹3,52,82,505 X (1 + 6%\*90/365) = ₹3,58,04,492.75

Assumption : interest rate given in the question are per annum rates.

iii) No hedging :

Expected spot after 90days	Probability	Probability weighted
72.50	0.25	18.125
73.00	0.50	36.500
74.50	0.25	18.625
		73.25

Expected outflow = 500,000 × 73.25 = INR 3,66,25,000

iv) Option contract :

Expected Rate	Option Strike price	Option exercised	Applicable Rate	Probability
72.50	74.00	No	72.50	0.25
73.00	74.00	No	73.00	0.50
74.50	74.00	Yes	74.00	0.25
			Probability weighted Rate	73.125

Total outflow	500,000 × 73.125 = 3,65,62,500
Add: Option premia	500,000 × 0.1/USD = INR 50,000
Interest cost on Premia	= 50,000 × 6% × 90/365 = INR 739.73
Total cost	= INR 3,66,13,239.73

On comparing all four options, **monet market hedge** is best suited in case of sun limited as it results in least outflow of ₹3,58,04,492.75

#### 74. Illustration

XYZ, an Indian firm, will need to pay JAPANESE YEN (JY) 5,00,000 on 30th June. In order to hedge the risk involved in foreign currency transaction, the firm is considering two alternative methods i.e., forward market cover and currency option contract.

On 1st April, following quotations (JY/INR) are made available:

Spot	3 months forward
1.9516/1.9711.	1.9726./1.9923

The prices for forex currency option on purchase are as follows:

Strike Price	JY 2.125
Call option (June)	JY 0.047
Put option (June)	JY 0.098

For excess or balance of JY covered, the firm would use forward rate as future spot rate. You are required to recommend cheaper hedging alternative for XYZ.





**Solution :**

**Forward :**

INR JPY 3 M forward = 1.9726/9923

Rate applicable as per Banker Bids to Buy Base Currency = INR JPY 1.9726

Equivalent INR outflow = 500,000/1.9726 = **2,53,472.57**

**Option :**

Strike price INR JPY = 2.1250

5,00,000 JPY to INR = 500,000 / 2.1250 = INR2,35,294.12

Put option premia is applicable as we need to sell INR and buy JPY and the quotes are given in Indirect quote. We need to enter option to sell INR and buy JPY.

Premia = 0.098 JPY per INR

**Total Premia** = 235,294.12 × 0.098 = 23058.82 JPY

Equivalent Premia in INR as premia is paid on initiation date i.e., using spot rate 1.9516

INR premia = 23058.82 / 1.9516 = 11,815.34

Interest cost on upfront premia paid is ignored.

Total cost of 500,000 JPY in case of any option = 11,815.34 + 2,35,294.12 = **2,47,109.46**

**On comparing forward and option, option is cheaper alternative 2,47,109.46 as compared to INR 2,53,472.57**

**75. Illustration**

An American firm is under obligation to pay interests of Can\$ 1,010,000 and Can\$ 705,000 on 31st July and 30th September respectively. The Firm is risk averse and its policy is to hedge the risks involved in all foreign currency transactions. The Finance Manager of the firm is thinking of hedging the risk considering two methods i.e., fixed forward or option contracts.

It is now June 30. Following quotations regarding rates of exchange, US\$ per Can\$, from the firm's bank were obtained:

Spot	1 Month Forward	3 Months Forward
0.9284-0.9288	0.9301	0.9356

Price for a US\$ /CAN\$ option on a U.S. stock exchange (cents per Can\$, payable on purchase of the option, contract size Can\$ 50000) are as follows:

Strike Price (US\$/Can\$)	Calls		Puts	
	July	Sept.	July	Sept.
0.93	1.56	2.56	0.88	1.75
0.94	1.02	NA	NA	NA
0.95	0.65	1.64	1.92	2.34

According to the suggestion of finance manager if options are to be used, one month option should be bought at a strike price of 94 cents and three-month option at a strike price of 95 cents and for the remainder uncovered by the options the firm would bear the risk itself. For this, it would use forward rate as the best estimate of spot. Transaction costs are ignored.

Recommend, which of the above two methods would be appropriate for the American firm to hedge its foreign exchange risk on the two interest payments?

(ICAI SM, MTP Sept'22, MTP Mar'22, MTP Nov'21 New & Old)



Solution :

Hedging using 1Month and 3 Month forward:

	1M	3M
Exposure in CAD	10,10,000	705,000
USD for 1 CAD	0.9301	0.9356
USD outflow if forward is entered	= 10,10,000 × 0.9301 = 939,401	= 705,000 × 0.9356 = 659,598

Option :

	1M	3M
Exposure	10,10,000	705,000
Option Lot size	50,000	50,000
Rounded Lots	=10,10,000/50,000 = 20	=705,000/50,000 = 14
Hedged Portion	CAD 10,00,000	CAD 700,000
Unhedged Portion	CAD 10,000	CAD 5000
Call option strike	0.94 USD per CAD	0.95 USD per CAD
Amount payable on option exercise in USD (1)	10,00,000 × 0.94 = USD 9,40,000	700,000 × 0.95 USD 6,65,000
Premia paid	0.0102 USD per CAD	0.0164 USD Per CAD
Total Premia (2)	= 10,00,000 × 0.0102 CAD = USD 10,200	700,000 × 0.0164 = USD 11,480
Unhedged exposure	CAD 10,000	CAD 5000
Forward rate	USD 0.9301 per CAD	USD 0.9356 per CAD
Unhedged exposure paid (3)	USD 9301	USD 4678
Total payable under option (1+2+3)	USD 959,501	USD 681,158

On comparing option and forward, the best option for firm is to **hedge using forward** as they are cheaper as compared to options.

## 76. Illustration

A Ltd. of U.K. has imported some chemical worth of USD 3,64,897 from one of the U.S. suppliers. The amount is payable in six months' time. The relevant spot and forward rates are:

Spot rate	USD 1.5617-1.5673
6 months' forward rate	USD 1.5455 -1.5609

The borrowing rates in U.K. and U.S. are 7% and 6% respectively and the deposit rates are 5.5% and 4.5% respectively. Currency options are available under which one option contract is for GBP 12,500. The option premium for GBP at a strike price of USD 1.70/GBP is USD 0.037 (call option) and USD 0.096 (put option) for 6 months period.

The company has 3 choices:

- (i) Forward cover
- (ii) Money market cover, and
- (iii) Currency option





Which of the alternatives is preferable by the company?

(ICAI SM, RTP Nov'22, MTP Apr'19, MTP Mar'18)

Solution :

i) Forward Cover

Exposure USD 6M	364,897
Exchange rate applicable (As per Banker Bids to Buy Base Currency )	1.5455
Amount paid in GBP on account for forward cover	= 364,897/1.5455 = GBP 236,102.88

ii) Money Market hedge:

Borrow GBP @7% P.a	GBP 228,512.19
GBP in hand	= 356,867.48/1.5617 = GBP 228,512.19
Convert GBP into USD @ 1.5617 USD per GBP	USD 356,867.48
Principal	= 364,897/1.0225 = USD 356,867.48
Interest @4.5 % P.a ( 2.25% for 6 Months)	= 364,897 - 356,867.48 = 8029.52
Deposit matures in USD	USD 364,897
Get USD in hands	USD 364,897
Repay GBP loan with interest	= 228,512.19 × 1.035 = GBP 236,510.12

iii) Currency option :

Lot Size	GBP 12,500
Strike price	1.70 USD per GBP
1 lot in USD equivalent	= 12,500 × 1.70 = USD 21,250
Exposure	USD 364,897
Lots required	= 364,897/21,250 = 17.17 ~ 17 Lots
Hedged exposure	= 21250 × 17 = USD 361,250 or GBP 212,500
Amount unhedged	= 364,897 - 361,250 = USD 3647

For strike price of 1.70 USD per GBP, base currency is GBP so Put option has to be entered into to sell GBP and buy USD.

Put premia	= 0.096 USD for selling 1 GBP
Total put premia	= 0.096 × GBP212,500 = USD 20,400
Spot rate	GBP USD 1.5617
Equivalent GBP premia (1)	= 20,400/1.5617 = GBP 13,062.69
Unhedged portion	USD 3647
Equivalent GBP outflow (2)	= 3647/1.5455





	= GBP 2,359.75
Option exercised and equivalent GBP outflow (3)	GBP 212,500
Interest on premia paid (4)	GBP 13,062.69 × 7% × 6/12 = GBP 457.19
Total outflow on account of option = 1+2+3+4	= GBP 228,379.63

On comparing three ways of hedging, **Currency Option** is the cheapest as compared to both forward and money market.

### NOSTRO, VORO, LORO

#### 77. Illustration

Suppose you are a dealer of ABC Bank and on 20.10.2014 you found that balance in your Nostro account with XYZ Bank in London is £65,000 and you had overbought £35,000. During the day following transaction have taken place:

(ICAI SM, Nov-24 8M Similar)

	£
DD purchased	12,500
Purchased a Bill on London	40,000
Sold forward TT	30,000
Forward purchase contract cancelled	15,000
Remitted by TT	37,500
Draft on London cancelled	15,000

What steps would you take, if you are required to maintain a credit Balance of £7,500 in the Nostro A/c and keep as overbought position on £7,500?

(ICAI SM)

Solution:

Exchange Position	GBP Purchased	GBP Sold
Opening balance over brought	35,000	
DD Bought	+12,500	
Purchased Bill	+40,000	
Sold forward TT		30,000
Forward Purchase cancelled		15,000
TT remittance		37,500
Draft on London Cancelled	15,000	
	102,500	82,500
Closing Balance Overbought	20,000	

Nostro Account	GBP (Dr)	GBP (Cr)
Opening Balance		65,000
TT Remittance	37,500	
Closing Balance	27,500	

To keep credit balance of GBP 7,500 in Nostro account, you will have to sell GBP 20,000 in spot.



To keep overbought position in exchange Account one must buy in forward market GBP 7,500 as balance is NIL before this transaction in the exchange account.

### 78. Illustration

XYZ Bank, Amsterdam, wants to purchase ₹ 25 million against £ for funding their Nostro account and they have credited LORO account with Bank of London, London.

Calculate the amount of £'s credited. Ongoing inter-bank rates are per \$, ₹ 61.3625/3700 & per £, \$ 1.5260/70.

(ICAI SM, RTP May'19 Old, Old PM)

**Solution :**

Given,

	Bid	Ask
USD INR	61.3625	61.3700
GBP USD	1.5260	1.5270

GBP INR (As per Banker Bids to Buy Base Currency) =  $61.3625 \times 1.5260 = 93.6392$

If remittance of INR 2,50,00,000 is required then equivalent GBP =  $250,00,000 / 93.6392 = \text{GBP } 266,982.20$

GBP required to be credited to Bank of London, LORO = GBP 266,982.20

### 79. Illustration

ABN-Amro Bank, Amsterdam, wants to purchase ₹ 15 million against US\$ for funding their Nostro account with Canara Bank, New Delhi. Assuming the inter-bank, rates of US\$ is 51.3625/3700, what would be the rate Canara Bank would quote to ABN-Amro Bank? Further, if the deal is struck, what would be the equivalent US\$ amount.

(ICAI SM, Old PM)

**Solution :**

Exchange rate applicable (As per Banker Bids to Buy Base Currency) = USD INR 51.3625

The rate Canara bank would quote to ABN Amro in indirect quote (INR USD) will be =  $1 / 51.3625 = \text{USD } 0.01947$  per INR.

Equivalent USD amount =  $15000000 \times 0.01947 = \text{USD } 292,050$

### 80. Illustration

You as a forex dealer have dealing position in your account in London:

Particulars	£
Opening Balance (Oversold)	187,500
Purchase of cheques not credited to the account	164,000
Outstanding Forward Contracts:	
Sales	4,096,500
Purchases	3,651,500
DD issued not yet presented for payment	610,040
Bill purchased in hand not due for	1,442,820

What must you do to square up your position?

(MTP Sept'14)

**Solution :**

Exchange Position	GBP Purchased	GBP Sold
Opening balance over sold		187,500
Purchased cheques not credited	164,000	
Forward Contracts:		





Sales		4,096,500
Purchases	3,651,500	
DD Issued		610,040
Bill purchased not yet due	1,442,820	
	<b>5,258,320</b>	<b>4894040</b>
Overbought position	<b>364,280</b>	

In order to square this position, one has to sell **GBP 364,280**.

### 81. Illustration

You as a dealer in foreign exchange have the following position in Swiss Francs on 31st October, 2009:  
Swiss Francs

Balance in the Nostro A/c Credit	1,00,000
Opening Position Overbought	50,000
Purchased a bill on Zurich	80,000
Sold forward TT	60,000
Forward purchase contract cancelled	30,000
Remitted by TT	75,000
Draft on Zurich cancelled	30,000

What steps would you take, if you are required to maintain a credit Balance of Swiss Francs 30,000 in the Nostro A/c and keep as overbought position on Swiss Francs 10,000?

(ICAI SM, Nov'18 QP 8 marks, RTP Nov'24, MTP Mar'22, MTP Oct'20)

Solution :

Exchange Position	CHF Purchased	CHF Sold
Opening balance over bought	50,000	
Purchase bill on Zurich	80,000	
Sold Forward TT		60,000
Forward Purchase cancelled		30,000
Remitted by TT		75,000
Draft on Zurich cancelled	30,000	
	<b>160,000</b>	<b>165,000</b>
Oversold position		<b>5000</b>
Add: Spot purchase	<b>5000</b>	
Balance	<b>Nil</b>	

Nostro Account	CHF (Dr)	CHF (Cr)
Opening Balance		100,000
TT Remittance	75,000	
Add: Spot purchases		5,000
Closing Nostro Balance	30,000	

Exchange account balance to be 10,000, so 10,000 forward has to be bought. (Balance of Nil to 10,000 over bought)

### Fate of Forward Contracts

### 82. Illustration

On 1 October 2015 Mr. X an exporter enters into a forward contract with a BNP Bank to sell US\$ 1,00,000 on 31 December 2015 at ₹ 65.40/\$. However, due to the request of the importer, Mr. X received amount on 28 November 2015. Mr. X requested the bank to take delivery of the remittance on 30 November 2015 i.e., before due date. The inter-banking rates on 28 November 2015 was as follows:



Spot ₹ 65.22/65.27

One Month Premium 10/15

If bank agrees to take early delivery, then what will be net inflow to Mr. X assuming that the prevailing prime lending rate is 18%.

[ICAI SM, MTP Sept'23, Similar MTP Apr'21 (New & Old), MTP Oct'18]

Solution :

Date	X Ltd	BNP Bank
On 1/10	To sell USD 100,000 @ 65.40 on 31/12	Buy USD 100,000 @65.40 on 31/12
		Back to Back : Agree to sell USD 100,000 @ rate on 31/12
On 28/11	<b>Early Delivery</b> X Ltd sells USD on 28/11 @ 65.40	Bank buys 100,000 USD @ 65.40 on 28/11
		A. Sell USD 100,000 at Spot @ 65.22
		B. Buy 1 month forward for 31/12 @ 65.42
	<b>Swap</b>	<b>Interest</b>
28/11	Sell USD 100,000 @ 65.22	Bought USD 100,000 @ 65.40 (Outflow)
	Buy USD 100,000 @ 65.42	Sold USD 100,000 @ 65.22 (Inflow)
	Loss = USD 100,000 × (65.22-65.42) = USD 100,000 × (0.20) per USD = INR (20,000)	Net outflow = USD 100,000 × (65.40 - 65.22) = ( 18,000)
		Interest cost on net outflow = 18,000 × 18% × 31/365 = (275.18)

Inflow to Mr X

<b>Contract</b>	USD 100,000 @ 65.40 = INR 65,40,000
<b>Less: Swap loss</b>	(20,000)
<b>Less : Interest cost</b>	(275.18)
<b>Net cash inflow</b>	<b>65,19,724.82</b>
<b>Cost of early delivery</b>	= 20,000 + 275.18 = <b>20,275.18</b>

### 83. Illustration

On 15th January 2015 you as a banker booked a forward contract for US\$ 250000 for your import customer deliverable on 15th March 2015 at ₹ 65.3450. On due date customer request, you to cancel the contract. On this date quotation for US\$ in the inter-bank market is as follows:

Spot ₹ 65.2900/2975 per US\$  
Spot/ April 3000/ 3100  
Spot/ May 6000/ 6100

Assuming that the flat charges for the cancellation is ₹ 100 and exchange margin is 0.10%, then determine the cancellation charges payable by the customer.

(ICAI SM)





### Solution :

Date	Customer	Bank
15/1	Buy USD 250,000 @ 65.3450 on 15/3	To Sell USD 250,000 @ 65.3450 on 15/3
		Back to Back : Agree to buy USD 250,000 in interbank @ rate on 15/3
15/3	Cancel the contract	Buy USD 250,000 @ 65.3450
	Pay exchange difference loss of INR 30,000	Sell in market @ spot 65.29
	Add : Flat charges INR 100	Less :exchange margin @ 0.1% = (0.06529)
	Total borne by customer = <b>INR 30,100</b>	Applicable rate = <b>65.2250</b> (rounded off)
		Loss = USD 250,000 × (65.2250 - 65.3450) = INR 30,000

Hence as a result of cancellation of contract on due date, customer has to bear cost of **INR 30,100**.

### 84. Illustration

You as a banker has entered into a 3 month's forward contract with your customer to purchase AUD 1,00,000 at the rate of ₹ 47.2500. However, after 2 months your customer comes to you and requests cancellation of the contract. On this date quotation for AUD in the market is as follows:

Spot ₹ 47.3000/3500 per AUD  
1 month forward ₹ 47.4500/5200 per AUD

Determine the cancellation charges payable by the customer.

(ICAI SM)

### Solution :

Date	Customer	Bank
1/1	Sell AUD 100,000 @ 47.25 on 31/3	To Buy AUD 100,000 @ 47.25 on 31/3
		Back to Back : Agree to sell AUD 100,000 in interbank @ rate on 31/3
1/3	Cancel the contract	Enter into 1M Buy AUD 100,000 contract @ 47.5200
		Buy from market @ 47.52 instead of customer @ 47.25
		Exchange difference Loss for bank = AUD 100,000 × (47.52 - 47.25) = 100,000 × 0.27 = INR 27,000

Hence, because of early cancellation by customer, customer has to bear loss of **INR 27,000**.





## 85. Illustration

Suppose you are a banker and one of your export customers has booked a US\$ 1,00,000 forward sale contract for 2 months with you at the rate of ₹ 62.5200 and simultaneously you covered yourself in the interbank market at ₹ 62.5900. However, on due date, after 2 months your customer comes to you and requests for cancellation of the contract and, also requests for extension of the contract by one month. On this date quotation for US\$ in the market was as follows:

Spot	₹ 62.6800/62.7200
1 month forward	₹ 62.6400/62.7400

Determine the extension charges payable by the customer assuming exchange margin of 0.10% on buying as well as selling.

(ICAI SM)

Solution :

Date	Customer	Bank
1/1	Agree to sell USD 100,000 @ 62.52 on 28/2	Agrees to buy USD 100,000 @ 62.52 on 28/2
		Back to Back : Agrees to sell USD 100,000 in interbank @ 62.59 on 28/2
28/2	Seeks extension	Buy at spot @ 62.72 + 0.1% margin = 62.78272 or 62.7825 (rounded off)
	Contra : Customer to buy USD 100,000 @ 62.72 + 0.1% margin = 62.7825 (rounded off)	Instead of buying from customer @ 62.52, bank is forced to buy from market @ 62.7825
		Hence exchange loss = USD 100,000 × (62.7825 - 62.52) = USD 100,000 × 0.2625 = INR 26,250
28/2	New contract : Sell USD 100,000 on 31/3 @ 62.64 less 0.1% margin = 62.5775 (rounded off)	New contract : Buy 100,000 USD on 31/3 @ 62.5775

The customer will enter into a new contract for USD 100,000 @ 62.5775 to be sold on 31/3 and the cancellation loss to be borne is **INR 26,250**.

## 86. Illustration

Suppose you as a banker entered into a forward purchase contract for US\$ 50,000 on 5<sup>th</sup> March with an export customer for 3 months at the rate of ₹ 59.6000. On the same day you also covered yourself in the market at ₹ 60.6025. However, on 5<sup>th</sup> May your customer comes to you and requests extension of the contract to 5<sup>th</sup> July. On this date (5<sup>th</sup> May) quotation for US\$ in the market is as follows:

Spot	₹ 59.1300/1400 per US\$
Spot/ 5th June	₹ 59.2300/2425 per US\$
Spot/ 5th July	₹ 59.6300/6425 per US\$

Assuming a margin 0.10% on buying and selling, determine the extension charges payable by the customer and the new rate quoted to the customer.

Note: Rates to be rounded off to 4 decimals in multiples of 0.0025.

(ICAI SM)





Solution :

Date	Customer	Bank
5/3	Agree to sell USD 50,000 @ 59.60 on 5/6	Agrees to buy USD 50,000 @ 59.60 on 5/6
		Back to Back : Agrees to sell USD 50,000 in interbank @ on 5/6
5/5	Seeks extension by 1 month	Buy 1 month forward at @59.2425 + 0.1% margin = 59.3017 or 59.3025 (rounded off)
	Contra : Customer to buy USD 50,000 @ 59.2425 + 0.1% margin = 59.3025 (rounded off)	Instead of buying from customer @ 59.60, bank is forced to buy from market @ 59.3025
		Hence exchange gain = USD 50,000 × (59.60 - 59.3025) = USD 50,000 × 0.2975 = INR 14,875
5/5	New contract : Sell USD 50,000 on 5/7 @ 59.63 less 0.1% margin = 59.5700 (rounded off)	New contract : Buy 50,000 USD on 5/7 @ 59.5700

Hence, customer will get exchange gain of INR 14,875

### 87. Illustration

On 10th July, an importer entered into a forward contract with bank for US \$ 50,000 due on 10th September at an exchange rate of ₹ 66.8400. The bank covered its position in the interbank market at ₹ 66.6800.

How the bank would react if the customer requested on 12th September:

- (i) to cancel the contract?
- (ii) to execute the contract?
- (iii) to extend the contract with due date to fall on 10<sup>th</sup> November?

The exchange rates for US\$ in the interbank market were as below:

		10th September	12th September
Spot	US\$1 =	66.1500/1700	65.9600/9900
Spot/September		66.2800/3200	66.1200/1800
Spot/October		66.4100/4300	66.2500/3300
Spot/November		66.5600/6100	66.4000/4900

Exchange margin was 0.1% on buying and selling. Interest on outlay of funds was 12% p.a. You are required to show the calculations to:

- (i) cancel the Contract,
- (ii) execute the Contract, and
- (iii) extend the Contract as above.

(Old PM, Similar Nov 23'QP 8 marks)





## Solution :

Date	Customer	Bank
10/7	2 Month forward Buy USD 50,000 @ 66.84 on 10/9	To sell USD 50,000 @ 66.84 on 10/9
		Back to Back : Agree to buy USD 50,000 in interbank @ 66.68 rate on 10/9
<b>I</b>		
10/9	No action	Buy interbank USD 50,000 @ 66.68 Sell on spot USD 50,000 @ 66.15 instead of selling it to customer
		Optionally deliverable forward contract: To buy USD 50,000 @ 66.3200
12/9	Cancel request	Buy USD 50,000 on 12/9 @ 66.3200 Sell on spot USD 50,000 @ 65.9600 (Cancellation Price ) less 0.1% margin = 65.8950 (rounded off)
	<b>Swap</b> : Spot sold @ 66.15 USD 50,000 and Forward buy @ 66.32 USD 50,000 Loss = USD 50,000 × (66.32-66.15) = 50,000 × 0.17 INR per USD = <b>INR 8,500</b>	
	<b>Interest on cashflows</b> : spot sale @ 66.15 USD 50,000 and Forward buy @ 66.68 USD 50,000 Loss = USD 50,000 × (66.68 -66.15) = 50,000 × 0.53 INR per USD = INR 26,500 Interest = 26,500 × 2/365 × 12% = <b>INR 17.42</b>	
	<b>Exchange difference Loss for bank</b> = USD 50,000 × (65.8950 - 66.8400) = 50,000 × 0.945 = <b>INR 47,250</b>	
	<b>Total loss to be borne by customer on account of cancellation</b> = 47,250 + 8,500 +17.42 = INR 55,767.42	
<b>II</b>	Customer ask for execution	
	Cancellation + New spot = INR 55,767 + USD 50,000 × (65.9900+ 0.1% margin ) = 55,767 + 50,000 × 66.0550 = <b>INR 33,58,517</b>	
<b>III</b>	Extension on 10/11 Cancellation loss + extension with new contract @ 66.49 +0.1% margin = INR 55,767 + 50,000 × 66.5575 = <b>INR 33,83,642</b>	

## 88. Illustration

Y has to remit USD \$ 1,00,000 for his son's education on 4th April 2018. Accordingly, he has booked a forward contract with his bank on 4th January @ ₹ 63.8775. The Bank has covered its position in the market @ ₹ 63.7575.



The exchange rates for USD \$ in the interbank market on 4<sup>th</sup> April and 6<sup>th</sup> April were:



	4 <sup>th</sup> April (₹)	6 <sup>th</sup> April (₹)
Spot USD 1=	63.2775/63.2975	63.1575/63.1975
Spot/April	63.3975/63.4275	63.2775/63.3275
May	63.5275/63.5675	63.4075/63.7650
June	63.7775/63.8250	63.6575/63.7275
July	64.0700/64.1325	63.9575/64.0675

Exchange margin of 0.10 percent and interest outlay of funds @12 percent are applicable. The remitter, due to rescheduling of the semester, has requested on 6<sup>th</sup> April 2018 for extension of contract with due date on 14<sup>th</sup> June 2018.

Rates must be rounded to 4 decimal place in multiples of 0.0025. Calculate:

- Cancellation Rate;
- Amount Payable on \$ 100,000;
- Swap loss;
- Interest on outlay of funds, if any;
- New Contract Rate; and
- Total Cost

[MTP Oct'21 New & Old, May'18 QP (Old)]

Solution :

Date	Customer	Bank
4/1	Agree to Buy 3 Month forward USD 100,000 @ 63.8775 on 4/4	Agrees to sell USD 100,000 @ 63.8775 on 4/4
		Back to Back : Agrees to Buy USD 100,000 in interbank @ 63.7575 on 4/4
4/4	No show up	Buy USD 100,000 @ 63.7575 Sell USD 100,000 @ 63.2775
		Optionally deliverable forward contract (ODFC): Buy USD 100,000 @ 63.4275
6/4	Request for extension USD 100,000 30/6 @ 63.7275	Sell ODFC @spot 63.1575 Cancellation rate = 63.1575 - 0.1% margin = 63.0950
		New contract for USD 100,000 @ 63.7275 + 0.1% margin = 63.7900 (rounded off)

$$\begin{aligned} \text{Cancellation gain/loss} &= \text{USD } 100,000 \times (63.8775 - 63.0950) \\ &= 100,000 \times 0.7825 \\ &= \text{INR } 78,250 \end{aligned}$$

**Swap charges :**  
Buy USD 100,000 @63.4275 and sell USD 100,000 @ 63.2775  
Loss = 100,000 × (63.4275 - 63.2775)  
= USD 100,000 × 0.1500 INR per USD  
= **INR 15,000**

**Interest on cashflows :**  
Buy USD 100,000 @ 63.7575 and sell USD 100,000 @ 63.2775  
Cash outflow = USD 100,000 × ( 63.7575-63.2775)  
= 100,000 × 0.48



= INR 48,000  
 Interest for 2 days @ 12% =  $48,000 \times 2/365 \times 12\%$  = INR 31.56

Total amount payable on account of automatic cancellation =  $78,250 + 15,000 + 32 =$   
 INR 93,282

i) Cancellation rate	63.0950
ii) Exchange gain loss	INR 78,250
iii) Swap loss	INR 15,000
iv) Interest	INR 32
v) New contract rate	63.7900
vi) Total cost	INR 93,282

### 89. Illustration

An importer booked a forward contract with his bank on 10<sup>th</sup> April for USD 2,00,000 due on 10<sup>th</sup> June @ ₹ 64.4000. The bank covered its position in the market at ₹ 64.2800. The exchange rates for dollar in the interbank market on 10<sup>th</sup> June and 13<sup>th</sup> June were:

	10 <sup>th</sup> June	13 <sup>th</sup> June
Spot USD 1=	₹ 63.8000/8200	₹ 63.6800/7200
Spot/June	₹ 63.9200/9500	₹ 63.8000/8500
July	₹ 64.0500/0900	₹ 63.9300/9900
August	₹ 64.3000/3500	₹ 64.1800/2500
September	₹ 64.6000/6600	₹ 64.4800/5600

Exchange Margin 0.10% and interest on outlay of funds @ 12%. The importer requested on 13<sup>th</sup> June for extension of contract with due date on 10<sup>th</sup> August.

Rates to be rounded off to 4 decimals in multiples of 0.0025.

On 10<sup>th</sup> June, Bank Swaps by selling spot and buying one month forward. Calculate:

- Cancellation rate
- Amount payable on \$ 2,00,000
- Swap loss
- Interest on outlay of funds if any
- New contract rate
- Total Cost

[ICAI SM, RTP May'18, MTP Mar'23, Nov'20 QP (Old)]

Solution :

Date	Customer	Bank
10/4	Agree to Buy 2 Month forward USD 200,000 @ 64.40 on 10/6	Agrees to sell USD 200,000 @ 64.40 on 10/6
		Back to Back : Agrees to buy USD 200,000 in interbank @ 64.2800 on 10/6
10/6	No show up	Buy USD 200,000 @ 64.2800 Sell USD 200,000 @ 63.80
		Optionally deliverable forward contract (ODFC): Buy USD 200,000 @ 63.95





13/6	Request for extension USD 200,000 10/8 @ 63	Sell ODFC @spot 63.68 Cancellation rate = 63.68 - 0.1% margin = 63.6175 (rounded off)
		New contract on 10/8 for USD 200,000 @ 64.25 + 0.1% margin = <b>64.3150</b> (rounded off)
	<b>Cancellation gain/loss</b> = USD 200,000 × ( 64.4000- 63.6175) = 200,000 × 0.7825 = <b>INR 156,500</b>	
	<b>Swap charges :</b> Buy USD 200,000 @ 63.9500 and sell USD 200,000 @ 63.8000 Loss = 200,000 × (63.9500 - 63.8000) = USD 200,000 × 0.1500 INR per USD = <b>INR 30,000</b>	
	<b>Interest on cashflows :</b> Buy USD 200,000 @ 64.28 and sell USD 200,000 @ 63.8000 Cash outflow = USD 200,000 × ( 64.2800-63.8000) = 200,000 × 0.48 = INR 96,000 Interest for 3 days @ 12% = 96,000 × 3/365 × 12% = <b>INR 95</b>	
	<b>Total amount payable on account of automatic cancellation</b> = 156,500 + 30,000 + 95 = <b>INR 186,595</b>	

i) Cancellation rate	63.6175
ii) Exchange gain loss	INR 156,500
iii) Swap loss	INR 30,000
iv) Interest	INR 95
v) New contract rate	64.3150
vi) Total cost	INR 186,595

## 90. Illustration

An exporter requests his bank to extend the forward contract for US\$ 20,000 which is due for maturity on 31st October, 2014, for a further period of 3 months. He agrees to pay the required margin money for such extension of the contract.

Contracted Rate - US\$ 1 = ₹ 62.32 The US Dollar quoted on 31-10-2014:-

Spot - 61.5000/61.5200

3 months' Discount - 0.93%/ 0.87%

Margin money from bank's point of view for buying and selling rate is 0.45% and 0.20% respectively.

Compute:

- The cost to the exporter in respect of the extension of the forward contract, and
- The rate of new forward contract.

(RTP May'15)

**Solution :**

Given, USD 20,000 forward maturing on 31/10/14. Forward maturity @ 62.32 INR per USD

Cancellation spot on 31/10 = 61.5000/5200

New forward for 31/10 for 3 month





- i) **Cost for extension** : Since cancellation and extension is on due date, a new contract will be entered into for revised date @ spot and for existing contract cancellation gain/loss will have to be borne.

Date	Customer	Bank
31/10	Agree to sell USD 20,000 @ 62.32	Agrees to buy USD 20,000 @ 62.32 on 31/10 Back to Back : Agrees to sell USD 20,000 in interbank @ on 31/10
31/10	Seeks extension	Cancel the contract: Spot rate applicable = 61.5200 + margin @ 0.20% = 61.6425 (rounded off) Exchange gain = USD 20,000 × (62.32 - 61.6425) = USD 20,000 × 0.6775 = INR 13,550

New forward contract for 3 month = Spot 61.50 - 0.93% (discount) = 60.92805

Less: Margin @ 0.45% = (0.27417)

= 60.65387 ~ 60.6550 (rounded off)

The new forward for 3 month is 60.6550

### 91. Illustration

An importer requests his bank to extend the forward contract for US\$ 20,000 which is due for maturity on 30th October, 2010, for a further period of 3 months. He agrees to pay the required margin money for such extension of the contract.

Contracted Rate - US\$ 1 = ₹ 42.32

The US Dollar quoted on 30-10-2010

Spot - 41.5000/41.5200

3 months' Premium - 0.87% /0.93%

Margin money for buying and selling rate is 0.075% and 0.20% respectively. Compute:

- (i) The cost to the importer in respect of the extension of the forward contract, and  
(ii) The rate of new forward contract.

(ICAI SM, MTP Aug'18 Old)

**Solution :**

Given, USD 20,000 forward maturing on 30/10/10. Forward maturity @ 42.32 INR per USD

Cancellation spot on 30/10 = 41.5000/5200

New forward for 30/10 for 3 month.

Date	Customer	Bank
Unknown	Agree to buy USD 20,000 @ 42.32	Agrees to sell USD 20,000 @ 42.32 on 30/10 Back to Back : Agrees to buy USD 20,000 in interbank @ on 30/10
30/10	Seeks extension	Cancel the contract: Spot rate applicable = 41.5000 - margin @ 0.075% = 41.4700 (rounded off)





$$\begin{aligned} \text{Exchange Loss} &= \text{USD } 20,000 \times (42.32 - 41.4700) \\ &= \text{USD } 20,000 \times 0.85 \\ &= \text{INR } 17,000 \end{aligned}$$

i)

Rate of new forward contract:

Spot selling rate	41.5200
Add: Premium @ 0.93%	0.3861
	<b>41.9061</b>
Add: Margin money @ 0.20%	0.0838
	<b>41.9899</b>

## 92. Illustration

NP and Co. has imported goods for US \$ 7,00,000. The amount is payable after three months. The company has also exported goods for US \$ 4,50,000 and this amount is receivable in two months. For receivable amount a forward contract is already taken at ₹ 48.90.

The market rates for Rupee and Dollar are as under:

Spot	₹ 48.50/70
Two months	25/30 points
Three months	40/45 points

The company wants to cover the risk and it has two options as under:

- To cover payables in the forward market and
- To lag the receivables by one month and cover the risk only for the net amount. No interest for delaying the receivables is earned.

Evaluate both the options if the cost of Rupee Funds is 12%. Which option is preferable?

(ICAI SM, MTP Oct'19, RTP May'18 Old)

Solution :

a)

USD 700,000 3 Month payable cover USD	48.70
INR	
Add: 3 Month premia	0.45
	<b>49.15</b>
Total amount paid after 3 months	700,000 × 49.15 = INR 3,44,05,000
Export proceeds received	= USD 450,000 × 48.90 INR 2,20,05,000
Add : Interest for 1 Month on depositing export proceeds @12% P.a	= 2,20,05,000 × 12% × 1/12 = INR 2,20,050
Total inflow after 3 months	= 2,20,05,000 + 2,20,050 = INR 2,22,25,050
After 3 months outflow	= INR 3,44,05,000
Net outflow	= INR 1,21,79,950

b) Lag receivable by 1 month

Payable after 3 month	USD 700,000
Receivable after 3 month	USD 4,50,000
Net payable after 3 month	USD 2,50,000





Enter into forward contract for 3 month USD 250,000 payable @ 49.15

Net amount paid = 250,000 × 49.15

= INR 1,22,87,500

Cancellation of receivable forward contract :

Original rate to sell USD 450,000 after 2 months= USD INR 48.90

To cancel : Buy USD 450,000 after 2 months = USD INR 48.70 + 0.30 = USD INR 49

Loss = USD 450,000 × (49-48.90) = USD 450,000 × 0.10 INR per USD

= INR 45,000

Loss of INR 45,000 to be paid after 2 months but paid after 3 months to match cashflows.

= 45,000 × (1+1%) = 45,000 × 1.01 = **INR 45,450**

Total amount to be paid after 3 months = INR 1,22,87,500 + 45,450 = **INR 1,23,32,950**

Hence, after comparing both the options, option A is preferable as total amount to be paid is INR 1,21,79,950 as compared to INR 1,23,32,950 in option B.

### 93. Illustration

On 1st January 2019 Global Ltd., an exporter entered into a forward contract with BBC Bank to sell US\$ 2,00,000 on 31<sup>st</sup> March 2019 at ₹ 71.50/\$. However, due to the request of the importer, Global Ltd. received the amount on 28 February 2019. Global Ltd. requested the Bank to take delivery of the remittance on 2nd March 2019. The Inter- banking rates on 28th February were as follows:

Spot Rate	₹ 71.20/71.25
One month premium	5/10

If Bank agrees to take early delivery then what will be the net inflow to Global Ltd. assuming that the prevailing prime lending rate is 15%. Assume 365 days in a year.

(May'19 QP 8 marks)

Solution :

Date	Customer	Bank
1/1/19	Agree to sell 3 Month forward USD 200,000 @ 71.50	Agrees to buy USD 200,000 @ 71.50 on 31/3
		Back to Back : Agrees to sell USD 200,000 in interbank @
28/2	Early delivery	Buy from customer USD 200,000 @ 71.50
		Buy 1M forward in interbank @ 71.25 + 0.10 = 71.35
		Sell USD 200,000 at spot @ 71.20
	<b>Swap :</b>	
	Sell spot USD 200,000 @	71.20
	Buy USD 200,000 @	71.35
	Swap Loss on USD 200,000	<b>0.15</b>
	Total loss	= 200,000 × 0.15 = INR 30,000
	<b>Interest on cashflows :</b>	
	Buy USD 200,000	71.50
	Sell USD 200,000	71.20
	Loss on USD 200,000	<b>0.30</b>





Total loss	= 200,000 × 0.30 = INR 60,000
Interest = 60,000 × 15% × 31/365 = INR 764	
Early deliver charges = INR 30,000 + 764 = INR 30,764	
Net amount received = (200,000 × 71.50) - 30,764 = INR 1,42,69,236	

#### 94. Illustration

On 19<sup>th</sup> January, Bank A entered into forward contract with a customer for a forward sale of US\$ 7,000, delivery 20<sup>th</sup> March at ₹ 46.67. On the same day, it covered its position by buying forward from the market due 19<sup>th</sup> March, at the rate of ₹ 46.655. On 19<sup>th</sup> February, the customer approaches the bank and requests for early delivery of US\$. Rates prevailing in the interbank markets on that date are as under:

Spot (₹/\$) 46.5725/5800

March 46.3550/3650

Interest on outflow of funds is 16% and on inflow of funds is 12%. Flat charges for early delivery are ₹ 100.

What is the amount that would be recovered from the customer on the transaction?

Note: Calculation should be made on months basis than on days basis. (Nov 18 N)

(Nov'18 QP 8 marks)

Solution :

Date	Customer	Bank
19/1	Agree to buy 2 Month forward USD 7,000 @ 46.67	Agrees to sell forward USD 7,000 @ 46.67 on 18/3
		Back to Back :
		Agrees to buy USD 7,000 in interbank @ 46.655
19/2	Early delivery	Sell to customer USD 7,000 @ 46.67
		Buy USD 7,000 at spot @ 46.58
		Sell forward USD 7,000 on 20/3 @ 46.355
	<b>Swap :</b>	
	Sell spot USD 7,000 @	46.355
	Buy USD 7,000 @	46.58
	Swap Loss on USD 7,000	<b>0.225</b>
	Total loss	= 7,000 × 0.225 = INR 1,575
	<b>Interest on cashflows :</b>	
	Buy USD 7,000	46.67
	Sell USD 7,000	46.58
	Loss on USD 7,000	<b>0.09</b>
	Total net inflow	= 7,000 × 0.09 = INR 630
	Interest received= 630 × 12% × 1/12 = INR 6.30	
	Early deliver charges = INR 1,575 - 6.30 + 100 = INR 1,668.7	
	Net amount paid = (7,000 × 46.67) + 1,668.7 = INR 3,28,358.70	





## 95. Illustration

A customer with whom the Bank had entered into 3 months' forward purchase contract for Swiss Francs 10,000 at the rate of ₹ 27.25 comes to the bank after 2 months and requests cancellation of the contract. On this date, the rates, prevailing, are:

Spot CHF 1 = ₹ 27.30/27.35

One month forward ₹ 27.45/27.52

What is the loss/gain to the customer on cancellation?

(ICAI SM)

Solution :

Date	Customer	Bank
Day 0	Agree to sell CHF 10,000 @ 27.25	Agrees to sell CHF 10,000 @ 27.25 after 3 months Back to Back : Agrees to buy CHF 10,000 in interbank @ after 3 months
After 2 M	Cancellation	Buy CHF 10,000 forward 1Month @ 27.52
	Agreed to buy from customer @ 27.25 but had to purchase on 60 <sup>th</sup> Day @ 27.52	
	Loss = 27.52 - 27.25 = 0.27 INR per CHF Total loss = CHF 10,000 × 0.27 = INR 2,700	

## 96. Illustration

On 1st October, 2020 Mr. Guru, an exporter, enters into a forward contract with the Bank to sell USD 1,00,000 on 31st December 2020 at INR/USD 75.40. However, at the request of the importer, Mr. Guru received the amount on 30th November, 2020. Mr. Guru requested the bank take delivery of the remittance on 30th November, 2020 i.e., before due date.

The inter-bank rate on 30th November 2020 was as follows:

Spot INR/USD 75.22-75.27

One Month Premium 10/15 Assume 365 days in a year.

- If bank agrees to take early delivery then what will be net inflow to Mr. Guru assuming that the prevailing prime lending rate is 18% per annum.
- If Mr. Guru can deploy these funds in USD, he gets return at the rate of 3% per annum. Which is better? Why?

[Jul'21 QP (Old)]

Solution :

i)

Date	Customer	Bank
1/10	Agree to sell 3 Month forward USD 100,000 @ 75.4 on 31/12	Agrees to Buy 3 Month forward USD 100,000 @ 75.4 on 31/12 Back to Back : Agrees to sell USD 100,000 3Month forward in interbank @ 75.4
30/9	Early delivery	Buy from customer USD 100,000 @ 75.4 Sell USD 100,000 at spot @ 75.22
		Buy forward 1Month USD 100,000 @ 75.27 + 0.15 = 75.42
	Swap :	
	Sell spot USD 100,000 @	75.22





Buy USD 100,000 @	75.42
Swap Loss on USD 100,000	<b>0.20</b>
Total loss	= 100,000 × 0.20 = INR 20,000
<b>Interest on cashflows :</b>	
Bank to Sell USD 100,000 at Spot	75.22
Bank to BUY USD 100,000 from Customer	75.40
Loss on USD 100,000	<b>0.18</b>
Total net Outflow	= 100,000 × 0.18 = INR 18,000
Interest = 18,000 × 18% × 31/365 = INR 275.18	
Early deliver charges = INR 20,000 + 275.18 = INR 20,275.18	
Net amount received = (100,000 × 75.40) - 20,275.18 = <b>INR 75,19,724.82</b>	

ii)

If money in USD received early, they can be deployed @ 3% P.a

Interest = USD 100,000 × 3% × 31/365  
= USD 254.79

Forward contract for 1 month to sell USD 254.79 @ 75.32 per USD ;  
Amount realised = USD 254.79 × 75.32 = INR 19,190.78

Add : Export proceeds on 31/12 @ forward rate of INR 75.4 = 100,000 × 75.4 = INR 75,40,000

Total amount received in hand = 75,40,000 + 19,190.78 = INR 75,59,190.78

On comparing above two methods, it is better to place export proceeds in USD deposit and realise higher amount.

However, the early delivery proceeds of INR 75,19,724.82 is received on 30/11 as compared to export proceeds by deposit on 30/12.

So, considering, 18% P.a is available to deposit for 1 month, amount realised after 1 month will be  
= INR 75,19,724.82 + 75,19,724.82 × 18% × 31/365 = **INR 76,34,683.90**

Hence in this case, early delivery is better.

### 97. Illustration

A bank enters into a forward purchase TT covering an export bill for Swiss Francs 1,00,000 at ₹ 32.4000 due 25th April and covered itself for same delivery in the local interbank market at ₹ 32.4200. However, on 25th March, exporter sought for cancellation of the contract as the tenor of the bill is changed.

In Singapore market, Swiss Francs were quoted against dollars as under:

Spot	USD 1 = Sw.	1.5076/1.5120
Fcs.		
One month forward		1.5150/ 1.5160
Two months forward		1.5250 / 1.5270
Three months forward		1.5415/ 1.5445

And in the interbank market US dollars were quoted as under:



Spot	USD 1	49.4302/.4455
= ₹		
Spot/April		.4100/.4200
Spot/May		.4300/.4400
Spot/June		.4500/.4600

Calculate the cancellation charges, payable by the customer if exchange margin required by the bank is 0.10% on buying and selling. (ICAI SM, MTP Oct'23)

Solution :

Given,

	Spot	April 25 Forward
USD INR	49.4302/4455	49.8402/8655 (WN 1)
USD CHF	1.5076/5172	1.5150/5160

Date	Customer	Bank
Day 0	Agree to sell CHF 100,000 on 25/4 @ 32.40	Agrees to Buy CHF 100,000 @ 32.40 on April 25
		Back to Back : Agrees to sell CHF 100,000 in interbank @ 32.42 on April 25
After 2 M	Cancellation	Buy CHF 100,000 1 Month forward @ 32.9475 (WN 2)
	Booking rate = 32.40 and cancellation rate = 32.9475	
	Cancellation loss = 0.5475 INR per CHF	
	Total loss = CHF 100,000 × 0.5475 = <b>INR 54,750</b>	

WN 1:

Spot rate 49.4302/49.4455  
Add : Forward points 0.4100/4200  
Forward rate 1 Month 49.8402/8655

WN 2:

USD CHF = 1.5150 and USD INR = 49.8655  
So, CHF INR = 49.8655/1.5150 = 32.9145  
Add : Margin @ 0.1% = 0.329  
CHF INR = 32.9474 ~ 32.9475 (rounded off)

### Others

#### 98. Illustration

M/s. Daksh Ltd is planning to import multipurpose machines from the USA at a cost of \$15000. The company can avail loans at 19% Interest per annum with quarterly rests with which it can import the machine. However, there is an offer from New York branch of an Indian based bank extending credit of 180 days at 2% per annum against opening of an irrevocable letter of credit.

Other Information:

Spot rate US\$ 1 = ₹ 75

180 days forward rate US \$ 1 = ₹ 77

The commission charges for a letter of credit at 2% per 12 months.





- (i) Justify why the offer from the foreign branch should be accepted?  
 (ii) Based on the present market condition the company is not interested in taking the risk of currency fluctuations and wanted to hedge with an additional expense of ₹ 30,000, if so, what is your advice to the company?  
 Assume 360 days in the year.

(May'22 QP 8 marks)

**Solution:**

Machine Import Cost	= \$15,000
Local Borrowing	= 19% (with Quarterly Rest)
Foreign Currency LC based borrowing	= 2% p.a
LC Commission paid upfront	= 2% p.a
LC tenor	= 180 days
Day Convention	= 360 days

USD/INR	
Spot	= 75
180 Forward	= 77

**Cost of Local Borrowing from Importer**

USD to be paid	= \$15,000
USD/INR Spot	= 75
INR to be paid	= 15,000 * 75 = ₹ 11,25,000

Borrow at 19% p.a with Quarterly rests

$$A = P * (1 + r/n)^{nt}$$

Here, n = 4  
 r = 19%  
 t = 0.5

$$\text{Amount to be repaid after 180 days, } A = 11,25,000 * (1 + \frac{19\%}{4})^{4*0.5} = ₹ 12,34,413$$

Foreign Currency Borrowing

LC Value	= ₹ 11,25,000
LC Commission @2% for 180 Days	= 11,25,000 * 2% * $\frac{180}{360}$ = ₹ 11,250

$$\text{FV of LC Commission paid} = 11250 * 1.0475^2 = ₹ 12,344.13 \quad \text{(A)}$$

$$\begin{aligned} \text{Interest in USD} &= \$15,000 * \frac{180}{360} * 2\% = \$ 150 \\ \text{Amount to be repaid after 180 days in USD} &= 15,000 + 150 = \$15,150 \\ \text{Forward Rate after 180 days USD/INR} &= 77 \\ \text{Amount to be repaid after 180 days in INR} &= 15,150 * 77 = ₹ 11,66,550 \quad \text{(B)} \end{aligned}$$

$$\begin{aligned} \text{Total Cost of opening LC and making a FC borrowing} \\ \text{A+B} &= ₹ 11,78,894.13 \end{aligned}$$

- i) Offer from foreign branch of Indian bank **should be accepted** as the overall cost of Import + Borrowing is cheaper by ₹ 55,519



- ii) Even if the company incurs additional amount of ₹ 30,000 towards hedging the FC borrowing is cheaper by ₹ 25,519. Hence, the **Company should borrow in FC** even in this scenario.

### 99. Illustration

A Japanese company imports hi-tech printer cartridges from US worth \$1 million. The chief financial officer of the company wishes to know the best strategy for protection against uncertainty, for the payment that has to be made at the end of 3 months. Financial team of the company has collected the following options for evaluation:

Table-1: Exchange rates quoted in FOREX Market:

¥/\$ Quotations	Bid Price	Offer/Ask Price
Spot Rates	146.03	146.63
3M - Forward Rates	144.03	145.00
6M - Forward Rates	146.35	146.70

Table-2 : Options Market rates for European options with 3 months expiry :

Type of Option	Strike Price (X) (¥/\$)	Premium (%) for Call & Put Options
Call & Put	145.20	1.6766% (Call) & 1.7414% (Put)
Call & Put	146.00	1.3505% (Call) & 2.1006% (Put)

The expected spot price at expiry is ¥/\$ : 144.90/145.05

Suggest the best strategy for CFO of the Japanese Company to protect against uncertainty, with respect to the following alternatives :

- Forward Hedge
- Buy 3 months call, X = 145.20
- Sell 3 months put, X = 145.20
- Buy call & sell put both having X = 146.00 (Nov 23'QP 8 marks)

#### Solution:

- (i) Forward Hedge

Amount payable after 3 months

\$ 1,000,000 @ Forward rate of Yen 145 Per USD = ₹ 145 million

- (ii) Buy 3 month call option | Strike Price = ₹ 145.20

Premium = 1 Mio x 145.20 x 1.6766%

= Yen 2434423

= Yen 2.43 Million

Spot on Maturity Date = ₹ 145.05 The option to buy @ 145.20 will not be exercised

Accordingly the cost of import will be





Spot	¥ 145.05 million
Add: Premium Paid*	¥ 2.43 million
<b>Total</b>	<b>¥ 147.48 million</b>

\*Time value ignored

(iii) Selling 3 month Put at Strike of ¥ 145.20

Premium Receipt  $¥ 145.20 \times 1.7414\% \times \$ 1 \text{ million} = ¥ 2.528 \text{ million}$

On Maturity the put option will be exercised as spot bid rate is 144.90 compared to put strike of ¥ 145.20

Total cost of imports will be

Buying Yen in under option after 3 month	¥ 145.20 million
Less: Premium Receipt $¥ 145.20 \times 1.7414\% \times \$ 1 \text{ million}$	¥ 2.528 million
<b>Net Cost</b>	<b>¥ 142.67 million</b>

(iv) Buying Call and selling Put at Strike of ¥ 146

Premium paid on call option =  $¥ 146.00 \times 1.3505\%$  = ¥ 1.9717 million

Premium Receipt on Put option =  $¥ 146.00 \times 2.1006\%$  = ¥ 3.0669 million

**Net premium Received = ¥ 1.0952 million**

Option	Buy Call	Sell Put
Strike	146	146
Spot on Maturity	145.05	144.90
Exercised	No	Yes

Put option by buyer will be exercised. Accordingly, cost of 1 Mio USD will be

Buying US\$ under Put Option ¥ 146.00 million

Less: Receipt of Net Premium ¥ 1.09520 million

**Net ¥ 144.905 million**

Decision: Selling a put option is the best course of action as the net cost buying 1 Mio USD is lowest @ Yen 142.67 Mio

## 100. Illustration

On 20.10.2024, the balance in NOSTRO account with XYZ Bank in London was GBP 80000 and the balance in overbought was GBP 50000. During the day the following transactions have taken place:

Events	Amount (GBP)
DD Purchased	25,000
Purchased a bill on London	75,000
Sold forward TT	50,000
Forward purchased contract cancelled	25,000
Remitted by TT	42,500
Draft in London cancelled	20,000



What steps would you take if you are required to maintain a credit balance of GBP 10,000 in the NOSTRO account and keep as Overbought position on GBP 32,500?

(Nov'24 QP 8 marks)

**Solution:**

Nostro Account / Cash position

	Debit (GBP)	Credit (GBP)
Opening Balance		80,000
TT Remittance	42,500	
Spot Sell (balance figure)	27,500	
To Balance C/d (already given)	10,000	
<b>Total</b>	<b>80,000</b>	<b>80,000</b>

Exchange Position

	Purchased (GBP)	Sold (GBP)
Overbought Opening Balance	50,000	
DD Purchased	25,000	
Bill on London Purchased	75,000	
Sold Forward TT		50,000
FWD purchase Cancelled		25,000
Remittance by TT		42,500
Draft on London Cancelled	20,000	
<b>Sub : Total</b>	<b>1,70,000</b>	<b>1,17,500</b>
To Balance C/d (Overbought)		52,500
<b>Grand Total</b>	<b>1,70,000</b>	<b>1,70,000</b>
To Balance b/d Overbought	52,500	
Spot Sell on Nostro (Entry from Nostro)		27,500
<b>Forward Buy (Balance figure)</b>	<b>7,500</b>	
<b>Closing Balance (Provided in Question) c/d</b>		<b>32,500</b>
<b>Total</b>	<b>60,000</b>	<b>60,000</b>

In order to maintain Closing balance of GBP 10000 in Nostro & Overbought position of GBP 32500 in Exchange position the Bank should  
Spot Sell GBP 27,500, &  
Forward Buy GBP 7,500

### 101. Illustration

True Life Inc., a US-based company, has won a contract to implement a project in India. The project will require an initial investment of ₹8,000 million. The project, along with the equipment, will be sold to the Indian Government for ₹9,600 million in one year. Since the Indian Government will pay in Indian Rupees (₹), the company is worried about exposure due to exchange rate volatility.

Construct a swap that will help True Life Inc. to reduce exchange rate risk. Assume the Indian Government offers a swap at the spot rate, which is INR/USD 80 in one year. The spot rate after one year is expected to be INR/USD 84. Further, you may assume True Life Inc. can take a USD loan at 6% per annum. Advise whether the company should opt for this option or do nothing.

(Nov'24 QP 6 marks)





### Solution:

Org Investment INR Mn	8000
Current Spot USD INR	80
Org Investment USD Mn (8000/80)	100
Sale Value after 1 year INR Mn	9600
Expected Spot After 1 Year USD INR	84
Sale Value based on expected Spot 9600/84 (USD Mn)	114.29
Sale Value based on Current Spot 9600/80 (USD Mn)	120

Option 1:

If Swap is considered for entire Sale Value

	USD Mn
Sale Value (9600/80)	120
Less: Original Investment (8000/80)	100
Less: Interest @ 6% on 100 Mn for 1 year	6
<b>Net Surplus / Profit</b>	<b>14</b>

Option 2:

If Swap is considered for Original Investment Value & Profit portion is @ Future Spot

	USD Mn
Investment portion of Sale Value (8000/80)	100
Profit portion of Sale Value (1600/84)	19.05
Less: Original Investment (8000/80)	100
Less: Interest @ 6% on 100 Mn for 1 year	6
<b>Net Surplus / Profit</b>	<b>13.05</b>

Option 3:

If Swap is not considered @ transaction is executed at Future Spot

	USD Mn
Sale Value (9600/84)	114.29
Less: Original Investment (8000/80)	100.00
Less: Interest @ 6% on 100 Mn for 1 year	6.00
<b>Net Surplus / Profit</b>	<b>8.29</b>

The Company Should Option for Swap if possible for full sale proceeds; if that is not possible swap should be executed for investment value at least

### 102. Illustration

Mr. X gets the following 2-way quotes in the foreign exchange market:

	Spot	2-months Forward
₹/US\$	86.00/86.20	88.00/88.40

Calculation upto two decimal place.

You are required to calculate -

- How many US Dollars should Mr. X sell to get ₹ 40,00,000 after 2 months?
- How many Rupees Mr. X is required to pay to obtain US\$ 3,00,000 in the spot market?
- Assume that Mr. X has US\$ 75,000 in current account earning no interest. Return on Investment on rupee investment is 12% per annum. Should Mr. X convert the US\$ now or 2 months later?





## Solution:

### Part 1

₹40 Lacs to be received after 2 months

Mr. X should enter into a 2 month forward contract where he sells USD and gets INR in return i.e ₹88 per USD ( i.e BID) - remember BBBBC

$$\begin{aligned} \text{USD to be sold} &= ₹40,00,000 / ₹88 \text{ per 1 USD} \\ &= \text{USD } 45,454.545 \end{aligned}$$

### Part 2

Mr. X intends to buy USD 3,00,000 in spot

Relevant rate is ₹86.20 per USD ( ASK)

$$\begin{aligned} \text{So INR has to be paid} &= \text{USD } 300,000 \times ₹86.2 \text{ per USD} \\ &= ₹2,58,60,000 \end{aligned}$$

### Part 3

USD 75,000 converted now & deposited in INR

$$\text{INR received} = \text{USD } 75,000 \times ₹86 \text{ per USD} = ₹ 64,50,000$$

Deposit @12% p.a for months

$$\text{Interest} = 64,50,000 \times 12\% \times 2/12 = ₹1,29,000$$

$$\text{Final Amount in Hand} = ₹64,50,000 + ₹1,29,000 = ₹ 65,79,000 \text{ ----- A}$$

USD 75,000 converted into INR after 2 months

$$\text{USD } 75,000 \times ₹88 \text{ per USD} = ₹66,00,000 \text{ ----- B}$$

Since Forward rate is giving us higher amount of ₹66 Lakhs it is better to convert USD 75,000 after 2 months and not now

### Alternative way to look at it

INR depreciation from ₹86 to ₹88 is ₹ 2

It works to 13.95% PA (i.e  $2 \times 6/86$ )

Forward has higher premium so better enter into a forward contract instead of converting in spot and depositing in INR

## 103. Illustration

On 1st February 2025, XYZ Ltd. a laptop manufacturer imported a particular type of Memory Chips from SKH Semiconductor of South Korea. The payment is due in one month from the date of Invoice, amounting to 1190 million South Korean Won (SKW). Following Spot Exchange Rates (1st February) are quoted in two different markets:

USD/ INR	85.00/ 85.50	in Mumbai
USD/ SKW	1390.00/ 1390.90	in New York

Since hedging of Foreign Exchange Risk was part of company's strategic policy and no contract for hedging in SKW was available at any in-shore market, it approached an offshore Non-Deliverable Forward (NDF) Market for hedging the same risk. In NDF Market a dealer quoted one-month USD/ SKW at 1390.00/1390.60 to be settled at reference rate declared by Bank





of Korea. After 1 month (1st March 2020) the dealer agreed for SKW 1385/ USD as rate for settlement and on the same day the Spot Rates in the above markets were as follows:

USD/ INR 85.50/ 85.75 in Mumbai

USD/ SKW 1388.00/ 1388.60 in New York

Analyze the position of company under each of the following cases, comparing with Spot Position of 1st February: (i) Do Nothing. (ii) Opting for NDF Contract. Note: Both ₹/ SKW Rate and final payment (to be computed in ₹ Lakh) to be rounded off upto 4 decimal points.

(RTP Sep'25)

Solution:

Part 1 Do Nothing

We shall compute the cross rates on both days and shall compare the amount payable in INR on these two days.

On 1st February 2025

Rupee - Dollar selling rate = ₹ 85.50 ( BBBBC - Since XYZ is buying dollar Ask will be applicable)

Dollar - SKW = SKW 1390.00 ( Since XYZ is selling USD, Bid will be applicable)

Rupee - SKW cross rate = ₹ 85.50 / 1390.00 = ₹ 0.0615 /SKW

( INR /USD x USD / SKW = INR / SKW)

Amount payable to Importer as per above rate (1190 Million SKW x ₹ 0.0615 / SKW) = ₹ 731.8500 Lakh

On 1st March 2025

Rupee - Dollar selling rate = ₹ 85.75 / USD

Dollar - SKW = SKW 1388.00 / USD

Rupee - SKW cross rate = ₹ 85.75 / 1388.00 = ₹ 0.0618 ( INR /USD x USD / SKW = INR / SKW)

Amount payable to Importer as per above rate (1190 Million x ₹ 0.0618) = ₹ 735.4200 Lakh

Thus, Exchange Rate Loss = (₹ 735.4200 Lakh - ₹ 731.8500 Lakh) = ₹ 3.5700 Lakh

(ii) Hedging in NDF

Since company needs SKW after one month it will take long position in SKW at quoted rate of SKW 1390/ USD and after one-month it will reverse its position at fixing rate of SKW 1385/USD. The profit/ loss position will be as follows:

Buy SKW 1190 Million and sell USD (1190 Million/ 1390)	USD 8,56,115.1079
Sell SKW 1190 Million and buy USD at Fixing Rate (1190 Million/ 1385)	USD 8,59,206.7762





Profit	USD 3,090.6683
--------	----------------

Final Position

Amount Payable in Spot Market (as computed earlier) ₹735.4200 Lakh

Less: Profit from NDF Market USD 3090.6683 × 85.50	₹ 2.6425 Lakh
	₹ 732.7775 Lakh

Thus, Exchange Rate Loss = (₹ 732.7775 Lakh - ₹ 731.8500 Lakh) = ₹ 0.9275 Lakh

Decision: Since Exchange Loss is less in case of NDF same can be opted for.

#### 104. Illustration

Quick & Smart Inc. is a leading software development company in the UK. It has a substantial portfolio of trade in various countries including the USA. It has recently invoiced a USA customer with the sum of USD (\$) 75,00,000 receivable in one year's time. Quick & Smart Inc.'s Chief Finance Officer (CFO) is considering two alternatives for hedging the exchange risk:

Alternative I: Borrowing present value of USD (\$) 75,00,000 now for one year, converting the amount into GBP (£), and repaying the loan out of eventual receipts.

Alternative II: Entering a 12-month forward exchange contract with the company's bank to sell the USD (\$) 75,00,000.

The spot exchange rate is GBP (£) 1 = USD (\$) 1.3288

The 12-month forward exchange rate is GBP (£) 1 = USD (\$) 1.3128 Interest rates for 12 months are = USA 4.50%; and UK 5%.

You are required to -

Calculate net proceeds in GBP (£) under both the alternatives and advise the company.

Note: Ignore bank commission and decimals. (Sep-25 7 Marks)

Solution:

Alternative 1:

PV of USD 75,00,000 @ 4.5% for 1 year =  $USD\ 75,00,000 / 1.045 = USD\ 71,77,073$

Borrow 71,77,073 USD and Convert the USD to GBP at current Exchange Rate 1.3288

$USD\ 71,77,073 \times 1\ GBP / 1.3288\ USD = GBP\ 54,01,139$

Make a GBP Deposit @ 5%

GBP Proceeds after 1 year =  $GBP\ 54,01,139 \times 1.05 = GBP\ 56,71,196$



## Alternative 2

Forward Contract to sell 75,00,000 USD & Buy GBP @ 1.3128 USD per GBP

Inflow after 1 year = 75,00,000 USD × 1 GBP / 1.3128 USD = GBP 57,12,980

Alternative 2 results in higher GBP inflow and hence choose that

### 105. Illustration

XYZ Ltd. has imported goods to the extent of US\$ 8 Million. The payment terms are as under:

- (1) 1% discount if full amount is paid immediately, or
- (2) 60 days interest free credit. However, in case of a further delay up to 30 days, interest at the rate of 8% p.a. will be charged for additional days after 60 days. XYZ Ltd. has ₹ 25 Lakh available and for remaining it has an offer from bank for a loan upto 90 days @ 9.0% p.a. The quotes for foreign exchange are as follows:

Spot Rate INR/ US\$ (buying) ₹ 66.98

60 days Forward Rate INR/ US\$ (buying) ₹ 67.16 90 days Forward Rate INR/ US\$ (buying) ₹ 68.03

Advise which one of the following options would be better for XYZ Ltd.:

- (i) Pay immediately after utilizing cash available and for balance amount take 90 days loan from bank.
- (ii) Pay the supplier on 60th day and avail bank's loan (after utilizing cash) for 30 days.
- (iii) Avail supplier's offer of 90 days credit and utilize cash available.

Further presume that the cash available with XYZ Ltd. will fetch a return of 4% p.a. in India till it is utilized.

Note:

- Assume year has 360 days.
- Ignore Taxation.
- Cashflows ₹ in Crore.
- Round off all intermediate and final calculations to four decimal places.

(Jan 26 Q 2a 6 Marks)

Solution:

Option 1:

Pay immediately

	Working	Amount in Rs. Cr
Payment in USD today	8 Mio USD × 99% × 66.98 / 1 cr	53.0482
Less: Money in hand		0.25
Net amount paid today		52.7982
Interest on Money borrowed @9% pa for 90 days	52.7982 × 90/360 × 9%	+1.1880





Total Cash Outflow ( Per faculty)		53.9862
Add Cash paid from existing balance Including opportunity cost	$0.25 \times 4\% \times 90/360 = 0.0025$	0.2525
Cash outflow considered by ICAI		54.2387

#### Pay supplier in 60 days

	Working	Amount in Rs. Cr
Payment in USD after 60 days	8 Mio USD $\times$ 67.16/ 1 cr	53.728
Less: Money in hand after 60 days at 4% int	$0.25 + 0.25 \times 60/360 \times 4\%$	-0.2517
Net amount paid after 60 days		53.4763
Interest on Money borrowed @9% pa for 30 days	$53.4763 \times 30/360 \times 9\%$	+0.4011
Total Cash Outflow after 90 days ( Per faculty)		53.8774
Add Cash paid from existing balance	0.0025	0.2500
Cash outflow considered by ICAI		54.1274

#### Pay supplier by taking create for 90 days

	Working	Amount in Rs. Cr
Payment in USD after 90 days	8 Mio	
Add Interest @ 8% for 30 days	$8 \text{ Mio} \times 8\% \times 30/360 = 53,333$	
Total amount paid after 90 days	$8,053,333 \times 68.03$	54.7868
Less: Surplus money incl interest	$0.25 + 0.25 \times 90/360 \times 9\%$	-0.2525
Total Cash Outflow after 90 days ( Per faculty)		54.5343
Cash outflow considered by ICAI	$54.5343 - 0.2500$	54.7843

#### 106. Illustration

Following are the direct quotes available in the international market: GBP1 = EURO 1.2950/65 (Direct rate)

GBP1 = USD 1.6025/6000 EURO1 = USD 1.2375/9000

You are required to:

- Calculate Bid & Ask Cross Rates for Euro per Pound (Euro/Pound)
- Prove that arbitrage gains are not possible if-

(a) You buy Pounds against Euro under direct route and sell through cross rate route.

(b) You sell Pounds against Euro under direct route and buy through cross rate route.

(Q 3b Jan 26 4 Marks)





Solution:

	Bid	Ask ICAI Interpretation	Ideal Interpretation
GBPEUR i.e EUROs per GBP	1.2950	1.2965	1.2965
GBPUSD i.e USD per GBP	1.6025	1.6000	1.6060
EURUSD i.e USD per Euros	1.2375	1.9000	1.2390

(1) Cross Rates working using ICAI interpretation - faculty working

	Bid	Ask ICAI Interpretation
GBPEUR i.e EUROs per GBP	B x B	A X A
= Euro / USD x USD / GBP	1.6025 x 1/1.9000	1.6000x 1/1.2375
Euro Per GBP	0.8434	1.2929

Since Euro Per USD quote is not available and only USD per Euro is available Bid and ask will be interchanged when we compute Euro per USD as  $1 / (\text{USD per Euro})$

2(a)

Arbitrage on Buying pound direct and selling pounds through cross

Buy 1 GBP Direct	Sell Euro	-1.2965
Sell 1 GBP Cross	Buy Euro	+0.8434
Net flow		0.4531 Loss

There is an arbitrage loss

2(b)

Arbitrage on Selling pound direct and Buying pounds through cross

Sell 1 GBP Direct	Buy Euro	+1.2950
Buy 1 GBP Cross	Sell Euro	-1.2929
Net flow		0.0021 Gain

There is an arbitrage Profit

(1) Cross Rates working using ICAI interpretation - ICAI working - incorrect in faculty opinion

Bid	Ask ICAI Interpretation
-----	-------------------------





GBPEUR i.e EUROs per GBP =	B x B 1.6025 x 1/1.2375	A X A 1.6000x 1/1.9000
Euro Per GBP	0.8421	1.2950

ICAI has multiplied Bid with Bid and ask with ask. It has taken an interpretation that bid is lower value and ask is higher value in USD EUR per USD quote which is incorrect

2(a)

Arbitrage on Buying pound direct and selling pounds through cross

Buy 1 GBP Direct	Sell Euro	-1.2965
Sell 1 GBP Cross	Buy Euro	+0.8421
Net flow		0.4544 Loss

There is an arbitrage  
loss

2(b)

Arbitrage on Selling pound direct and Buying pounds through cross

Sell 1 GBP Direct	Buy Euro	+1.2950
Buy 1 GBP Cross	Sell Euro	-1.2950
Net flow		No Gain or loss

There is an No arbitrage Profit or loss



# INTEREST RATE RISK MANAGEMENT (35Q)

## Examples

### Example 1

On 1<sup>st</sup> February 20X1 Reliance Industries Limited requires a loan for Rs.1 crore for a period of 3 months. The Company entered into a Forward Rate Agreement with SBI on 1<sup>st</sup> of January 20X1 at 7% interest per annum for a nominal of Rs.1 crore repayable after 3 months effective from 1<sup>st</sup> February.

The actual rate of interest on 1<sup>st</sup> of February as per SBI is 8%. Compute the settlement amount.

## Illustrations

### 1 Illustration

M/s. Parker & Co. is contemplating to borrow an amount of ₹ 60 crores for a Period of 3 months in the coming 6 months' time from now. The current rate of interest is 9% p.a., but it may go up in 6 months' time. The company wants to hedge itself against the likely increase in interest rate.

The Company's Bankers quoted an FRA (Forward Rate Agreement) at 9.30% p.a.

What will be the Final settlement amount, if the actual rate of interest after 6 months happens to be (i) 9.60% p.a. and (ii) 8.80% p.a.?

(ICAI SM, Sep-25 Similar 4M, RTP Nov'18, MTP Oct'22, MTP Mar'18, Old PM)

**Solution :**

Assumptions :

- 1) Ms. Parker & Co. entered into 6 × 9 FRA for INR 60 Crores notional @9.3% P.a
- 2) All the time periods are considered in months.
  - i) Settlement Date = 6 Months from today  
Settlement value @ interest rate of 9.6% Reference rate.

Forward Agreed rate	9.3%
Notional	INR 60 Crores
Period of loan	3 Months
Loan settlement	6 Months
Reference Rate > Forward Rate	Long FRA Will gain

Settlement Value = Notional ( Reference Rate - Forward Rate ) × ( Days to Maturity/Days in year ) / ( 1 + Reference Rate × Days to maturity/Days in Year )

IN other Words, Settlement Value =  $\frac{N (RR-FR) \times DTM/Dy}{1+(RR \times \frac{DTM}{Dy})}$

$$= \frac{60 \text{ Cr} \times (9.6\% - 9.3\%) \times 3/12}{(1 + 9.6\% \times \frac{3}{12})} = 60 \times 0.075\% / 1.24\%$$

$$= 60,00,00,000 \times 0.00075 / 1.024 = \text{INR } 4,39,453.13.$$

This amount has to be paid by bank to Ms Parker & Co.

ii) If reference rate is 8.8%, then FRA settlement value will be :

$$\frac{60 \text{ Cr} \times (8.8\% - 9.3\%) \times 3/12}{(1 + 8.8\% \times \frac{3}{12})} = 60 \times -0.5\% \times 0.25 / 1.22\%$$

$$= (750,000) / 1.022 = \text{INR } ( 7,33,855.19)$$

This amount will be paid by Ms Parker & Co to bank on settlement date as reference rate is lower than forward rate.





## 2 Illustration

TM Fincorp has bought a 6 × 9 Rs. 100 crore Forward Rate Agreement (FRA) at 5.25%. On fixing date reference rate i.e., MIBOR turns out be as follows:

Period	Rate (%)
3 months	5.50
6 months	5.70
9 months	5.85

You are required to determine:

- Profit/Loss to TM Fincorp. in terms of basis points.
- The settlement amounts. (Assume 360 days in a year)

(ICAI SM, MTP Mar'19, Old PM)

Solution :

- a) 6 × 9 FRA means a loan made for 3 months. After 6 months the relevant MIBOR rate is 5.5%

Hence Reference rate (RR) = 5.5% and Forward rate (FR) = 5.25%

Profit to TM Fincorp = RR - FR = 5.5% - 5.25% = 0.25% i.e., **25 Basis Points**

$$\text{Settlement Value} = \frac{N(RR-FR) \times \frac{DTM}{Dy}}{1 + (RR \times \frac{DTM}{Dy})}$$

$$= \frac{100 \text{ Cr} \times (5.5\% - 5.25\%) \times \frac{90}{360}}{(1 + 5.5\% \times \frac{90}{360})}$$

$$= 100 \times 0.25\% \times 0.25 / 1 + 1.375\%$$

$$= \text{INR } 6,16,522.81.$$

This money will be paid by bank to TM Fincorp.

## 3 Illustration

The treasurer of Company A expects to receive a cash inflow of \$15,000,000 in 90 days. The treasurer expects short-term interest rates to fall during the next 90 days. In order to hedge against this risk, the treasurer decides to use an FRA that expires in 90 days and is based on 90-day LIBOR. The FRA is quoted at 1.5%. At expiration, LIBOR is 1.25%. Assume that the notational principal on the contract is \$15,000,000.

- Indicate whether the treasurer should take a long or short position to hedge interest rate risk.
- Using the appropriate terminology, identifying the type of FRA used here
- Calculate the gain or loss to Company A as a consequence of entering the FRA

(MTP Apr'14)

Solution :

- Since the treasurer is lending/depositing/investing and not borrowing, the treasurer will short the FRA.
- The FRA is for 3 months deposit after 3 months, i.e., the 3 month deposit will mature in 6 months. The FRA is 3 × 6 for notional USD 15 Million.
- Since A ltd has shorted FRA and interest rate went down, they will make a gain.

$$\text{Settlement value for Long FRA} = \frac{N(RR-FR) \times \frac{DTM}{Dy}}{1 + (RR \times \frac{DTM}{Dy})}$$

$$\text{Settlement value for short FRA} = \frac{N(FR-RR) \times \frac{DTM}{Dy}}{1 + (RR \times \frac{DTM}{Dy})}$$





$$= \text{USD } 15 \text{ Million} \times (1.5\% - 1.25\%) \times (90/360) + 1.25\% \times 90/360$$

$$= \text{USD } 15 \text{ Million} \times 0.0625\% / 1.3125\%$$

$$= \text{USD } 9,345.79$$

Hence, The gain of USD 9,345.79 will be paid by banker to Company A.

#### 4 Illustration

P Ltd. is contemplating to borrow an amount of ₹ 50 crores for a period of 3 months in the coming 6 months' time from now. The current rate of interest is 8% per annum but it may go up in 6 months' time. The company wants to hedge itself against the likely increase in interest rate.

The Company's Bankers quoted an FRA (Forward Rate Agreement) at 8.30% per annum.

Compute the effect of FRA and actual rate of interest cost to the company, if the actual rate of interest during consideration period happens to be (i) 8.60% p.a., or (ii) 7.80% p.a.

(Nov-24 Similar 6M, Nov'19 QP 8 marks)

**Solution :**

i) P Ltd will go long on 6 × 9 INR 50 Crores FRA @8.3%.

On fixing date if Interest rate is 8.6%. Then reference rate is greater than forward rate then P Ltd will gain.

$$\text{Settlement value for Long FRA} = \frac{N(RR - FR) \times DTM / Dy}{1 + (RR \times \frac{DTM}{Dy})}$$

$$\text{I.e.,} = \frac{50 \text{ Cr} \times (8.6\% - 8.3\%) \times 3/12}{1 + 8.6\% \times 3/12} = \text{INR } 50 \text{ Crores} \times 0.075\% / 1.215\%$$

$$= 375,000 / 1.0215 = \text{INR } 367,107.20$$

The banker will pay to company INR 367,107.2 towards FRA. If company borrows 8.6% on fixing date then interest cost would be :

$$= 50 \text{ Crores} \times 8.6\% \times 3/12 = \text{INR } 1,07,50,000 \text{ payable on loan maturity date.}$$

But it has received INR 3,67,107.2 on loan commencement date. Ignoring the FV of the amount received on FRA Settlement then, total cost of borrowing

$$= 1,07,50,000 - 367,107.20 = \text{INR } 1,03,82,892.8$$

$$\text{Effective interest cost} = 1,03,82,892.8 / 50 \times 12/3 = \mathbf{8.306\%}.$$

If FV of settlement amount is considered, then net interest cost = (1,07,50,000) - (367,107.2 × 1.0215) = (103,75,000).

$$\text{Interest cost \%} = 103,75,000 / 50 \times 12/3 = \mathbf{8.3\%}$$

Note : In previous case, we have not taken the Future Value of the amount on settlement date hence we got 8.306%, otherwise if we have considered FV of settlement amount as in latter case, we got exact 8.3%.

ii) If interest rate is 7.8%, then settlement amount will be

$$\frac{50 \text{ Cr} \times (7.8\% - 8.3\%) \times 3/12}{1 + 7.8\% \times 3/12} = \text{INR } 625,000 / 1.0195 = \text{INR } (613,045.61).$$

P Ltd will have to pay INR 613,045.61 to bank.

**Effective interest rate :**

$$\text{Interest cost on } 50 \text{ Cr @ } 7.8\% \text{ for } 3 \text{ months} = 50 \text{ Crores} \times 7.8\% \times 3/12 = \text{INR } 97,50,000.$$

$$\text{Add : Outflow on account of FRA} = 613,045.61$$

$$\text{Total Outflow} = 97,50,000 + 613,045.61 = \text{INR } 1,03,63,045.61.$$

$$\text{Effective cost} = 103,63,045.61 / 50 \text{ Crores} \times 12/3 = \mathbf{8.29\%}.$$

Similarly, if we take FV of Settlement amount, we will get exact 8.3% as in case of (i).





## 5 Illustration

The following market data is available: Spot USD/JPY 116.00

Deposit rates p.a.	USD	JPY
3 months	4.50%	0.25%
6 months	5.00%	0.25%

Forward Rate Agreement (FRA) for Yen is Nil.

1. What should be 3 months FRA rate at 3 months forward?
2. The 6 & 12 months LIBORS are 5% & 6.5% respectively. A bank is quoting 6/12 USD FRA at 6.50 -6.75%. Is any arbitrage opportunity available?

(RTP Nov'23, RTP May'18, Old PM)

**Solution :**

- 1) The question is only talking about USD rates as the forward rate agreement for Yen is Nil.

Given,

0 to 3 Months deposit rate = 4.5% and 0 to 6 Months deposit rate = 5%.

Then, we need to find out deposit rate for 4 to 6 Months.

Let rate for period 4 to 6 months be X.

Then,  $(1 + 5\%/2) = (1 + 4.5\%/4) \times (1 + X\%/4)$

$1.025 = 1.01125 \times (1 + X\%/4)$

$X\%/4 = 0.013597 = X\% = 0.054388$

X = 5.4388%.

Hence, the 3 × 6 FRA rate for USD should be 5.4388%.

- 2) Given,

USD LIBORS		USD Deposit Rates	
6 Months	5%	3 Months	4.5%
12 Months	6.5%	6 Months	5%
<b>6 × 12 USD FRA = 6.50% - 6.75%</b>			

- a) Only the 3 Months deposit rate is available ; therefore there is no possibility of any arbitrage.
- b) For 6 months both Lending and deposit rates are same at 5%, hence there is no opportunity for arbitrage.

Let us assume the rates of lending for months 7-12 be X.

$1.065 = (1 + 0.05/2) \times (1 + X\%/2)$

$X\% = 0.07804$  or X = 7.804%

Thus, Interest rate for LIBOR 7 -12 Months is **7.804%**.

FRA for months 7-12 i.e., 6 × 12 FRA is at 6.5%-6.75%. Hence there is arbitrage opportunity that exists as bootstrapped rate based on LIBORS for months 7-12 is 7.804%.

Case 1 : Borrow at 5% for 6 months and 6.75% for 7 to 12 Months

: Rate for 12 months will be

$= (1 + 5\%/2) \times (1 + 6.75\%/2) - 1 = (1.025) \times (1.03375) - 1 = 5.96\%$

Borrow for 12 Months USD 100 @ 5.96% and lend @ 6.5% (USD Libor 12 months rate) ,

**Gain = USD 0.54 per USD 100**

Note : The other case of borrowing at 6.5% for 12 months will not result in any arbitrage opportunity, as deposit rates for 6 months is 5% and 7 to 12 months is 6.5% (FRA rate when we lend



to Bank). Hence the weighted average rate for 12 months will be between 5% to 6.5%. Thus, you cannot lend at below 6.5% (cost of borrowing for 12 months) and expect to make profit.

## 6 Illustration

Consider a party with a short position in IRF having to deliver a bond and there are three options available to it with spot prices as mentioned below. If the futures settlement price is Rs.110 find out which is the cheapest to deliver bond:

S. No	Bond Price ₹	Conversion Factor
1	109.55	0.88
2	106.01	0.84
3	102.09	0.83

Solution :

Futures Price	Bond	Conversion Factor	Equivalent Value	Bond Price	Gain/(Loss)
110	1	0.88	96.8	109.55	(12.75)
110	2	0.84	92.4	106.01	(13.61)
110	3	0.83	91.3	102.09	(10.79)

The cheapest to deliver bond is **Bond 3** as the loss is the least.

## 7 Illustration

A trader has sold 10-year US Treasury bond futures contracts expiring in June 20X1 and now has the obligation to deliver and the right to choose which security to deliver (the CTD bond). The futures contract reference security is a US Treasury bond with 20 years to maturity and a coupon of 6%. The T-bond futures contract size is \$100,000. The futures contract settlement price is \$143.47. The trader now needs to determine which of the two bonds in the following table is cheapest to deliver.

	Bond A	Bond B
Bond Maturity	15/02/20X7	15/05/20X8
Price (\$)	120.75	128.50
Futures Settlement price	143.47	143.47
Conversion Factor	0.8388	0.8883
FV Of Bond (\$)	100	100
Lot size (# of bonds)	1000	1000

(CFA Material)

Solution :

Bond	Market Price	Futures Price	Conversion Factor	Equivalent Value	Gain/(Loss)
A	120.75	143.47	0.8388	120.3426	(0.4074)
B	128.50	143.47	0.8883	127.4444	(1.0556)

Bond A has lower loss of USD 0.4074 per bond. Hence the trader will choose to deliver that. On one contract of 1000 Bonds, loss will be incurred:

Bond A= USD 0.4074 × 1000 = **USD 407.4** and Bond B = USD 1.0556 × 1000 = **USD 1055.6**  
Hence **Bond A** is chosen.





## 8 Illustration

Suppose that a 1-year cap has a cap rate of 8% and a notional amount of ₹ 100 crore. The frequency of settlement is quarterly and the reference rate is 3-month MIBOR. Assume that 3-month MIBOR for the next four quarters is as shown below.

Quarters	3-months MIBOR (%)
1	8.70
2	8.00
3	7.80
4	8.20

You are required to compute payoff for each quarter.

(MTP Feb'14)

**Solution :**

Payoff = Notional × Max (0, [R<sub>A</sub> - R<sub>C</sub>]) × Days/Days in a year

# Assuming month convention

Quarter	Reference Rate Cap	Rate Actual	Pay Off	Pay off Actual
1	8%	8.7%	100 Cr × [Max,(0,8.7% - 8%) × 3/12]	INR 17.5 Lakhs
2	8%	8%	0	0
3	8%	7.8%	0	0
4	8%	8.2%	100 Cr × [Max,(0,8.2% - 8%) × 3/12]	INR 5 Lakhs

## 9 Illustration

Suppose that a 1-year cap has a cap rate of 8% and a notional amount of \$100 million. The frequency of settlement is quarterly, and the reference rate is 3-month LIBOR. Assume that 3-month LIBOR for the next four quarters is as shown in the following figure. Calculate the payoff for each quarter

Payoff to 8% Interest Rate Cap

Quarter	3-month LIBOR	Payoff
1	7.7%	?
2	8.0%	?
3	8.4%	?
4	8.6%	?

(CFA Material)





Solution :

$$\text{Payoff} = \text{Notional} \times \text{Max}(0, [R_A - R_C]) \times \text{Days/Days in a year}$$

Quarter	Reference Rate Cap	Rate Actual	Pay Off	Pay off Actual
1	8%	7.7%	USD 100 Mn × [Max,(0,7.7% -8%) ×3/12]	0
2	8%	8%	0	0
3	8%	8.4%	USD 100 Mn × [Max,(0,8.4% -8%) ×3/12]	USD 100,000
4	8%	8.6%	USD 100 MN × [Max,(0,8.6% -8%) ×3/12]	USD 150,000

### 10 Illustration

On April 15, DH Bank makes ( i.e gives ) a one-year floating rate loan for \$10 million. Interest payments are quarterly at LIBOR plus 200 basis points based on actual days in the period over 360. The payments are due July 15, January 15, and April 15. DH Bank purchases a nine-month quarterly pay Floor for \$85,000 with a strike rate of 8.5%. Assuming LIBOR rates on April 15, July 15, October 15, and January 15 are 8.0%, 8.4%, 8.65%, and 8.4% respectively, determine the four payoff dates on the loan, the loan interest received, any option payment received, and the effective net interest earned by DH Bank.

(CFA Material)

Solution :

Given,

Loan = USD 10 Million, Loan Start = April 15/Y1, Interest Rate = Libor + 200 Bps, Convention = A/360

Loan Interest Service Dates	Days in Period
July 15 <sup>th</sup> (Year 1)	91 Days
October 15 <sup>th</sup> (Year 1)	92 Days
January 15 <sup>th</sup> (Year 2)	92 Days
April 15 <sup>th</sup> (Year 2)	90 Days

First Floorlet is for LIBOR set on July 15<sup>th</sup> (Year 1)

Quarter	Interest Received from Borrower	Pay off from floor if any
Q1 July 15 <sup>th</sup>	USD 10 Mn × (L+2%) ×91/360 = USD 10 Mn × (10%) × 91/360 = USD 252,777.78	NIL, as first floorlet starts from July 15 <sup>th</sup>
Q2 October 15 <sup>th</sup> (Libor on July 15 <sup>th</sup> )	= USD 10 Mn × (8.4% + 2%) × 92/360 = USD 265,777.78	USD 10 Mn × Max (0,8.5%-8.4%) × 92/360 = USD 2,555.56
Q3 Jan 15 <sup>th</sup> (Libor on Oct 15 <sup>th</sup> )	= USD 10 Mn × (8.65% + 2%) × 92/360 = USD 272,166.67	NIL, as floor has no value, as strike price of 8.5% < Actual 8.65%
Q4 April 15 <sup>th</sup> ( Libor on Jan 15 <sup>th</sup> )	= USD 10 Mn × ( 8.4% + 2%) × 90/360 = USD 260,000	=USD 10 Mn × Max (0,8.5%-8.4%) × 90/360 = USD 2,500





Total Inflow :

Quarters	Interest on floating loan (USD)	Floor Pay off	Total
1	252,777.78	0	USD 252,777.78
2	265,777.78	2,555.56	USD 268,333.34
3	272,166.67	0	USD 272,166.67
4	260,000	2,500	USD 265,000
<b>Total</b>			<b>USD 10,55,777.79</b>
<b>Less : Cost of floor</b>			<b>USD 85,000</b>
<b>Net Interest Income</b>			<b>USD 9,70,777.79</b>

## 11 Illustration

On December 15, DH Bank issues a \$50 million "two year" floating rate liability. The four interest payments are based on 180-day LIBOR plus 150 basis points. The first interest rate is set today with payment 180 days thereafter. Each loan payment is 180 days after the preceding payment. To hedge against rising interest rates, the bank buys an appropriate interest rate cap with a strike rate of 4.75%. To fully offset the initial cost of the cap, the bank sells a floor with a strike rate of 2.25%.

Initial LIBOR is 3.40%. Assuming that in 180, 360, 540 and 720 days LIBOR rates are 4.00%, 5.10%, 2.00% and 1.75%, respectively, calculate the net interest paid by the bank on each payment date and show all the cash flows leading to that next payment.

Explain the cost of the collar.

(CFA Material)

**Solution:**

DH Bank = USD 50 Mn Bank 2 Year 6 M LIBOR + 150 Bps Loan

CAP = 4.75% and Floor = 2.25%

LIBOR Rates	Days	From Date	Applicable Rate	Loan Rate (LIBOR + 150 Bps)
3.4%	0	1/1/20X1	3.4%	4.9%
4%	180	30/6/20X1	4%	5.5%
5%	360	1/1/20X2	5.1%	6.6%
2%	540	30/6/20X2	2%	3.5%
1.75%	720	1/1/20X3		

Period	LIBOR Applicable	Impact of CAP Max [0, R <sub>a</sub> - R <sub>c</sub> ] (4.75%)	Impact of Floor -Max [0, R <sub>f</sub> - R <sub>a</sub> ] (2.25%)
H1 180 Days	3.4%	0	0
H2 360 Days	4%	0	0
H3 540 Days	5.1%	0.35%	0
H4 720 Days	2%	0	-0.25%



### Total Interest Cost :

Periods	Loan USD Million	Loan Interest Rate	Interest (USD Million)	Collar	Impact of collar (USD Million)
H1	50	4.9%	1.225	0	
H2	50	5.5%	1.375	0	
H3	50	6.6%	1.65	+ 0.35%	+0.0875
H4	50	3.5%	0.875	- 0.25%	- 0.0625

### Total Interest cost including impact of collar :

Periods	Total Interest (USD Million)
H1	1.225
H2	1.375
H3	=1.65- 0.0875 = 1.5625
H4	= 0.875 - (0.0625) = 0.9375

### 12 Illustration

XYZ Inc. issues a £ 10 million floating rate loan on July 1, 2013 with resetting of coupon rate every 6 months equal to LIBOR + 50 bp. XYZ is interested in a collar strategy by selling a Floor and buying a Cap. XYZ buys the 3 years Cap and sell 3 years Floor as per the following details on July 1, 2013:

Notional Principal Amount	\$ 10 million
Reference Rate	6 months LIBOR
Strike Rate	4% for Floor & 7% for Cap
Premium	0*

\*Since Premium paid for Cap = Premium received for Floor

Using the following data, you are required to determine:

- Effective interest paid out at each reset date,
- The average overall effective rate of interest p.a.

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

(Similar May'22 QP 8 marks, RTP May'19, MTP Oct'18, Old PM)

### Solution :

Given, Loan & Collar Notional GBP 10 Million, Start Date = 1/7/2013, Loan Rate = 6M L + 50 Bps  
Floor = 4% Cap = 7% and 3 Year Loan

Assumption : Actual/365 Days Convention Used





Interest Service Dates	LIBOR (%)	Outflow (Floor) 4%	Inflow (Cap) 7%	Total Cost (L+ 50 Bps - Cap + Floor)
31/12/2013	6			6.5%
30/6/2014	7.5		Max (0,7.5%-7%) =0.5%	7.5%
31/12/2014	5			5.5%
30/6/2015	4			4.5%
31/12/2015	3.75	Max (0,4-3.75%) =0.25%		4.5%
30/6/16	4.25			4.75%

Interest paid:

Dates	Total Interest Rate	Days	Total Interest Cost (GBP)
31/12/2013	6.5%	181	322,329
30/6/2014	7.5%	184	378,082
31/12/2014	5.5%	181	272,739
30/6/2015	4.5%	184	226,850
31/12/2015	4.5%	182	223,770
30/6/16	4.75%	184	238,798
<b>Total Interest</b>			<b>1,662,568</b>

Effective Interest Rate

$$= 16,62,568 / 10,000,000 \times 365 / 1096$$

$$= 5.5368\%$$

If compounded HY, interest rate will be 5.61%

### 13 Illustration

XYZ Limited borrows £ 15 Million of six months LIBOR + 10.00% for a period of 24 months. The company anticipates a rise in LIBOR; hence it proposes to buy a Cap Option from its Bankers at the strike rate of 8.00%. The lump sum premium is 1.00% for the entire reset periods and the fixed rate of interest is 7.00% per annum. The actual position of LIBOR during the forthcoming reset period is as under:

Reset Period	LIBOR
1	9.00%
2	9.50%
3	10.00%

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 three decimal points and amount nearest to £. It should be part of working notes.

(ICAI SM, RTP Nov'22, MTP May'20 New & Old, MTP Oct'19, MTP Aug'18, MTP Apr'18, Old PM)





### Solution :

Given, GBP 15 Million Loan

Premia = 1% Paid over the period

Premia = Prem% × loan Value / PVIF (4 Periods, 3.5%)

= (1% × GBP 15 Million)/PVIFA (3.5%,4)

= 150,000/3.673

= GBP 40,837

Periods	GBP	Cap	Cap Payoff Max (0, R <sub>a</sub> - R <sub>c</sub> )	Total Interest rate (LIBOR CAP + 10%)
H2	9%	8%	1%	18%
H3	9.5%	8%	1.5%	18%
H4	10%	8%	2%	18%

Periods	Interest Before Cap		Cap Payoff		Interest after Cap
	%	GBP (Mn)	%	GBP	GBP (Mn)
H2	19	1.425	1	75,000	13,50,000
H3	19.5	1.4625	1.5	112,500	13,50,000
H4	20	1.5	2	150,000	13,50,000

### Net Interest Cost after premia

Period	Interest	Add: Premia	Cap	Net Inflow
H2	13,50,000	40,837		13,90,837
H3	13,50,000	40,837		13,90,837
H4	13,50,000	40,837		13,90,837

Cap Payoff - Inflow	Premia Outflow	Net Received
75,000	40,837	34,163
112,500	40,837	71,663
150,000	40,837	109,163
<b>337,500</b>	<b>122,511</b>	<b>214,989</b>

Benefit from using Cap is **GBP 214,989** as the cost is reduced from 337,500 which is increase in Interest rate.

### 14 Illustration

Two companies ABC Ltd. and XYZ Ltd. approach the DEF Bank for FRA (Forward Rate Agreement). They want to borrow a sum of ₹ 100 crores after 2 years for a period of 1 year. Bank has calculated Yield Curve of both companies as follows:

Year	XYZ Ltd.	ABC Ltd.*
1	3.86	4.12
2	4.20	5.48
3	4.48	5.78





\*The difference in yield curve is due to the lower credit rating of ABC Ltd. compared to XYZ Ltd.

- (i) You are required to calculate the rate of interest DEF Bank would quote under 2V3 FRA, using the companies yield information as quoted above.
- (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 XYZ Ltd. if interest rate in 2 years turns out to be
- (a) 4.50% & (b) 5.50%

(RTP May'21, RTP Nov'19, MTP Oct'21 Old, RTP May'19 Old, RTP Nov'20 Old, Old PM)

Solution:

i)

Year	XYZ	ABC
1	3.86	4.12
2	4.20	5.48
3	4.48	5.78

**XYZ Ltd:**

By bootstrapping, forward rate for year 2 will be

$$(1.0386) \times (1+f_2) = (1.042)^2, F_2 = 4.54\%$$

$$\text{Similarly for year 3, } (1.042)^2 \times (1+F_3) = (1+0.0448)^3, F_3 = 5.04\%$$

Hence, FRA Rate for 2V3 for XYZ = **5.04%**

**ABC Ltd:**

$$(1+Y_2)^2 \times (1+F_3) = (1+Y_3)^3$$

$$(1+0.548)^2 (1+F_3) = (1.0578)^3, F_3 = 6.38\%$$

Hence, FRA Rate for 2V3 for ABC = **6.38%**

- ii) Premia = 0.1% of INR 100 cr= INR 10 Lakhs

XYZ Paid premia and entered into FRA

- a) In case of 4.5% Interest, XYZ will forego premia and avail the loan at 4.5%. Interest cost = INR 100 Crores  $\times$  4.5% = INR 4,50,00,000.  
Add : Premia Paid = 10,00,000

**Total Cost = INR 4,60,00,000**

- b) In case of interest rate at 5.5%, then company will exercise the option and borrowing will be at 5.04%

$$\text{Interest cost} = \text{INR } 100 \text{ Crores} \times 5.04\% = \text{INR } 5,04,00,000$$

$$\text{Add: Premia paid} = \text{INR } 10,00,000$$

**Total Cost = INR 5,14,00,000**

## 15 Illustration

Electraspace is consumer electronics wholesaler. The business of the firm is highly seasonal in nature. In 6 months of a year, firm has a huge cash deposits and especially near Christmas time and other 6 months firm cash crunch, leading to borrowing of money to cover up its exposures for running the business.

It is expected that firm shall borrow a sum of €50 million for the entire period of slack season in about 3 months.

A Bank has given the following quotations:





Spot	5.50% - 5.75%
3 × 6 FRA	5.59% - 5.82%
3 × 9 FRA	5.64% - 5.94%

3 month €50,000 future contract maturing in a period of 3 months is quoted at 94.15 (5.85%). You are required to determine:

- (a) How an FRA, shall be useful if the actual interest rate after 3 months turnout to be:
- 4.5%
  - 6.5%
- (b) How 3 months Future contract shall be useful for company if interest rate turns out as mentioned in part (a) above.

(RTP May'21, RTP May'18, RTP Nov'19 Old, RTP May'21 Old, Old PM)

Solution :

a)

Interest Rate	4.5%	6.5%
EURO 50 Million FRA, 3 × 9 FRA @ 5.94%		
Interest paid by Electraspace (Mn)	(1.125)	1.625
FRA Receipt on net cash settlement (Mn)	= 50 Mn × (5.94%-4.5%) × 6/12 = (0.360)	= 50 Mn × (6.5%-5.94%) × 6/12 = 0.140
<b>Total Outflow</b>	<b>EURO 1.485 Mn</b>	<b>EURO 1.485 Mn</b>

Due to FRA, interest cost of Electraspace is frozen @ EURO 1.485/50Mn × 12/6= 5.94 %

b) Futures rate contract instead of FRA.

Electraspace will short futures worth EURO 50 Mn.

No of contracts = EURO 50 Mn/50,000 × Duration of loan/Future Maturity

= 1000 × 6/3= 2000 Contracts

Interest Rate	4.5%	6.5%
Future sale price on Day 0 @ 5.85%	94.15	94.15
Futures Price after 3 Months	100-4.5 =95.5	100-6.5= 93.5
Loss	= 95.5 - 94.15 = 1.35%	
Gain		= 94.15-93.5 = 0.65%
<b>Total Gain/(loss)</b>	=50,000 × 2000 × 1.35% × 3/12 = (3,37,500)	=50,000 × 2000 × 0.65% × 3/12 = 1,62,500
<b>Interest Cost @ Market rate</b>	= EURO 50 Mn × 4.5% × 6/12 = EURO 1.125 Mn	= EURO 50 Mn × 6.5% × 6/12 = EURO 1.625 Mn
<b>Add : Gain/(Loss)</b>	0.3375 Mn	(0.1625 Mn)
<b>Net</b>	<b>1.4625 Mn</b>	<b>1.4625 Mn</b>
<b>Implied Interest Rate = 1.4625 /50 × 12/6 = 5.85%</b>		





## 16 Illustration

A textile manufacturer has taken a 4 year floating interest rate loan of ₹ 40,00,000 on 1st April, 2012. The rate of interest at the inception of loan is 8.5% p.a. interest is to be paid every year on 31st March. In the month of October 2012, the Central bank of the country releases following projections about the interest rates likely to prevail in future.

- (i) On 31st March, 2013, at 8.75%; on 31st March, 2014 at 10% on 31st March, 2015 at 10.5% and on 31st March, 2016 at 7.75%. Show how this borrowing can hedge the risk arising out of expected rise in the rate of interest when he wants to peg his interest cost at 8.50% p.a.
- (ii) Assume that the premium negotiated by both the parties is 0.75% to be paid on 1st October, 2012 and the actual rate of interest on the respective due dates happens to be as: on 31st March, 2013 at 10.2%; on 31st March, 2014 at 11.5%; on 31st March, 2015 at 9.25%; on 31st March, 2016 at 8.25%. Show how the settlement will be executed on the respective interest due dates.

(ICAI SM, RTP May'22, MTP Sept'23, MTP Apr'23, MTP Mar'22, MTP Nov'21, Nov'17 QP (O), PMJ)

### Solution :

Loan Date : 1/04/12, Loan Amount = INR 40 Lakhs

Period	Interest Rate Estimate (%)	Interest Rate Actual (%)
12-13	8.5	8.5
13-14	8.75	10.2
14-15	10	11.5
15-16	10.5	9.25
16-17	7.75	8.25

- i) The textile manufacturer should go long on Interest rate cap to ensure interest rate borrowing is capped at 8.5%.
- ii) Premia to be paid =  $0.75\% \times 40 \text{ Lakhs} = \text{INR } 30,000$

Particulars	Interest on Loan	Cap Pay off (8.5%)	Total
2012-13	@ 8.5% on 40 Lakhs = 3.4 Lakhs	-	3.4 Lakhs
2013-14	@10.2% on 40 lakhs = 4.08 Lakhs	$(10.2\% - 8.5\%) \times 40$ lakhs = INR 68 Lakhs	= 4.08 - 0.68 = 3.4 Lakhs
2014-15	@11.5% on 40 lakhs = 4.6 Lakhs	$(11.5\% - 8.5\%) \times 40$ lakhs = INR 1.2 Lakhs	= 4.6 - 1.2 = 3.4 Lakhs
2015-16	@9.25% on 40 Lakhs = 3.7 Lakhs	Gain = $(9.25\% - 8.5\%)$ $\times 40$ lakhs = 0.3 Lakhs	= 3.7 - 0.3 Lakhs = 3.4 Lakhs

Assumption : The borrowing was made on 1/4/12. So, for year 12-13, rate as on 1/4/12 will be applicable and not as on 31/3/13 and hence the rate as on 31/3/16 the last payment date is not relevant.

## 17 Illustration

Suppose a dealer quotes 'All-in-cost' for a generic swap at 8% against six month LIBOR flat. If the notional principal amount of swap is ₹5,00,000.

- (i) Calculate semi-annual fixed payment.
- (ii) Find the first floating rate payment for (i) above if the six-month period from the effective date of swap to the settlement date comprises 181 days and that the corresponding LIBOR was 6% on the effective date of swap.





In (ii) above, if the settlement is on 'Net' basis, how much the fixed rate payer would pay to the floating rate payer?

Generic swap is based on 30/360 days basis.

(ICAI SM, MTP Mar'24, Old PM)

**Solution :**

- i) Semi-annual fixed payment = Notional  $\times$  Dt/360  $\times$  Interest Rate  
= INR 500,000  $\times$   $\frac{1}{2}$   $\times$  8% = 20,000
- ii) INR 500,000  $\times$  181/360  $\times$  6% = INR 15,083
- iii) If settlement is on net basis, the fixed rate payer will pay INR 4,917 i.e., ( INR 20,000 -15,083)

Assumption : For floating rate payment, 181/360 day convention is used, and for fixed rate payment,  $\frac{1}{2}$  Month convention is used.

## 18 Illustration

P Ltd., a dealer quotes 'All-in-cost' for a generic swap at 6% against six months LIBOR flat. If the Notional principal amount of swap is ₹ 8,00,000:

- (i) Calculate semi-annual fixed payment.
- (ii) Find the first floating rate payment for (i) above if the six month period from the effective date of swap to the settlement date comprises 181 days and that the corresponding LIBOR was 5% on the effective date of swap. (Consider up to three decimal places).
- (iii) In question number (ii) above, if the settlement is on 'Net' basis, how much the fixed rate payer would pay to the floating rate payer?

Note: Generic swap is based on 30/360 days basis.

(July'21 QP 8 marks, Nov'18 QP 4 marks, RTP May'23, MTP Mar'21 New & Old)

**Solution :**

For generic swap the semi fixed annual fixed rate payment = Notional  $\times$  All in Cost  $\times$  180/360

- i) Semi Annual fixed payment = 800,000  $\times$  6%  $\times$  180/360 = **INR 24,000**
- ii) Floating Rate payment = INR 800,000  $\times$  181/360  $\times$  5% = **INR 20,111.111**
- iii) If settlement is on net basis, the fixed rate payer will pay **INR 3,888.88** i.e., ( INR 24,000 -20,111.11)

## 19 Illustration

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, 2nd August, 2010 and was to commence on 3rd 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.

[ICAI SM, Nov-24 Similar 4M, RTP Nov'21, RTP Nov'24, MTP Apr'24, MTP Oct'23, MTP Sept'22, MTP Oct'20, Nov'17 QP (Old), Old PM]





Solution :

Days	Interest Rate (%)	Principal	Interest
Tuesday	7.75	10,00,00,000	21,233
Wednesday	8.15	10,00,21,233	22,334
Thursday	8.12	10,00,43,567	22,256
Friday	7.95	10,00,65,823	21,795
Saturday	7.98	10,00,87,618	21,882
Sunday	7.98	10,01,09,500	21,887
Monday	8.15	10,01,31,387	22,358
<b>Total</b>			<b>153,745</b>

If on Sunday interest is also compounded, then interest for Sunday is INR 21,887, otherwise it is INR 21,882.

To be received on floating = 153,745

Net received = INR 317

Paid fixed = 153,745 - 317 = INR **153,428**

Fixed rate for which interest is INR 153,428 on INR 10,00,00,000 for 7 days is **8%** (153,428/10 Cr ×365/7)

## 20 Illustration

Punjab Bank has entered into a plain vanilla swap through on Overnight Index Swap (OIS) on a principal of ₹ 2 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 ₹ 507 net on settlement, calculate Fixed rate and interest under both legs.

Notes:

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

(May'18 QP 8 marks)

Solution :

Days	Interest Rate (%)	Principal	Interest
Tuesday	8.7	2,00,00,000	4767
Wednesday	9.1	2,00,04,767	4987
Thursday	9.12	2,00,09,754	5000
Friday	8.95	2,00,14,754	4908
Saturday	8.98	2,00,19,662	9851
Sunday	8.98	2,00,19,662	
Monday	9.10	2,00,29,153	4994
<b>Total</b>			<b>34,507</b>

To be received on floating = 34,507

Net received = INR 507

Paid fixed = 34,507 - 507 = INR **34,000**



Fixed rate for which interest is INR 34,000 on INR 2,00,00,000 for 7 days is **8.86%** ( $34,000/2 \text{ Cr} \times 365/7$ )

Interest rate for Saturday and Sunday is computed as 2 Day interest based on rate prevailing on Saturday.

## 21 Illustration

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:

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

(Nov'20 QP, May 23'QP 8 marks, MTP Mar'23)

**Solution :**

Given,

	Zaki	IB
<b>Wanted</b>	YEN Fixed	INR Floating
<b>Got</b>	INR Floating	YEN Fixed

- Yes, Swap is possible
- IB wants YEN fixed rate loan and Zaki wants INR Floating rate loan.

Total loan required = 2% + BPLR + 2.5% = **BPLR + 4.5%**

Alternatively,

IB get floating at BPLR + 0.5% and Zaki Gets fixed at 2.25%.

Total cost then would be = **BPLR + 2.75%**

<b>Total Saving if swap is entered into</b>	= (BPLR + 4.5% - BPLR + 2.75%) = 1.75%
<b>Less : Commission</b>	0.25%
<b>Net Gain</b>	1.5%
<b>Shared Equally</b>	0.75% each

Firms	Zaki	IB
<b>Original Cost</b>	BPLR + 2.5%	2%
<b>Less : Savings (As calculated above)</b>	0.75%	0.75%
<b>Net Cost</b>	<b>BPLR + 1.75%</b>	<b>1.25%</b>





## 22 Illustration

IM is an American firm having its subsidiary in Japan and JI is a Japanese firm having its subsidiary in USA: They face the following interest rates

	IM	JI
USD Floating rate	LIBOR+0.5%	LIBOR+2.5%
JPY Fixed rate	4%	4.25%

IM wishes to borrow USD at floating rate and JI JY at fixed rate. The amount required by both the companies is same at the current Exchange Rate. A financial institution requires 75 basis points as commission for arranging Swap. The companies agree to share the benefit/ loss equally.

You are required to find out

- Whether a beneficial swap can be arranged?
- What is the rate of interest for both IM and JI ?

[MTP Oct'21 New & Old, MTP Mar'21, May'19 QP (Old)]

Solution :

Cost of loan want	= LIBOR+ 0.5% + 4.25%
	= LIBOR +4.75%
Cost of loan after swap	= LIBOR + 2.5% + 4%
	= LIBOR + 6.5%

- No, a beneficial swap cannot be arranged as on swapping cost increases from LIBOR + 4.75% to LIBOR + 6.5%
- Their existing rates are better, IM @ LIBOR + 0.5% and JI @ 4.25%.

## 23 Illustration

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:

Company	¥ Loan	\$ Loan
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 An 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.

(ICAI SM, RTP May'24, RTP May'20 New & Old, Old PM)

Solution :

B Books

Borrow in USD	200,000 @ 10%
Pay Interest in USD	(20,000)
Receive Interest from A @9%	18,000
Shortfall (USD)	2,000
B will Pay A 6% in YEN on equivalent of USD 200	





USD payment	=200,000 × 6% = USD 12,000 or YEN = 12,000 × 120 = YEN 14,40,000
Add : Shortfall in YEN	= 2000 × 120 = 2,40,000
Total YEN Costs	YEN 16,80,000
Interest %	= 16,80,000/120= USD 14000 = 14000/200000 =7%

#### A's Books

Paid Interest in YEN	200,000 × 120 × 5% = (YEN 12,00,000)
Add: YEN interest received from B	= YEN 14,40,000
Gain in YEN	YEN 2,40,000
Gain in USD	= 2,40,000/120 = USD 2,000
Interest paid to B on B's Loan	USD 18,000
Net Interest Outflow	= USD 16,000
Interest %	= 16,000/200,000 = 8%

Hence, both the parties have reduced the cost as explained above. **A will borrow in YEN 2,40,00,000 and swap it with B** for USD 200,000 who has borrowed same from its bank.

#### 24 Illustration

Euroloan Bank has a differential advantage in issuing variable-rate loans, but wishes to avoid the income risk associated with such loan. Currently bank has a portfolio €25,000,000 loans with PLR + 150bp, reset monthly PLR is currently 4%.

IB an investment bank has arranged for Euroloan to swap into a fixed interest payment of 6.5% on notional amount of loan for its variable interest income.

If Euroloan agrees to this, what amount of interest is received and given in the first month? Further, assume that PLR increased by 200 bp.

(RTP Nov'11)

Solution :

PLR + 150 Vs Loan	6.5% EURO 25 Million
Interest on Var loan is swapped for fixed payment. So fixed rate is received on account of swap and whatever variable interest is received from borrower is passed onto the other party is swapped.	
<u>Step 1</u> : Receive PLR + 1.5% on EURO 25 Million	= 25 Mn × 5.5% × 1/12 = EURO 114,583.33
<u>Step 2</u> : Pass on this interest to swap counterparty	(114,583.33)
<u>Step 3</u> : Receive fixed payment @6.5%	EURO 135,416.66
Net Gain	EURO 20,833.33



On Second month, if PLR Rises by 2%

<b>Step 1: Receive interest from borrowers @ 7.5%</b>	EURO 156,250
<b>Step 2: Pay to swap counterparty</b>	(EURO 156,250)
<b>Step 3: Receive interest 6.5% from swap counterparty</b>	(EURO 135,416.67)
<b>Net Loss</b>	<b>EURO 20,833.33</b>

Hence, If PLR increases, the bank losses **EURO 20,833.33**

## 25 Illustration

A Ltd. is considering a ₹ 50 crores 3 year interest rate swap. The company is interested in borrowing at floating rate however, due to its good credit rating, it has a comparative advantage over lower rated companies in fixed rate market. It can borrow at fixed rate of 6.25% or floating rate MIBOR+0.75%.

Presently, MIBOR is 5.25% but is expected to change in 6 months due to political situation in the country. X Ltd. an intermediary bank agreed to arrange a swap. The bank will offset the swap risk with a counter party (B. Ltd.) a comparative lower credit rated company, which could borrow at a fixed rate of 7.25% and floating rate of MIBOR + 1.25%. X Ltd. would charge ₹ 12,00,000 per year as its fee from each party. Mr. Fin the CFO, of A Ltd. desires that A Ltd. should receive 60% of any arbitrage saving (before payment of fees) from the swap as A Ltd. enjoying high credit rating.

Any fees paid to the bank are tax allowable. The applicable tax rate is 30%. You are required to:

- Evaluate whether the proposal is beneficial for both parties or not.
- Assuming that MIBOR was to increase to 5.75% immediately after political crisis over and shall remain constant for the period of swap. Evaluate the present value of savings from the swap for A Ltd., assuming that interest payment are made semi-annually in arrears.

(RTP Nov'11)

**Solution :**

Loan = INR 50 Crores

	Floating	Fixed
A Ltd	MIBOR + 75 Bps	6.25%
B Ltd	MIBOR + 125 Bps	7.25%

- a) If A Borrows fixed and B Floating, then total cost would be M + 750 Bps which is 50 Bps lower than A floating and B Fixed and they both will swap.

Total saving P.a = 50 Bps on INR 50 Crores i.e., 25 Lakhs.

A will get INR 15 Lakhs (60%) and B will get 10 Lakhs (40%), I.e., 30 Bps and 20 Bps respectively.

Benefit	A	B
Reduction in Interest P.a	INR 15 Lakhs	INR 10 Lakhs
Banker Fees P.a	INR 12 Lakhs	INR 12 Lakhs
Net Saving	3 Lakhs	(2 Lakhs)
Less : Tax @30%	INR 90,000	(INR 60,000)
	<b>INR 2,10,000</b>	<b>INR 1,40,000</b>

Hence, the swap is beneficial only for A as their net savings (Post tax) is INR 2,10,000 Vs net loss on INR 140,000 for B Ltd.





b) MIBOR for next 2.5 years = 5.75%; Cost of loan to A :

Original Cost	MIBOR + 75 Bps
Less: Savings on Account of Swap	30 Bps
Net Cost	MIBOR + 45 Bps

Savings to A :

30 Bps P.a per Interest Payment

Loan = 50 Crores	
Discount Rate	= 5.75% + 0.45% = 6.2% or 3.1% for 3 Months
PVIFA @ 3.1% for 5 Periods	4.5667
After tax savings	= 4.5667 × 5.25 Lakhs = INR 23.97 Lakhs
Payment to X Ltd	12 Lakhs P.a
Present value for brokerage for 5 periods	= 600,000 × 4.5667 × 0.7 = INR 19.18 Lakhs
Net savings	= 23.97 - 19.18 = INR 4.79 Lakhs

Interest Payments	Savings @ 30 Bps	Less : Tax @ 30%	Discounting @ 3.1%
1		Done	
2	750,000	525,000	0.9699
3	750,000	525,000	0.9407
4	750,000	525,000	0.9125
5	750,000	525,000	0.8850
6	750,000	525,000	0.8584

*Note :* If post tax interest rate is considered i.e.,  $6.2\% \times 0.7 = 4.34\%$  P.a then net savings will be INR 4.92 Lakhs

## 26 Illustration

Drilldip Inc. a US based company has a won a contract in India for drilling oil field. The project will require an initial investment of ₹ 500 crore. The oil field along with equipment will be sold to Indian Government for ₹ 740 crore in one year time. Since the Indian Government will pay for the amount in Indian Rupee (₹) the company is worried about exposure due exchange rate volatility.

You are required to:

- Construct a swap that will help the Drill dip to reduce the exchange rate risk.
- Assuming that Indian Government offers a swap at spot rate which is  $1\text{US\$} = ₹ 50$  in one year, then the company should opt for this option or should it just do nothing. The spot rate after one year is expected to be  $1\text{US\$} = ₹ 54$ . Further you may also assume that the Drill dip can also take a US\$ loan at 8% p.a.

(ICAI SM - Forex Chapter, Similar Nov-24 6 M, RTP May'19 Old)

**Solution:**

- Drill dip should **hedge** its INR receivables that it will convert at later date today itself so that it is not exposed to forex risks. If INR depreciates they will get **fewer dollars to remit back**.
- Swap with GOI





Investment 500 crores @USD INR 50	USD 100 Million
Less : Interest Cost @8% on Borrowings	(USD 8 Million)
Add: Sale Proceeds INR 740 Crores @ USD INR 50	USD 148 Million
Net Gain	USD 40 Million
Assumption : GOI Agrees to Swap	

If GOI Swaps only initial investment then with swap gains is as follows

Investment 500 crores @USD INR 50	USD 100 Million
Less : Interest Cost @8% on Borrowings	(USD 8 Million)
Add: Sale Proceeds INR 500 Crores @ USD INR 50	USD 100 Million
Profit Converted INR 240 Crores USD INR 54	USD 44.44 Million
Net Gain	USD 36.44 Million

Without Swap

Investment 500 crores @USD INR 50	USD 100 Million
Less : Interest Cost @8% on Borrowings	(USD 8 Million)
Add: Sale Proceeds INR 740 Crores @ USD INR 54	USD 137.04 Million
Net Gain	USD 29.04 Million

Hence, Drill Dip should swap and lock gain of USD 40 Million.

## 27 Illustration

XYZ has taken a six-month loan from its foreign collaborator for USD 2 million. Interest is payable on maturity @ LIBOR plus 1%. The following information is available:

Spot Rate	INR/USD	68.5275
6 months Forward rate	INR/USD	68.4575
6 months LIBOR for USD		2%
6 months LIBOR for INR		6%

You are required to :

- Calculate Rupee requirements if forward cover is taken.
- Advise the company on the forward cover.

What will be your opinion if spot rate of INR/USD is 68.4275 ?

(Jan'21 QP 8 marks, RTP May'23)

Solution : i)

Loan	USD 2 Million
Period	6 Months
Interest	L+ 100 Bps = 2% + 1% = 3% P.a
Interest Payable	= USD 2 Million × 3% × 6/12 = USD 30,000
Total Payment after 6 Months	= USD 2,000,000 + 30,000 = USD 2,030,000



Forward rate	USD INR 68.4575
Total INR Required after 6 Months	= 2,030,000 × 68.4575 = INR 13,89,68,725

ii) Ideal Spot as per Interest rate parity =  $S \times (1+D)/(1+F) = 68.5275 \times (1+6\%/2)/(1+2\%/2)$   
= INR 69.8844

Current forward = 68.4575

Forward is better than probable spot after 6 months. Hence take forward cover.

If Spot is 68.4275, then as per IRP, expected spot after 6 Months is 69.7825 ( $68.4275 \times 1.03/1.01$ )

Even then, **take forward cover** as expected spot is greater than forward rate.

## 28 Illustration

K Ltd. currently operates from 4 different buildings and wants to consolidate its operations into one building which is expected to cost ₹90 crores. The Board of K Ltd. had approved the above plan and to fund the above cost, agreed to avail an External Commercial

Borrowing (ECB) of GBP 10 m from G Bank Ltd. on the following conditions:

- (i) The Loan will be availed on 1st April, 2019 with interest payable on half yearly rest.
- (ii) Average Loan Maturity life will be 3.4 years with an overall tenure of 5 years.
- (iii) Upfront Fee of 1.20%.
- (iv) Interest Cost is GBP 6 months LIBOR + Margin of 2.50%.
- (v) The 6 month LIBOR is expected to be 1.05%.

K Ltd. also entered into a GBP-INR hedge at 1 GBP = INR 90 to cover the exposure on account of the above ECB Loan and the cost of the hedge is coming to 4.00% p.a.

As a Finance Manager, given the above information and taking the 1 GBP = INR 90:

- (i) Calculate the overall cost both in percentage and rupee terms on an annual basis.
- (ii) What is the cost of hedging in rupee terms?
- (iii) If K Ltd. wants to pursue an aggressive approach, what would be the net gain/loss for K Ltd. if the INR depreciates/appreciates against GBP by 10% at the end of the 5 years assuming that the loan is repaid in GBP at the end of 5 years?

Ignore time value and taxes and calculate to two decimals.

(May'19 QP 8 marks)

### Solution

(i)

Overall Cost in INR and % basis

6 months Libor = 1.05%

Total Cost of Loan = 6 months Libor + 250 bps (2.50%)  
= 3.55%

Upfront fees =  $\frac{1.2\%}{3.4\text{yrs}} = 0.35\% \text{ p.a.}$  (Assuming amortized over average tenure)

Hedging Cost (currency) = 4%

Total = 3.55% + 0.35% + 4%  
= 7.9%

Cost of Loan in INR terms

= 1 Cr (GBP) \* 90 INR/GBP \* 7.9%

= 90 Cr \* 7.9% = 7.11 Crores p.a.



(ii)

Cost of Hedging in INR  
Loan value = 90 Cr  
Hedging Cost = 4%  
Annual Hedging Cost = 3.6 Cr

(iii)

Assuming INR is not hedged, if INR depreciates by 10% from 90 to 99, GBP/INR from 90 to 99.  
Value of Loan = GBP 10 million  
So, the Loan value increases from 90 Crores to 99 Crores, thereby a loss of 9 Crores.  
Actual Loss = 9 Crores - 3.6 Crores (Cost of Hedging)  
= 5.4 Crores

If INR appreciates by 10%, there is a gain of 9 Crores.

Actual Gain = 9 Crores + 3.6 Crores (by not hedging) = 12.6 Crores  
(3.6 Cr pa x 3.4 years can also be alternatively considered in both the above computations)

## 29. Illustration

In March, 2022, SMD Bank sold 7% Interest Rate Futures underlying Notional 7.5% Coupon Bonds. The Exchange provides following details of eligible securities that can be delivered :

Security	Quoted Spot Price of Bonds	Conversion Factor
6.55 GOI 2025	9264.0	0.9060
6.80 GOI 2029	8775.5	0.9195
6.85 GOI 2026	9723.0	0.9643
8.44 GOI 2027	11463.0	1.1734
8.85 GOI 2028	12017.0	1.2428

Recommend the Cheapest to Deliver (CTD) security that should be delivered by SMD Bank if Future settlement price is 10000.

(Nov 23'QP 6 marks, MTP Apr'21)

Solution:

Cheapest to Deliver Bond (CTD)

Futures Sales Price x Conversion Factor = Equivalent Bond to be delivered

Profit = Deliverable Bond price - Quoted spot price of deliverable Bond

Security	Future Settlement Price	Conversion factor	FSP x Con. Factor A	Quoted spot price B	Profit / loss A-B
6.55GOI 2025	10000	0.9060	9060	9264	(204)
6.80 GOI 2029	10000	0.9195	9195	8775	420
6.85 GOI 2026	10000	0.9643	9643	9723	(80)
8.44 GOI 2027	10000	1.1734	11743	11463	280
8.85 GOI 2028	10000	1.2428	12428	12017	411





The seller will choose to deliver the 6.80% GOI bond as it has highest profit - it is the CTD Bond

### 30. Illustration

Suppose a dealer bank quotes for a generic swap "AIC 8%/8.20% vs. 6M LIBOR Flat". Notional principal amount of swap is ₹ 1 Million, and the same is for a period of three years, reset after every six months.

In this context, answer the following questions:

- (1) Interpret the dealer bank quote.
- (2) If a firm is buying a swap, what is the nature of cash flows?
- (3) If a firm is selling a swap, what is the nature of cash flows?
- (4) Calculate semi-annual fixed payment for the buyer of swap at the end of every six months.
- (5) If the six month period from the effective date of swap to the settlement date comprises of 181 days and that the corresponding LIBOR was 5% on the effective date of swap, then what will be the first floating rate payment for the buyer?
- (6) If the settlement is on "Net Basis", how much the buyer of swap has to pay or receive at the end of first six months?

[Assume 30/360 days basis]

(Nov 23'QP 8 marks)

**Solution:**

1. Dealer quote interpretation:
  - Generic Swap here means swap to exchange cashflows for floating rate loan with a fixed rate loan and vice versa
  - AIC means "all in cost" of fixed rate of 8% / 8.2% with no additional charges over and above this quoted number
  - 8.00% is the bid i.e at this rate the bank will pay fixed rate of 8% and receive floating rate
  - 8.20% is the ask i.e at this rate the bank will receive fixed rate of 8.2% and pay floating rate
  - Floating rate is 6M Libor
  - Flat refers to no additional changes on the floating rate
2. If a firm is Buying a swap, it means that the firm will receive floating rate and pay fixed rate of 8.2%
3. If a firm is Selling a swap, it means that the firm will pay floating rate and receive fixed rate of 8.0%
4. Semi - Annual fixed payments at the the end of 6 months for a buyer swap will be as follows:  
 $\text{Rs. } 1 \text{ Mio} \times 180/360 \times 8.2\% = \text{Rs. } 41000$
5. Floating rate payment made to the buyer ( i.e amount received by buyer)  
 $= \text{Notional} \times \text{Libor} \times (\text{dt} / 360)$   
 $= \text{Rs.}1 \text{ Mio} \times 5\% \times 181/360$   
 $= \text{Rs.}25,138.89$
6. Net settlement for Buyer swap after 1<sup>st</sup> 6 months

Fixed rate payment made by the buyer ( i.e amount paid by buyer)  
 $= \text{Notional} \times \text{Fixed Rate} \times (\text{dt} / 360)$   
 $= \text{Rs.}1 \text{ Mio} \times 8.2\% \times 181/360$   
 $= \text{Rs.}41,227.78$



Less Amount received by the buyer from 5 above = Rs.25,138.89

Net amount paid by the buyer = Rs.41,227.78 - Rs.25,138.89 = Rs.16,088.89

### 31. Illustration

A manufacturer of electronic components has taken floating interest Loan of ₹2 Crore on 1st April, 2023. The rate of interest at the inception of loan is 9% per annum. Interest is to be paid every year on 31st March. In the month of October 2023, the Central Bank of the country releases the following projections about the interest rates likely to prevail in future.

- (i) On 31st March, 2024. — 9.25%
- On 31' March 2025 — 9.50%
- On 31st March, 2026 — 10.00%
- On 31st March, 2027 — 9.00%
- On 31st March, 2028 — 8.25%

You are required to show how the borrower can hedge the risk using Option Cap arising out of expected rise in the rate of interest when he wants to peg his interest cost at 9% per annum.

- (ii) Assume that the premium negotiated by both the parties is 0.80% to be paid at once on 1st October, 2023 and the actual rate of interest on the respective due dates happens to be as:

- On 31st March, 2024 — 9.50%
- On 31st March, 2025 — 11.00%
- On 31st March, 2026 — 9.25%
- On 31st March, 2027 — 9.00%
- On 31st March, 2028 — 8.50%

You are required to show how the settlement will be executed on the perspective interest due dates.

- (iii) State whether this option is advantageous when compared to Interest Rate Collar option. Explain.

(May'24 QP)

#### Solution:

1. By using Interest rate caps the borrower can limit the maximum interest he / she pays when the interest rates rise. At inception the interest rate is 9% and if cap @ 9% is entered into then the interest expense annually will be a maximum of 9% only. If floating rates fall below 9% the investor's annual interest cost will be lower as per market floating rates. However if floating rates go above 9%, the investors interest cost is capped i.e restricted at 9%

Loan is taken on 1<sup>st</sup> April 2023 and the floating interest rate on 1<sup>st</sup> April 2023 is 9%

Period	Interest Set Date	Interest	Remarks
1 <sup>st</sup> April 2023 to 1 <sup>st</sup> April 2024	31 <sup>st</sup> March 2023	9%	Rate as on borrowing date
1 <sup>st</sup> April 2024 to 1 <sup>st</sup> April 2025	31 <sup>st</sup> March 2024	9.25%	Central Bank estimate
1 <sup>st</sup> April 2025 to 1 <sup>st</sup> April 2026	31 <sup>st</sup> March 2025	9.50%	Central Bank estimate





1 <sup>st</sup> April 2026 to 1 <sup>st</sup> April 2027	31 <sup>st</sup> March 2026	10.00%	Central Bank estimate
1 <sup>st</sup> April 2027 to 1 <sup>st</sup> April 2028	31 <sup>st</sup> March 2027	9.00%	Central Bank estimate
1 <sup>st</sup> April 2028 to 1 <sup>st</sup> April 2029	31 <sup>st</sup> March 2028	8.25%	Central Bank estimate

If a cap is entered into after October 2023 then the following will be the interest cost for the borrower

Period	Expected Interest Rate in %	CAP rate in %	Effective rate i.e Min (Cap , Market Rate)	Effective Interest Cost in ₹ for ₹ 2 Cr loan
1 <sup>st</sup> April 2023 to 1 <sup>st</sup> April 2024	9%	*	9%	₹ 18 Lacs
1 <sup>st</sup> April 2024 to 1 <sup>st</sup> April 2025	9.25%	9%	9%	₹ 18 Lacs
1 <sup>st</sup> April 2025 to 1 <sup>st</sup> April 2026	9.50%	9%	9%	₹ 18 Lacs
1 <sup>st</sup> April 2026 to 1 <sup>st</sup> April 2027	10.00%	9%	9%	₹ 18 Lacs
1 <sup>st</sup> April 2027 to 1 <sup>st</sup> April 2028	9.00%	9%	9%	₹ 18 Lacs
1 <sup>st</sup> April 2028 to 1 <sup>st</sup> April 2029	8.25%	9%	8.25%	₹ 16.50 Lacs

\*For the First year CAP is not relevant as the applicable rate for the year has already been decided on the inception date

If the Central Bank's predicted interest rates pan out then the effective interest cost will be as computed above.

Cost of CAP is ignored as the information s not provided for this part of the question

2. Cap pay off and effective cost in case interest rates are different as compared to the central bank's predictions

Period	Actual Interest Rate in %	CAP rate in %	Interest Outflow in ₹ Lacs for ₹ 2 Cr loan based on floating rate (A)	CAP Triggered	Cap Inflow in ₹ Lacs (B)	Effective Int cost in ₹ Lacs (A + B)
1 <sup>st</sup> April 2023 to 1 <sup>st</sup> April 2024	9%	*	18.00	No	-	18.00
1 <sup>st</sup> April 2024 to 1 <sup>st</sup> April 2025	9.50%	9%	19.00	Yes	1(WN1)	18.00





1 <sup>st</sup> April 2025 to 1 <sup>st</sup> April 2026	11.00%	9%	22.00	Yes	4(WN2)	18.00
1 <sup>st</sup> April 2026 to 1 <sup>st</sup> April 2027	9.25%	9%	18.50	Yes	0.5(WN3)	18.00
1 <sup>st</sup> April 2027 to 1 <sup>st</sup> April 2028	9.00%	9%	18.00	No	-	18.00
1 <sup>st</sup> April 2028 to 1 <sup>st</sup> April 2029	8.50%	9%	17.00	No	-	17.00

### Working Notes: Cap Inflows

Working Note	1	2	3
Cap Inflow	(Market Rate - Cap rate ) x ₹ 2 Cr	(Market Rate - Cap rate ) x ₹ 2 Cr	(Market Rate - Cap rate ) x ₹ 2 Cr
Cap Inflow in ₹ lacs	(9.5% - 9% ) x ₹ 2 cr	(11.0% - 9% ) x ₹ 2 cr	(9.25% - 9% ) x ₹ 2 cr
Cap Inflow in ₹ lacs	₹ 1 Lac	₹ 4 Lacs	₹ 50,000

Premia Paid = 0.8% x ₹ 2 Cr = ₹ 1.6 Lacs of one-time fees. If the fees is to be paid every year then the fees will Rs.1.6 Lacs x 5 years = Rs.8 Lacs

3. In a collar, a Cap is purchased and Floor is sold. Premium paid on the Cap is compensated by the premium received on a Floor. Whether a collar is advantageous or not compared to a cap depends on :
- Premia amounts paid / received on Cap & Floor
  - How the interest rates actually move
  - The gap between the Cap and the Floor

Eg: if a Floor was below 8.5%, the collar would be advantageous as the floor premium would offset the cap premium and based on the above interest rates the floor would not have been triggered. However, if the floor was above 8.5% then it cannot be clearly said if it would have been advantageous or not without knowing the premia received.

### 32. Illustration

XY Ltd. is planning to expand its operations in view of growing demand for its products. For this purpose, it is considering borrowing an amount of ₹100 crores for a period of 3 months in the coming 6 months' time from now. In the meantime, the company wants to hedge itself against the likely increase in interest rate.

The company's Bankers quoted an FRA (Forward Rate Agreement) at 8.20% per annum.

You are required to calculate due to FRA:

- (i) The actual interest rate if the Banker pays to XY Ltd. an amount of ₹9,78,952.52  
(ii) The actual interest rate if XY Ltd. will pay to the Banker a sum of ₹9,80,872.98

(Nov'24 QP 6 marks)





### Solution:

$$\text{FRA Payoff} = \frac{\text{Notional Amount} \times (\text{Ref Rate (Actual)} - \text{Forward Rate (Agreed)}) \times \text{DTM} / 365}{(1 + \text{Ref rate} \times \text{DTM} / 365)}$$

$$\text{Forward Rate Agreed} = 8.2\%$$

$$\text{FRA Tenure} = 3 \text{ Months}$$

$$\text{Notional Amount} = ₹100 \text{ Crores}$$

Amount Paid by Banker on Settlement date = ₹9,78,952.52 ⇒ Actual rate is higher than FRA rate

Let Actual rate be  $X$

Then,

$$\frac{₹100 \text{ cr} \times (X\% - 8.2\%) \times 3/12}{(1 + X\% \times 3/12)} = ₹9,78,952.52$$

$$\frac{₹25 \text{ cr} \times (X\% - 8.2\%) \times 3/12}{(1 + 0.25X\% \times 3/12)} = ₹9,78,952.52$$

$$\frac{(X\% - 8.2\%) \times 25,00,00,000}{(1 + 0.25X\% \times 3/12)} = ₹9,78,952.52$$

$$\frac{(X\% - 8.2\%) \times 25,00,00,000}{(1 + 0.25X\% \times 3/12)} = ₹9,78,952.52$$

$$(X\% - 8.2\%) \times 25,00,00,000 = (1 + 0.25X\% \times 3/12) \times ₹9,78,952.52$$

$$X\% - 8.2\% = \frac{₹9,78,952.52}{25,00,00,000} + 0.00097895X$$

$$X\% - 0.00097895X = 0.0039158$$

$$0.00097895X = 0.0859158$$

$$X = \frac{0.0859158}{0.00097895}$$

$$X = 0.08600$$

$$X\% = 8.6\%$$

Amount Paid by XY Ltd on Settlement date = ₹9,80,872.98 ⇒ Actual rate is Lower than FRA rate

Let Actual rate be  $Y$

Then,

$$\frac{₹100 \text{ cr} \times (Y\% - 8.2\%) \times 3/12}{(1 + Y\% \times 3/12)} = -₹9,80,872.98$$

$$\frac{₹25 \text{ cr} \times (Y\% - 8.2\%) \times 3/12}{(1 + 0.25Y\% \times 3/12)} = -₹9,80,872.98$$

$$\frac{(Y\% - 8.2\%) \times 25,00,00,000}{(1 + 0.25Y\% \times 3/12)} = -₹9,80,872.98$$

$$Y\% - 8.2\% = \frac{-₹9,80,872.98}{25,00,00,000} + 0.0009808729Y$$

$$Y\% + 0.0009808729Y = \frac{-₹9,80,872.98}{25,00,00,000} + 8.2\%$$

$$Y\% + 0.0009808729Y = 0.082 - 0.00392349$$

$$1.0009808729Y = 0.078076$$

$$Y = \frac{0.078076}{1.0009808729}$$

$$Y = 0.07800$$

$$Y\% = 7.8\%$$

Actual rate in Case 1 is 8.6% & in Case II it is 7.8%





### 33. Illustration

MN Bank entered into a plain vanilla swap through an OIS (Overnight Index Swap) on a principal of ₹5 crores, agreeing to receive MIBOR overnight floating rates for a fixed payment on the principal. The swap was entered into on Monday, 2nd August and was to commence on 3rd August and run for 7 days. The MIBOR rates for Tuesday to Monday were:

8.00%, 8.25%, 8.15%, 7.90%, 7.95%, 8.15%

MN Bank received ₹275 net of settlement.

Working is to be rounded off. Bank does not accept decimal values

Calculate the fixed rate and interest under both legs, with the assumption that Sunday is a holiday.

(Nov'24 QP 4 marks)

Solution:

Days	Interest Rate (%)	Opening Principal	Interest
Tuesday	8.00	5,00,00,000	10,959
Wednesday	8.25	5,00,10,959	11,304
Thursday	8.15	5,00,22,263	11,169
Friday	7.90	5,00,33,432	10,829
Saturday	7.95	5,00,44,261	10,900
Sunday	7.95	5,00,55,161	10,902
Monday	8.15	5,00,66,063	11,179
<b>Total</b>			<b>77,242</b>

Interest To be received on floating = 77,242

Net received = INR 275

Paid fixed = 77,242 - 317 = INR 76,967

Fixed rate for which interest is INR 76,967 on INR 5,00,00,000 for 7 days is 8.026%

(Rounded Off 8%)

(76.967 / ₹5 Cr × 365 / 7)

### 34. Illustration

DEF Ltd. has implemented a strategy to manage its exposure to fluctuating interest rates by engaging in both interest rate caps and floors.

The company has purchased \$50,00,000 (i.e., call options on interest rates) cap of 8% at a premium of 0.75% of the face value to protect against rising interest rates. \$50,00,000 (i.e., put options on interest rates) floor of 5% is also available at a premium of 0.85% of face value.

You are required to analyze the following situation:

- If interest rate rise to 10 percent, what is the amount received by DEF Ltd.? What are the net savings from the cap?
- If DEF Ltd. also purchases a floor, what are net savings if interest rate rises to 10%?
- Calculate net savings if interest rates fall to 4 percent considering cap & floor both purchase.
- If DEF Limited has purchased the cap and sold the floor and there is price rise to 11%, what will be net saving to the company?

(May'25 6(b) - 7 Marks)

Solution:

Part 1

CAP @ 8% Premium @0.75% on USD 5 Mio & Market rate is 10%





Amount received on CAP = Max ( Market rate - Cap , 0 ) x USD 5 Mio  
 = Max ( 10%-8%,0 ) x USD 5 Mio  
 = 2% x USD 5 Mio  
 = USD 100,000

Less: Premia Paid = USD 5 Mio x 0.75%  
 = USD 37,500

Net Savings = USD 62,500

### Part 2

Buy CAP@8% + Buy Floor @5% for 0.85% Premium & Market rate = 10%

Premia on Floor = USD 5 MIO x 0.85% = USD 42500  
 Cap Premia = USD 5 MIO x 0.75% = USD 37500  
**Total Paid = USD 80,000**

Amount received on CAP = Max ( Market rate - Cap , 0 ) x USD 5 Mio  
 = Max ( 10%-8%,0 ) x USD 5 Mio  
 = 2% x USD 5 Mio  
 = **USD 100,000**

Amount received on FLOOR = Max ( Floor - Market Rate , 0 ) x USD 5 Mio  
 = Max ( 5%- 10%, 0 ) x USD 5 Mio  
 = 0 x USD 5 Mio  
 = **NIL**

Net Savings = USD 100,000 - USD 80,000 = **USD 20,000**

### Part 3

Buy CAP @8% + Buy Floor @5% & Market rate = 4%

Premia on Floor = USD 5 MIO x 0.85% = USD 42500  
 Cap Premia = USD 5 MIO x 0.75% = USD 37500  
**Total Paid = USD 80,000**

Amount received on CAP = Max ( Market rate - Cap , 0 ) x USD 5 Mio  
 = Max ( 4%-8%,0 ) x USD 5 Mio  
 = Nil

Amount received on FLOOR = Max ( Floor - Market Rate , 0 ) x USD 5 Mio  
 = Max ( 5%- 4%, 0 ) x USD 5 Mio  
 = 1% x USD 5 Mio  
 = **USD 50,000**

Net Savings = USD 50,000 - USD 80,000 = - **USD 30,000**

### Part 3

Buy CAP@8% + Sell Floor @5% & Market rate = 11%

Premia on Floor Received = USD 5 MIO x 0.85% = USD 42500  
 Cap Premia Paid = USD 5 MIO x 0.75% = USD 37500



 **Total Received = USD 5,000**

Amount received on CAP = Max ( Market rate - Cap , 0) x USD 5 Mio  
= Max (11%-8%,0) x USD 5 Mio  
= 3% x USD 5 Mio = **USD 1,50,000**

Amount paid on FLOOR = Max ( Floor - Market Rate , 0) x USD 5 Mio  
= Max ( 5%- 11%, 0) x USD 5 Mio  
= **NIL**

Net Savings = USD 5,000 + USD 1,50,000 = **USD 1,55,000**

### 35. Illustration

Name	Status	Principal Amount (₹ in millions)	Duration of loan/ deposit (time)	Interest rates of Borrowing/ Lending	Strike Rate (PLR) (K)	Premium (%) (lumpsum) (P)	If PLR rate at the end of first 6-months (Reset Period)
AB Ltd.	Borrower	₹ 5.00	5 Year	PLR+0.5	8% p.a.	0.4%	10% p.a.
XY Ltd.	Depositor	₹ 2.00	3 Year	PLR-0.5	8% p.a.	0.5%	6% p.a.

You are required to:

- Elaborate the strategy to be adopted by both the companies to hedge against the risk of interest rate fluctuations.
- Premium paid/received based on the strategy to be adopted in (i) using 8% p.a. as the reference rate.
- Net Gain/loss due to hedging to both the companies. (Q4a, Jan'26 6 Marks)

Solution:

Strategy to be adopted:

(1) AB Limited Buy a cap for 5 years on balance maturity left with strike rate of 8% for Rs.5 Mio

XY Limited Buy a Floor for 3 years on balance maturity left with strike rate of 8% for Rs.2 Mio

(2) AB Limited Lumpsum premia = 0.4% x 5 Mio = 20,000

Equalized annual premium = 20000/ PVIFA ( 5 years x frequency of 2, 4% i.e 8%/2) - Assuming 8% pa is the discounting rate

= 20000/8.1108

= 2465.82

= Rounded off to Rs.2466

XY Limited Lumpsum premia = 0.5% x 2 Mio = 10,000





Equalized annual premium =  $10000 / PVIFA (3 \text{ years} \times \text{frequency of } 2, 4\% \text{ i.e } 8\%/2)$  - Assuming 8% pa is the discounting rate  
 =  $10000/5.242$   
 =  $1907.62$  = Rounded off to Rs.1908

3)

**AB Limited Net gain or loss on 1<sup>st</sup> reset date**

Loan rate	PLR + 0.5%
CAP on PLR	8%
PLR on 1 <sup>st</sup> Reset date	10%
Gain made on account of CAP	2% (10-8)
Gain in ₹ $2\% \times 5 \text{ Mio} \times \frac{1}{2}$	₹50,000
Less: Equalized annual Premia	₹2466
Net gain / Loss	₹47,534
<b>XY Limited Net gain or loss on 1<sup>st</sup> reset date</b>	
Deposit rate	PLR - 0.5%
CAP on PLR	8%
PLR on 1 <sup>st</sup> Reset date	6%
Gain made on account of CAP	2% (8-6)
Gain in ₹ $2\% \times 2 \text{ Mio} \times \frac{1}{2}$	₹20,000
Less: Equalized annual Premia	₹1908
Net gain / Loss	₹18,092



1. Illustration

Perfect Inc., a U.S. based Pharmaceutical Company has received an offer from Aids cure Ltd., a company engaged in manufacturing of drugs to cure Dengue, to set up a manufacturing unit in Baddi (H.P.), India in a joint venture.

As per the Joint Venture agreement, Perfect Inc. will receive 55% share of revenues plus a royalty @ US \$0.01 per bottle. The initial investment will be ₹ 200 crores for machinery and factory. The scrap value of machinery and factory is estimated at the end of five (5) year to be ₹ 5 crores. The machinery is depreciable @ 20% on the value net of salvage value using Straight Line Method. An initial working capital to the tune of ₹ 50 crores shall be required and thereafter ₹ 5 crores each year.

As per GOI directions, it is estimated that the price per bottle will be ₹ 7.50, and production will be 24 crores bottles per year. The price in addition to inflation of respective years shall be increased by ₹ 1 each year. The production cost shall be 40% of the revenues.

The applicable tax rate in India is 30% and 35% in US and there is Double Taxation Avoidance Agreement between India and US. According to the agreement tax credit shall be given in US for the tax paid in India. In both the countries, taxes shall be paid in the following year in which profit have arisen/ remittance received.

The Spot rate of \$ is ₹ 57. The inflation in India is 6% (expected to decrease by 0.50% every year) and 5% in US.

As per the policy of GOI, only 50% of the share can be remitted in the year in which they are realised and remaining in the following year.

Though WACC of Perfect Inc. is 13% but due to risky nature of the project it expects a return of 15%.

Determine whether Perfect Inc. should invest in the project or not (from subsidiary point of view).

(ICAI SM, MTP Nov'21 New & Old)

Solution :

Year	0	1	2	3	4	5	6
Exchange Rate	57	$=57 \times \frac{1.06}{1.05}$ =57.54	$=57.54 \times \frac{1.055}{1.05}$ = 57.82	$=57.82 \times \frac{1.05}{1.05}$ =57.82	$57.82 \times \frac{1.045}{1.05}$ = 57.54	$=57.54 \times \frac{1.04}{1.05}$ = 56.99	$=56.99 \times \frac{1.035}{1.05}$ = 56.18
Inf India	6%	6.00%	5.50%	5.00%	4.50%	4.00%	3.50%
Inf US		5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Sales Volume ( Cr)		24	24	24	24	24	
Price initial (INR)		7.5	=7.5+1 = 8.5	=8.5+1 =9.5	=9.5+1 =10.5	=10.5+1 =11.5	
Inflation (%)		6%	5.50%	5%	4.50%	4%	
Post Inf price (INR)		=7.5 × (1+6%) =7.95	=8.5 × (1+5.5%) =8.97	=9.5 × (1+5%) =9.98	=10.5 × (1+4.5%) =10.97	=11.5 × (1+4%) =11.96	
Total Revenue (INR Cr)		= 24 × 7.95 =190.8	= 24 × 8.97 =215.22	= 24 × 9.98 =239.40	=24 × 10.97 =263.34	= 24 × 11.5 =287.04	





Share of 55%	A	=190.8 × 55% =104.94	=215.22 × 55% = 118.37	=239.4 × 55% =131.67	=263.34 × 55% =144.84	= 287.04 × 55% = 157.87	
Royalty @ 0.01 USD per bottle (USD Cr)		=24 × 0.01 = 0.24	=24 × 0.01 = 0.24	=24 × 0.01 = 0.24	=24 × 0.01 = 0.24	=24 × 0.01 = 0.24	
Royalty in USD Rs. Cr	B	= 57.54 × 0.24 =13.81	=57.82 × 0.24 = 13.88	=57.82 × 0.24 = 13.88	= 57.54 × 0.24 = 13.81	= 56.99 × 0.24 = 13.68	
Production costs Rs. Cr @ 40%	C	=104.94 × 40% = 41.98	= 118.37 × 40% = 47.35	= 131.67 × 40% = 52.67	= 144.84 × 40% = 57.93	= 157.87 × 40% = 63.15	
Less: Dep	D	39	39	39	39	39	
PBT	A + B -C -D	= 37.77	=45.90	=53.88	=61.71	=69.40	

Year	0	1	2	3	4	5	6
Tax @30% INR Cr-India		=37.77 × 30% = 11.33	= 45.90 × 30% = 13.77	= 53.88 × 30% = 16.16	1.71 × 30% = 18.51	= 69.40 × 30% = 20.82	
Tax @ 35% INR Cr - USA		=37.77 × 35% = 13.22	= 45.90 × 35% = 16.06	= 53.88 × 35% = 18.86	= 61.71 × 35% = 21.60	= 69.40 × 35% = 24.29	
Extra Tax		=13.22-11.33 = 1.89	=16.06-13.77 = 2.29	= 18.86-16.16 = 2.69	= 21.60-18.51 = 3.09	= 24.29-20.82 = 3.47	
Indian Co PAT		= 37.77 - 11.33 = 26.44	= 45.90 - 13.77 = 32.13	= 53.88 - 16.16 = 37.71	= 61.71 - 18.51 = 43.20	= 69.40 - 20.82 = 48.58	
FCF to Perfect PAT		26.44	32.13	37.72	43.20	48.58	
Add : Dep		39.00	39.00	39.00	39.00	39.00	
Add : Tax		11.33	13.77	16.16	18.51	20.82	
Investment	(200)					5	
WC Adj	(50)	(5.00)	(5.00)	(5.00)	(5.00)	70.00	
Less : Tax paid			(11.33)	(13.77)	(16.16)	(18.51)	(20.82)
Net FCF	(250)	71.77	68.57	74.11	79.55	164.89	(20.82)
Actual Remittance (CY)	(250)	35.89	34.28	37.05	39.77	82.44	(20.82)
Remittance (PY)			35.89	34.28	37.05	39.77	82.44
Total Remittance	(250)	35.89	70.17	71.34	76.83	122.22	61.62





Exchange Rate	57.00	57.54	57.82	57.82	57.54	56.99	56.18
CF to Perfect in USD Mn	$\frac{-(250) \times 10}{57} = (43.86)$	$\frac{35.89 \times 10}{57.54} = 6.24$	$\frac{70.17 \times 10}{57.82} = 12.14$	$\frac{71.34 \times 10}{57.82} = 12.34$	$\frac{76.83 \times 10}{57.54} = 13.35$	$\frac{122.22 \times 10}{56.99} = 21.44$	$\frac{61.62 \times 10}{56.18} = 10.97$
Extra Tax US in INR Cr			1.89	2.29	2.69	3.09	3.47
Extra Tax US in USD Mn			$\frac{-(1.89) \times 10}{57.82} = (0.33)$	$\frac{-(2.29) \times 10}{57.82} = (0.40)$	$\frac{-(2.69) \times 10}{57.54} = (0.47)$	$\frac{-(3.09) \times 10}{56.99} = (0.54)$	$\frac{-(3.47) \times 10}{56.18} = (0.62)$
Net CF after Tax	(43.86)	6.24	$= 12.14 + (0.33) = 11.81$	$12.34 + (0.40) = 11.94$	$= 13.35 + (0.47) = 12.88$	$= 21.44 + (0.54) = 20.90$	$= 10.97 + (0.62) = 10.35$

Depreciation	20%
Project Cost	200
Less: Salvage Value	(5)
Depreciable Value	195
SLM Depreciation	$= 195 \times 0.2 = 39$

Assumption : Entire project cost borne by perfect Inc and Aids cure only does marketing

Year	0	1	2	3	4	5	6
Tax @30% INR Cr- India		$= 37.77 \times 30\% = 11.33$	$= 45.90 \times 30\% = 13.77$	$= 53.88 \times 30\% = 16.16$	$= 61.71 \times 30\% = 18.51$	$= 69.40 \times 30\% = 20.82$	
Tax @ 35% INR Cr - USA		$= 37.77 \times 35\% = 13.22$	$= 45.90 \times 35\% = 16.06$	$= 53.88 \times 35\% = 18.86$	$= 61.71 \times 35\% = 21.60$	$= 69.40 \times 35\% = 24.29$	
Extra Tax		$= 13.22 - 11.33 = 1.89$	$= 16.06 - 13.77 = 2.29$	$= 18.86 - 16.16 = 2.69$	$= 21.60 - 18.51 = 3.09$	$= 24.29 - 20.82 = 3.47$	
Indian Co PAT		$= 37.77 - 11.33 = 26.44$	$= 45.90 - 13.77 = 32.13$	$= 53.88 - 16.16 = 37.71$	$= 61.71 - 18.51 = 43.20$	$= 69.40 - 20.82 = 48.58$	
FCF to Perfect PAT		26.44	32.13	37.72	43.20	48.58	
Add : Dep		39.00	39.00	39.00	39.00	39.00	
Add : Tax		11.33	13.77	16.16	18.51	20.82	
Investment	(200)					5	
WC Adj	(50)	(5.00)	(5.00)	(5.00)	(5.00)	70.00	





Less :			(11.33)	(13.77)	(16.16)	(18.51)	(20.82)	
Tax paid								
Net FCF	(250)	71.77	68.57	74.11	79.55	164.89	(20.82)	
Actual Remittance (CY)	(250)	35.89	34.28	37.05	39.77	82.44	(20.82)	
Remittance (PY)			35.89	34.28	37.05	39.77	82.44	
Total Remittance	(250)	35.89	70.17	71.34	76.83	122.22	61.62	
Exchange Rate	57.00	57.54	57.82	57.82	57.54	56.99	56.18	
CF to Perfect in USD Mn	$\frac{(250) \times 10}{57} = (43.86)$	$\frac{35.89 \times 10}{57.54} = 6.24$	$\frac{70.17 \times 10}{57.82} = 12.14$	$\frac{71.34 \times 10}{57.82} = 12.34$	$\frac{76.83 \times 10}{57.54} = 13.35$	$\frac{122.22 \times 10}{56.99} = 21.44$	$\frac{61.62 \times 10}{56.18} = 10.97$	
Extra Tax US in INR Cr			1.89	2.29	2.69	3.09	3.47	
Extra Tax US in USD Mn			$\frac{(1.89) \times 10}{57.82} = (0.33)$	$\frac{(2.29) \times 10}{57.82} = (0.40)$	$\frac{(2.69) \times 10}{57.54} = (0.47)$	$\frac{(3.09) \times 10}{56.99} = (0.54)$	$\frac{(3.47) \times 10}{56.18} = (0.62)$	
Net CF after Tax	(43.86)	6.24	$= 12.14 + (0.33) = 11.81$	$= 12.34 + (0.40) = 11.94$	$= 13.35 + (0.47) = 12.88$	$= 21.44 + (0.54) = 20.90$	$= 10.97 + (0.62) = 10.35$	

*Assumption - tax is on profits & not CF hence WC and investment scrap value are excluded in this*

PVIF @15%	1.00	0.87	0.76	0.66	0.57	0.50	0.43	
PVCF	(43.86)	$= 6.24 \times 0.87 = 5.42$	$= 11.81 \times 0.76 = 8.93$	$= 11.94 \times 0.66 = 7.85$	$= 12.88 \times 0.57 = 7.37$	$= 20.90 \times 0.5 = 10.39$	$= 10.35 \times 0.43 = 4.48$	
NPV		<b>0.58</b>						
Exchange Rate	57.00	57.54	57.82	57.82	57.54	56.99	56.18	
CF to Perfect in USD Mn	$\frac{(250) \times 10}{57} = (43.86)$	$\frac{35.89 \times 10}{57.54} = 6.24$	$\frac{70.17 \times 10}{57.82} = 12.14$	$\frac{71.34 \times 10}{57.82} = 12.34$	$\frac{76.83 \times 10}{57.54} = 13.35$	$\frac{122.22 \times 10}{56.99} = 21.44$	$\frac{61.62 \times 10}{56.18} = 10.97$	
Tax in US in USD Mn @35%			$= 6.24 \times 35\% = 2.18$	$= 12.14 \times 35\% = 4.25$	$= 12.34 \times 35\% = 4.32$	$= 13.35 \times 35\% = 4.67$	$= 21.44 \times 35\% = 7.51$	$= 10.97 \times 35\% = 3.84$
Tax in India in INR Cr			11.33	13.77	16.16	18.51	20.82	
Tax in India in \$ Mio			$\frac{(11.33) \times 10}{57.82} = 1.96$	$\frac{13.77 \times 10}{57.82} = 2.38$	$\frac{16.16 \times 10}{57.54} = 2.81$	$\frac{18.51 \times 10}{56.99} = 3.25$	$\frac{20.82 \times 10}{56.18} = 3.71$	





Diff in US & Indian tax			= 1.96-2.18 = (0.22)	= 2.38-4.25 = (1.87)	= 2.81-4.32 = (1.51)	= 3.25-4.67 = (1.42)	= 3.71-(7.51) = (3.80)	-3.84
Net CF after tax	(43.86)	6.24	=12.14 +(0.22) = 11.91	=12.34 + (1.87) = 10.47	= 13.35 + (1.51) = 11.84	= 21.44 + (1.42) = 20.02	= 10.97 + (3.80) = 7.17	
<b>Assumption : Tax is on profits in India and on CF in US</b>								
PVIF @15%	1.00	0.870	0.756	0.658	0.572	0.497	0.432	0.376
PVCF	(43.86)	= 6.24 × 0.870 = 5.42	= 11.91 × 0.756 = 9.01	= 10.47 × 0.658 = 6.89	= 11.84 × 0.572 = 6.77	= 20.02 × 0.497 = 9.95	= 7.17 × 0.432 = 3.10	=(3.84) × 0.376 = (1.44)
NPV	=(4.16)							

## 2. Illustration

Its Entertainment Ltd., an Indian Amusement Company is happy with the success of its Water Park in India. The company wants to repeat its success in Nepal also where it is planning to establish a Grand Water Park with world class amenities. The company is also encouraged by a marketing research report on which it has just spent ₹ 20,00,000 lacs.

The estimated cost of construction would be Nepali Rupee (NPR) 450 crores and it would be completed in one years' time. Half of the construction cost will be paid in the beginning and rest at the end of year. In addition, working capital requirement would be NPR 65 crores from the year end one. The after-tax realizable value of fixed assets after four years of operation is expected to be NPR 250 crores. Under the Foreign Capital Encouragement Policy of Nepal, company is allowed to claim 20% depreciation allowance per year on reducing balance basis subject to maximum capital limit of NPR 200 crore. The company can raise loan for theme park in Nepal @ 9%.

The water park will have a maximum capacity of 20,000 visitors per day. On an average, it is expected to achieve 70% capacity for first operational four years. The entry ticket is expected to be NPR 220 per person. In addition to entry tickets revenue, the company could earn revenue from sale of food and beverages and fancy gift items. The average sales expected to be NPR 150 per visitor for food and beverages and NPR 50 per visitor for fancy gift items. The sales margin on food and beverages and fancy gift items is 20% and 50% respectively. The park would open for 360 days a year.

The annual staffing cost would be NPR 65 crores per annum. The annual insurance cost would be NPR 5 crores. The other running and maintenance costs are expected to be NPR 25 crores in the first year of operation which is expected to increase NPR 4 crores every year. The company would apportion existing overheads to the tune of NPR 5 crores to the park.

All costs and receipts (excluding construction costs, assets realizable value and other running and maintenance costs) mentioned above are at current prices (i.e., 0 point of time) which are expected to increase by 5% per year.

The current spot rate is NPR 1.60 per rupee. The tax rate in India is 30% and in Nepal it is 20%.

The average market return is 11% and interest rate on treasury bond is 8%. The company's current equity beta is 0.45. The company's funding ratio for the Water Park would be 55% equity and 45% debt.

Being a tourist Place, the amusement industry in Nepal is competitive and very different from its Indian counterpart. The company has gathered the relevant information about its nearest competitor in Nepal.



The competitor's market value of the equity is NPR 1850 crores, and the debt is NPR 510 crores, and the equity beta is 1.35.

State whether Its Entertainment Ltd. should undertake Water Park project in Nepal or not.

(ICAI SM)

Solution :

Particulars/Year	0	1	2	3	4	5
Depreciation Allowance :						
Opening			200	160	128	102.4
Depreciation @20%			(40)	(32)	(25.6)	(20.48)
Closing			160	128	102.4	81.92
Profit & Loss						
Revenue						
Capacity per Day			20,000	20,000	20,000	20,000
Utilization			70%	70%	70%	70%
Days per year			360	360	360	360
Visitors per year			= 20,000 × 70% × 360 = 50,40,000	= 20,000 × 70% × 360 = 50,40,000	= 20,000 × 70% × 360 = 50,40,000	= 20,000 × 70% × 360 = 50,40,000
Ticket Price	220	=220 × 1.05 = 231	=231 × 1.05 = 242.55	=242.55 × 1.05 = 254.68	=254.68 × 1.05 = 267.41	= 267 × 1.05 = 280.78
F&B Margin	30	=30 × 1.05 = 31.5	=31.5 × 1.05 = 33.08	=33.08 × 1.05 = 34.73	= 34.73 × 1.05 = 36.47	=36.47 × 1.05 = 38.29
Gifts Margin	25	=25 × 1.05 = 26.25	=26.25 × 1.05 = 27.56	=27.56 × 1.05 = 28.94	=28.94 × 1.05 = 30.39	=30.39 × 1.05 = 31.91
Total Revenue (Ticket Price + F&B + Gifts)	275.00	288.75	303.19	318.35	334.26	350.98
Revenue in NPR in Cr			=303.19 × 0.504 = 152.81	=318.35 × 0.504 = 160.45	= 334.26 × 0.504 = 168.47	= 350.98 × 0.504 = 176.89
Costs						
Staffing Cost	(65)	= (65) × 1.05 = (68.25)	= (68.25) × 1.05 = (71.66)	= (71.66) × 1.05 = (75.25)	= (75.25) × 1.05 = (79.01)	= (79.01) × 1.05 = (82.96)
Insurance	(5)	= (5) × 1.05 = (5.25)	= (5.25) × 1.05 = (5.51)	= (5.51) × 1.05 = (5.79)	= (5.79) × 1.05 = (6.08)	= (6.08) × 1.05 = (6.38)
Maintenance			=(25)	=(25)-4 = (29)	= (29)-4 = (33)	=(33)-4 = (37)
Depreciation			(40)	(32)	(25.6)	(20.48)
PBT			10.63	18.41	24.78	30.07
Tax @20%			(2.13)	(3.68)	(4.96)	(6.01)





PAT			8.51	14.73	19.83	24.06
FCF						
PAT			8.51	14.73	19.83	24.06
Add :Depreciation			40	32	25.6	20.48
WC		(65)	= (65) × 1.05 =(3.25)	=(65+3.25) × 1.05 = (3.41)	=(65+3.25+3 .41) × 1.05 = (3.58)	(65+3.25+ 3.41+3.58) = 75.25
Investment	(225)	(225)				
Free Cash Flow	(225)	(290)	45.26	43.32	41.84	369.78

Competitor	Market Value NPR Cr	Beta	%
Equity	1,850	1.35	$= \frac{1850 \times 100}{2360} = 78\%$
Debt	510		$= \frac{510 \times 100}{2360} = 22\%$
Total	2,360		

Particulars	Amount
Asset Beta	=Equity Beta × $\frac{E}{E+D(\text{Post Tax})}$
AB of Competitor	1.11
Its Entertainment Asset Beta	1.11
Asset Beta	=Equity Beta × $\frac{E}{E+D(\text{Post Tax})}$
	$1.11 = \frac{EB \times 247.5}{(247.5 + 202.5) \times (1 - 20\%)}$
	$1.11 = 0.60 \times EB$
	$EB = 1.84$
Its Entertainment Project Cost	450
Equity @55%	247.50
Debt @45%	=450 - 247.50 = 202.5
Ke	$Ke = R_f + MRP \times EB$ $Ke = 8\% + 1.84 (3\%)$ $Ke = 13.51\%$
Kd	9%
WACC	=13.51% × 0.55 + 9% (1-20%) × 0.45 = 10.67%

Free Cash Flow	(225)	(290)	45.26	43.32	41.84	369.78
PVIF @ 10.67%	1	0.9036	0.8165	0.7377	0.6666	0.6023
PVCF	= (225) × 1 = (225)	= (290) × 0.9036 = (262.04)	= 45.26 × 0.8165 = 36.95	= 43.32 × 0.7377 = 31.96	= 41.84 × 0.6666 = 27.89	= 369.78 × 0.6023 = 222.74



The Company Its entertainment should not invest in this project as NPV is Negative at project level

### 3. Illustration

X Ltd. is interested in expanding its operation and planning to install manufacturing plant at US. For the proposed project it requires a fund of \$ 10 million (net of issue expenses/ floatation cost). The estimated floatation cost is 2%. To finance this project, it proposes to issue GDRs. You as financial consultant is required to compute the number of GDRs to be issued and cost of the GDR with the help of following additional information.

- (i) Expected market price of share at the time of issue of GDR is ₹ 250 (Face Value ₹ 100)
- (ii) 2 Shares shall underly each GDR and shall be priced at 10% discount to market price.
- (iii) Expected exchange rate ₹ 60/\$.
- (iv) Dividend expected to be paid is 20% with growth rate 12%.

(ICAI SM, Similar May'24 QP, Similar May'22 QP, May'18 QP 8 marks)

Solution :

Particulars	Amount (INR)
Market Price of share	250
GDR Equivalent MP of equity shares	$250 \times 2$ = 500
GDR Price	= 10% of Equity Share Market Price = $500 \times 90\%$ = 450
USD price per share	= $\frac{450}{60}$ = USD 7.5
Funds required	USD 10 Million
Floatation Cost	2%
Issue Size	= $\frac{10 \text{ Million}}{98\%}$ = USD 10.2048 Million
USD Price per GDR	USD 7.5
Total GDR Issued	= USD $\frac{10.2048 \text{ Million}}{7.5}$ = 1,360,544 GDRs
Money raised per GDR	USD 7.5 × INR 60 = 450
Money received is 98%	= $450 \times 98\%$ = INR 441

Particulars	CASE A : When Price is 441 (Net proceeds)	CASE B : When Price is 450 (Gross proceeds)
D1	= Face Value per share × Number of shares per GDR × 20% = $100 \times 2 \times 20\%$ = INR 40	= Face Value per share × Number of shares per GDR × 20% = $100 \times 2 \times 20\%$ = INR 40
g	12%	12%
PO	= $D1 / (Ke - g)$ $441 = 40 / (Ke - 12\%)$ $Ke - 12\% = 9.07\%$ $Ke = 21.07\%$	$PO = D1 / (Ke - g)$ $450 = 40 / (Ke - 12\%)$ $Ke - 12\% = 10.88\%$ $Ke = 22.88\%$

If listed price is consider, then Cost is 22.88% whereas if net proceeds are considered, cost will be 21.07%.





#### 4. Illustration

Right Limited has proposed to expand its operations for which it requires funds of \$ 30 million, net of issue expenses which amount to 4% of the issue size. It proposed to raise the funds through a GDR issue. It considers the following factors in pricing the issue:

- (i) The expected domestic market price of the share is ₹ 300 (Face Value of ₹ 10 each share)
- (ii) 4 shares underly each GDR
- (iii) Underlying shares are priced at 20% discount to the market price
- (iv) Expected exchange rate is ₹ 70/\$

You are required to compute the number of GDR's to be issued and cost of GDR to Right Limited, if 20% dividend is expected to be paid with a growth rate of 20%.

(RTP Nov'23, RTP May'21 New & Old, MTP Apr'21, MTP Apr'18, MTP Mar'18)

Solution :

Particulars	Amount (INR)
Market Price of share	300
GDR Equivalent MP of equity shares	300 × 4 = 1200
GDR Price	= 20% of Equity Share Market Price = 1200 × 80% = 960
Expected Exchange rate	USD INR 70
USD price per share	= $\frac{960}{70}$ = USD 13.7142
Total Funds required	USD 30 Million
Floataion Cost	4%
Funds raised	USD $\frac{30 \text{ Million}}{96\%}$ = USD 31.25 Mn
GDRs issued	= $\frac{\text{Funds Raised}}{\text{Price of GDR}}$ = USD $\frac{31.25 \text{ Mn}}{13.7142}$ = 2,278,660

Cost of GDR

Particulars	Gross of Floataion Cost	Net of Floataion Cost
GDR in INR Equivalent	INR 960	INR 960 - 4% = INR 921.60
D1	20% of FV of 10 × 4 shares per GDR = 10 × 4 × 20% = 8	20% of FV of 10 × 4 shares per GDR = 10 × 4 × 20% = 8
Ke	= $\frac{D1}{p0} + g$ = $\frac{8}{960} + 20\% = 20.83\%$	= $\frac{8}{921.6} + 20\%$ = 20.868%

Cost of GDR - Gross is 20.83% and Net of Floataion Cost is 20.868%.



## 5. Illustration

Opus Technologies Ltd., an Indian IT company is planning to make an investment through a wholly owned subsidiary in a software project in China with a shelf life of two years. The inflation in China is estimated as 8 percent. Operating cash flows are received at the year end.

For the project an initial investment of Chinese Yuan (CN¥) 30,00,000 will be in land. The land will be sold after the completion of project at estimated value of CN¥ 35,00,000. The project also requires an office complex at cost of CN¥ 15,00,000 payables at the beginning of project. The complex will be depreciated on straight-line basis over two years to a zero-salvage value. This complex is expected to fetch CN¥ 5,00,000 at the end of project.

The company is planning to raise the required funds through GDR issue in Mauritius. Each GDR will have 5 common equity shares of the company as underlying security which are currently trading at ₹ 200 per share (Face Value = ₹ 10) in the domestic market. The company has currently paid the dividend of 25% which is expected to grow at 10% p.a. The total issue cost is estimated to be 1 percent of issue size. The annual sales are expected to be 10,000 units at the rate of CN¥ 500 per unit. The price of unit is expected to rise at the rate of inflation. Variable operating costs are 40 percent of sales. Fixed operating costs will be CN¥ 22,00,000 per year and expected to rise at the rate of inflation.

The tax rate applicable in China for income and capital gain is 25 percent and as per GOI Policy no further tax shall be payable in India. The current spot rate of CN¥ 1 is ₹ 9.50. The nominal interest rate in India and China is 12% and 10% respectively and the international parity conditions hold

You are required to

- Identify expected future cash flows in China and determine NPV of the project in CN¥.
- Determine whether Opus Technologies should go for the project or not assuming that there neither there is restriction on the transfer of funds from China to India nor any charges/taxes payable on the transfer of funds.

(ICAI SM)

Solution :

Particulars	Amount (CNY)
Shares per GDR	5
MP per share INR	200
Equivalent value of GDR INR	1000
D0	25%
FV of GDR	50
D0 per GDR	= 50 × 25% = 12.5
G	10%
D1	= 12.5 × 1.1 = 13.75
Floatation Cost	1%
Net Proceeds from GDR	= $\frac{1000}{100\% - 1\%}$ = 990
Ke	= $\frac{D1}{NP} + g$ = 13.75/990 + 10% = 11.39%

CNY Lakhs/Year	0	1	2
Land	(30)		
Office Complex	(15)		





Depreciation on Office Complex		=15/2 =(7.5)	=15/2 =(7.5)
Complex Sale Value			5
Complex NFA			0
Capital Gain			5
Tax @25%			= 5 × 25% = (1.25)
Net Cash Flow			3.75
Land Sale Value			35
Land NFA			30
Capital Gain			5
Tax @25%			(1.25)
Net Cash Flow			33.75
Inflation China	8%		
Int rate India	12%		
Int rate China	10%		
CNY /INR	9.5	$\frac{= 9.5 \times (1 + 12\%)}{(1 + 10\%)}$ = 9.67	$= \frac{9.67 \times (1+12\%)}{(1+10\%)}$ = 9.85
Profit & Loss			
Units Sold		10,000	10,000
Sale Price in CNY	500	= 500 × (1+8%) = 540	= 540 × (1+8%) = 583.20
Total Sales Value - CNY Lakhs		= $\frac{540 \times 10,000}{100,000}$ = 54	= $\frac{583.2 \times 10,000}{100,000}$ = 58.32
Variable Cost @40%		= 54 × 40% = (21.6)	= 58.32 × 40% = (23.33)
Fixed Cost	(22)	(23.76)	(25.66)
Depreciation		(7.5)	(7.5)
Profit before tax		1.140	1.831
Less : Tax @25%		(0.28)	(0.46)
Profit After Tax		0.855	1.373
FCF			
PAT		0.855	1.373
Add : Depreciation		7.5	7.5
Investment Outflow	(45)		





Investment Inflow (Net of tax)			$= 33.75 + 3.75$ $= 37.5$
FCF	(45)	$= 0.855 + 7.5$ $= 8.355$	$= 1.373 + 7.5 + 37.5$ $= 46.373$
Discount Rate			
11.39%			
PVF	1	0.898	0.806
PVCF in CNY lakhs	$(45) \times 1 =$ (45)	$= 8.355 \times 0.898 =$ 7.501	$= 46.373 \times 0.806 =$ 37.375
NPV CNY Lakhs	(0.12)		
CNY INR	9.5	9.67	9.85
PVCF in INR Lakhs	$= (45) \times$ 9.5 $= (427.5)$	$= 7.501 \times 9.67$ $= 72.53$	$= 37.375 \times 9.85$ $= 368.14$
NPV INR Lakhs	13.17		
PVF @12%	1	0.893	0.797
CNY Lakhs CF	(45)	8.36	46.37
CNY INR Rate	9.5	9.67	9.85
INR Lakhs CF	(427.5)	$= 8.36 \times 9.67$ $= 80.79$	$= 46.37 \times 9.85$ $= 456.78$
PV of INR CF Lakhs	(427.5)	$= 80.79 \times 0.893$ $= 72.14$	$= 456.78 \times 0.797$ $= 364.14$
NPV INR Lakhs	8.78		

Assumption : CF are remitted in Same year & The discount rate is taken as the cost of GDR.

## 6. Illustration

ABC Ltd. is considering a project in US, which will involve an initial investment of US \$ 1,10,00,000. The project will have 5 years of life. Current spot exchange rate is ₹ 48 per US \$. The risk-free rate in US is 8% and the same in India is 12%. Cash inflow from the project is as follows

Year	Cash Inflow
1	\$ 20,00,000
2	\$ 25,00,000
3	\$ 30,00,000
4	\$ 40,00,000
5	\$ 50,00,000

Calculate the NPV of the project using foreign currency approach. Required rate of return on this project is 14%.

(ICAI SM, Similar Jan'21 QP 8 marks, RTP Nov'19, MTP Mar'18 Old, Old PM)

**Solution :**

Under FC approach

Step 1: FC CF are Discounted at FC RADR

Step 2: Compute FC NPV

Step 3: Convert to Home Currency at Spot





Discounting Rate:

$(1 + \text{Risk free Rate}) (1 + \text{Risk premium}) = (1 + \text{Risk Adjusted Discount Rate})$

India Rf = 12%

India RADR = 14%

$\Rightarrow \text{India Risk premium} = (1 + 14\%) / (1 + 12\%) - 1 = 1.786\%$

Assuming Same Risk premium Applies in US as well , USD RADR =  $(1 + 8\%) (1 + 1.786\%) - 1 = 9.929\%$

Discounting USD CF at 9.929%

Particulars	0	1	2	3	4	5
Project Cost (USD Mn)	-11					
Cash Inflow (USD Mn)		2	2.5	3	4	5
PVF @9.929%	1	0.9097	0.8275	0.7528	0.6848	0.6229
PV of USD CF Mn	=-11	1.8194	2.0688	2.2583	2.7391	3.1146
NPV USD Mn	1.00025					

INR NPV = USD 1.00025 Mn x INR 48 Per USD

INR NPV = INR 48, 01,2,000

## 7. Illustration

A USA based company is planning to set up a software development unit in India. Software developed at the Indian unit will be bought back by the US parent at a transfer price of US \$10 million. The unit will remain in existence in India for one year; the software is expected to get developed within this time frame.

The US based company will be subject to corporate tax of 30 per cent and a withholding tax of 10 per cent in India and will not be eligible for tax credit in the US. The software developed will be sold in the US market for US \$ 12.0 million. Other estimates are as follows:

Rent for fully furnished unit with necessary hardware in India	₹ 15,00,000
Manpower cost (80 software professional will be working for 10 hours each day)	₹ 400 per man hour
Administrative and other costs	₹ 12,00,000

Advise the US Company on the financial viability of the project. The rupee-dollar rate is ₹ 48/\$.

Note: Assume 365 days a year.

(ICAI SM, May-25 similar 4 M, RTP Nov'22, RTP May'18, Old PM)

Solution :

Manpower Cost

Particulars	Amount
People	80
Hours per day	10
Days	365
Rs/ man hour	400
Manpower Cost	= 80 × 10 × 365 × 400





	= INR 11,68,00,000
Rent	15,00,000
Administrative and other cost	12,00,000
<b>Total Cost</b>	<b>11,95,00,000</b>
Indian Entity Revenue	TP of USD 10 Mn @ INR 48 per USD
Revenue	= INR 48,00,00,000
Total Cost	INR (11,95,00,000)
Profit Before Tax	36,05,00,000
Less : Corporation Tax @30%	(10,81,50,000)
Profit After tax	<b>25,23,50,000</b>
Less : withholding tax remitted @10%	2,52,35,000
	22,71,15,000
Amount received in USD @ INR 48 per USD	= $\frac{22,71,15,000}{48 \times 10}$ <b>= USD 4.7315 Mn</b>

At TP of 10 Million , profit before US Taxes is USD 4.7315 Mn. If sale price is higher @12 Mn , then profit will be even higher.

#### Assumptions :

1. Withholding tax of 10% has no tax credit.
2. Corporate tax in India of 30% has also no tax credit.

### 8. Illustration

XY Limited is engaged in large retail business in India. It is contemplating for expansion into a country of Africa by acquiring a group of stores having the same line of operation as that of India.

The exchange rate for the currency of the proposed African country is extremely volatile. Rate of inflation is presently 40% a year. Inflation in India is currently 10% a year. Management of XY Limited expects these rates likely to continue for the foreseeable future.

Estimated projected cash flows, in real terms, in India as well as African country for the first three years of the project are as follows:

	Year 0	Year 1	Year 2	Year 3
Cash Flow in ₹ (000)	-50,000	-1,500	-2,000	-2,500
Cash Flows in African Rands (000)	-	+50,000	+70,000	+90,000

XY Ltd. assumes the year 3 nominal cash flows will continue to be earned each year indefinitely. It evaluates all investments using nominal cash flows and a nominal discounting rate. The present exchange rate is African Rand 6 to ₹ 1.

You are required to calculate the net present value of the proposed investment considering the following:

- (i) African Rand cash flows are converted into rupees and discounted at a risk adjusted rate.
- (ii) All cash flows for these projects will be discounted at a rate of 20% to reflect it's high risk.
- (iii) Ignore taxation.

	Year 1	Year 2	Year 3
PVIF @ 20%	0.833	0.694	0.579

(ICAI SM, MTP Sept'23, MTP Aug'18, RTP May'18 Old, MTP Apr'18 Old, Old PM)





Solution :

Particulars	0	1	2	3
Inflation Rate India		10%	10%	10%
Inflation Rate Africa		40%	40%	40%
Exchange Rate Rand / INR	6	$= \frac{6 \times (1+40\%)}{(1+10\%)} = 7.6364$	$= \frac{7.6364 \times (1+40\%)}{(1+10\%)} = 9.7190$	$= \frac{9.7190 \times (1+40\%)}{(1+10\%)} = 12.3696$
Cashflows Real (INR Thousands)	(50,000)	(1,500)	(2000)	(2500)
Cashflows Nominal (INR Thousands)	(50,000)	$= (1500) \times 1.1 = (1650)$	$= (2000) \times 1.1^2 = (2420)$	$= 2500 \times 1.1^3 = (3327.5)$
Cashflow Real (Rand Thousands)	(200,000)	50,000	70,000	90,000
Cashflow Nominal (Rand Thousands)	(200,000)	$= 50,000 \times 1.4 = 70,000$	$= 70,000 \times 1.4^2 = 137,200$	$= 90,000 \times 1.4^3 = 246,960$
INR Equivalent Rand Cashflows	$= \frac{(200,000)}{6} = (33,333.33)$	$= \frac{70,000}{7.6364} = 9,166.67$	$= \frac{137,200}{9.7190} = 14,116.67$	$= \frac{246,960}{12.3696} = 19,965$
Total Cashflows	$(50,000) + (33,333.33) = (83,333.33)$	$(1650) + 9,166.67 = 7,516.67$	$(2420) + 14,116.67 = 11,696.67$	$(3,327.5) + 19,965 = 16,637.5$
Terminal Cashflow				$= \frac{16,637.5}{20\%} = 83,187.5$
Total Cashflow	<b>(83,333.33)</b>	<b>7,516.67</b>	<b>11,696.67</b>	<b>= 16,637.5 + 83,187.5 = 99,825</b>
PVF	1	0.833	0.694	0.579
PVCF	$(83,333.33) \times 1 = (83,333.33)$	$7,516.67 \times 0.833 = 6,261.38$	$11,696.67 \times 0.694 = 8,117.49$	$99,825 \times 0.579 = 57,798.68$
NPV in ₹ Thousands				<b>(11,155.79)</b>

As NPV is **negative**, XY Ltd should **not proceed** with this project.

Assumption : All profits are repatriated to India.

## 9. Illustration

A multinational company is planning to set up a subsidiary company in India (where hitherto it was exporting) in view of growing demand for its product and competition from other MNCs. The initial project cost (consisting of Plant and Machinery including installation) is estimated to be US\$ 500 million. The net working capital requirements are estimated at US\$ 50 million. The company follows straight line method of depreciation. Presently, the company is exporting two million units every year at a unit price of US\$ 80, its variable cost per unit being US\$ 40.

The Chief Financial Officer has estimated the following operating cost and other data in respect of proposed project:

- (i) Variable operating cost will be US \$ 20 per unit of production
- (ii) Additional cash fixed cost will be US \$ 30 million p.a. and project's share of allocated fixed cost will be US \$ 3 million p.a. based on principle of ability to share



- (iii) Production capacity of the proposed project in India will be 5 million units
- (iv) Expected useful life of the proposed plant is five years with no salvage value
- (v) Existing working capital investment for production & sale of two million units through exports was US \$ 15 million
- (vi) Export of the product in the coming year will decrease to 1.5 million units in case the company does not open subsidiary company in India, in view of the presence of competing MNCs that are in the process of setting up their subsidiaries in India
- (vii) Applicable Corporate Income Tax rate is 35%
- (viii) Required rate of return for such project is 12%.

Assuming that there will be no variation in the exchange rate of two currencies and all profits will be repatriated, as there will be no withholding tax, estimate Net Present Value (NPV) of the proposed project in India.

Present Value Interest Factors (PVIF) @ 12% for five years are as below:

Year	1	2	3	4	5
PVIF	0.8929	0.7972	0.7118	0.6355	0.5674

(ICAI SM, Nov'19 QP 8 marks, RTP Nov'18, MTP Oct'24, MTP Oct'22, MTP May'20 New & Old, MTP Oct'18, RTP Nov'19 Old, Old PM)

Solution :

Particulars	Amount (USD Million)
<u>Capex :</u>	
Plant and Machinery	(500)
Working Capital	(50)
Total Investment	(550)
<u>Export Sales :</u>	
Units	1.5
Price per Unit	80
VC per unit	40
Contribution per unit	= 80 - 40 = 40
Total Contribution	= 40 × 1.5 = 60
Tax @35%	= 60 × 35% = (21)
Post-Tax contribution	39
<u>Subsidiary :</u>	
Units	5
Price	80
VC	(20)
Contribution per unit	60
Total contribution	= 60 × 5 = 300
Less: FC	(30)
Dep @ 100 Mio for 5 years	(100)
PBT	170
Tax @ 35%	170 × 35% = (59.5)
Profit After Tax	110.5
<u>Incremental Cashflow:</u>	
PAT of Indian Subsidiary	110.5





Add : Depreciation	100
Less : Cashflow of US Exports	(39)
Yearly Incremental CF	171.5
PVIFA @12% for 1-5	3.6048
PV of Incremental Cashflow	= 171.5 × 3.6048 = 618.22
Total Investment	(550)
Add : WC already deployed in existing business	15
Net Investment	(535)
5 <sup>th</sup> year Cash inflow of WC	35
PV Factor of year 5	0.5674
PV of cash inflow of year 5	= 35 × 0.5674 = 19.8590
NPV	= 618.22 - 535 + 19.8590 = 103.0822

Since NPV is positive, company should invest in it.

### 10. Illustration

XYZ Ltd., a company based in India, manufactures very high-quality modern furniture, and sells to a small number of retail outlets in India and Nepal. It is facing tough competition. Recent studies on marketability of products have clearly indicated that the customers are now more interested in variety and choice rather than exclusivity and exceptional quality. Since the cost of quality wood in India is very high, the company is reviewing the proposal for import of woods in bulk from Nepalese supplier. The estimate of net Indian (₹) and Nepalese Currency (NC) cash flows in Nominal terms for this proposal is shown below:

Year	Net Cash Flows (in millions)			
	0	1	2	3
NC	-25.000	2.600	3.800	4.100
Indian (₹)	0	2.869	4.200	4.600

The following information is relevant:

- XYZ Ltd. evaluates all investments by using a discount rate of 9% p.a. All Nepalese customers are invoiced in NC. NC cash flows are converted to Indian (₹) at the forward rate and discounted at the Indian rate.
- Inflation rates in Nepal and India are expected to be 9% and 8% p.a. respectively. The current exchange rate is ₹ 1 = NC 1.6

Assuming that you are the finance manager of XYZ Ltd., calculate the net present value (NPV) and modified internal rate of return (MIRR) of the proposal.

You may use following values with respect to discount factor for ₹1 @9%.

	Present value	Future Value
Year 1	0.917	1.188
Year 2	0.842	1.090
Year 3	0.772	1

(ICAI SM, Sep-25 Similar 7M, Nov'22 8M, Dec'21 8M, RTP May'20, MTP Aug'18 Old, Old PM)





Solution :

Particulars/Years	0	1	2	3
India Inflation		8%	8%	8%
Nepal Inflation		9%	9%	9%
NC per INR	1.6	$= \frac{1.6 \times 1.09}{1.08}$ = 1.6148	$= \frac{1.6148 \times 1.09}{1.08}$ = 1.6298	$= \frac{1.6298 \times 1.09}{1.08}$ = 1.6449
CF NC Mn	(25)	2.6	3.8	4.1
CF NC Mn converted to INR (A)	$= \frac{(25)}{1.6}$ = (15.6250)	$= \frac{2.6}{1.6148}$ = 1.6101	$= \frac{3.8}{1.6298}$ = 2.3316	$= \frac{4.1}{1.6449}$ = 2.4926
CF in INR Mn (B)	0	2.8690	4.2	4.6
Total Cashflow (A+B)	(15.6250)	= 1.6101 +2.8690 = 4.4791	= 4.2+2.3316 = 6.5316	= 4.6 + 2.4926 = 7.0926
PV @9%	1	0.9170	0.8420	0.7720
PVCF	= (15.6250) × 1 = (15.6250)	= 4.4791 × 0.9170 = 4.1073	= 6.5316 × 0.8420 = 5.4996	= 7.0926 × 0.7720 = 5.4755
NPV		(0.5425)		

MIRR Computation:

Year	CF	Reinvestment Rate	Fin Rate	PV	FVF	FV
0	(15.6250)	9%	9%	(15.6250)		
1	4.4791	9%	9%		1.188	= 4.4791 × 1.188 = 5.32116
2	6.5316	9%	9%		1.090	= 6.5316 × 1.090 = 7.11947
3	7.0926	9%	9%		1	= 7.09262
						<b>19.53325</b>

$$\text{MIRR} = 19.5332/15.6250^{1/3} - 1$$

$$= 7.725\%$$

Since NPV Is negative, XYZ Ltd should not proceed further.

### 11. Illustration

The Management of a multinational company TL Ltd. is engaged in construction of Infrastructure Project. A proposal to construct a Toll Road in Nepal is under consideration of the Management.

The following information is available:

The initial investment will be in purchase of equipment costing USD 250 lakhs. The economic life of the equipment is 10 years. The depreciation on the equipment will be charged on straight line method.

EBIDTA to be collected from the Toll Road is projected to be USD 33 lakhs per annum for a period of 20 years. To encourage investment Nepalese government is offering a 15-year term loan of USD 150 lakhs at an interest rate of 6 per cent per annum. The interest is to be paid annually. The loan will be repaid at the end of 15 year in one tranche.





The required rate of return for the project under all equity financing is 12 per cent per annum. Post tax cost of debt is 5.6 per cent per annum. Corporate Tax Rate is 30 per cent. All cash Flows will be in USD.

Ignore inflation. You are required to advise the management on the viability of the proposal by using Adjusted Net Present Value method.

Given PVIFA (12%, 10) = 5.650, PVIFA (12%, 20) = 7.469, PVIFA (8%,15) = 8.559, PVIF (8%, 15) = 0.315.

(Nov'20 QP 8 marks, RTP Nov'24, MTP Apr'23)

Solution :

Operating Cashflow :

Particulars	Years	USD Lakhs	Ke	PVIFA	PVCF USD Lakhs
EBITDA	1-20	33	12%	7.4690	= 33 × 7.4690 = 246.4770
Less : Depreciation	1-10	25	12%	5.6500	= 25 × 5.6500 = (141.2500)
PBT					105.2270
Less : Tax @30%					(31.5681)
PAT					73.6589
Add : Depreciation					141.25
CFAT					214.9089
Less : Initial Investment					(250)
NPV from Operations					(35.0911)

Tax Shield on Interest	Years	USD Lakhs	Kd for Interest Payment	PVIFA @8%	PVCF USD Lakhs
Loan Interest	1-15	9	6%	8.5590	150 = 9 × 8.5590 = 77.0310
Tax on Interest Paid @30%					23.1093
NPV on Tax shield Interest					23.1093
APV based evaluation	Base NPV				(35.0911)
	PV of Tax shield				23.1093
	Net APV				(11.9818)

As APV is negative, TL Ltd should not proceed with the project.

WN 1 : Debt Discount Rate

Post-tax rate	5.6
Tax rate	30%
Pretax rate	= 5.6/1-30%



PV of Interest Subsidy	Amount	Years	PVIFA	PVCF
Market Interest	8%			
Int of currency loan	6%			
Int subsidy	2%			
Loan value in US Lakhs	150			
Int subsidy PA	3	1-15	8.559	= 8.559 × 3 = 25.677
<b>APV:</b>				
Base	(35.0911)			
Tax Shield on Interest	23.1093			
Subsidy PV	25.6770			
Net APV	<b>13.6952</b>			

If interest subsidy is also considered, then the project can be undertaken as APV is Positive.

## 12. Illustration

A proposed foreign investment involves creation of a plant with an annual output of 1 million units. The entire production will be exported at a selling price of USD 10 per unit.

At the current rate of exchange dollar cost of local production equals to USD 6 per unit. Dollar is expected to decline by 10% or 15%. The change in local cost of production and probability from the expected current level will be as follows:

Decline in value of USD (%)	Reduction in local cost of production (USD/unit)	Probability
0	-	0.4
10	0.30	0.4
15	0.15 Additional reduction	0.2

The plant at the current rate of exchange will have a depreciation of USD 1 million annually. Assume local Tax rate as 30%.

You are required to find out:

- Annual Cash Flow After Tax (CFAT) under all the different scenarios of exchange rate.
- Expected value of CFAT assuming no repatriation of profits.
- Viability of the investment proposal assuming an initial investment of USD 25 million on plant and working capital with a required rate of return of 11% on investment and on the basis of CFAT arrived under option (ii). The CFAT will grow @ 3% per annum in perpetuity.

(Jan'21 QP, MTP Mar'23)

Solution :

Particulars	Scenario 1	Scenario 2	Scenario 3
Probability	40%	40%	20%
Depreciation	0%	10%	15%
Selling price USD	10.00	10.00	10.00
Reduction in Local COP	0.00	0.30	0.45





Local COP in USD terms	6.00	= 6 - 0.3 =5.70	=5.7 - 0.15 =5.55
Margin USD	= 10 - 6 =4.00	= 10 - 5.7 =4.30	=10 - 5.55 =4.45
Annual Output	10,00,000	10,00,000	10,00,000
Annual Margin (A)	= 10,00,000 × 4 =40,00,000	= 10,00,000 × 4.3 =43,00,000	=10,00,000 × 4.45 =44,50,000
Depreciation (B)	10,00,000	= 10,00,000 × 0.9 =9,00,000	=10,00,000 × 0.85 =8,50,000
PBT (A-B)	30,00,000	34,00,000	36,00,000
Tax @ 30%	(9,00,000)	(10,20,000)	(10,80,000)
PAT	21,00,000	23,80,000	25,20,000
Add: Dep	10,00,000	9,00,000	8,50,000
CFAT	31,00,000	32,80,000	33,70,000
Expected Value of CFAT			
Probability	40%	40%	20%
CFAT	31,00,000	32,80,000	33,70,000
Weighted CFAT	=31,00,000 × 40% =12,40,000	= 32,80,000 × 40% =13,12,000	= 33,70,000 × 20% =6,74,000
Probability weighted CFAT		32,26,000	

Depreciation is also assumed to reduce by 10% & 15% respectively.

Kc	11%
CFAT g	3%
PV of CFAT taken to perpetuity	$\frac{CFAT(1+g)}{Kc-g}$ $\frac{32,26,000 \times (1+3\%)}{11\%-3\%}$ =4,15,34,750
Less: Investment	2,50,00,000.00
NPV of the project	1,65,34,750.00

The project is viable as NPV is positive.

### 13. Illustration

A US company wants to setup a manufacturing plant in India which requires an initial outlay of ₹ 8 Million. It is expected to have a useful life of 5 years with a salvage of ₹ 2 Million. The company follows straight line method of depreciation. To support additional level of activity, investment would require one-time additional working capital of ₹ 1 Million. Since the cost of production lower in India, the variable cost of production would be ₹ 30 per unit. Additional fixed cost per annum is estimated at ₹0.5 Million. The company is projecting its annual sales to 80000 units at the price of ₹ 100 per unit. Applicable tax rate to the company is 34% and its cost of capital is 8%. Inflation rates in US and India are expected to be 8% and 9% respectively. The current exchange rate is ₹ 72 per US Dollar. Assuming that all profit will be repatriated every year and there will be no withholding taxes, estimate the net present value of the proposed project in India and evaluate its feasibility. PVF @ 8% for the five years are as under:

Rate	Year 1	Year 2	Year 3	Year 4	Year 5
8%	0.926	0.857	0.794	0.735	0.681



**Solution:**

Particulars / Year	0	1	2	3	4	5
Sales Units		80,000.00	80,000.00	80,000.00	80,000.00	80,000.00
Sales price in Rs.		100.00	100.00	100.00	100.00	100.00
VC in Rs. Per Unit		30.00	30.00	30.00	30.00	30.00
Contribution per unit in Rs.		70.00	70.00	70.00	70.00	70.00
Total Contribution in Rs. Million		5.60	5.60	5.60	5.60	5.60
Less FC in Rs. Mn		0.50	0.50	0.50	0.50	0.50
EBITDA in Rs. Mn		5.10	5.10	5.10	5.10	5.10
Less: Depreciation in Rs. Mn		1.20	1.20	1.20	1.20	1.20
PBT in Rs. Mn		3.90	3.90	3.90	3.90	3.90
Tax @ 34% in Rs. Mn		1.33	1.33	1.33	1.33	1.33
PAT in Rs. MN		2.57	2.57	2.57	2.57	2.57
Add: Dep in Rs. Mn		1.20	1.20	1.20	1.20	1.20
CFAT in Rs. Mn		3.77	3.77	3.77	3.77	3.77
Add: WC withdrawal in Ys. 5						1.00
Add: Salvage value in Yr 5						2.00
Cash Inflows in Rs. Mn		3.77	3.77	3.77	3.77	6.77
USD INR exchange rate		72.67	73.34	74.02	74.70	75.40
Cash Inflows in USD INR		51,935.78	51,459.30	50,987.20	50,519.43	89,846.05
PVF @ 8%		0.926	0.857	0.794	0.735	0.681
PVCIF in USD		48,092.53	44,100.62	40,483.84	37,131.78	61,185.16
PVCIF in USD	2,30,994					
Original Investment made in USD	1,25,000					
NPV of project in USD	1,05,994					

The project has + ve NPV & hence the company should go ahead with it

WN 1:

Initial Outlay	80,00,000
Project life	5 years
Salvage value	20,00,000
Depreciable value	60,00,000
Asset Life in Yrs	5.00
Annual SLM Dep	12,00,000
Addtl WC in ₹	10,00,000





## WN 2 USD INR Exchange rate

Year		1.00	2.00	3.00	4.00	5.00
Indian Inflation		9%	9%	9%	9%	9%
US Inflation		8%	8%	8%	8%	8%
USDINR	72.00	72.67	73.34	74.02	74.70	75.40

## WN 3

Initial investment in INR ( Capex + WC)	90,00,000
USD INR	72
Initial investment in USD	1,25,000.00

## 14. Illustration

The directors of Implant Inc. wish to make an equity issue to finance a \$10 m (million) expansion scheme which has an expected Net Present Value of \$2.2m and to re-finance an existing \$6 m 15% Bonds due for maturity in 5 years' time. For early redemption of these bonds there is a \$3,50,000 penalty charges. The Co. has also obtained approval to suspend these pre-emptive rights and make a \$15 m placement of shares which will be at a price of \$0.5 per share. The floatation cost of issue will be 4% of Gross proceeds. Any surplus funds from issue will be invested in IDRs which is currently yielding 10% per year.

The Present capital structure of Co. is as under:

	'000
Ordinary Share (\$1 per share)	7,000
Share Premium	10,500
Free Reserves	25,500
	43,000
15% Term Bonds	6,000
11% Debenture (2012-2020)	8,000
	57,000

Current share price is \$2 per share and debenture price is \$ 103 per debenture. Cost of capital of Co. is 10%. It may be further presumed that stock market is semi-strong form efficient and no information about the proposed use of funds from the issue has been made available to the public. You are required to calculate expected share price of company once full details of the placement and to which the finance is to be put, are announced.

(RTP May'19 New & Old)

Solution :

Particulars	USD	Shares	USD
Current market Value	2	7 Million	14 Mn
Fresh issue	0.5	30	15 Mn
Less : Repay Loan			(6 Mn)
Prepayment Charges			(0.35 Mn)
Cost of issue 4% of 15 Mn			(0.6 Mn)
Less : Investment in New Project			(10 Mn)
Add : Benefit from Project			12.2 Mn





Add : Benefit from Refinance of Debenture @15% #			
Interest @15% on 6 Mn for 5 Years (Discount @10%)			= PVIFA 900,000 [ 5 years, 10%] = 900,000 × 3.791 = USD 34,11,708
Principal Repayment 6Mn after 5 years (Discount @10%)			= PVIF 6Mn [5 <sup>th</sup> year @10%] = 6 Mn × 0.621 = USD 37,26,000
Total			31,387,708
Total Market Value equivalent revised			31,387,708
Equity Shares (Old + new)			37,000,000
Revised Share Price			$\frac{31,387,708}{37,000,000}$ = USD 0.8483

Since it is a semi strong market the information that is private is not already reflecting in the share price and hence the price of equity share will fall from USD 2 to USD 0.8483

# The benefit on account of nonpayment of Debenture interest and principal repayment should be discounted at WACC of 10%

### 15. Illustration

M/s. Raghu Ltd. is interested in expanding its operation and planning to install manufacturing plant at US. It requires 8.82 million USD (net of issue expenses/ floatation cost) to fund the proposed project. GDRs are proposed to be issued to finance this project. The estimated floatation cost of GDRs is 2%.

Additional information:

- Expected market price of share at the time of issue of GDR is ₹ 360 (Face Value ₹ 100)
- Each GDR will represent two underlying Shares.
- The issue shall be priced at 10% discount to the market price.
- Expected exchange rate is INR/USD 72.
- Dividend is expected to be paid at the rate of 20% with growth rate of 12%.

(1) You, as a financial consultant, are required to compute the number of GDRs to be issued and cost of the GDR.

(2) What is your suggestion if the company receives an offer from a US Bank willing to provide an equivalent loan with an interest rate of 12%?

(3) How much company can save by choosing the option as recommended by you?

[RTP May'22, MTP Apr'22, Jul'21 QP (Old)]

Solution :

1)

Particulars	USD Million
Project Cost (Net)	8.82
Floatation Cost of GDR	2%
Total fund to be raised (gross)	$= \frac{8.82}{0.98} = 9$
CMP of share	360
Shares per GDR	2
Equivalent MV of GDR in INR	$= 360 \times 2 = 720$
Discount at the time of issue	10%
GDR Issue price in Equivalent INR	$= 720 \times 0.9 = 648$
USD INR	72
GDR Issue price in USD	9





Total Issue proceeds in USD Mn	9
No of GDRs to be issued in Mn	=9/9 =1
D1	20% of FV
FV per share in INR	100
FV per GDR in INR	=100 × 2 = 200
D1 in INR	= 200 × 20% = 40
g	12%
GDR Issue price	648
Less : Floatation Cost	2%
GDR Proceeds	635.04
Ke	$= \frac{D1}{Mp} + g = \frac{40}{635.04} + 12\%$ = 18.30%
Cost of GDR	18.30%

2) If the company receives a quote for USD loan @ 12% , then it is preferable to take that loan instead of issue GDR @ 18.30%

3) The cost saving when the company goes through the loan route is 6.3% ( 18.3% - 12%)

### 16. Illustration

Mr. Vishwas, a friend of Mr. Pramod who is one of the Directors of Ashirwad Limited, is a citizen of Mauritius. His immediate family members including his parents, born in India are residing in India. He has many friends in different parts of India, due to which he happens to visit India on frequent basis. He along with Mr. Pramod evince interest in setting up business in India and formally incorporate a company to commence their operations. Accordingly, a company is called "Aerious Private Ltd." got incorporated in Mumbai.

To start with he received a business proposal from one of his friends Nimish a consultant. It is estimated that in equivalent terms the business shall require an initial investment of MUR 100 Million and thereafter MUR 2 Million each year will be needed as working capital fund.

He wished to evaluate whether the business proposal is viable or not. The information related to exchange rate and inflation rate is as follows:

Spot Rate for 1 Mauritian Dollar (MUR) = 1.88 Indian Rupee (INR) The inflation in India is 6% and in Mauritius is 5%.

It is expected that this inflation rate will remain unchanged for the next 4 years.

INR 8 Crore out of initial investment shall be required for setting up a plant. The useful life of the plant is 4 years. At the end of 4th year estimated salvage value of this plant shall be INR 80 lakhs. Depreciation of the plant shall be charged on the basis of straight-line method.

40 % of the investment shall be through debt funds from Mauritius at the cost of 10% (post tax) while remaining funds shall be arranged by him and his friends. They expect a rate of return of 12% on their funds.

Expected revenues & costs (excluding depreciation) in real term are as under:

	1	2	3	4
Year				
Revenues (₹ Crore)	6.00	7.00	8.00	8.00
Costs (₹ Crore)	3.00	4.00	4.00	4.00

Assume that applicable tax rate in India is 30%. Since there is Double tax avoidance agreement between India and Mauritius, the company is not required to pay tax in Mauritius if tax has been paid in India.





The applicable inflation rates for revenues & costs are as follows:

Year	Revenues	Costs
1	10%	12%
2	9%	10%
3	8%	9%
4	7%	8%

He wants an expert opinion for the same investment proposal. Demonstrate whether investment in this project is viable option or not.

Note:

1. Round off calculations upto 4 decimal points.
2. Show INR calculations in Crore and MUR calculations in Million.

(RTP May'24)

Solution:

Initial Investment	MUR Million	100.00				
Annual WC	MUR Million	2.00				
Years		0	1	2	3	4
Exchange rate INR per MUR		1.88	1.8979	1.9160	1.9342	1.9526
Inflation MUR	5%					
Inflation INR	6%					
Fx rate fr Yr 2 = $Y1 * (1+D) / (1+F)$						
Amount of Investment	Rs. Cr	-				
		18.80				
Amount of WC	MUR Mn		2	2	2	2
Amount of WC	Rs. Cr		-0.3796	-0.3832	-0.3868	-0.3905
Revenue	Rs. Cr real		6.00	7.00	8.00	8.00
Revenue Inflation	%		10%	9%	8%	7%
Revenue	Rs. Cr Nominal		6.6000	8.3930	10.3594	11.0845
Costs	Rs. Cr real		3.00	4.00	4.00	4.00
Cost inflation	%		12%	10%	9%	8%
Cost nominal	Rs. Cr Nominal		3.3600	4.9280	5.3715	5.8012
EBITDA	INR Cr		3.2400	3.4650	4.9878	5.2833
Depreciation	INR Cr		-1.8000	-1.8000	-1.8000	-1.8000
EBIT	INR Cr		1.4400	1.6650	3.1878	3.4833
Interest	INR CR					
Assumed that loan is taken by vishwas and not aeriuous						
PBT	INR CR		1.4400	1.6650	3.1878	3.4833
Tax @ 30%	INR CR		-	-	-	-
			0.4320	0.4995	0.9564	1.0450
PAT	INR CR		1.0080	1.1655	2.2315	2.4383
Add: Dep	INR CR		1.8000	1.8000	1.8000	1.8000





CFAT	INR CR		2.8080	2.9655	4.0315	4.2383
Cash Outflow ( Inv + WC)	INR CR	-18.80	-0.3796	-0.3832	-0.3868	-0.3905
Cash inflow	INR CR		2.8080	2.9655	4.0315	4.2383
WC Recovery	INR CR					1.5402
Scrap value	INR CR					0.80
Net CF	INR CR	- 18.8000	2.4284	2.5823	3.6446	6.1879
Net CF In MUD	MUD Mn	- 100.0000	12.7953	13.4777	18.8429	31.6898
PVF on MUD money	@ 11.2%	1.0000	0.8993	0.8087	0.7273	0.6540
Net PV of CF in MUD	MUD Mn	- 100.0000	11.5065	10.8995	13.7035	20.7253
NPV	MUD Mn	- 43.1651				

Since the NPV of the project in MUD terms is -ve the proposal is a no go

#### WN 1 on depreciation

Plant cost	INR Cr	8.0000	
Salvage value	INR Cr	0.8	
Life	Years	4.00	
Depreciable value		7.20	
SLM PA Dep	INR Cr	1.80	
Project cost in Inr cr		18.80	
Debt	40%	7.52	
Equity	60%	11.28	
Int cost on loan post tax	10%		
WN 2 on Disc rate			
WACC	Debt	Equity	WACC
% of capital	40%	60%	
Cost of Capital	10%	12%	
Weighted Average	4.000%	7.200%	11.200%

## 17. Illustration

PQR Ltd. is considering a project in the US, which involves an initial investment of ₹124.50 Crore. The project will have a useful life of 5 years. Current spot exchange rate is INR/USD 83. The risk-free rate in the US is 4.186% and the same in India is 6.9768%. Cash inflows in USD from the project are as follows:

Year	1	2	3	4	5
Cash inflow	30,00,000	40,00,000	50,00,000	60,00,000	70,00,000

PQR Ltd. is expecting a net surplus of ₹1858.08 lakh to be received after closure of the project. There is no salvage value. PQR Ltd. wants to take a forward cover to protect itself from exchange rate fluctuations.

n	1	2	3	4	5
PVIF(6.9768%, n)	0.935	0.874	0.817	0.764	0.714
PVIF(4.186%, n)	0.959	0.921	0.884	0.849	0.815



PVIF(12%, n)	0.893	0.797	0.712	0.636	0.567
PVIF(15%, n)	0.870	0.756	0.658	0.572	0.497

You are required to recommend the INR/USD rate for the forward cover?

(Nov'24 QP 6 marks)

**Solution:**

Question is poorly framed with no clear details of what is expected

**Method 1:** Assume all money is retained in US & remitted toward the project closure time @ ₹1858.08

Lacs

USD Lacs

Year	0	1	2	3	4	5
CF	-150 (WN1)	30	40	50	60	70
FV of CF		30(1+4.186%) <sup>4</sup>	40(1+4.186%) <sup>3</sup>	50(1+4.186%) <sup>2</sup>	60(1+4.186%) <sup>1</sup>	70(1+4.186%) <sup>0</sup>
FV of CF		35.347	45.236	54.27	62.5116	70
Total FVCF						267.3646 →A

Cash Invested in INR 12450 Lacs

FV of INR Money invested ₹12450 Lacs x (1+6.9768%)<sup>5</sup> = ₹17442.8 Lacs → B

Net Surplus from project = ₹1858.08 Lacs

Let Forward Exchange rate be F

Then, F x USD 267.3646 Lacs - ₹17442.8 Lacs = ₹1858.08 Lacs

F x 267.3646 = 1858.08 + 17442.8

F x 267.3646 = 19300.93

F = 19300.93/267.3646

F = 72.189 INR per USD

WN 1: INR 12450 Lacs / USD INR 83 = 150

**Method 2:** Assume that the Discount rates provided are Risk Adjusted Discount Rates USD and INR respectively & 1858.08 is Project NPV

RADR for INR = 15%

RADR for USD = 12%

Rf rate for INR = 6.9678%

Rf for USD = 4.186%

Risk Premium for USD = (1+12%)/(1+4.186%) - 1 = 7.5%

Risk Premium for INR = (1+15%)/(1+6.9678%) - 1 = 7.5%

Year	1	2	3	4	5
CF	30	40	50	60	70
PVF	0.893	0.797	0.712	0.636	0.567
PVCIF	30 x 0.893	40 x 0.797	50 x 0.712	60 x 0.636	70 x 0.567
PVCIF	172				

USD 172 Lacs x Forward Rate - ₹12450 = 1858.08 Lacs

172 x F = 14308.05 Lacs

F = 14308.05 / 172

Forward Rate = USD INR 83.186





## 18. Illustration

DK Ltd. is considering an investment proposal in Sri Lanka involving an initial investment of LKR 25 billion. The current spot exchange rate is INR/LKR 0.370. The risk-free rate in India is 6% and the same in Sri Lanka is 5.02%.

The project will generate a cash flow of LKR 5 billion in the first year. The cash flow will increase by LKR 1 billion each year for the next 4 years. The project will wind up on completion of 5 years with no salvage value. The required rate of return for the project is 8%

1. You are required to find out the investment worth of the project by using

- Home Currency Approach
- Foreign Currency Approach

2. Compare the outcome under both the approaches. Given

PVIF (8%, t)	0.92593	0.85734	0.79383	0.73503	0.68058
PVIF (7%, t)	0.93457	0.87344	0.81630	0.76290	0.71299

Note: Excepts rates show all calculations in Billion upto four decimal points.

(Model Test Paper 6 - Feb 2025 Q 2(a))

**Solution:**

INR Per 1 LKR = 0.370

Risk Free rate India = 6%

Risk Free rate Sri lanka 5.02%

INR / LKR expected Future Exchange Rates based on interest rate parity

Year	INR / LKR Computation	INR / LKR
0	0.370	0.370
1	$0.370 \times 1.06 / 1.0502$	0.3734
2	$0.370 \times (1.06 / 1.0502)^2$	0.3769
3	$0.370 \times (1.06 / 1.0502)^3$	0.3805
4	$0.370 \times (1.06 / 1.0502)^4$	0.3840
5	$0.370 \times (1.06 / 1.0502)^5$	0.3876

Home Currency Approach

Discount all cashflows in Home currency

Year	INR / LKR (A)	CF LKR Billion (B)	PVF @ 8% (C)	PVCF in INR Bn D = A x B x C
0	0.37	-25	1.00000	- 9.2500
1	0.3734	5	0.92593	1.7287
2	0.3769	6	0.85734	1.9388
3	0.3805	7	0.79383	2.1144
4	0.3840	8	0.73503	2.2580
5	0.3876	9	0.68058	2.3741
<b>Total</b>				<b>1.1640</b>





\*Even if you get numbers that are slightly off by taking 4 decimals everywhere , you would ideally get marks

### Foreign Currency Approach

Discount all cashflows in Foreign currency using Risk Adjusted Discount Rate of Foreign Currency

RADR in LKR - ?

RADR in INR = 8%

$$(1 + \text{RADR}_{\text{India}}) = (1 + R_{f, \text{India}}) \times (1 + \text{Risk Premium}_{\text{India}})$$

$$(1 + 8\%) = (1 + 6\%) \times (1 + \text{RP}_{\text{India}})$$

$$\Rightarrow (1 + \text{RP}_{\text{India}}) = (1.08/1.06)$$

$$\Rightarrow (1 + \text{RP}_{\text{India}}) = (1.018868)$$

$$\Rightarrow \text{Risk Premium India} = 1.8868\%$$

Under Foreign currency approach, it is assumed that Risk Premium Does not change across countries

$$\Rightarrow \text{Risk Premium Sri Lanka} = 1.886\%$$

$$\Rightarrow \text{Risk Free Rate Sri Lanka} = 5.02\%$$

$$\Rightarrow 1 + \text{RADR Sri Lanka} = (1.0502) \times (1.018868)$$

$$\Rightarrow 1 + \text{RADR Sri Lanka} = 1.07$$

$$\Rightarrow \text{RADR Sri Lanka} = 7\%$$

Year	CF LKR Billion (A)	PVF @ 7% (B)	PVCF in LKR Bn C = A x B
0	-25	1.00000	-25.00000
1	5	0.93457	4.67285
2	6	0.87344	5.24064
3	7	0.81630	5.71410
4	8	0.76290	6.10320
5	9	0.71299	6.41691
Total			<b>3.14770</b>

PV of Project in INR Billion = 3.1477 x 0.37 = INR 1.16465 Bn. Under both the methods the project is generating positive NPV and hence the company should go ahead with the same





## Additional Illustrations for Practice

### 19. Illustration

A US based company is planning to set up a subsidiary company in India (where so far it was exporting) in view of growing demand for its product and competition from other US based companies. The initial project cost consisting of plant and machinery including installation is estimated to be US\$ 490 million. The net working capital requirements are estimated at US\$ 60 million. The company follows straight line method of depreciation. Currently, the company is exporting two million units every year at a unit price of US\$ 90, its variable cost per unit being US\$ 50.

The CFO of the Company has estimated the following operating cost and other data in respect of proposed project:

- (i) Variable operating cost will be US \$ 30 per unit of production
- (ii) Additional cash fixed cost will be US \$ 30 million p.a. and project's share of allocated fixed cost will be US \$ 3 million p.a. based on principle of ability to share
- (iii) Expected useful life of the proposed plant is five years with no salvage value
- (iv) Production capacity of the proposed project in India will be 5 million units
- (v) Existing working capital investment for production and sale of two million units through exports was US \$ 25 million
- (vi) Export of the product in the coming year will decrease to 1.5 million units, provided the company does not set up subsidiary company in India, in view of the presence of competing other US based companies that are in the process of setting up their subsidiaries in India
- (vii) Applicable Corporate Income Tax rate is 35%, and
- (viii) Required rate of return for such project is 12%.

Assuming that there will be no variation in the exchange rate of two currencies and all profits will be repatriated as there will be no withholding tax, Estimate Net Present Value of the proposed project in India and give your advice. Present Value Interest Factors (PVIF) @ 12% for five years is as below:

Year	1	2	3	4	5
PVIF	0.8929	0.7972	0.7118	0.6355	0.5674

*(Jul'21 QP 8 marks, RTP May'23)*

**Solution :**

Particulars	Amount (USD Million)
<b>Capex :</b>	
Plant and Machinery	(490)
Working Capital	(60)
<b>Total Investment</b>	<b>(550)</b>
<b>Export Sales :</b>	
Units	1.5
Price per Unit	90
VC per unit	50
Contribution per unit	=90 - 50 =40
Total Contribution	= 40 × 1.5 = 60
Tax @35%	= (21)
Post-Tax contribution	39
<b>Subsidiary :</b>	
Units	5





Price	90
VC	(30)
Contribution per unit	60
Total contribution	=60 × 5 =300
Less: FC	(30)
Dep @ 98 Mn for 5 years	(98)
PBT	172
Tax @ 35%	(60.2)
Profit After Tax	<b>111.8</b>
<b>Incremental Cashflow:</b>	
PAT of Indian Subsidiary	111.8
Add : Depreciation	98
Less : Cashflow of US Exports	(39)
Yearly Incremental CF	170.8
PVIFA @12% for 1-5	3.6048
PV of Incremental Cashflow	= 170.8 × 3.6048 = 615.6998
Total Investment	(550)
Add : WC already deployed in existing business	25
Net Investment	(525)
5 <sup>th</sup> year Cash inflow of WC	35
PV Factor of year 5	0.5674
PV of cash inflow of year 5	= 35 × 0.5674 = 19.8590
NPV	= 615.6998 - 525 + 19.8590 = <b>110.5588</b>

Since NPV is positive, company should proceed with the project.

## 20. Illustration

A USA based company is planning to set up a software development unit in India. Software developed at the Indian unit will be bought back by the US parent at a transfer price of US \$10 million. The unit will remain in existence in India for one year; the software is expected to get developed within this time frame.

The US based company will be subject to corporate tax of 30 per cent and a withholding tax of 10 per cent in India and will be eligible for tax credit in India. The software developed will be sold in the US market and many companies are ready to acquire the same. Other estimates are as follows:

Rent for fully furnished unit with necessary hardware in India	₹ 18,75,000
Manpower cost (80 software professional will be working for 10 hours each day)	500 per man hour
Administrative and other costs	₹ 15,00,000

Advise the US Company the minimum amount it should charge from the prospective buyer. The rupee-dollar rate is ₹ 60/\$.

Note: Assume 365 days a year

(RTP Nov'21)





Solution :

Particulars	Amount
People	80
Hours per day	10
Days	365
Rs/ man hour	500
Manpower Cost	= $80 \times 10 \times 365 \times 500$ = INR 14,60,00,000
Rent	18,75,000
Administrative and other cost	15,00,000
Total Cost	<b>14,93,75,000</b>
Indian Entity Revenue	TP of USD 10 Mn @ INR 60 per USD
Revenue	= INR 60,00,00,000
Total Cost	INR (14,93,75,000)
Profit Before Tax	45,06,25,000
Less : Corporation Tax @30% ( inc WHT )	(13,51,87,500)
Profit After tax	<b>31,54,37,500</b>
Amount received in USD @ INR 60 per USD	= $\frac{31,54,37,500}{60 \times 10}$ = USD 5.257292 Mn



# BUSINESS VALUATION

## Illustrations

### 1. Illustration

There is a privately held company X Pvt. Ltd that is operating into the retail space, and is now scouting for angel investors.

The details pertinent to valuing X Pvt. Ltd are as follows -

- The company has achieved break even this year and has an EBITDA of 90.
- The unleveraged beta based on the industry in which it operates is 1.8, and the average debt to equity ratio is hovering at 40:60.
- The rate of return provided by risk free liquid bonds is 5%.
- The EV is to be taken at a multiple of 5 on EBITDA.
- The accountant has informed that the EBITDA of 90 includes an extraordinary gain of 10 for the year, and a potential write off of preliminary sales promotion costs of 20 are still pending.
- The internal assessment of rate of market return for the industry is 11%.
- The FCFs for the next 3 years are as follows:

	Y1	Y2	Y3
Future Cash flows	100	120	150

- The pre-tax cost of debt is 12%.
- Assume a tax regime of 30%.

What is the potential value to be placed on X Pvt. Ltd?

(ICAI SM, May-25 Similar 7 M)

**Solution:**

*Calculation of Total EBITDA:*

EBITDA	90
Less: Extraordinary gain	(10)
Less : Preliminary expenses written off	(20)
Adjusted EBITDA	60

*Calculation for Beta of Equity:*

EBITDA Multiple	5
EV	300
Unlevered Beta	1.8
Ba	$=(B_e \times E)/E+[D \times (1-T)]$ $1.8=BE \times 0.6/ 0.6+ 0.4 \times(1-30\%)$ $B_e/ 0.88=1.8/0.6$
Beta of Equity(Be)=	2.64

Cost of Equity(Ke)	$K_e=R_f + MRP \times B_e$ $=5\% + (11\%-5\%) \times 2.64$ $K_e= 20.84\%$
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Cost Of Debt (Kd)	12%
Kd × (1-t)	$=12\% \times (1-30\%)$ $=8.4\%$



Calculation of Weighted Average Cost of Capital (WACC):

<b>WACC</b>	$=K_d \times (1-t) \times d/(d+e) + K_e \times e/(d+e)$ $=8.4\% \times 0.4 + 20.84\% \times 0.6$
<b>WACC=</b>	<b>15.864 %</b>

Calculation of Potential value:

Year	1	2	3	Total
Cash Flow (CF)	100	120	150	
Present Value (PV)@ 15.864%	0.86	0.74	0.64	
<b>PVCF</b>	<b>86.31</b>	<b>89.39</b>	<b>96.44</b>	<b>272.13</b>

Value to be placed on X Pvt Ltd is in the range of Rs.272.13 Cr & Rs.300 Cr

## 2. Illustration

A Ltd. made a Gross Profit of ₹ 10,00,000 and incurred Indirect Expenses of ₹ 4,00,000. The number of issued Equity Shares is 1,00,000. The company has a Debt of ₹ 3,00,000 and Surplus Funds to the tune of ₹ 5,00,000. The market related details are as follows:

Risk Free Rate of Return	4.5%
Market Rate of Return	12%
$\beta$ of the Company	0.9

Determine:

- Per Share Earning Value of the Company.
- Equity Value of the company if applicable EBITDA multiple is 5

(ICAI SM)

Solution:

### a) Earnings Capitalisation

Particulars	Amount
Gross Profit	10,00,000
Less : Indirect Expenses	(400,000)
<b>EBITDA</b>	<b>600,000</b>

**Note:** Ideally, EBITDA should be capitalised based on WACC, since WACC is not available, we will use Cost of equity ( $K_e$ )

$$K_e = R_f + \text{Market Risk Premium} \times \text{Beta}$$

$$K_e = 4.5\% + 0.9 \times (12\% - 4.5\%) \quad \{ \text{MRP} = \text{Market rate of return less Risk free rate of return} \}$$

$$K_e = 11.25\%$$

Earnings Value	$=600,000/11.25\%$ $= 53,33,333.33$
Less : Debt	(300,000)
Earnings	50,33,333.33
No of shares	100,000
Earnings value per share	$=50,33,333.33/100,000$ <b>50.33</b>

**Note :** If we don't adjust the value of debt, then earnings value per share will be 53.33.





### b) Equity Value based on EBITDA multiple

EBITDA	600,000
Multiple	5
EV	30,00,000
Less :Debt	(300,000)
Add : Surplus Fund	500,000
Equity Value	32,00,000
Share Count	100,000
Value per Equity share	=32,00,000/100,000 = 32

### 3. Illustration

The balance sheet of H K Ltd. is as follows:

	Rs. ('000)
Non-Current Assets	1000
Current Assets	
• Trade Receivables	500
• Cash and cash equivalents	500
	2000
Shareholder's funds	800
Long Term Debt	200
Current Liabilities and Provisions	1000
	2000

The shares are actively traded and the Current Market Price (CMP) is Rs.12 per share. Shareholder funds represent 70,000 shares of Rs.10 each and rest is retained earnings.

Calculate the Enterprise Value of HK Ltd

(ICAI SM, MTP Apr'14)

Solution :

Particulars	Amount (INR)
CMP/Share	12
Total Shares	70,000
Market Capitalisation	840,000
Add : Debt	200,000
Less : Surplus Cash	(500,000)
EV	540,000

Hence the Enterprise Value of HK Ltd is INR 5,40,000.

### 4. Illustration

Using the chop-shop approach (or Break-up value approach), assign a value for Cornett GMBH. whose stock is currently trading at a total market price of €4 million. For Cornett, the accounting data set forth in three business segments:

- consumer wholesaling,
- specialty services, and
- assorted centres.

Data for the firm's three segments are as follows:





Business segment	Segment sales	Segment assets	Segment income
Consumer wholesaling	€1,500,000	€ 750,000	€100,000
Specialty services	€800,000	€700,000	€150,000
Assorted centers	€2,000,000	€3,000,000	€600,000

Industry data for "pure-play" firms have been compiled and are summarized as follows:

Business segment	Capitalization	Capitalization	Capitalization
	Sales	Assets	Operating Income
Consumer wholesaling	0.75	0.60	10.00
Specialty services	1.10	0.90	7.00
Assorted centers	1.00	0.60	6.00

(ICAI SM)

Solution :

Segment	Capitalisation to Sales Ratio (a)	Sales (EURO ) (b)	Value (a × b)
Consumer Wholesaling	0.75	1,500,000	1,125,000
Speciality Services	1.10	800,000	880,000
Assorted Centres	1	2,000,000	2,000,000
Total Value			4,005,000

Segment	Capitalisation to asset Ratio (a)	Assets (EURO) (b)	Value (a × b)
Consumer Wholesaling	0.60	750,000	450,000
Speciality Services	0.90	700,000	630,000
Assorted Centres	0.60	30,00,000	1,800,000
Total Value			2,880,000

Segment	Capitalisation to operating income (a)	Operating Income (EURO ) (b)	Value (a × b)
Consumer Wholesaling	10	100,000	1,000,000
Speciality Services	7	150,000	1,050,000
Assorted Centres	6	600,000	3,600,000
Total Value			5,650,000

Particulars	Value (EURO)
Sales	4,005,000
Assets	2,880,000
Operating Income	5,650,000
Average of three	4,178,333.33
CMP value	4,000,000
Undervalued	$(4178333 - 4000000) / 4000000$ = 4.26%

Hence the stock of the company is undervalued by 4.26%.





#### 4a. Illustration (For Practice)

Using the chop-shop approach (or Break-up value approach), assign a value for Cranberry Ltd. whose stock is currently trading at a total market price of €4 million. For Cranberry Ltd, the accounting data set forth three business segments: consumer wholesale, retail, and general centres. Data for the firm's three segments are as follows:

Business Segment	Segment Sales	Segment Assets	Segment Operating Income
Wholesale	€225,000	€600,000	€75,000
Retail	€720,000	€500,000	€150,000
General	€ 2,500,000	€4,000,000	€700,000

Industry data for "pure-play" firms have been compiled and are summarized as follows:

Business Segment	Capitalization Sales	Capitalization Assets	Capitalization Operating Income
Wholesale	0.85	0.7	9
Retail	1.2	0.7	8
General	0.8	0.7	4

(MTP Aug'18, RTP May'18 Old)

Solution :

Segment	Capitalisation to Sales Ratio (a)	Sales (EURO) (b)	Value (a × b)
Wholesale	0.85	225,000	191,250
Retail	1.20	720,000	864,000
General	0.8	2,500,000	20,00,000
Total Value			3,055,250

Segment	Capitalisation to asset Ratio (a)	Assets (EURO) (b)	Value (a × b)
Wholesale	0.70	600,000	420,000
Retail	0.70	500,000	350,000
General	0.70	40,00,000	2,800,000
Total Value			3,570,000

Segment	Capitalisation to operating income (a)	Operating Income (EURO ) (b)	Value (a × b)
Wholesale	9	75,000	675,000
Retail	8	150,000	1,200,000
General	4	700,000	2,800,000
Total Value			4,675,000

Particulars	Value (EURO)
Sales	30,55,250
Assets	3,570,000
Operating Income	4,675,000
Average of three	37,82,417
CMP value	4,000,000
Undervalued	(37,82,417 - 4000000) / 4000000 = (5.44%)





### 5. Illustration

ABC Company is considering acquisition of XYZ Ltd. which has 1.5 crores shares outstanding and issued. The market price per share is ₹ 400 at present.

ABC's average cost of capital is 12%. Available information from XYZ indicates its expected cash accruals for the next 3 years as follows:

Year	₹ Cr.
1	250
2	300
3	400

Calculate the range of valuation that ABC has to consider.

(PV factors at 12% for years 1 to 3 respectively: 0.893, 0.797 and 0.712).

(ICAI SM, MTP Oct'22, Old PM)

Solution :

#### Value of XYZ Ltd

Number of shares in Cr	1.5
MP of share	400
Current Market Capitalisation in Cr	600

Year	1	2	3
Cash Accruals	250	300	400
PVF	0.893	0.797	0.712
PVCF (INR Crores)	223.25	239.10	284.80
PVCF (INR Crores)	747.15		
No Of shares (In Cr)	1.5		
Price per Share (INR)	498.10		

Range of valuation	Per Share (INR)	Total in Cr
MP	400	600
DCF	498.10	747.15

### 6. Illustration

Eagle Ltd. reported a profit of ₹ 77 lakhs after 30% tax for the financial year 2011-12. An analysis of the accounts revealed that the income included extraordinary items of ₹ 8 lakhs and an extraordinary loss of ₹10 lakhs. The existing operations, except for the extraordinary items, are expected to continue in the future. In addition, the results of the launch of a new product are expected to be as follows:

	₹ In lakhs
Sales	70
Material costs	20
Labour costs	12
Fixed costs	10

You are required to:

- Calculate the value of the business, given that the capitalization rate is 14%.
- Determine the market price per equity share, with Eagle Ltd.'s share capital being comprised of 1,00,000 13% preference shares of ₹ 100 each and 50,00,000 equity shares of ₹ 10 each and the P/E ratio being 10 times.

(ICAI SM, RTP Nov'18, MTP Sept'22, MTP Apr'18, RTP May'19 Old)





Solution :

i)

Particulars	Amount Lakhs)	(INR
Reported PAT	77	
Tax Rate		30%
Reported PBT	=77/(1-0.3) = 110	
Less : Extraordinary Income		(8)
Add : Extraordinary Loss		10
Adjusted PBT		112

Value of new business:

Particulars	Amount (INR Lakhs)
Sales	70
Less : Material	(20)
Less : Labour	(12)
Less : Fixed Cost	(10)
PBT New business	28

Total Value of business

Total Sustainable PBT	= 112+28 = 140
Less : Tax @30%	(42)
Sustainable PAT	INR 98 Lakhs
Capitalisation Rate	14%
Value of Business	=98/14% = INR 700 Lakhs

ii)

Particulars	Amount (INR Lakhs)
Adjusted PAT	98
Less : Preference Dividend (13% of 100 Lakhs)	(13)
Earnings available to Equity Shareholders (EAESH)	85
No of equity shares	50
EPS	=85/50 = 1.7
PE Ratio	10
MP per share	17

Hence the market price per share is INR 17.

## 7. Illustration

ABC Co. is considering a new sales strategy that will be valid for the next 4 years. They want to know the value of the new strategy. Following information relating to the year which has just ended, is available:

Income Statement

₹



Sales	20,000
Gross margin (20%)	4,000
Administration, Selling & distribution expense (10%)	2,000
PBT	2,000
Tax (30%)	600
PAT	1,400
<b>Balance Sheet Information</b>	
Fixed Assets	8,000
Current Assets	4,000
Equity	12,000

If it adopts the new strategy, sales will grow at the rate of 20% per year for three years. From 4th year onward Cash Flow will be stabilized. The gross margin ratio, Assets turnover ratio, the Capital structure and the income tax rate will remain unchanged.

Depreciation would be at 10% of net fixed assets at the beginning of the year. The Company's target rate of return is 15%.

Determine the incremental value due to adoption of the strategy.

(ICAI SM, MTP Nov'21 New and Old, MTP Apr'19, RTP May'20, MTP Feb'14)

**Solution :**

**Profit & Loss :**

Year	0	1	2	3	4
Turnover (Growth rate of 20%)	20,000	24,000	28,800	34,560	34,560
Gross Margin @20%	4,000	4,800	5,760	6,912	6,912
Admin Expense @10% (including depreciation)	2,000	2,400	2,880	3,456	3,456
PBT	2,000	2,400	2,880	3,456	3,456
Less: Tax @30%	600	720	864	1036.80	1036.80
PAT	1,400	1,680	2,016	2,419.20	2,419.20

**Balance Sheet :**

Year	0	1	2	3	4
Fixed Assets	8,000	9,600	11,520	13,824	13,824
FA Turnover Ratio (Turnover/Fixed Assets)	2.5	2.5	2.5	2.5	2.5
Current Assets	4,000	4,800	5,760	6,912	6,912
CA as % of sales	20%	20%	20%	20%	20%
Total Assets	12,000	14,400	17,280	20,736	20,736
Equity	12,000	14,400	17,280	20,736	20,736

**Computation of FCFF :**

Year	1	2	3	4
				



PAT	1680	2016	2419.2	2419.2
Less :Change in WC	800	960	1152	
Less : Capex	2400	2880	3456	1382.4
Add : Depreciation	800	960	1152	1382.4
FCFF	720	864	1,036.80	2,419.2

### Fixed Assets

Year	1	2	3	4
Opening -NFA	8,000	9,600	11,520	13,824
Less : Depreciation @10%	800	960	1,152	1,382.4
Add : Capex (Bal Fig) Capex = Closing - Opening + Depreciation	2,400	2,880	3,456	1,382.4
Closing	9,600	11,520	13,824	13,824

Year	1	2	3	4
FCFF	(720)	(864)	(1,036.80)	2,419.2
Terminal Value			=2419/15% = 16,128	
Total (FCFF + TV)	(720)	(864)	15,091	
Present value factor @ 15%	0.870	0.756	0.658	
PVCF	(626.09)	(653.31)	9,922.71	
Total PVCF			8,643.31	

Hence value of business with new strategy is INR 8,643.31

Value of new business without new strategy :

FCFF in year 0 will be INR 1400 as there are no changes in WC, Capex or Depreciation.

FCFF in year 1 with no growth will remain same INR 1400 as :

1. Profit and loss will remain same.
2. Closing NFA will remain same as asset Turnover ratio is constant.
3. Current assets will remain same as CA as % of sales will be constant.

Value of new business without new strategy =  $1400/0.15 = 9,333.33$

Incremental value of new strategy =  $8,643.31 - 9,333.33 = (690.02)$

Hence company should not go for new strategy as incremental value is negative.

### 8. Illustration

H Ltd. agrees to buy over the business of B Ltd. effective 1st April, 2012. The summarized Balance Sheets of H Ltd. and B Ltd. as on 31st March 2012 are as follows:

Balance sheet as at 31st March, 2012 (In Crores of Rupees)

Liabilities:	H. Ltd	B. Ltd.
Paid up Share Capital		
-Equity Shares of ₹100 each	350.00	--
-Equity Shares of ₹10 each	--	6.50
Reserve & Surplus	950.00	25.00
Total	1,300.00	31.50





<b>Assets:</b>		
Net Fixed Assets	220.00	0.50
Net Current Assets	1,020.00	29.00
Deferred Tax Assets	60.00	2.00
<b>Total</b>	<b>1,300.00</b>	<b>31.50</b>

H Ltd. proposes to buy out B Ltd. and the following information is provided to you as part of the scheme of buying:

- (1) The weighted average post tax maintainable profits of H Ltd. and B Ltd. for the last 4 years are ₹ 300 crores and ₹ 10 crores respectively.
- (2) Both the companies envisage a capitalization rate of 8%.
- (3) H Ltd. has a contingent liability of ₹ 300 crores as on 31st March, 2012.
- (4) H Ltd. to issue shares of ₹ 100 each to the shareholders of B Ltd. in terms of the exchange ratio as arrived on a Fair Value basis. (Please consider weights of 1 and 3 for the value of shares arrived on Net Asset basis and Earnings capitalization method respectively for both H Ltd. and B Ltd.)

You are required to arrive at the value of the shares of both H Ltd. and B Ltd. under:

- (i) Net Asset Value Method
- (ii) Earnings Capitalisation Method
- (iii) Exchange ratio of shares of H Ltd. to be issued to the shareholders of B Ltd. on a Fair value basis (taking into consideration the assumption mentioned in point 4 above.)

(ICAI SM, MTP Oct'23)

**Solution:**

Particulars	H Ltd (INR Crores)	B Ltd (INR Crores)
i) NAV Method		
Equity + Reserves and Surplus	1300	31.50
Less : Contingent Liability (Refer note)	(300)	0
NAV of the Company	1000	31.50
Equity share capital	350	6.5
FV per share	100	10
No of equity shares	3,50,00,000	65,00,000
NAV per share (INR)	285.71	48.46
ii) Earning Capitalisation Method		
Weighted Average Post tax maintainable profits	300	10
Capitalisation rate	8%	8%
Value of company	=300/8% = 3,750	=10/8% = 125
No of shares	3,50,00,000	65,00,000
Value per share	1071.43	192.31

**Note :** Contingent liability is recognised as a crystallised liability in NAV Method whereas it is assumed that the same is already factored in capitalisation method, hence no effect has been given.





iii) Fair Value computation

Particulars	H Ltd	B Ltd
Value per share		
NAV Method	285.71	48.46
Earning Capitalisation Method	1071.43	192.31
Weights-		
NAV method	1	1
Earning Capitalisation Method	3	3
Fair Value (Weighted Average)	$=[(285.71 \times 1) + (1071.43 \times 3)] / (1+3)$	$=[48.46 \times 1] + (192.31 \times 3)$
INR per share	= 875	= 156.35
Exchange Ratio	$=156.35/875$ = 0.1787	
Hence, for every share of B Ltd, 0.1787 shares of H Ltd are allotted.		

9. Illustration

AB Ltd., is planning to acquire and absorb the running business of XY Ltd. The valuation is to be based on the recommendation of merchant bankers and the consideration is to be discharged in the form of equity shares to be issued by AB Ltd.

As on 31.3.2006, the paid-up capital of AB Ltd. consists of 80 lakhs shares of ₹ 10 each. The highest and the lowest market quotation during the last 6 months were ₹ 570 and ₹ 430.

For the purpose of the exchange, the price per share is to be reckoned as the average of the highest and lowest market price during the last 6 months ended on 31.3.06.

XY Ltd.'s Balance Sheet as at 31.3.2006 is summarised below:

	₹ lakhs
<b>Sources</b>	
Share Capital	
20 lakhs equity shares of ₹10 each fully paid	200
10 lakhs equity shares of ₹10 each, ₹5 paid	50
Loans	100
Total	350
<b>Uses</b>	
Fixed Assets (Net)	150
Net Current Assets	200
Total	350

An independent firm of merchant bankers engaged for the negotiation, have produced the following estimates of cash flows from the business of XY Ltd.:

Year ended	By way of	₹ lakhs
31.3.07	after tax earnings for equity	105
31.3.08	after tax earnings for equity	120
31.3.09	after tax earnings for equity	125
31.3.10	after tax earnings for equity	120





31.3.11	after tax earnings for equity	100
	Terminal Value estimate	200

It is the recommendation of the merchant banker that the business of XY Ltd. may be valued on the basis of the average of

- (i) Aggregate of discounted cash flows at 8% and
- (ii) Net assets value. Present value factors at 8% for years

1-5:	0.93	0.86	0.79	0.74	0.68
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You are required to:

- (i) Calculate the total value of the business of XY Ltd.
  - (ii) The number of shares to be issued by AB Ltd.; and
  - (iii) The basis of allocation of the shares among the shareholders of XY Ltd.
- (ICAI SM, MTP Oct'23, MTP Oct'21)

Solution :

i) Valuation of AB's share = Average of 6M High & Low =  $(570+430)/2 = 500$

NAV Method

= Equity = INR 250 Lakhs

ii) DCF Method

Year	FCFE (INR Lakhs)	PV Factor	PVCF (INR Lakhs)
1	105	0.93	97.65
2	120	0.86	103.20
3	125	0.79	98.75
4	120	0.74	88.80
5	100	0.68	68
Terminal Value	200	0.68	136
Total			592.40

Value of XYZ Business = Average of NAV and DCF =  $(250+592.40)/2 = 421.20$

Number of shares to be issued

Value of business (INR Lakhs)	421.20
Value per share	500
No of shares	84,240
Fully paid shares in Lakhs	20
Partly paid shares in Lakhs (half paid)	10
Fully paid equivalent share	= $20 + (10/2) = 25$
Shares of AB to fully paid shareholders of XYZ	= $84,240 \times 20/25$ = 67,392
Shares of AB to partly paid shareholders of XYZ	= $84,240 \times 5/25$ = 16,848

### 10. Illustration

The valuation of Hansel Limited has been done by an investment analyst. Based on an expected free cash flow of ₹ 54 lakhs for the following year and an expected growth rate of 9 percent, the analyst has estimated the value of Hansel Limited to be ₹ 1800 lakhs. However, he committed a mistake of using the book values of debt and equity.





The book value weights employed by the analyst are not known, but you know that Hansel Limited has a cost of equity of 20 percent and post-tax cost of debt of 10 percent. The value of equity is thrice its book value, whereas the market value of its debt is nine-tenths of its book value. What is the correct value of Hansel Ltd?

(ICAI SM, RTP May'19)

**Solution :**

Given,

FCFF = 54 Lakhs,  $g = 9\%$  and Value of Hansel Ltd = INR 1800 Lakhs

As per Gordon Growth Model, Value =  $FCFF / (Kc - g)$

$1800 \text{ Lakhs} = 54 / (Kc - 9\%)$

$Kc - 9\% = 3\%$  or  $Kc = 12\%$

Cost of equity ( $K_e$ )	20%
Cost of Debt ( $K_d$ )	10%
Cost of capital ( $K_c$ )	12%
Assuming weight of equity	X
Then, weight of debt	1-X

$$12\% = 20\% \times X + 10\% \times (1-X)$$

$$X = 2\% / 12\% = 0.20$$

Hence weight of equity = 20% and weight of debt =  $1 - 20\% = 80\%$

Weight of equity	20%
Correct weight of equity	= $20\% \times 3 = 60\%$
Correct weight of debt	= $80\% \times 90\% = 72\%$
Revised $K_c$	= $20\% \times 60\% / 132\% + 10\% \times 72\% / 132\%$ = 14.545%
Revised value of Hansel based on GGM	= $54 / (14.545\% - 9\%)$ = INR 973.85 Lakhs

Hence revised value of Hansel based on revised cost of capital is INR 973.85 Lakhs.

#### 11. Illustration

Following information is available in respect of XYZ Ltd. which is expected to grow at a higher rate for 4 years after which growth rate will stabilize at a lower level:

Base year information:

Revenue	₹ 2,000 crores
EBIT	₹ 300 crores
Capital expenditure	₹ 280 crores
Depreciation	₹ 200 crores

Information for high growth and stable growth period are as follows:

	High Growth	Stable Growth
Growth in Revenue & EBIT	20%	10%
Growth in capital expenditure and depreciation	20%	Capital expenditure are offset by depreciation
Risk free rate	10%	9%
Equity beta	1.15	1



Market risk premium	6%	5%
Pretax cost of debt	13%	12.86%
Debt equity ratio	1: 1	2: 3

For all time, working capital is 25% of revenue and corporate tax rate is 30%. What is the value of the firm?

(ICAI SM, Nov'22 QP 8 marks, MTP Mar'22, MTP Mar'19 Old)

Solution :

Calculation of Weighted Average Cost of Capital (WACC) for High growth and Stable period

Particulars	High Growth Period	Stable Period
Ke = Rf + Market risk Premium (b)	= 10% + (6%)(1.15) = 16.9%	Ke = 9% + (5%) (1) = 14%
Kd	13%	12.86%
Tax Rate	30%	30%
Post tax Kd	= 13% × (1-30%) = 9.1%	= 12.86% × (1-30%) = 9.002%
Debt Equity Ratio	1:1	2:3
WACC	= (16.9% × 1) + (9.1% × 1)/(1+1) = 13%	= (14% × 3/5) + (9.002% × 2/5) = 12%

Hence WACC is 13% and 12% for High growth and stable period respectively.

FCFF	Base Year	1	2	3	4	Stable Period
Revenue (Growth=20% for HG period and 10% for stable)	2000	2400	2880	3456	4147.2	4561.92
EBIT(Growth=20% for HG period and 10% for stable)	300	360	432	518.40	622.08	684.29
Tax Rate	30%	30%	30%	30%	30%	30%
EBIT (1 - Tax)		252	302.40	362.88	435.46	479
WC as % of sales	25%	25%	25%	25%	25%	25%
WC	500	600	720	864	1036.80	1140.48
Increase in WC		(100)	(120)	(144)	(172.80)	(103.68)
Depreciation	200	240	288	345.60	414.72	
Dep Growth %		20%	20%	20%	20%	
Capex	280	336	403.20	483.84	580.61	
Capex Growth		20%	20%	20%	20%	

Calculation of FCFF:

Particulars	1	2	3	4	Stable Period
EBIT (1 - Tax)	252	302.40	362.88	435.46	479
Add : Depreciation	240	288	345.60	414.72	
Less : Capex	(336)	(403.20)	(483.84)	(580.61)	



Less : Inc in WC	(100)	(120)	(144)	(172.80)	(103.68)
FCFF	56	67.20	80.64	96.77	375.32
Discount Rate	13%	13%	13%	13%	12%
PV Factor	0.885	0.783	0.693	0.613	
PVCF	49.56	52.63	55.89	59.35	
Total PVCF (Explicit Period)	217.42				

Terminal value at the end of 4<sup>th</sup> Year =  $FCFF_{terminal} / (K_c - g) = 375.32 / (12\% - 10\%) = 18,766.08$

PV of Terminal Value =  $18,766.08 \times 0.613 = 11,509.59$

Total Value of the firm = Explicit + terminal value

=  $217.42 + 11,509.59$

= 11,727.01

## 12. Illustration

Following information is given in respect of WXY Ltd., which is expected to grow at a rate of 20% p.a. for the next three years, after which the growth rate will stabilize at 8% p.a. normal level, in perpetuity.

For the year ended March 31, 2014

Revenues	₹ 7,500 Crores
Cost of Goods Sold (COGS)	₹ 3,000 Crores
Operating Expenses	₹ 2,250 Crores
Capital Expenditure	₹ 750 Crores
Depreciation (included in Operating Expenses)	₹ 600 Crores

During high growth period, revenues & Earnings before Interest & Tax (EBIT) will grow at 20% p.a. and capital expenditure net of depreciation will grow at 15% p.a. From year 4 onwards, i.e., normal growth period revenues and EBIT will grow at 8% p.a. and incremental capital expenditure will be offset by the depreciation. During both high growth & normal growth period, net working capital requirement will be 25% of revenues.

The Weighted Average Cost of Capital (WACC) of WXY Ltd. is 15%. Corporate Income Tax rate will be 30%.

Required:

Estimate the value of WXY Ltd. using Free Cash Flows to Firm (FCFF) & WACC methodology.

The PVIF @ 15 % for the three years are as below:

Year	t1	t2	t3
PVIF	0.8696	0.7561	0.6575

(ICAI SM, Nov'22 QP 8 marks, MTP Mar'24, RTP Nov'20 Old)

Solution :

Particulars	Base Year	1	2	3	Terminal Year
Revenue (Growth =20% and 8% for terminal year)	7500	9000	10,800	12,960	13,996.80
COGS (Growth =20% and 8% for terminal year)	3000	3600	4320	5184	5598.72





Opex before Depreciation (Growth =20% and 8% for terminal year)	1650	1980	2376	2851.20	3079.30
Depreciation (Growth =20% and 8% for terminal year)	600	720	864	1036.80	1119.74
EBIT	2250	2700	3240	3888	4199.04
Capex (bal fig)	(750)	(892.50)	(1062.38)	(1264.93)	(1119.74)
Depreciation	600	720	864	1036.80	1119.74
Capex- Depreciation	(150)	(172.50)	(198.38)	(228.13)	
Growth Rate		15%	15%	15%	
NWC as % of revenue	25%	25%	25%	25%	25%
Net Working Capital	1875	2250	2700	3240	3499.20
Inc in WC		(375)	(450)	(540)	(259.20)

#### Calculation of FCFF:

Particulars	Base Year	1	2	3	Terminal Year
EBIT		2700	3240	3888	4199.04
EBIT (1 - Tax)		1890	2268	2721.6	2939.33
Add : Depreciation		720	864	1036.80	1119.74
Less : Capex		(892.50)	(1062.38)	(1264.93)	(1119.74)
Less : Inc in WC		(375)	(450)	(540)	(259.20)
FCFF		1342.50	1619.63	1953.47	2680.13
WACC		15%	15%	15%	15%
PV Factor		0.8696	0.7561	0.6575	
PVCF		1167.44	1224.60	1284.41	
Total PVCF (Explicit Period)			3676.44		

Terminal value at the end of 4<sup>th</sup> Year =  $FCFF_{terminal} / (K_c - g) = 2680.13 / (15\% - 8\%) = 38,287.54$

PV of Terminal Value =  $38,287 \times 0.6575 = 25,174.06$

Total Value of the firm = Explicit + terminal value

=  $3676.44 + 25,174.06$

= 28,850.50

### 13. Illustration

The Balance Sheet of M/s. Sundry Ltd. as on 31-03-2020 is follows:

Liabilities	₹	Assets	₹
Share Capital	300	Fixed Assets	600
Reserves	200	Inventory	500
Long Term Loan	400	Receivables	240
Short Term Loan	300	Cash	60
Payables & Provisions	200		
<b>Total</b>	<b>1400</b>	<b>Total</b>	<b>1400</b>





Sales for the year was ₹ 600 lakhs. The sales are expected to grow by 20% during the year. The profit margin and dividend pay-out ratio are expected to be 4% and 50% respectively.

The company further desires that during the current year Sales to Short Term Loan and Payables and Provision should be in the ratio of 4: 3. Ratio of fixed assets to Long Term Loans should be 1.5. Debt Equity Ratio should not exceed 1.5.

You are required to determine:

- The amount of External Fund Requirement (EFR)
- The amount to be raised from Short Term, Long Term and Equity funds.

[ICAI SM (New Question), Jan'21 QP 8 marks, MTP Mar'23]

Solution

Particulars	2020 (Amount in Lakhs)	2021 (Amount in Lakhs)
Sales	600	720
Growth		20%
Profit		28.80
Profit Margin		4%
Dividend		14.40
Payout Ratio		50%
Retained Profit		14.40
Sales/(ST Loan + Provision)		4:3
Sales		720
ST Loan + Provision	500	=720 × 3/4 =540
Fixed Asset to Long term Loan		1.5
Debt/ Equity		<1.5
Fixed Assets	600	720
Sales	600	720
FA T/O Ratio	1	1
FA/LT Loan		1.5
FA		720
Long term loan		= 720/1.5 = 480
Calculation of Net Working Capital		
Inventory	500	600
Receivable	240	288
Cash	60	72
Gross Working Capital	800	960
Less : Provision	(200)	(240)
Net Working Capital	600	720
Sales	600	720
NWC as % of sales	100%	100%

Assuming NWC/Sales = 100% as in FY 20 and assuming all items of NWC have increased in same proportion.





## i) External Funds Required

Increase in FA	120
Increase in WC	120
Less : Profit Retained	(14.40)
External Funds Required	225.60

## ii)

LT loan Increase	80
ST Loan Increase ( Increased from provision only)	0
Equity	= External Funds Required - LT Loan Increase - ST Loan = 225.60 - 80 = 145.60
Total ST Loan + Provision	540
Less : Provision @20%	240
ST Loan	300
<i>There is no increase in short term loan</i>	

Short term loan	300
Long Term Loan	480
Total Debt	780
Share Capital	300
Reserves	200
Add : Retained Profit	14.40
New Equity raised	145.60
Total Equity	= 300+200+14.40+145.60 = 660
Debt Equity	780/660 = 1.18, which is less than 1.5

## 14. Illustration

AB Industries has Equity Capital of ₹ 12 Lakhs, total Debt of ₹ 8 Lakhs, and annual sales of ₹ 30 Lakhs. Two mutually exclusive proposals are under consideration for the next year. The details of the proposals are as under:

Particulars	Proposal no. 1	Proposal no. 2
Target Assets to Sales Ratio	0.65	0.62
Target Net Profit Margin (%)	4	5
Target Debt Equity Ratio (DER)	2:3	4:1
Target Retention Ratio (of Earnings) (%)	75	-
Annual Dividend (₹ In Lakhs)	-	0.30
New Equity Raised (₹ in Lakhs)	-	1

You are required to calculate sustainable growth rate for both the proposals. (Nov'20 QP 8 marks)





Solution :

Current

Particulars	Amount (Lakhs)
Equity	12
Debt	8
Debt/Equity	2:3
Sales	30

Proposal 1:

Target Assets to Sales	0.65
Assume sales for NY in Proposal	30
Assets	= 30 × 0.65 = 19.50
Net profit Margin	4%
Net profit	= 30 × 4% = 1.2
Target D/E	2:3
Proposal 1 Equity Component in Total Assets	= 19.5 × 3/5 = 11.7
Return on Equity = Net profit/ Equity	= 1.2/11.7 = 10.26%
Retention Ratio	75%
Sustainable Growth Rate (SGR) = Retention ratio × ROE	= 75% × 10.26% = 7.69%
Proposal 2 :	
Target assets to sales	0.62
Existing Equity	12
New Equity	1
Total Equity	13
Debt/Equity Ratio	4:1
Debt	52
Total Assets	= 52/4 × 5 = 65
Sales based on target assets	= 65/0.62 = 104.84
Net profit margin	5%
Net profit	= 104.84 × 5% = 5.24
Annual Dividend	0.3
Payout Ratio	5.72%
Retention Ratio	= 1 - 5.72% = 94.28%
ROE	= 5.24/13 = 40.32%
SGR = ROE × Retention Ratio	= 40.32% × 94.28% = 38.01%

### 15. Illustration (For Practice)

Excellent Ltd. reported a profit of Rs. 154 lakhs after 30% tax for the financial year 2019- 20. An analysis of the accounts revealed that there is an extraordinary loss of Rs. 20 lakhs and the income included extraordinary items of Rs. 16 lakhs. The existing operations, except for the extraordinary items, are expected to continue in the future. In addition, the results of the launch of a new product are expected to be as follows:

	Rs. in lakhs
Sales	140
Material costs	40
Labour costs	24
Fixed costs	20



You are required to:

- (i) Calculate the value of the business, given that the capitalization rate is 14%.
- (ii) Determine the market price per equity share, with Excellent Ltd.'s share capital being comprised of 2,00,000 at 13% preference shares of Rs. 100 each and 100,00,000 equity shares of Rs. 10 each and the P/E ratio being 12 times. (Ignoring Corporate Dividend Tax).

(July'21 QP 8 marks, RTP May'23)

Solution :

i)

Particulars	Amount (INR Lakhs)
Reported PAT	154
Tax Rate	30%
Reported PBT	=154/(1-0.3) = 220
Less : Extraordinary Income	(16)
Add : Extraordinary Loss	20
Adjusted PBT	224

Value of new business:

Particulars	Amount (INR Lakhs)
Sales	140
Less : Material	(40)
Less : Labour	(24)
Less : Fixed Cost	(20)
PBT New business	56

Total Value of business

Total Sustainable PBT	= 224+56 = 280
Less : Tax @30%	(84)
Sustainable PAT	INR 196 Lakhs
Capitalisation Rate	14%
Value of Business	=196/14% = INR 1400 Lakhs

Particulars	Amount (INR Lakhs)
Adjusted PAT	196
Less : Preference Dividend (13% of 100 Lakhs)	(26)
Earnings available to Equity Shareholders (EAESH)	170
No of equity shares	100
EPS	=170/100 = 1.7
PE Ratio	12
MP per share	20.4

Hence the market price per share is INR 20.4

### 16. Illustration

Following information is available of M/s. TS Ltd.

	₹ Cr
PBIT	5.00
Less: Interest on Debt (10%)	1.00
PBT	4.00



Less: Tax @ 25%	1.00
PAT	3.00
No. of O/S shares of ₹ 10 each	40 lakhs
EPS (₹)	7.5
Market price of share (₹)	75
P/E ratio	10 Times

TS Ltd. has an undistributed reserve of ₹ 8 crores. The company requires ₹ 3 crores for the purpose of expansion which is expected to earn the same rate of return on capital employed as present. However, if the debt to capital employed ratio is higher than 35%, then P/E ratio is expected to decline to 8 times and rise in the cost of additional debt to 14%. Given this data which of the following options the company would prefer, and why?

Option (i): If the required amount is raised through debt, and

Option (ii): If the required amount is raised through equity and the new shares will be issued at a price of ₹ 25 each.

(Nov'19 QP 8 marks)

Solution :

Particulars	Amount (INR Crores)
<u>Option 1: Additional Funding raised by debt</u>	
Existing debt	= Interest on debt/ Int% = $1/10\% = 10$
New Debt	3
Total Debt	13
Existing share capital	= 40 Lakh shares × 10 = 4
Reserves	8
Existing Equity	12
Current ROCE	= EBIT/Capital Employed = $5/10+12 = 5/22 = 22.73\%$
Capital Employed = Debt + Equity	
Revised ROCE same as earlier	= 22.73%
Revised Capital Employed	= 13+12 = 25
Hence revised EBIT	= $25 \times 22.73\% = 5.68$
Revised Debt/Capital Employed Ratio	= $13/(13+12) = 0.52$
Since revised D/CE ratio is greater than 0.35, cost of new debt will be 14%	
Existing debt interest	1
New debt interest	= $3 \times 14\% = 0.42$
Total revised interest expense	1.42
Revised Profit and Loss	
EBIT	5.68
Less : Revised Interest	(1.42)
EBT	4.26
Less : Tax @25%	(1.07)
PAT	3.19
No of shares in Cr	0.40
Earnings per Share	7.99
Revised PE as Debt/CE > 0.35	8
Revised Market price	= $7.99 \times 8 = 63.93$

Option 2: Amount raised by Equity





Funds required	3
Issue price per share	25
Shares issued in Numbers	12,00,000
Existing share capital	4
Add : New share capital	3
Revised Share capital	7
Existing reserves	8
Total Revised Equity	15
Debt	10
Debt / Capital Employed	=10/(10+15) = 40%
<i>Since the new D/CE is also greater than 35%, the PE will decline</i>	
EBIT	5.68
Less : Interest	(1)
EBT	4.68
Less : Tax @25%	(1.17)
PAT	3.51
No of shares in Cr	= Existing + New = 0.40 + 0.12 = 0.53
Earnings per Share	= 3.51/0.53 = 6.75
Revised PE	8
Revised Market Price per share	= 6.75 × 8 = 54.02

Given that, share price is falling to INR 63.93 only in option 1 as compared to INR 54.02 in option 2, hence option 1 is preferred.

### 17. Illustration

Mr. X, a financial analyst, intends to value the business of PQR Ltd. in terms of the future cash generating capacity. He has projected the following after tax cash flows:

Year:	1	2	3	4	5
Cash flows (₹ in lakh)	1,760	480	640	860	1,170

It is further estimated that beyond 5th year, cash flows will perpetuate at a constant growth rate of 8% per annum, mainly on account of inflation. The perpetual cash flow is estimated to be ₹ 10,260 lakh at the end of the 5th year.

Required:

- What is the value of the firm in terms of expected future cash flows, if the cost of capital of the firm is 20%?
- The firm has outstanding debts of ₹ 3,260 lakh and cash/bank balance of ₹ 2,710 lakh. Calculate the shareholder value per share if the number of outstanding shares is 151.50 lakh.
- The firm has received a takeover bid from XYZ Ltd. of ₹ 225 per share. Is it a good offer?

[Given: PVIF at 20% for year 1 to Year 5: 0.833, 0.694, 0.579, 0.482, 0.402]

(Nov'19 QP 8 marks)





## Solution :

All figures in INR Lakhs, unless otherwise stated.

Year	Cash Flows	PVF	PVCF
1	1760	0.833	1466.08
2	480	0.694	333.12
3	640	0.579	370.56
4	860	0.482	414.52
5	1170	0.402	470.34
Present Value of cash flows of explicit period			<b>3054.62</b>

Perpetual Cashflow at the end of year 5	10,260
Terminal Value	= FCFF <sub>6</sub> / K <sub>c</sub> -g
K <sub>c</sub>	20%
g	8%
FCFF 6	= FCFF <sub>5</sub> × (1+g) = 10,260 × (1+8%) = 11,080.8
Terminal Value at the end of year 5	= 11,080.8 / (20%-8%) = <b>92,340</b>
PV of terminal value at the end of year 5	= 92340 × 0.402 = <b>37120.68</b>
Explicit period PV of CF	3054.62
PV of terminal value	37120.68
<b>Total value of firm</b>	<b>40,175.3</b>
Less : Value of debt	(3260)
Add : Cash balance	2710
Value of equity	<b>39,625.3</b>
Number of shares	<b>151.5</b>
Value per share	<b>261.55</b>

No, the takeover bid of ₹ 225 per share is well below intrinsic value per share of ₹ 261.55 hence, the offer should be rejected.

### 18. Illustration

Sun Ltd. recently made a profit of ₹ 200 crore and paid out ₹ 80 crore (slightly higher than the average paid in the industry to which it pertains). The average PE ratio of this industry is 9. The estimated beta of Sun Ltd. is 1.2.

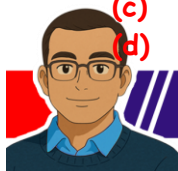
As per Balance Sheet of Sun Ltd., the shareholder's fund is ₹ 450 crore and number of shares is 10 crores. In case the company is liquidated, building would fetch ₹ 200 crore more than book value and stock would realize ₹ 50 crore less.

The other data for the industry is as follows:

- Projected Dividend Growth           4%
- Risk Free Rate of Return           6%
- Market Rate of Return               11%

Calculate the valuation of Sun Ltd. using

- P/E Ratio
- Dividend Growth Model
- Book Value
- Net Realizable Value





Solution :

a) P/E Ratio:

Particulars	Amount (INR Crores)
Given, NP	200
Dividend paid	80
PE	9
NP	200
Value in Cr	1800
No of shares in Cr	10
Value per share of Sun Ltd	180

b) Dividend Growth Model:

Ke	= $R_f + (\text{market risk premium} \times \text{Beta})$
Ke	= $6\% + 1.2 \times (11\% - 6\%) = 12\%$
D0	80
D1	= $D_0 \times (1+g) = 80 \times (1+4\%) = 83.2$
Value of Sun Ltd using DGM	= $D_1 / (K_e - g) = 83.2 / (12\% - 4\%) = 1040$
Value per share	= $1040 / 10 = 104$

c) Book Value:

Equity Value	450
Equity value per share	= $450 / 10 = 45$

d) Net Realisable value :

Particulars	Amount (INR Crores)
Book Value	450
Add : Value for buildings	200
Less : Stock value reduction	(50)
Total NRV	600
NRV per share	= $600 / 10 = 60$

Summary of value of Sun Ltd and value per share

Methods	INR Crores (Total)	Value per share (INR)
PE	1800	180
Dividend Growth Model	1040	104
Book Value	450	45
Net realisable value	600	60

## 19. Illustration

XY Ltd., a Cement manufacturing Company has hired you as a financial consultant of the company. The Cement Industry has been very stable for some time and the cement companies SK Ltd. & AS Ltd. are similar in size and have similar product market mix characteristic.

Use comparable method to value the equity of XY Ltd. In performing analysis, use the following ratios:

(i) Market to book value



- (ii) Market to replacement cost
- (iii) Market to sales
- (iv) Market to Net Income

The following data are available for your analysis:

Amount in ₹	SK Ltd.	AS Ltd.	XY Ltd.
Market Value	450	400	
Book Value	400	300	250
Replacement Cost	600	550	500
Sales	550	450	500
Net Income	18	16	14

[MTP Oct'21 New & Old, Nov'19 QP (Old)]

Solution :

Valuation of XYZ Ltd

Particulars	SK Ltd		AS Ltd		XY Ltd	
	INR	Ratio	INR	Ratio	INR	Ratio*
Market Value	450		400			
Book Value	400		300		250	= 250 × 1.2292 = 307.29
MV/BV		=450/400 = 1.125		=400/300 = 1.333		= (1.125+1.333)/2 = 1.2292
Replacement Cost (RC)	600		550		500	=500 × 0.7386 = 369.32
MV/RC		=450/600 = 0.75		=400/550 = 0.7273		= (0.75+0.7273)/2 = 0.7386
Sales	550		450		500	=500 × 0.8535 = 426.7677
MV/Sales		=450/550 = 0.8182		= 400/450 = 0.8889		=(0.8182+0.8889) )/2 = 0.8535
Net Income	18		16		14	=14 × 25 = 350
MV/Net Income		=450/18 = 25		=400/16 = 25		= 25
Average of all methods						= (307.29+369.32+426.77+350)/4 =363.35

Ratios are taken as average of SK and AS Ltd and the value of XY Limited using comparable method is taken as average value of all comparable valuations.

## 20. Illustration

Equity of KGF Ltd. (KGFL) is ₹ 410 Crores, its debt, is worth ₹ 170 Crores. Printer Division segments value is attributable to 74%, which has an Asset Beta ( $\beta_p$ ) of 1.45, balance value is





applied on Spares and Consumables Division, which has an Asset Beta ( $\beta_{sc}$ ) of 1.20 KGFL Debt beta ( $\beta_D$ ) is 0.24.

You are required to calculate:

(i) Equity Beta ( $\beta_E$ ),

(ii) Ascertain Equity Beta ( $\beta_E$ ), if KGF Ltd. decides to change its Debt Equity position by raising further debt and buying back of equity to have its Debt Equity Ratio at 1.90. Assume that the present Debt Beta ( $\beta_{D1}$ ) is 0.35 and any further funds raised by way of Debt will have a Beta ( $\beta_{D2}$ ) of 0.40.

(iii) Whether the new Equity Beta ( $\beta_E$ ) justifies increase in the value of equity on account of leverage?

[MTP May'20, May'19 QP (Old)]

Solution :

i) Asset beta based on Division betas

Division	%	Beta	Weighted Average
Printer	0.74	1.45	1.0730
Spares and Consumables	0.26	1.20	0.3120
<b>Asset beta</b>			<b>1.3850</b>

	Value in Cr	%	Beta	Weighted Average
Total Asset	580	100	1.3850	1.3850
Debt Beta	170	29	0.24	0.0703
Diff : Equity Beta	410	71	= 1.3147/71% = 1.8598	1.3147

Alternatively :

$$\text{Total Asset beta} = W_d \times B_d + W_e \times K_e$$

$$1.385 = (170/580) \times 0.24 + (410/480) \times B_e$$

$$B_e = 1.8598$$

ii)

Total Debt + Equity	580
New Debt: Equity	1.9:1
Revised Debt value	= $580 \times 1.9 / (1+1.9)$ = 380
Existing Debt	170
New Debt Taken	= $380 - 170$ = 210
Equity Bought Back	210
Balance Equity	= $410 - 210$ = 200

	Beta	Value in Cr	Beta × Value
Total Asset	1.3850	580	803.30
Old Debt	0.35	170	59.5
New Debt	0.40	210	84





Equity	= 659.8/200 = 3.2990	200	= 803.3 - 59.5- 84 = 659.8
--------	-------------------------	-----	----------------------------------

$$B_e = (B_a \times A - B_{d1} \times D_1 - B_{d2} \times d_2) / E$$

iii) Yes Equity beta has increased as Value of Debt has increased which has led to increase risk & hence equity Beta is high.

## 21. Illustration

The closing price of LX Ltd. is ₹ 24 per share as on 31st March, 2019 on NSE Ltd. The Price Earnings Ratio was 6. It was found that an amount of ₹ 24 Lakhs as income and an extra ordinary loss of ₹ 9 lakhs were included in the books of accounts. The existing operations except for the extraordinary items are expected to continue in future. Further the company has launched a new product during the year with the following expectations:

(₹ in Lakhs)

Sales	150
Material Cost	40
Labour Cost	344
Fixed Cost	24

The company has 500,000 equity shares of ₹ 10 each and 100,000 9% Preference Shares of ₹ 100 each. The Price Earnings Ratio is 6 times. Post tax cost of capital is 10 per cent per annum. Tax rate is 34 per cent.

You are required to determine:

- Existing Profit from old operations
- The value of business

[May'19 QP (Old)]

Solution :

- Profit from old operations :

Particulars	Amount (INR)	Amount (INR Lakhs)
Closing Market Price	24	
PE Ratio	6	
EPS = MP/PE Ratio	4	
EAESH	4	
No of equity shares	500,000	
EAESH		20
Face value of Preference shares	100	
No of preference shares	100,000	
Total face value		100
Dividend @9%		9
Profit after tax = EAESH +Preference Dividend		= 20 +9 =29
Tax rate	34%	
PBT = PAT/(1-Tax Rate)		= 29/(1-34%) = 43.9394
Less : Extraordinary Income		(24)
Add : Extraordinary Loss		9



## ii) Value of business :

Particulars	Amount (INR Lakhs)
<b>Profit from new operations :</b>	
Sales	150
Less : Material cost	(40)
Less : Labour cost	(34)
Less : Fixed cost	(24)
PBT from New operations	52
<b>Total future maintainable profits</b>	<i>Profit from old operations + profit from new ops</i> = 28.9394 + 52 = <b>80.9394</b>
Less : tax @34%	(27.5194)
Profit after tax	<b>53.4200</b>
Value of business	= 53.42/10% = <b>534.2</b>

Since the entire business was being valued, preference dividend is not subtracted from profit after tax.

## 22. Illustration

Intel Ltd., promoted by a Trans National Company, is listed on the stock exchange holding 80%. The value of the floating stock is ₹ 45 crores. The Market Price per Share (MPS) is ₹ 150. The capitalisation rate is 20%.

The promoters holding is to be restricted to 75% as per the norms of listing requirement. The Board of Directors have decided to fall in line to restrict the Promoters' holding to 75% by issuing Bonus Shares to minority shareholders while maintaining the same Price Earnings Ratio (P/E).

You are required to calculate:

- Bonus Ratio;
- MPS after issue of Bonus Shares; and
- Free float Market capitalisation after issue of Bonus Shares.

[MTP Oct'21 New & Old, May'18 QP (Old)]

Solution :

Particulars	Amount in INR crores
Promoter holding (%)	80%
Minority holding (%)	20%
Floating stock value	45
Total value of firm	= 45/20% = <b>225</b>
Current market price	150
Total number of shares in crores	= 225/150 = <b>1.5</b>
Current market price	150
Capitalisation rate (Given)	20%
EPS	= 150 × 20% = <b>30</b>
Profit after tax	= EPS × Number of shares = 30 × 1.5 = <b>45</b>



<b>PE Ratio</b>	= CMP/EPS = 150/30 = 5
<b>Existing shares in Cr</b>	1.5
<b>Let new shares to be issued be</b>	X
<b>Existing share of minority</b>	= 1.5 × 20% = 0.3
<b>New shares of minority</b>	0.30 + X
<b>New share of minority in % (given)</b>	25%
<b>New share of minority</b>	25% = (0.3 + X)/(1.5 + X) 1 / 4 = (0.3 + X)/(1.5 + X) 1.5 + X = 1.2 + 4X X = 0.10
<b>Bonus ratio</b>	1 for every 3 held by minority

ii)

Particulars	Amount
<b>PAT (INR Crores)</b>	45
<b>Number of shares</b>	= 1.5 + 0.10 = 1.6
<b>EPS</b>	= 45/1.6 = 28.1250
<b>PE Ratio</b>	5
<b>Market price post bonus</b>	= 28.1250 × 5 = 140.6250

iii)

<b>Free float shares count in Cr</b>	0.3 + 0.1 = 0.4
<b>Market price per share</b>	140.625
<b>Free float market cap (Cr)</b>	56.25

### 23. Illustration

Eager Ltd. has a market capitalization of Rs. 1,500 crores and the current market price of its share is Rs. 1,500. It made a PAT of Rs. 200 crores and the Board is considering a proposal to buy back 20% of the shares at a premium of 10% to the current market price. It plans to fund this through a 16% bank loan. The company's corporate tax rate is 30%. Calculate the post buy back Earnings Per Share (EPS).

[MTP Mar'21 New & Old, Nov'18 QP (Old)]

Solution :

Particulars	Amount (INR Crores)
<b>Market capitalisation of Eager Ltd</b>	1500
<b>Current market price of share (INR)</b>	1500
<b>No of shares</b>	= 1500/1500 = 1
<b>Profit after tax</b>	200
<b>EPS (INR)</b>	= PAT/ No of shares = 200/1 = 200
<b>Shares bought back</b>	= 1 × 20% = 0.2
<b>Revised number of shares</b>	= 0.8
<b>Buyback price</b>	= 10% premium over CMP = 1650
<b>Total buyback value</b>	= Shares bought back × Buyback price = 0.2 × 1650 = 330





Bank loan taken	330
Interest on bank loan @ 16%	= 330 × 16% = 52.8
Pre buyback PAT	200
Tax rate	30%
Pre buyback PBT	= PAT/(1- tax) = 200/(1-30%) = 285.71
Less : Additional Interest	(52.80)
Revised PBT	232.91
Less : Tax @30%	(69.87)
Revised PAT	163.04
Revised Share count	0.8
Revised EPS post buyback	= 163.04/0.8 = 203.8

#### 24. Illustration

You are interested in buying some equity stocks of RK Ltd. The company has 3 divisions operating in different industries.

- Division A captures 10% of its industries sales which is forecasted to be Rs. 50 crores for the industry.
- Division B and C captures 30% and 2% of their respective industry's sales, which are expected to be Rs. 20 crore and Rs. 8.5 crore respectively.
- Division A traditionally had a 5% net income margin, whereas divisions B and C had 8% and 10% net income margin respectively.

RK Ltd. has 3,00,000 shares of equity stock outstanding, which sell at Rs. 250. The company has not paid dividend since it started its business 10 years ago. However, from the market sources you come to know that RK Ltd. will start paying dividend in 3-year time and the pay-out ratio is 30%. Expecting this dividend, you would like to hold the stock for 5-year. By analysing the past financial statements, you have determined that RK Ltd.'s required rate of return is 18% and that P/E ratio of 10 for the next year and on ending P/E ratio of 20 at the end of the fifth year are appropriate.

Evaluate:

- Whether you will be interested in purchasing RK Ltd. equity at this time based on your one year forecast?
- Price you will like to pay for the stock of RK Ltd if you expect earnings to grow @ 15% continuously.

Ignore taxation.

PV factors are given below:

Years	1	2	3	4	5
PVIF@ 18%	0.847	0.718	0.609	0.516	0.437

[MTP Mar'21, Nov'19 QP (Old)]

Solution :

i) Amounts in INR Crores

Particulars	A	B	C
Industry Sales	50	20	8.5
Division Share	10%	30%	2%
Division Sales	5	6	0.17
NI margin	5%	8%	10%
NI	0.25	0.48	0.02
Total NI	0.747		





NI in INR	74,70,000
Current Market Price	250
No of shares	300,000
EPS	= 74,70,000/300,000 = <b>24.90</b>
Next year EPS	24.90
Next year PE	10
Share price forecasted at year end	= 24.9 × 10 = <b>249</b>
Current market price discounted @18%	= 249/1.18 = <b>211.02</b>

Hence, we would not be interested in purchasing RK Limited's share at CMP of INR 250 as the fair value of the share based on PE multiple comes only INR 211.02.

ii)

Particulars	EPS (Growth @15%)	DPS (payout @30%)	PV factor @18%	PV of DPS
1	24.90		0.847	0
2	28.64		0.718	0
3	32.93	9.88	0.609	6.02
4	37.87	11.36	0.516	5.86
5	43.55	13.07	0.437	5.71
Total				<b>17.59</b>

PE at the end of 5 years	<b>20</b>
EPS at the end of 5 <sup>th</sup> year	43.55
Share price at the end of 5 <sup>th</sup> year	= 20 × 43.55 = 871.01
PVF for 5 <sup>th</sup> year	0.437
Current market price based on 5 <sup>th</sup> year EPS and PE discounted to Y 0	= 871.01 × 0.437 = <b>380.63</b>
<u>Valuation using Dividend Discount Model :</u>	
Year 5 Dividend	13.07
Year 6 Dividend	= 13.07 × 1.15 = <b>15.02</b>
Shares price at 5 <sup>th</sup> year	= D <sub>6</sub> / (K <sub>e</sub> - g) = 15.02 / (18% - 15%) = <b>500.83</b>
PVF for 5 <sup>th</sup> year	0.437
Year 0 Price	= 500.83 × 0.437 = 218.86
Add : PY Dividend	17.59
PV of share based on DDM	<b>236.45</b>

Max price that one can pay based on PE ratio is INR 380.63 and based on DDM is INR 236.45

## 25. Illustration

Given below is the Balance Sheet of S Ltd. as on 31.3.2008:

Liabilities	₹ (In lakh)	Assets	₹ (In lakh)
Share capital (share of ₹ 10)	100	Land and building Plant and machinery	40
Reserves and surplus	40	Investments	80
Long-Term Debts	30	Stock	10
		Debtors	20
		Cash at bank	15
			5
	<b>170</b>		<b>170</b>





You are required to work out the value of the Company's, shares on the basis of Net Assets method and Profit-earning capacity (capitalization) method and arrive at the fair price of the shares, by considering the following information:

- (i) Profit for the current year ₹ 64 lakhs includes ₹ 4 lakhs extraordinary income and ₹ 1 lakh income from investments of surplus funds; such surplus funds are unlikely to recur.
- (ii) In subsequent years, additional advertisement expenses of ₹ 5 lakhs are expected to be incurred each year.
- (iii) Market value of Land and Building and Plant and Machinery have been ascertained at ₹ 96 lakhs and ₹ 100 lakhs respectively. This will entail additional depreciation of ₹ 6 lakhs each year.
- (iv) Effective Income-tax rate is 30%.
- (v) The capitalization rate applicable to similar businesses is 15%. (Old PM)

**Solution :**

NAV based valuation :

Particulars	Amount (INR Lakhs)
Land and Building (considering Market value)	96
Plant and Machinery (considering market value)	100
Investments	10
Stock	20
Debtors	15
Cash	5
Less : Long term debt	(30)
Net Assets	216
Number of shares	10
NAV price per share	=216/10 = 21.6

Profit earning capacity

Particulars	EBIT	PBT	PAT
EBIT	64		
Less : Interest			
PBT		64	= 64/(1-0.3) = 91.43
Less : Tax @ 30%	(19.20)	(19.20)	27.43 (B/f)
PAT		44.8	64
EBIT (1 - tax)	44.80		
EBIT	64		
Adjustments :			
Less : Surplus income	(5)		
Less : Additional Advertisement expense	(5)		
Less : Additional Depreciation	(6)		
Future Maintainable Profit	48		
Less : Tax @30%	(14.4)		





Future Maintainable EBIT after tax	33.6		
PBT		64	91.43
Less : Adjustments		= (5+5+6) = (16)	= (5+5+6) = (16)
Adjusted PBT		48	75.43
Less : Tax @30%		(14.4)	(22.63)
Future Maintainable PAT		33.60	52.80
Capitalisation rate	15%	15%	15%
Post capitalisation value of firm	= 33.6/15% = 224		
Post capitalisation value of equity		=33.6/15% =224	=52.8/15% = 352
Less : Value of debt	(30)		
Value of equity	194	224	352
No of shares	10	10	10
Value per share post capitalisation method	=194/10 = 19.4	=224/10 = 22.4	=352/10 = 35.2
Value per share NAV Method	21.6	21.6	21.6
Fair Value (Average of two)	20.5	22	28.4

Here Word profit can mean EBIT / PBT / PAT and it is not clear and hence computed using multiple methods.

## 26. Illustration

There are two companies ABC Ltd. and XYZ Ltd. are in same in industry. On order to increase its size ABC Ltd. made a takeover bid for XYZ Ltd.

Equity beta of ABC and XYZ is 1.2 and 1.05 respectively. Risk Free Rate of Return is 10% and Market Rate of Return is 16%. The growth rate of earnings after tax of ABC Ltd. in recent years has been 15% and XYZ's is 12%. Further both companies had continuously followed constant dividend policy.

Mr. V, the CEO of ABC requires information about how much premium above the current market price to offer for XYZ's shares.

Two suggestions have forwarded by merchant bankers.

- Price based on XYZ's net worth as per B/S, adjusted considering current value of assets and estimated after tax profit for the next 5 years.
- Price based on Dividend Valuation Model, using existing growth rate estimates.

Summarised Balance Sheet of both companies is as follows:

(₹ Lakhs)

	ABC Ltd.	XYZ Ltd.		ABC Ltd.	XYZ Ltd.
Equity Share Capital	2,000	1,000	Land & Building	5,600	1,500
General Reserves	4,000	3,000	Plant & Machinery	7,200	2,800





Share Premium	4,200	2,200			
Long Term Loans	5,200	1,000			
<u>Current Liabilities</u>			<u>Current Assets</u>		
Sundry Creditors	2,000	1,100	Accounts Receivable	3,400	2,400
Bank Overdraft	300	100	Stock	3,000	2,100
Tax Payable	1,200	400	Bank/Cash	200	400
Dividend Payable	<u>500</u>	<u>400</u>		--	--
	<u>19,400</u>	<u>9,200</u>		<u>19,400</u>	<u>9,200</u>

Profit & Loss A/c

(₹)

Lakhs)

	ABC Ltd.	XYZ Ltd.		ABC Ltd.	XYZ Ltd.
To Net Interest	1,200	220	By Net Profit	7,000	2,550
To Taxation	2,030	820			
To Distributable Profit	<u>3,770</u>	<u>1,510</u>		-	-
				=	=
	<u>7,000</u>	<u>2,550</u>		<u>7,000</u>	<u>2,550</u>
To Dividend	1,130	760	By Distributable Profit	3,770	1,510
To Balance c/d	<u>2,640</u>	<u>750</u>		-	-
				=	=
	<u>3,770</u>	<u>1,510</u>		<u>3,770</u>	<u>1,510</u>

Additional information

- (1) ABC Ltd.'s land & building have been recently revalued. XYZ Ltd.'s have not been revalued for 4 years, and during this period the average value of land & building have increased by 25% p.a.
- (2) The face value of share of ABC Ltd. is ₹ 10 and of XYZ Ltd. is ₹ 25 per share.
- (3) The current market price of shares of ABC Ltd. is ₹ 310 and of XYZ Ltd.'s ₹ 470 per share.

With the help of above data and given information you are required to calculate the premium per share above XYZ's current share price by two suggested valuation methods. Discuss which of these two values should be used for bidding the XYZ's shares.

State the assumptions clearly, you make.

(RTP Nov'11)

Solution :

NAV based valuation of XYZ :

Particulars	Amount (INR Lakhs)
Book value of land	1500
Average increase for 4 years	25%
Current Market Value of land	= 1500 × (1+25%) <sup>4</sup> = 3,662.11
Plant and Machinery	2,800
Account receivable	2400



Stock	2,100
Cash	400
Less : Long term loan	(1000)
Less : Creditors	(1,100)
Less : Overdraft	(100)
Less : Tax payable	(400)
Less : Dividend payable	(400)
NAV	8,362.11

Year	0	1	2	3	4	5
PAT	1,510	= 1510 × (1+12%) = 1691.20	= 1691.2 × (1+12%) = 1894.14	= 1894.14 × (1+12%) = 2121.44	= 2121.44 × (1+12%) = 2376.01	= 2376.01 × (1+12%) = 2661.14
Growth		12%	12%	12%	12%	12%
Discount rate	16.3% (WN 1)					
PV Factor		0.860	0.739	0.636	0.547	0.470
PVCF		= 1691.2 × 0.860 = 1454.17	= 1894.14 × 0.739 = 1400.40	= 2121.44 × 0.636 = 1348.63	= 2376.01 × 0.547 = 1298.76	= 2661.14 × 0.470 = 1250.74
Total PVCF	6752.71					
PAT for next 5 years at BV	=10,743.94					

Particulars	Amount (INR Lakhs)
NAV + Profits	= 8362.11 + 6,752.71 = 15,114.82
No of shares	= share capital/FV per share = 1000/25 = 40
Value of share	= 15,114.82/40 = 377.81

WN 1 : Discount rate =  $K_e$   
 $K_e$  = Risk free rat + Beta (Market risk premium)  
 $K_e$  = 10% + 1.05 (16%-10%) = 10% + 6.3% = 16.3%

#### Method 2 : Dividend Discount Model

Particulars	Amount (INR Lakhs)
D0	760
Number of shares	40
D0 (INR)	= 760/40 = 19
Growth rate of dividend	12%
D1	= D0 × 1.12 = 19 × 1.12 = 21.28
$K_e$ (WN 1)	16.3%
P0	= D1/( $K_e$ - g) = 21.28/(16.3% - 12%) = 21.28/4.3% = 494.88





Share Price

Premium over CMP %

= (Share price -  
CMP)/CMP

	Share Price	Premium over CMP %
Current Market price	470	0
Method 1	377.87	(19.6%)
Method 2	494.88	5.3%

- Under method 1, if PV of Pat is considered then premia does not exist and it is not an appropriate way of valuing the company
- Under method 2 Premia of value over CMP is 5.3% and is appears appropriate.
- ABC can also evaluate synergies arising from business instead of valuing purely on basis of CF of XYZ Ltd.

## 27. Illustration

BRS Inc deals in computer and IT hardware and peripherals. The expected revenue for the next 8 years is as follows:

Years	Sales Revenue (\$ Million)
1	8
2	10
3	15
4	22
5	30
6	26
7	23
8	20

Summarized financial position as on 31 March 2012 was as follows: (\$ Million)

Liabilities	Amount	Assets	Amount
Equity	12	Fixed Assets (Net)	17
Stocks		Current Assets	3
12% Bonds	8		
	20		20

Additional Information:

(a) Its variable expenses are 40% of sales revenue and fixed operating expenses (cash) are estimated to be as follows:

Period	Amount (\$ Million)
1- 4 years	1.6
5-8 years	2

(b) An additional advertisement and sales promotion campaign shall be launched requiring expenditure as per following details:

Period	Amount (\$ Million)
1 year	0.50
2-3 years	1.50
4-6 years	3.00
7-8 years	1.00



- (c) Fixed assets are subject to depreciation at 15% as per WDV method.  
 (d) The company has planned additional capital expenditures (in the beginning of each year) for the coming 8 years as follows:

Period	Amount(\$ Million)
1	0.50
2	0.80
3	2.00
4	2.50
5	3.50
6	2.50
7	1.50
8	1.00

- (e) Investment in Working Capital is estimated to be 20% of Revenue.  
 (f) Applicable tax rate for the company is 30%.  
 (g) Cost of Equity is estimated to be 16%.  
 (h) The Free Cash Flow of the firm is expected to grow at 5% per annum after 8 years  
 With above information you are require to determine the:  
 (i) Value of Firm  
 (ii) Value of Equity

(RTP Nov'23, RTP May'18, Old PM)

Solution :

Year	1	2	3	4	5	6	7	8
Revenue	8	10	15	22	30	26	23	20
Variable exp @40%	(3.2)	(4)	(6)	(8.8)	(12)	(10.40)	(9.2)	(8)
Fixed Cash Opex	(1.6)	(1.6)	(1.6)	(1.6)	(2)	(2)	(2)	(2)
Sales Promotion	(0.5)	(1.5)	(1.5)	(3)	(3)	(3)	(1)	(1)
EBITDA	2.7	2.9	5.9	8.6	13	10.6	10.8	9
Depreciation	(2.63)	(2.35)	(2.30)	(2.33)	(2.50)	(2.50)	(2.35)	(2.15)
EBIT	0.07	0.55	3.60	6.27	10.50	8.10	8.45	6.85
Tax @30%	(0.02)	(0.16)	(1.08)	(1.88)	(3.15)	(2.43)	(2.53)	(2.05)
EBIT (1- tax)	0.05	0.38	2.52	4.39	7.35	5.67	5.91	4.79
Add : Depreciation	2.63	2.35	2.30	2.33	2.50	2.50	2.35	2.15
Less : Capex	(0.50)	(0.80)	(2)	(2.5)	(3.5)	(2.5)	(1.5)	(1)
(Inc)/Dec in WC*	1.4	(0.4)	(1)	(1.4)	(1.6)	(0.8)	(0.6)	(0.6)
FCFF	3.58	1.54	1.82	2.82	4.75	6.47	7.37	6.55
PVFF @13%	0.885	0.783	0.693	0.613	0.543	0.480	0.425	0.376
PVCF	3.17	1.20	1.26	1.73	2.58	3.11	3.13	2.46
Terminal CF								= 6.5 × 1.05/(13%- 5%) = 85.90
PV of terminal CF								32.31
Total CF	3.17	1.20	1.26	1.73	2.58	3.11	3.13	34.78
Total PV of FCFF	50.95							
Value of firm	50.95							
Less : Value of debt	(8)							





Value of equity	<b>42.95</b>							
Fixed Assets								
Opening Balance	17	14.88	13.32	13.03	13.20	14.19	14.19	13.33
Add : Capex	0.5	0.80	2	2.5	3.5	2.5	1.5	1
NFA Before Dep	17.5	15.68	15.32	15.53	16.70	16.69	15.69	14.33
Dep @ 15%	(2.63)	(2.35)	(2.3)	(2.33)	(2.50)	(2.50)	(2.35)	(2.15)
Closing NFA	<b>14.88</b>	<b>13.32</b>	<b>13.03</b>	<b>13.20</b>	<b>14.19</b>	<b>14.19</b>	<b>13.33</b>	<b>12.18</b>
Current Assets								
Opening	3	1.6	2	3	4.4	6	5.2	4.6
Closing @20% of rev	1.6	2	3	4.4	6	5.2	4.6	4
(Increase)/Decrease	1.4	(0.40)	(1)	(1.40)	(1.60)	0.8	0.6	0.6

\*WC is released in first year and increases every year thereafter

WACC	Cost	Weight	WA
Equity	16%	12	9.6%
Post tax cost of debt	8.4%	8	3.4%
WACC		20	13%

## 28. Illustration

ABC (India) Ltd., a market leader in printing industry, is planning to diversify into defence equipment businesses that have recently been partially opened by the GOI for private sector. In the meanwhile, the CEO of the company wants to get his company valued by a leading-consultants, as he is not satisfied with the current market price of his scrip.

He approached consultant with a request to take up valuation of his company with the following data for the year ended 2009:

Share Price	₹ 66 per share
Outstanding debt	1934 lakh
Number of outstanding shares	75 lakhs
Net income (PAT)	17.2 lakh
EBIT	245 lakhs
Interest expenses	218.125 lakh
Capital expenditure	234.4 lakh
Depreciation	234.4 lakh
Working capital	44 lakhs
Growth rate	8% (from 2010 to 2014)
Growth rate	6% (beyond 2014)
Free cash flow	240.336 lakh (year 2014 onwards)

The capital expenditure is expected to be equally offset by depreciation in future and the debt is expected to decline by 30% in 2014.

Required:

Estimate the value of the company and ascertain whether the ruling market price is undervalued as felt by the CEO based on the foregoing data. Assume that the cost of equity is 16%, and 30% of debt repayment is made in the year 2014.

(Old PM)





**Solution :**

Particulars	Amount (INR Lakhs)
O/S Debt	1934
Interest Expense	218.125
Int Cost	=218.125/1934 =11.28%
PAT	17.20
EBIT	245
Less Interest	(218.13)
PBT	26.88
Less : Tax (B/f)	(9.68)
PAT	17.2
Tax %	= 9.68/26.88 = <b>36%</b>
Working Capital	44

Particulars	2009	2010	2011	2012	2013	2014
EBIT (Growth rate 8%)	245	264.4	285.768	308.629	333.320	359.985
Interest @ 11.28%	(218.125)	(218.125)	(218.125)	(218.125)	(218.125)	(152.688)
PBT	26.88	46.48	67.64	90.50	115.19	207.30
Less: Tax@36%	(9.68)	(16.73)	(24.35)	(32.58)	(41.47)	(74.63)
PAT	17.20	29.74	43.29	57.92	73.72	132.67
Add Dep	0	0	0	0	0	0
Less : Capex						
WC#	44	47.52	51.32	55.43	59.86	64.65
Change in WC		(3.52)	(3.80)	(4.11)	(4.43)	(4.79)
Less : Debt repayment						=(1934) × 30% =(580.20)
FCFE		26.22	39.49	53.82	69.29	(452.32)
TV at the end (WN 1)						2547.60
FCFE + TV		26.22	39.49	53.82	69.29	2095.24
PVF @16%		0.862	0.743	0.641	0.552	0.476
PVCF		22.61	29.35	34.48	38.27	997.57
Total PVCF				<b>1,122.27</b>		

Value of Equity (INR Lakhs)	1,122.27
No of shares in Lakhs	75
Value/share (INR)	=1122.27/75 = <b>14.96</b>
CMP	<b>INR 66</b>

#Assuming working capital growth rate same as EBIT growth rate.

**WN 1:** FCFE for year 2015 = 240.336 × (1+ 6%) = 254.76

Terminal value at the end of year 2014 = **FCFF 2015/ (Ke - g)** = 254.76/ (16%-6%) = 2,547.6





## 28 A. Illustration - Modified DCF Valuation

X Limited is currently under distress as it is unable to pay its vendors due to a steep fall in revenues and profits. The company has no debt & is fully equity funded. Compute the distress value of the company under Modified DCF method, if its next 3 years cashflows along with probability of distress are provided below. The company is expected (may) to revive after 3 years and hence, the terminal Value of the company at the end of year 4 is 10x of year 3's cashflows. Discount rate is 14%. If the value of Company's debt is ₹234 Lacs then what would be company's value?

Period	CF (₹ lacs)	Probability of distress
1	-40	0.70
2	60	0.20
3	90	0.10
4		0.05

Solution :

Modified DCF

$$ECF = CF \times (1 - P \text{ of distress})$$

Year	CF	P(d)	1-P(d)	CF × (1-P(d))	PVF @14%	PVCF
1	-40	0.7	0.3	-12	0.877	-10.524
2	60	0.2	0.8	48	0.769	36.912
3	90	0.1	0.9	81	0.675	54.675
4	90 × 10 = 900	0.05	0.95	855	0.592	506.16
Total						587.223

Value of A limited currently under distress is ₹ 587.223 Lacs under Modified DCF Approach

If A limited has additional debt of ₹234 lacs then the value of equity of the firm would be ₹587.223 lacs - ₹234 lacs = ₹ 353.223 Lacs

## 28. B. Illustration - DCF Valuation + Distress Value

Y Limited is going through distress. Its expected cash flows in the next 3 years, if it revives, are as follows:

Year	1	2	3
CFAT ₹ Lacs	300	450	700

The company is likely valued at 10x of year 3 CF as terminal value in year 4. The probability of distress is 51.5%. If the company were to go through a distress sale, it would recover at



most 65% of the value of its PPE which is expected to be constant over next 3 years at ₹500 Lacs

Y limited has no debt and its  $K_e = 14\%$

Compute Y Limited's value of Equity.

Solution :

DCF Value

Year	1	2	3	TV
CF ₹ Lacs	300	450	700	$700 \times 10$
PVF	0.8772	0.7695	0.6750	0.5921
PVCF	263.16	346.28	472.50	4144.70
Total ₹ Lacs				<b>5226.64</b>

$$\begin{aligned} \text{DCF Value} + \text{Distress Value} &= ₹ 5226.64 \text{ Lacs} \times (1-51.5\%) + ₹ 500 \text{ Lacs} \times 65\% \times 51.5\% \\ &= ₹2534.92 \text{ Lacs} + ₹167.375 \text{ lacs} \\ &= ₹2702.295 \text{ lacs} \end{aligned}$$

### 28 C. Illustration APV

Compute Value of P Ltd under APV. P Ltd is going through tough times.

Its unlevered firm value is ₹ 4321 Lacs.

Its distress sale value is @ 45% of its PPE (₹6143 lacs)

Probability of Distress = 34.67% over the next 2 years

Solution :

Firm Value = Unlevered firm value + Tax benefit from Debt - Expected cost of Bankruptcy

Expected cost of bankruptcy = (Unlevered firm value - Distress Sale Value) × Probability of Distress

$$\begin{aligned} \text{Expected cost of Bankruptcy} &= (₹ 4321 \text{ lacs} - ₹6143 \text{ lacs} \times 45\%) \times 34.67\% \\ &= ₹1556.65 \text{ Lacs} \times 34.67\% \\ &= ₹539.690 \text{ Lacs} \end{aligned}$$

$$\begin{aligned} \text{Firm value as per APV} &= ₹4321 \text{ Lacs} + 0 - ₹ 539.690 \text{ Lacs} \\ &= ₹ 3781.31 \text{ Lacs} \end{aligned}$$

### 28 D. Illustration VC method of Valuing a Start up

Peak 47 Partners ( VC firm) invests in a Startup a sum of USD 3 Mio. The startup is expected to become a unicorn in next 7 years. Peak 47 has an IRR expectation of 25% over these 7 years. What is the pre-money and post money valuation of the startup. What is the stake of the VC firm at the time of initial investment assuming no further investment in subsequent rounds



**Solution :**

	USD 1 Billion
Value of Startup after 7 years	
Value of startup today @ IRR of 25%	USD 1000 Million / ( 1.25) <sup>7</sup>
Value of startup today @ IRR of 25%	USD 209.7152 Million
Post money valuation today	USD 209.7152 Million
Less: Investment made	USD 3 Million
Pre- money valuation today	USD 206.7152 Million
Stake of VC firm as on date ( 3/ 209.7152 )	1.43%

**29. Illustration**

Compute EVA of A Ltd. with the following information:

All Figures - ₹ Lac

Profit and Loss Statement		Balance Sheet	
Revenue	1000	PPE	1000
Direct Costs	-390	Current Assets	300
Selling, General & Admin. Exp. (SGA)	-200		1300
EBIT	410	Equity	700
Interest	-10	Reserves	100
EBT	400	Non-Current Borrowings	100
Tax Expense	-120	Current Liabilities & Provisions	400
EAT	280		1300

Assume Bad Debts provision of ₹ 20 Lac is included in the SGA, and same amount is reduced from the trade receivables in current assets.

Also assume that the pre-tax Cost of Debt is 12%, Tax Rate is 30% and Cost of Equity (i.e., shareholder's expected return) is 8.45%.

(ICAI SM, RTP Nov'24, MTP Sept'23)

**Solution :**

Assumption 1 : Provision given is Pre tax

Particulars	Amount
EVA	= NOPAT × (1 - tax) - capital charge
EBIT	410
Add : Pre-tax Non-cash prov. for debtors	20
NOPAT	430
Existing PBT	400
Existing tax expense	120
Existing tax rate	= 120/400 = 30%
NOPAT = EBIT × (1 - tax)	= 430 × (1 - 30%) = 301
<b>WACC</b>	
Kd pre tax	12%
Tax rate	30%
Kd post tax	= 12% × (1 - 30%) = 8.40%
Ke	8.45%





Equity + reserves	800
NC Borrowing	100
Invested Capital	900
Adjustments :	
Provision on Doubtful debts ( pre-tax)	20
Provision on Doubtful debts ( post tax)	14
Invested Capital	<b>914</b>

	Weight	Cost	WACC
Equity Revised	814	8.45%	68.78
Debt	100	8.40%	8.40
WACC	914	= 77.18/914 = <b>8.44%</b>	= 68.78 + 8.40 = 77.18

Capital charge = WACC × Invested Adjusted Capital = 914 × 8.44% = **77.18**

EVA = NOPAT (1-T) - Cap charge = 301 - 77.18 = **223.82**

Assumption 2 : Provision given is post tax

Particulars	Amount
EVA	= NOPAT × (1 - tax) - capital charge
EBIT	410
Existing PBT	400
Existing tax expense	120
Existing tax rate	= 120/400 = 30%
NOPAT = EBIT (1 - tax)	= 410 × (1 - 30%) = 287
Add : Post tax provision for debtors	<b>20</b>
Adjusted NOPAT	307
WACC	
Kd pre tax	12%
Tax rate	30%
Kd post tax	= 12% × (1 - 30%) = <b>8.40%</b>
Ke	<b>8.45%</b>
Equity + reserves	800
NC Borrowing	100
Invested Capital	900
Adjustments :	
Provision on Doubtful debts ( pre-tax)	20
Provision on Doubtful debts ( post tax)	20
Invested Capital	<b>920</b>

	Weight	Cost	WACC
Equity Revised	820	8.45%	69.29
Debt	100	8.40%	8.40
WACC	920	= 77.18/914 = <b>8.44%</b>	= 69.29 + 8.40 = 77.69

Capital charge = WACC × Invested Adjusted Capital = 920 × 8.44% = **77.65**

EVA = NOPAT (i.e EBIT × (1-T)) - Cap charge = 307 - 77.65 = **229.35**





### 30. Illustration

With the help of the following information of Jatayu Limited compute the Economic Value Added:

#### Capital Structure

Equity capital	₹ 160 Lakhs
Reserves and Surplus	₹ 140 lakhs
10% Debentures	₹ 400 lakhs
Cost of equity	14%
Degree of Financial Leverage	1.5 times
Income Tax Rate	30%

(ICAI SM, May-25 Similar 4M)

Solution :

Particulars	Amount (INR)
Equity	300
Debt	400
Invested Capital	700
WACC	
Ke	14%
Kd (Pre-tax)	10%
Tax rate	30%
Kd (Post tax)	7%

	Weight	Cost	WACC
Equity	42.86 %	14%	6%
Debt	57.14 %	7%	4%
WACC			10%

$$\text{Capital Charge} = \text{WACC} \times \text{Invested Capital} = 700 \times 10\% = 70$$

$$\text{Financial Leverage} = \text{EBIT}/\text{EBT} \text{ or } \text{EBIT}/\text{EBIT} - \text{Interest (as EBT} = \text{EBIT} - \text{Interest)}$$

$$1.5 = \text{EBIT}/(\text{EBIT} - 40)$$

$$1.5 \text{ EBIT} - 60 = \text{EBIT}$$

$$0.5 \text{ EBIT} = 60$$

$$\text{EBIT} = 120$$

$$\text{NOPAT} = \text{EBIT} \times (1 - \text{tax})$$

$$= 120 \times (1 - 30\%)$$

$$= 84 \text{ Lakhs}$$

$$\text{EVA} = \text{NOPAT} - \text{Capital Charge}$$

$$= 84 - 70$$

$$= 14 \text{ Lakhs}$$

### 31. Illustration

RST Ltd.'s current financial year's income statement reported its net income after tax as ₹ 25,00,000. The applicable corporate income tax rate is 30%. Following is the capital structure of RST Ltd. at the end of current financial year:

	₹
Debt (Coupon rate = 11%)	40 lakhs
Equity (Share Capital + Reserves)	125 lakhs
Invested Capital	165 lakhs



Following data is given to estimate cost of equity capital:

Equity Beta of RST Ltd.	1.36
Rf i.e., current yield on Govt. bonds	8.5%
Average market risk premium (i.e., Excess of return on market portfolio over risk-free rate)	9%

Required:

- Estimate Weighted Average Cost of Capital (WACC) of RST Ltd.; and
- Estimate Economic Value Added (EVA) of RST Ltd.

(ICAI SM, RTP Nov'21, MTP Oct'20)

Solution :

i)

Particulars	Amount
Pre-tax Kd	11%
Tax rate	30%
Post tax Kd	= $11\% / (1 - 30\%)$ = 7.7%
Ke	= Rf + MRP (beta)
Ke	= 8.5% + 9% (1.36)
Ke	= 20.74%

	Weight	Cost	WACC
Equity	75.76 %	20.74%	15.71%
Debt	24.24 %	7.7%	1.87%
WACC			17.58%

ii)

PAT	25,00,000
Tax rate	30%
PBT	= PAT / (1 - Tax rate) = 25 L / (1 - 30%) = 35,71,428.57
Interest @ 11% on INR 40L	4,40,000
PBIT	40,11,428.57
NOPAT	= PBIT (1 - tax)
NOPAT	= 40,11,428.57 × (1 - 30%) = 28,08,000
Capital Charge	= Invested Capital × WACC = 16,50,00,000 × 17.58% = 29,00,500
EVA	= NOPAT - Capital Charge = 28,08,000 - 29,00,500 = (92,500)





### 32. Illustration

Tender Ltd has earned a net profit of ₹ 15 lacs after tax at 30%. Interest cost charged by financial institutions was ₹ 10 lacs. The invested capital is ₹ 95 lacs of which 55% is debt. The company maintains a weighted average cost of capital of 13%. Required,

- Compute the operating income.
- Compute the Economic Value Added (EVA).
- Tender Ltd. has 6 lac equity shares outstanding. How much dividend can the company pay before the value of the entity starts declining?

(ICAI SM)

Solution :

Particulars	Amount (INR Lakhs)
PAT	15
Tax rate	30%
PBT	= PAT/(1- tax rate) = 15 / (1-30%) = 21,42,857.14
Interest	10
EBIT	31,42,857.14
NOPAT	= EBIT (1- tax rate) = 31,42,857.14 × (1-30%) = 22,00,000
Invested Capital	95,00,000
WACC	13%
Capital Charge	= Invested Capital × WACC = 95,00,000 × 13% 12,35,000
EVA	= NOPAT - Capital Charge = 22,00,000 - 12,35,000 = 9,65,000
Total dividend that can be paid	9,65,000
Number of shares	600,000
Max dividend per share that can be paid (before value decline starts)	= 965000/600000 = 1.6083

If entire EVA is paid off as dividend then, EVA will become NIL and from then value decline starts.

### 33. Illustration

The following information is given for 3 Companies that are identical except for their capital structure:

	Orange	Grape	Apple
Total invested capital	1,00,000	1,00,000	1,00,000
Debt/assets ratio	0.8	0.5	0.2
Shares outstanding	6,100	8,300	10,000
Pre-tax cost of debt	16%	13%	15%
Cost of equity	26%	22%	20%
Operating Income (EBIT)	25,000	25,000	25,000

The tax rate is uniform 35% in all cases.



- (i) Compute the Weighted average cost of capital for each company.  
(ii) Compute the Economic Valued Added (EVA) for each company.  
(iii) Based on the EVA, which company would be considered for best investment? Give reasons.  
(iv) If the industry PE ratio is 11x, estimate the price for the share of each company.  
(v) Calculate the estimated market capitalisation for each of the Companies

(ICAI SM, Nov 23'QP 8 marks, RTP May'24, MTP Apr'22, MTP Apr'21 New & Old, MTP Oct'19, MTP Mar'18)

Solution:

Particulars	Orange	Grape	Apple
Invested Capital	100,000	100,000	100,000
Debt/Assets ratio	0.8	0.5	0.2
Total Debt	= 100,000 × 0.8 = 80,000	= 100,000 × 0.5 = 50,000	= 100,000 × 0.2 = 20,000
Equity (Total Capital - debt)	20,000	50,000	80,000
Debt %	80%	50%	20%
Equity %	20%	50%	80%
Kd (Pre-tax)	16%	13%	15%
Tax rate	35%	35%	35%
Kd (Post tax)	= 16% × (1-35%) = 10.4%	= 13% × (1-35%) = 8.45%	= 15% × (1-35%) = 9.75%
Ke	26%	22%	22%
i) WACC	= Kd Wd + Ke We = 10.4% × 80% + 26% × 20% = 13.52%	= 8.45% × 50% + 22% × 50% = 15.23%	= 9.75% × 20% + 22% × 80% = 17.95%
EBIT	25000	25000	25000
NOPAT = EBIT (1 - tax)	= 25000 (1-35%) = 16,250	16,250	16,250
Capital Charge = Invested Cap × WACC	= 100,000 × 13.52% = 13,520	= 100,000 × 15.23% = 15,225	= 100,000 × 17.95% = 17,950
ii) EVA = NOPAT - Capital Charge	= 16,520 - 13,520 = 2,730	= 16,250 - 15,225 = 1025	= 16,250 - 17,950 = (1700)
iii) Based on EVA, Orange Ltd has highest value addition and hence one could invest			
iv)			
EBIT	25,000	25,000	25,000
Less : Interest Loan	80,000	50,000	20,000
Interest %	16%	13%	15%





Interest Amount	(12,800)	(6,500)	(3000)
EBIT	12,200	18,500	22,000
Less : Tax @35%	(4270)	(6475)	(7700)
EAT	7,930	12,025	14,300
Number of shares	6,100	8,300	10,000
EPS = EAT/No of shares	1.3	1.45	1.43
PE Multiple	11	11	11
MP Per share = EPS × PE	14.3	15.94	15.73
Market Capitalisation	= 6,100 × 14.3 = 87,230	= 8,300 × 15.94 = 1,32,275	= 22,000 × 15.73 = 1,57,300

Ideally they would all have different PE as their capital structures are different

### 34. Illustration

Delta Ltd.'s current financial year's income statement reports its net income as ₹15,00,000. Delta's marginal tax rate is 40% and its interest expense for the year was ₹ 15,00,000.

The company has ₹ 1,00,00,000 of invested capital, of which 60% is debt. In addition, Delta Ltd. tries to maintain a Weighted Average Cost of Capital (WACC) of 12.6%.

- Compute the operating income or EBIT earned by Delta Ltd. in the current year.
- What is Delta Ltd.'s Economic Value Added (EVA) for the current year?
- Delta Ltd. has 2,50,000 equity shares outstanding. According to the EVA you computed in (ii), how much can Delta pay in dividend per share before the value of the company would start to decrease? If Delta does not pay any dividends, what would you expect to happen to the value of the company?

(ICAI SM, RTP Nov'22, MTP Mar'19)

Solution :

Particulars	Amount (INR )
PAT	15,00,000
Tax rate	40%
PBT	= PAT/(1- tax rate) = 15 /(1-40%) = 25,00,000.
Interest	15,00,000
i) EBIT	40,00,000
NOPAT	= EBIT (1- tax rate) = 40,00,000 × (1-40%) = 24,00,000
Invested Capital	100,00,000
WACC	12.6%
Capital Charge	= Invested Capital × WACC = 100,00,000 × 12.6% 12,60,000
ii) EVA	= NOPAT - Capital Charge = 24,00,000 - 12,60,000 = 11,40,000
Max dividend that can be paid	11,40,000
Number of shares	2,50,000
iii) Max Dividend per share	4.560





If div is not paid, amounts will be retained and EBIT will increase and hence company will have higher EVA as well as value going forward

### 35. Illustration

The following data (\$ Million) pertains to XYZ Inc. engaged in software consultancy business as on 31 December 2010

	\$ in Million
Income from consultancy	935.00
EBIT	180.00
Less: Interest on Loan	<u>18.00</u>
EBT	162.00
Tax @ 35%	<u>56.70</u>
EAT	<u>105.30</u>

Liabilities		Amount (\$ in Million)	Assets		Amount (\$ in Million)
Equity Stock (10 million share @ \$ 10 each)		100	Land and Building		200
Reserves & Surplus		325	Computers & Software		295
Loans		180	Current Assets:		
Current Liabilities		180	Debtors	150	
			Bank		
			100		
			Cash		290
		785	40		785

With the above information and following assumption you are required to compute

- (a) Economic Value Added®
- (b) Market Value Added.

Assuming that:

- (i) WACC is 12%.
- (ii) The share of company currently quoted at \$ 50 each

(ICAI SM)

Solution :

Particulars	Amount (USD Million)
EBIT	180
Tax Rate	35
NOPAT	= $180 \times (1-35\%)$ = 117
Invested Cap	= Equity + Debt = $100 + 325 + 180 = 605$
WACC	12%
Capital Charge	= Invested Capital $\times$ WACC = $605 \times 12\% = 72.60$
EVA	= NOPAT - Capital Charge = $117 - 72.60 = 44.40$
MVA	= Market Value - Book value of invested assets
Number of shares	10





MP per share	50
M Cap in USD Million	500
Debt in US \$ Million	180
Market value of Invested Capital	680
Book Value of invested Capital	605
Market value added	75

### 36. Illustration

Herbal Gyan is a small but profitable producer of beauty cosmetics using the plant, Aloe Vera. This is not a high-tech business, but Herbal's earnings have averaged around ₹ 12 lakh after tax, largely on the strength of its patented beauty cream for removing the pimples.

The patent has eight years to run, and Herbal has been offered ₹ 40 lakhs for the patent rights. Herbal's assets include ₹ 20 lakhs of working capital and ₹ 80 lakhs of property, plant, and equipment. The patent is not shown on Herbal's books. Suppose Herbal's cost of capital is 15 percent. What is its Economic Value Added (EVA)?

*(ICAI SM, May-25 May'18 QP 5 marks, RTP May'22, MTP Mar'23, Nov'20 QP (Old))*

Solution :

Particulars	Amount (INR)
WC	20
PPE	80
Patent (brought into the books and made part of invested capital)	40
Total Invested Capital	140
Cost of capital	15%
Capital charge	= 140 × 15% = 21
NOPAT = EBIT ( 1 - Tax)	= PAT# = 12
EVA	= NOPAT - Capital Charge = 12 - 21 = (9)

Hence, Herbal Gyan's EVA is negative 9 Lakhs.

*# Assuming no debt and other incomes / extra ordinary items then EBIT \* ( 1-T) is same as PAT*

### 37. Illustration

Constant Engineering Ltd. has developed a high-tech product which has reduced the Carbon emission from the burning of the fossil fuel. The product is in high demand. The product has been patented and has a market value of ₹ 100 Crore, which is not recorded in the books. The Net Worth (NW) of Constant Engineering Ltd. is ₹ 200 Crore. Long term debt is ₹ 400 Crore. The product generates a revenue of ₹ 84 Crore. The rate on 365 days Government bond is 10 percent per annum. Market portfolio generates a return of 12 percent per annum. The stock of the company moves in tandem with the market. Calculate Economic Value added of the company.

*[ICAI SM, May'18 QP (Old)]*





Solution :

Particulars	Amount (INR Crores)
Equity	200
Debt	400
Patent#	100
Invested Capital	700
NOPAT	84
Tax rate	NA
Kd	10%
Ke	12%
Wd	=400/700
Wd	=57.14%
We	= 1- 57.14% = 42.86%
WACC	= Wd Kd + We Ke = 57.14% × 10% + 42.86% × 12% = <b>10.86%</b>
Capital Charge	= Invested capital × WACC = 700 × 10.86% = 76
NOPAT	84
EVA	= NOPAT - Capital Charge = 84-76 = 8

Hence EVA of Constant engineering Ltd is INR 8 Crores

#Also, Patent which is off books if brought into the books, the value of equity will go up by 100 Cr

### 38. Illustration

Following is the information of M/s. DY Ltd. for the year ending 31/03/2021

Particulars	
Sales	₹ 1000 Lakh
Operating Expenses including Interest	₹ 620 Lakh
8% Debentures	₹ 250 Lakh
Equity Share Capital (Face value of Rs. 10 each)	₹ 250 Lakh
Market Value DY Ltd ( E +D)	₹ 900 Lakh
Reserves & Surplus	₹250 lakh
Corporate Tax Rate	30%
Risk free Rate of Return	7%
Market Rate of Return	12%
Equity Beta	1.4

You are required to-

- Calculate Weighted Average Cost of Capital of DY Ltd.
- Calculate Economic Value Added
- Calculate Market Value Added

(Dec'21 QP 8 marks)

Solution :

i) WACC

Particulars	Amount
Risk free rate	7%
Market rate of return	12%
Beta	1.4





Ke as per CAPM	= Rf + Beta (Rm- Rf) = 7% + 1.4 (12% -7%) = 14%
Kd Pre tax	8%
Tax rate	30%
Kd Post tax	= 8 × (1-30%) = 5.6%

	Cost	Weight	WA
Equity	14%	500/750 = 67%	9.33%
Debt	5.6%	250 / 750 = 33%	1.86%
<b>WACC</b>			<b>11.20%</b>

ii)

Particulars	Amount (INR Lakhs)
Sales	1000
Opex ( net of interest)	600
EBIT	400
Tax Rate	30%
EBIT (1- tax)	= 400 × (1-30%) = 280
NOPAT	= 280
Invested Capital	750
WACC	11.2%
Capital Charge	= Invested capital × WACC = 750 × 11.2% = 84
EVA	= NOPAT - Capital charge = 280 - 84 = 196

iii)

Particulars	Equity	Debt	Total
Market Value			900
Book Value	500	250	750
Difference			150 Lakhs

' @ - assumed that ₹ 900 lacs is MV of both Debt & Equity combined. If it is assumed only as MV of equity then the MVA would be 900 - 500 = 400 lacs

### 39. Illustration

ABC Ltd. has divisions A, B & C. The division C has recently reported on annual operating profit of ₹ 20,20,00,000. This figure arrived at after charging ₹ 3 crores full cost of advertisement expenditure for launching a new product. The benefit of this expenditure is expected to be lasted for 3 years.

The cost of capital of division C is ₹ 11% and cost of debt is 8%.



The Net Assets (Invested Capital) of Division C as per latest Balance Sheet is ₹ 60 crore, but replacement cost of these assets is estimated at ₹ 84 crore.

You are required to compute EVA of the Division C.

(RTP Nov'11)

Solution :

Particulars	Amount (INR)
Annual operating profit (assumed to be after tax)	20,20,00,000
Advertisement expense added back (assumed to be after tax)	$300,00,000 \times 2/3 = 200,00,000$
NOPAT	22,20,00,000
WACC	11%
Invested capital (Considered at replacement cost)	84,00,00,000
Capital charge	$= \text{Invested capital} \times \text{WACC}$ $= 84,00,00,000 \times 11\% = 9,24,00,000$
EVA	$= \text{NOPAT} - \text{Capital Charge}$ $= 22,20,00,000 - 9,24,00,000 = 12,96,00,000$

#### 40. Illustration

Compute Economic Value Added (EVA) of Good Luck Ltd. from the following information:

#### Profit & Loss Statement

Particulars	(₹ in Lakh)
(a) Income -	
Revenue from Operations	2000
(b) Expenses -	
Direct Expenses	800
Indirect Expenses	400
(c) Profit before interest & tax(a-b)	800
(d) Interest	30
(e) Profit before tax (c - d)	770
(f) Tax	231
(g) Profit after tax (e - f)	539

#### Balance Sheet

Particulars	(₹ in Lakh)
(a) Shareholder's Fund -	
Equity Share Capital	1000
Reserve and Surplus	600
(b) Non- Current Liabilities -	
Long Term Borrowings	200
(c) Current Liabilities	800
Total Equity and Liabilities:	2600
(a) Non - Current Assets	2000
(b) Current Assets	600
Total Assets:	2600

#### Other Information:

- (1) Cost of Debts is 15%.
- (2) Cost of Equity (i.e., shareholders' expected return) is 12%.
- (3) Tax Rate is 30%.



- (4) Bad Debts Provision of ₹ 40 lakhs is included in indirect expenses and ₹ 40 lakhs reduced from receivables in current assets.

(May'19 QP 8 marks)

Solution :

Particulars	Amount (INR Lakhs)
EBIT	800
Tax rate	30%
EBIT (1- tax rate)	= 800 × (1- tax rate ) = 560
Add : Bad debt provision	

Provision	Pre tax	Post tax
Provision value	40	40
Post tax provision	= 40 ( 1-30%) = 28	40
NOPAT	<b>588</b>	<b>600</b>

Kd Pre tax = 15%, Kd post tax = 15% × (1-30%) = 10.5%

Invested Capital	Amount	Weight	Cost	Weight × Cost
Equity	1628	=1628/1828 = 89.06%	12%	10.69%
Debt	200	= 200/1828 = 10.94%	10.5%	1.15%
<b>Total</b>	<b>1828</b>			<b>11.84%</b>

Equity	1600	1600
Add : Provision for doubtful debts	28	40
Revised Equity	1628	1640
Debt	200	200
Invested Capital	<b>1828</b>	<b>1840</b>
Capital Charge	= Invested Capital × WACC = 1828 × 11.84% = <b>216.36</b>	= 1840 × 11.84% = <b>217.78</b>

	Provision (pre-tax)	Provision (Post tax)
NOPAT	588	600
Less : Capital Charge	(216.36)	(217.78)
EVA	<b>371.64</b>	<b>382.22</b>

#### 41. Illustration

ABC Startup has the following expected profits under different scenarios along respective probabilities:

Year	Best Case		Base Case		Worst Case	
	Revenue	Expenses	Revenue	Expenses	Revenue	Expenses
1	₹ 100,00,000	₹ 80,00,000	₹ 100,00,000	₹ 90,00,000	₹ 100,00,000	₹ 95,00,000
2	₹ 120,00,000	₹ 92,40,000	₹ 110,00,000	₹ 95,70,000	₹ 102,00,000	₹ 98,94,000





3	₹ 144,00,000	₹ 108,00,000	₹ 121,00,000	₹ 102,85,000	₹ 104,04,000	₹ 101,95,920
Probability		30%		60%		10%

You are required to suggest the value of ABC Startup using First Chicago Method assuming that:

- Applicable discounting rate is 20%.
- Startup is located in Tax-free Zone.
- The multiple for Terminal is 10.
- No depreciable assets are held by the ABC Startup.

Note: 1. Present Value Factor (PVF)

Year	1	2	3
PVF@20%	0.8333	0.6944	0.5787

Round off the calculation to whole numbers.

(MTP Oct'24)

**Solution:**

Valuation of Startup under different scenarios:

**Best Case Scenario**

	Year 1	Year 2	Year 3	
Revenue	₹ 100,00,000	₹ 120,00,000	₹ 144,00,000	
Expenses	₹ 80,00,000	₹ 92,40,000	₹ 108,00,000	
Cash Flow/Earnings	₹ 20,00,000	₹ 27,60,000	₹ 36,00,000	
Terminal Value				₹ 3,60,00,000
PVF @ 20%	0.8333	0.6944	0.5787	0.5787
PV	₹ 16,66,600	₹ 19,16,544	₹ 20,83,320	₹ 2,08,33,200
<b>Value of Startup</b>				<b>₹ 2,64,99,664</b>

**Base Case Scenario**

	Year 1	Year 2	Year 3	
Revenue	₹ 100,00,000	₹ 110,00,000	₹ 121,00,000	
Expenses	₹ 90,00,000	₹ 95,70,000	₹ 102,85,000	
Cash Flow/Earnings	₹ 10,00,000	₹ 14,30,000	₹ 18,15,000	
Terminal Value				₹ 181,50,000
PVF @ 20%	0.8333	0.6944	0.5787	0.5787
PV	₹ 8,33,300	₹ 9,92,992	₹ 10,50,341	₹ 105,03,405
<b>Value of Startup</b>				<b>₹ 133,80,038</b>

**Worst Case Scenario**

	Year 1	Year 2	Year 3	
Revenue	₹ 100,00,000	₹ 102,00,000	₹ 104,04,000	
Expenses	₹ 95,00,000	₹ 98,94,000	₹ 101,95,920	
Cash Flow/Earnings	₹ 5,00,000	₹ 3,06,000	₹ 2,08,080	



Terminal Value				₹ 20,80,800
PVF @ 20%	0.8333	0.6944	0.5787	0.5787
PV	₹ 4,16,650	₹ 2,12,486	₹ 1,20,416	₹ 12,04,159
<b>Value of Startup</b>				<b>₹ 19,53,711</b>

Value of ABC Startup as per First Chicago Method

$$\begin{aligned}
 &= 0.30 \times ₹ 2,64,99,664 + 0.60 \times ₹ 133,80,038 + 0.10 \times ₹ 19,53,711 \\
 &= ₹ 79,49,899 + ₹ 80,28,023 + ₹ 1,95,371 \\
 &= ₹ 1,61,73,293
 \end{aligned}$$

#### 42. Illustration

##### Economic Value Added (EVA) Analysis for ABC Ltd. (4 Marks)

The Economic Value Added (EVA) of ABC Ltd. was ₹31,10,000. The following data relates to the capital structure of ABC Ltd. at the end of the current financial year:

Equity (Share Capital + Reserves & Surplus): ₹170 lakhs  
 Debt (Coupon Rate 10%): ₹80 lakhs  
 Invested Capital: ₹250 lakhs

The following data is given to estimate the cost of equity capital:

Beta of ABC Ltd.: 0.90

Risk-free rate (i.e., current yield on Government Bonds): 8%

Average market risk premium: 10%

Applicable Corporate Tax rate: 30%

Calculate the Profit After Tax of ABC Ltd.

(Nov'24 QP 4 marks)

**Solution:**

	₹ Lacs
Economic Value Added (EVA)	31.1
NOPAT - Capital Charge	31.1
Capital Charge = Invested Capital × WACC	
Invested Capital	250
<b>WACC (WN 1)</b>	13.8%
Capital Charge = 250 × 13.8%	34.5
NOPAT - 34.5 Lacs =	31.1
NOPAT =	31.1 + 34.5
<b>NOPAT =</b>	65.6
EBIT (1-T) =	65.6
EBIT (1-30%)	65.6
EBIT =	65.6/0.70
<b>EBIT =</b>	93.71429
Less: Interest (80 Lacs Debt × 10 % Coupon)	8.0
PBT =	85.71429
Tax @ 30% on 85.71429	25.71429
<b>PAT</b>	60.00

**WN 1**

WACC

Beta = 0.90 ; RF = 8% ; MRP = 10%

$K_e = 8\% + 0.90 \times (10\%) = 17\%$

$K_d = 10\%$





WACC =  $K_d (1-t) * \text{Debt} / \text{Invested Capital} + K_e * \text{Equity} / \text{Invested Capital}$

WACC =  $10\% \times (1-30\%) \times 80/250 + 17\% \times 170/250$

WACC =  $2.24\% + 11.56\% = 13.8\%$

### 43. Illustration

AMN Ltd. has surplus cash of ₹200 lakhs and wants to distribute 30% of it to shareholders through a share buyback. The finance officer of the company estimates that the share price after repurchase will likely be 15% above the buyback price. There are 15 lakh shares outstanding, with a current EPS of ₹3.00. Round off Buy Back price to 1 decimal point

Determine the price at which the shares can be repurchased if the market capitalization of the company should be ₹250 lakhs after the buyback.

Calculate the number of shares that can be repurchased.

Assess the impact of share repurchase on the EPS, assuming the net income is the same.

(Nov'24 QP 4 marks)

Solution:

Surplus Cash ₹ lacs	200
Surplus money used for Buy Back %	30%
Buy Back Amount ₹ Lacs	60
Buy Back Price ₹ ( Assume as X)	X
Post Buy Back price	1.15X
Shares Outstanding in Lacs	15
Current EPS in ₹	3
PAT ( EPS x Shares OS) in ₹ Lacs	45
Post Buy Back Market Cap in Rs. Lacs	250
No of shares bought back in Lacs ( Assume as Y) - Eq A	Y
No of shares bought back in Lacs - Eq B	60/X
Equating Eq A & B - Eq C	$Y = 60/X$
Post Buy Back Market Cap - Eq D	$(15 - Y) * 1.15X$
Substituting Eq C in Eq D	$(15 - 60/X) * 1.15X = 250$
	$(15X-60)*1.15 = 250$
	$17.25X = 250+69$
	$X = 319/17.25$
	$X = 18.50$
<b>Buy Back Price in ₹ - Answer Part 1</b>	18.50
<b>Shares Bought Back 60,00,000/18.5 - Answer Part 2</b>	3,24,324
PAT in ₹ Lacs	$15 \times 3 = 45$
Old Share Count	15,00,000
New Share count	$15,00,000 - 3,24,324$
New Share Count	11,75,676
New EPS = PAT / Net Share count	$45,00,000 / 11,56,676$
New EPS in ₹	3.83
Old EPS in ₹	3.00
Increase in EPS in ₹	0.83
<b>EPS Increase % - Answer Part 3</b>	$0.83/3.00 = 27.59\%$





#### 44. Illustration

With the help of the following information of PND Ltd., compute the Economic Value Added:

- Equity Share Capital: ₹ 100 Lakhs
- Reserves and Surplus: ₹ 200 Lakhs
- 8% Debentures: ₹ 300 Lakhs
- Cost of Equity: 15%
- Financial Leverage: 1.5 times
- Income Tax Rate: 25%

(May'25 1(b) - 4 Marks)

**Solution :**

$$\text{EVA} = \text{NOPAT (i.e EBIT} \times (1-t)) - \text{Capital Charge (i.e WACC} \times \text{Capital Employed)}$$

Capital Employed = Equity Share capital + Reserves + Debt

Capital Employed = ₹100 Lakhs + ₹200 Lakhs + ₹300 Lakhs = ₹ 600 Lakhs

Weight of Equity = 50% & Debt 50%

$$\begin{aligned} \text{WACC} &= K_e \times W_e + K_d \times (1-t) \times W_d \\ \text{WACC} &= 15\% \times 0.5 + 8\% (1-25\%) \times 0.5 \\ &= 7.5\% + 3\% \\ &= 10.5\% \end{aligned}$$

Interest Expense = ₹300 Lakhs of Debt  $\times$  8% = ₹24 Lakhs

Degree of Financial Leverage = EBIT / PBT = 1.5

EBIT / (EBIT - ₹24 Lakhs) = 1.5

EBIT = 1.5 EBIT - 36 Lakhs

0.5 EBIT = ₹36 Lakhs

EBIT = ₹72 Lakhs

$$\text{EVA} = \text{NOPAT (i.e EBIT} \times (1-t)) - \text{Capital Charge (i.e WACC} \times \text{Capital Employed)}$$

EVA = ₹72 Lakhs  $\times$  (1-25%) - 10.5%  $\times$  ₹600 Lakhs

EVA = ₹54 Lakhs - ₹63 Lakhs

EVA = -9 Lakhs

#### 45. Illustration

ZIO is a small-to-medium-sized privately held company specializing in electrical equipment manufacturing and is seeking additional investors. Below are key financial indicators to assist in evaluating the investment potential:

- **Break-even Achieved:** The Company has reached its break-even point this year.
- **EBITDA:** ₹ 110 Lakh, including an extraordinary gain of ₹ 16 Lakh.
- **Pending Adjustments:** ₹ 38 Lakh in preliminary sales promotion costs are yet to be written off.
- **Unlevered Beta:** 1.5 (based on the industry benchmark).
- **Capital Structure:** Debt-to-Equity Ratio of 30:70.



- Risk-Free Rate: 6% (based on liquid bonds).
- Market Rate of Return: 12% (internal industry assessment).
- Equity Value (EV): The EV is to be taken at a multiple of 8 on EBITDA.
- The pre-tax cost of debt is 12.45% and assume a tax regime of 30%.
- The Future Cash Flows (FCFs) for the next three years are as follows:

Year	1	2	3
Future cash flows (₹ in Lakh)	150	200	220

Future cash flows are discounted at Weighted Average Cost of Capital (WACC).

PV Factor at 15% & 14% are as under -

	1	2	3
PV Factor at 15%	0.870	0.756	0.658
PV Factor at 14%	0.877	0.769	0.675

Calculation up to 2 decimal places.

You are required to calculate potential value to be placed on ZIO Company.

(May'25 5(b) - 7 Marks)

**Solution :**

**Part 1**

**Computing Value using Adjusted EBITDA**

Reported EBITDA	= ₹110 Lakhs
Less: Extraordinary Gain	= ₹16 Lakhs
Less: Preliminary Expenses WO	= ₹ 38 lakhs
<b>Adjusted EBITDA</b>	<b>= ₹56 Lakhs</b>

Value of the firm based on EV @ 8 times of EBITDA = ₹56 lakhs × 8 = ₹ 448 Lakhs

**Part 2**

Year	0	1	2	3
CF in Lakhs		150	200	220
PVF @15% (WN 1)		0.870	0.756	0.658
<b>PVCF in Lakhs</b>	<b>₹426.46</b>			

Value of Firm based on CF is ₹ 426.46 Lakhs

Range of Valuation of ZIO is between ₹448 Lakhs & ₹ 426.46 Lakhs based on both the above methods



## Working Notes

Unlevered Beta = 1.5

Asset Beta = Equity Beta  $\times E / (E + D (1-t))$

1.5 =  $B_e \times 0.7 / (0.7 + 0.3 (1-30\%))$

1.5 =  $B_e \times 0.7 / 0.91$

$B_e = 1.5 \times 0.91 / 0.70$

$B_e = 1.95$

$K_e = R_f + B_e (R_m - R_f) = 6\% + 1.95 (12\% - 6\%)$

$K_e = 6\% + 6\% \times 1.95 = 17.7\%$

WACC =  $K_e \times W_e + K_d \times (1-t) \times W_d$

WACC =  $17.7\% \times 0.7 + 12.45\% (1-30\%) \times 0.3$

WACC =  $12.39\% + 2.6145\% = 15.0045\%$  (rounded off to 15%)

### 46. Illustration (For practice)

A valuation done of an established company by a well-known analyst has estimated a value of Rs. 500 lakhs, based on the expected free cash flow for next year of Rs. 20 lakhs and an expected growth rate of 5%.

While going through the valuation procedure, you found that the analyst has made the mistake of using the book values of debt and equity in his calculation. While you do not know the book value weights, he used, you have been provided with the following information:

- (i) Company has a cost of equity of 12%.
- (ii) After tax cost of debt is 6%.
- (iii) The market value of equity is three times the book value of equity, while the market value of debt is equal to the book value of debt.

You are required to estimate the correct value of the company.

(May'18 QP 8 marks, RTP Nov'19, MTP Oct'19 Old, RTP May'20 Old)

**Solution :**

Given,

FCFF = 20 Lakhs,  $g = 5\%$  and Value of Company = INR 500 Lakhs

As per Gordon Growth Model, Value =  $FCFF / (K_c - g)$

500 Lakhs =  $20 / (K_c - 5\%)$

$K_c - 5\% = 4\%$  or  $K_c = 9\%$

Cost of equity ( $K_e$ )	12%
Cost of Debt ( $K_d$ )	6%
Cost of capital ( $K_c$ )	9%
Assuming weight of equity	X
Then, weight of debt	1-X

$$9\% = 12\% \times X + 6\% \times (1-X)$$

$$X = 3\% / 6\% = 0.50$$

Hence weight of equity = 50% and weight of debt =  $1 - 50\% = 50\%$





Weight of equity	50%
Correct weight of equity	= 50% × 3 = 150%
Correct weight of debt	= 50% × 100% = 50%
Revised Kc	= 12% × 150%/200% + 6% × 50%/200% = 10.5%
Revised value of Hansel based on GGM	= 20/(10.5%-5%)
	= INR 363.6363 Lakhs

Hence revised value of Hansel based on revised cost of capital is INR 363.64 Lakhs.

#### 47. Illustration (For Practice)

T Ltd. recently made a profit of ₹ 50 crore and paid out ₹ 40 crore (slightly higher than the average paid in the industry to which it pertains). The average PE ratio of this industry is 9. As per Balance Sheet of T Ltd., the shareholder's fund is ₹ 225 crore and number of shares is 10 crores. In case company is liquidated, building would fetch ₹ 100 crore more than book value and stock would realize ₹ 25 crore less.

The other data for the industry is as follows:

Projected Dividend Growth	4%
Risk Free Rate of Return	6%
Market Rate of Return	11%
Average Dividend Yield	6%

The estimated beta of T Ltd. is 1.2. You are required to calculate value of T Ltd. using

- (i) P/E Ratio
- (ii) Dividend Yield
- (iii) Valuation as per:
  - (1) Dividend Growth Model
  - (2) Book Value
  - (3) Net Realizable Value

(RTP Nov'18 Old)

Solution :

i) P/E Ratio:

Particulars	Amount (INR Crores)
Given, NP	50
Dividend paid	40
PE	9
NP	50
Value in Cr	450
No of shares in Cr	10
Value per share of Sun Ltd	45





ii) Dividend Yield :

Value of company using dividend yield =  $D_0 / \text{Dividend Yield}$

=  $40 / 6\%$

= 666.67

Value per share =  $666.67 / 10 = 66.67$

iii)

1) Dividend Growth Model:

$K_e$	= $R_f + \text{market risk premium} \times \text{Beta}$
$K_e$	= $6\% + 1.2 \times (11\% - 6\%)$ = 12%
$D_0$	40
$D_1$	= $D_0 \times (1+g)$ = $40 \times (1+4\%)$ = 41.6
Value of Sun Ltd using DGM	= $D_1 / K_e - g$ = $41.6 / (12\% - 4\%)$ = 520
Value per share	= $520 / 10$ = 52

2) Book Value:

Equity Value	225
Equity value per share	= $225 / 10$ = 22.5

3) Net Realisable value :

Particulars	Amount (INR Crores)
Book Value	225
Add : Value for buildings	100
Less : Stock value reduction	(25)
Total NRV	300
NRV per share	= $300 / 10$ = 30

Summary of value of company and value per share

Methods	INR Crores (Total)	Value per share (INR)
PE	450	45
Dividend Yield	666.67	66.67
Dividend Growth Model	520	52
Book Value	225	22.5
Net realisable value	300	30





48. Illustration (For Practice)

XN Ltd. reported a profit of ₹ 100.32 lakhs after 34% tax for the financial Year 2015- 2016. An analysis of the accounts reveals that the income included extraordinary items of ₹ 14 lakhs and an extraordinary loss of ₹ 5 lakhs. The existing operations, except for the extraordinary items, are expected to continue in future. Further, a new product is launched and the expectations are as under:

Particulars	Amount ₹ in lakhs
Sales	70
Material Costs	20
Labour Costs	16
Fixed Costs	10

The company has 50,00,000 Equity Shares of ₹ 10 each and 80,000, 9% Preference Shares of ₹ 100 each with P/E Ratio being 6 times.

You are required to:

- compute the value of the business. Assume cost of capital to be 12% (after tax) and
- determine the market price per equity share.

(Nov'16 QP)

Solution :

i)

Particulars	Amount (INR Lakhs)
Reported PAT	100.32
Tax Rate	34%
Reported PBT	=100.32/(1-0.34)= 152
Less : Extraordinary Income	(14)
Add : Extraordinary Loss	5
Adjusted PBT	143

Value of new business:

Particulars	Amount (INR Lakhs)
Sales	70
Less : Material	(20)
Less : Labour	(16)
Less : Fixed Cost	(10)
PBT New business	24

Total Value of business

Total Sustainable PBT	= 143+24= 167
Less : Tax @34%	(56.78)
Sustainable PAT	INR 110.22 Lakhs
Capitalisation Rate	12%
Value of Business	=110.22/12% = INR 918.5 Lakhs





(ii)

Particulars	Amount (INR Lakhs)
Adjusted PAT	110.22
Less : Preference Dividend (9% of 80 Lakhs)	(7.2)
Earnings available to Equity Shareholders (EAESH)	103.02
No of equity shares	50
EPS	=103.02/50 = 2.0604
PE Ratio	6
MP per share	12.3624

Hence the market price per share is INR 12.36.

#### 49. Illustration (For practice)

Kanpur Shoe Ltd. is having sluggish sales during the last few years resulting in drastic fall in market share and profit. The marketing consultant has drawn out a new marketing strategy that will be valid for next four years. If the new strategy is adopted, it is expected that sales will grow @ 20% per year over the previous year for the coming two years and @ 30% from the third year. Other parameters like gross profit margin, asset turnover ratio, the capital structure and the rate of Income tax @ 30% will remain unchanged. Depreciation would be 10% of the net fixed assets at the beginning of the year. The targeted return of the company is 15%.

The financials of the company for the just concluded financial year 2015-16 are given below:

Income Statement	Amount (₹)
Turnover	2,00,000
Gross margin (20%)	40,000
Admin, selling & distribution exp (10%)	20,000
PBT	20,000
Tax (30%)	6,000
PAT	14,000

Balance Sheet Information	
Fixed Assets	80,000
Current Assets	40,000
Equity share capital	1,20,000

You are required to assess the incremental value that will accrue subsequent to the adoption of the new marketing strategy and advise the Board accordingly.

PVF @ 15% for 1, 2 & 3 years are: 0.870, 0.756, 0.658 respectively.

(May'16 QP)





Solution :

**Profit & Loss :**

Year	0	1	2	3	4
Turnover (Growth rate of 20% for years 1- 3 and @30% for remaining 2 years)	200,000	240,000	288,000	374,400	486,720
Gross Margin @20%	40,000	48,000	57,600	74,880	97,344
Admin Expense @10% (including depreciation)	20,000	24,000	28,800	37,440	48,672
PBT	20,000	24,000	28,800	37,440	48,672
Less: Tax @30%	6,000	7,200	8,640	11,232	14,601.6
PAT	14,000	16,800	20,160	26,208	34,070.4

**Balance Sheet :**

Year	0	1	2	3	4
Fixed Assets	80,000	96,000	115,200	149,760	194,688
FA Turnover Ratio (Turnover/Fixed Assets)	2.5	2.5	2.5	2.5	2.5
Current Assets	40,000	48,000	57,600	74,880	97,344
CA as % of sales	20%	20%	20%	20%	20%
Total Assets	120,000	144,000	172,800	224,640	292,032
Equity	120,000	144,000	172,800	224,640	292,032

**Computation of FCFF :**

Year	1	2	3	4
PAT	16,800	20,160	26,208	34,070.4
Less :Change in WC	8,000	9,600	17,280	22,464
Less : Capex	24,000	28,800	46,080	59,904
Add : Depreciation	8,000	9,600	11,520	14,976
FCFF	(7200)	(8,640)	(25,632)	(33,332)

**Fixed Assets**

Year	1	2	3	4
Opening -NFA	80,000	96,000	115,200	149,760
Less : Depreciation @10%	8000	9600	11,520	14,976
Add : Capex (Bal Fig) Capex = Closing - Opening + Depreciation	24,000	28,800	46,080	59,904
Closing	96,000	115,200	149,760	194,688





Year	1	2	3	4
FCFF	(7,200)	(8,640)	(25,632)	(33,332)
Terminal Value			=(33,332)/ 15% = (222,147)	
Total (FCFF + TV)	(7,200)	(8,640)	247,779	
Present value factor @ 15%	0.870	0.756	0.658	
PVCF	(6264)	(6531.84)	(163,038)	
Total PVCF			(175,833.84)	

Hence value of business with new strategy is INR (175,833.84)

Value of new business without new strategy :

FCFF in year 0 will be INR 14,000 as there are *no changes in WC, Capex or Depreciation*.

FCFF in year 1 with no growth will remain same INR 14,000 as :

1. Profit and loss will remain same.
2. Closing NFA will remain same as asset Turnover ratio is constant.
3. Current assets will remain same as CA as % of sales will be constant.

Value of new business without new strategy =  $14000/0.15 = 93,333.33$

Incremental value of new strategy =  $(175,833.84) - 93,333.33 = (269,167.17)$

Hence company should not go for new strategy as incremental value is negative.

### 50. Illustration (For Practice)

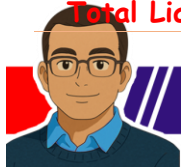
Following details are available for X Ltd.

Income Statement for the year ended 31st March, 2018

Particulars	Amount
Sales	40,000
Gross Profit	12,000
Administrative Expenses	6,000
Profit Before tax	6,000
Tax @ 30%	1,800
Profit After Tax	4,200

Balance sheet as on 31st March, 2018

Particulars	Amount
Fixed Assets	10,000
Current Assets	6,000
Total Assets	16,000
Equity Share Capital	15,000
Sundry Creditors	1,000
Total Liabilities	16,000





The Company is contemplating for new sales strategy as follows:

- (i) Sales to grow at 30% per year for next four years.
  - (ii) Assets turnover ratio, net profit ratio and tax rate will remain the same.
  - (iii) Depreciation will be 15% of value of net fixed assets at the beginning of the year.
  - (iv) Required rate of return for the company is 15%
- Evaluate the viability of new strategy.

(Nov'18 QP 12 marks)

Solution :

Profit & Loss :

Year	0	1	2	3	4	5
Turnover (Growth rate of 30%)	40,000	52,000	67,600	87,880	114,244	114,244
Gross Margin @30%	12,000	15,600	20,280	26,364	34,273.2	34,273.2
Admin Expense @15% (including depreciation)	6000	7,800	10,140	13,182	17,136.6	17,136.6
PBT	6000	7,800	10,140	13,182	17,136.6	17,136.6
Less: Tax @30%	(1800)	(2342)	(3042)	(3954.6)	(5140.98)	(5140.98)
PAT	4,200	5460	7098	9227.4	11,995.62	11,995.62

Balance Sheet :

Year	0	1	2	3	4	5
Fixed Assets	10,000	13,000	16,900	21,970	28,561	28561
FA Turnover Ratio (Turnover/Fixed Assets)	4	4	4	4	4	5
Current Assets	6,000	7,800	10,140	13,182	17,136.60	17136.60
CA as % of sales	15%	15%	15%	15%	15%	15%
Total Assets	16,000	20,800	27,040	35,152	45,697.6	45,697.6
Equity	15,000	19,500	25,350	32,955	42,841.50	42,841.50
Sundry Creditors	1,000	1,300	1,690	2,197	2,856.10	2,856.10
Total Liabilities	16,000	20,800	27,040	35,152	45,697.6	45,697.6

Computation of FCFF :

Year	1	2	3	4	5
PAT	5,460	7,098	9,227.4	11,995.62	11,995.62
Less :Change in WC	1,500	1,950	2,535	3,295.5	0
Less : Capex	4,500	5,850	7,605	9,886.5	4284.15
Add : Depreciation	1,500	1,950	2,535	3,295.50	4284.15
FCFF	960	1,248	1,622.4	2,109.12	11995.62



**Fixed Assets**

Year	1	2	3	4
Opening -NFA	10,000	13,000	16,900	21,970
Less : Depreciation @15%	1,500	1,950	2,535	3,295.50
Add : Capex (Bal Fig) Capex = Closing - Opening + Depreciation	4,500	5,850	7,605	9,886.5
Closing	13,000	16,900	21,970	28,561

Year	1	2	3	4	5
FCFF	960	1248	1622.40	2109.12	11,995.62
Terminal Value				=11,995.62/15% = 79,970.8	
Total (FCFF + TV)	960	1248	1622.40	82,079.92	
Present value factor @ 15%	0.870	0.756	0.658	0.572	
PVCF	835.2	943.49	1067.54	46,949.71	
Total PVCF			<b>49,795.94</b>		

Hence value of business with new strategy is INR 49,795.94

Value of new business without new strategy :

FCFF in year 0 will be INR 4,200 as there are no changes in WC, Capex or Depreciation.

FCFF in year 1 with no growth will remain same INR 4,200 as :

1. Profit and loss will remain same.
2. Closing NFA will remain same as asset Turnover ratio is constant.
3. Current assets will remain same as CA as % of sales will be constant.

Value of new business without new strategy =  $4,200/0.15 = 28,000$

Incremental value of new strategy =  $49,795.94 - 28,000 = 21,795.94$

Hence ,company should go for new strategy as incremental value is positive.



# MERGERS, ACQUISITIONS & CORPORATE RESTRUCTURING (59Q)

## 1. Illustration

The following is the balance sheet of XYZ Ltd. as on 31<sup>st</sup> March 2013

Liabilities	Amount	Assets	Amount
6 lakh Equity Shares of ₹100/- each	600	Land & Building	200
2 Lakh 14% Preference shares of ₹ 100/- each	200	Plant & Machinery	300
13% Debentures	200	Furniture & Fixtures	50
Debenture Interest accrued and Payable	26	Inventory	150
Loan from Bank	74	Sundry Debtors	70
Trade Creditors	300	Cash at bank	130
		Preliminary Expenses	10
		Cost of Issue of Debentures	5
		Profit & Loss Account	485
	<u>1,400</u>		<u>1,400</u>

- (i) The Company did not perform well and has suffered sizable losses during the last few years. However, it is now felt that the company can be nursed back to health by proper financial restructuring and consequently the following scheme of reconstruction has been devised:
- (ii) Equity shares are to be reduced to ₹ 25/- per share, fully paid up;
- (iii) Preference shares are to be reduced (with Dividend rate of 10%) to equal number of shares of ₹ 50 each, fully paid up.
- (iv) Debenture holders have agreed to forego interest accrued to them. Beside this, they have agreed to accept new debentures carrying a coupon rate of 9%.
- (v) Trade creditors have agreed to forgo 25 per cent of their existing claim; for the balance sum they have agreed to convert their claims into equity shares of ₹ 25/- each.
- (vi) In order to make payment for bank loan and augment the working capital, the company issues 6 lakh equity shares at ₹ 25/- each; the entire sum is required to be paid on application. The existing shareholders have agreed to subscribe to the new issue.
- (vii) While Land and Building is to be revalued at ₹ 250 lakh, Plant & Machinery is to be written down to ₹ 104 lakh. A provision amounting to ₹ 5 lakh is to be made for bad and doubtful debts.

You are required to show the impact of financial restructuring/re-construction. Also, prepare the new balance sheet assuming the scheme of re-construction is implemented in letter and spirit.

(ICAI SM, RTP Nov'20)

**Solution :**

Particulars	Amount (INR Lakhs)
<b>Benefits of restructuring :</b>	
Equity shares reduction	= 600,000 × (100-25) = 450
Preference shares reduction	= 200,000 × (100-50) = 100
Interest foregone by debenture holders	26
Trade creditors amount foregone	= 300 × 25% = 75





Increase in value of land and Building	50
Total benefits	701
<b>Adjustment on account of restructuring</b>	
Reduction in value of plant and machinery	= 300-104 = 196
Preliminary expenses written off	10
Cost of issue of debenture w/off	5
Profit and loss account balance	485
Add : Provision for bad and doubtful debts	5
Total use of restructured benefits	701

**Balance Sheet of XYZ as at \_\_\_\_\_  
(Post restructuring)**

Liabilities	Amount(INR Lakhs)	Assets	Amount(INR Lakhs)
Equity Shares ( ₹ 25 FV) (WN 1)	525	Land and Building	250
Preference Shares (10% & ₹50 FV) (WN 2)	100	Plant and Machinery	104
9% Debentures	200	Furniture and Fixtures	50
		Inventory	150
		Receivables less provision	65
		Cash (WN 3)	206
	<b>825</b>		<b>825</b>

**WN 1: Equity capital working**

Particulars	Amount (INR Lakhs)
Existing equity shares	600
Less : Reduction	(450)
Add : New issue	150
Add: Issued to creditors	225
Total (21 Lakhs shares @ 25 each)	<b>525</b>

**WN 2: Preference Share capital working**

Particulars	Amount (INR Lakhs)
Existing preference	200
Less : Reduction	(100)
Total	<b>100</b>

**WN 3 : Calculation of cash balance**

Closing balance of cash = Opening balance + New shares issued - repayment of bank loan  
= 130 + (25 × 6) - 74 = 206 Lakhs

**2. Illustration**

Company X is contemplating the purchase of Company Y, Company X has 3,00,000 shares having a market price of ₹ 30 per share, while Company Y has 2,00,000 shares selling at ₹ 20 per



share. The EPS are ₹ 4.00 and ₹ 2.25 for Company X and Y respectively. Managements of both companies are discussing two alternative proposals for exchange of shares as indicated below:

- (i) in proportion to the relative earnings per share of two companies.
- (ii) 0.5 share of Company X for one share of Company Y (0.5:1)

You are required:

- (i) to calculate the Earnings Per share (EPS) after merger under two alternatives; and
- (ii) to show the impact of EPS for the shareholders of two companies under both the alternatives.

(ICAI SM)

Solution :

Particulars	X	Y
Shares	300000	200000
CMP	30	20
EPS	4	2.25
PE Ratio	7.5	8.89
Market Capitalisation (INR Lakhs)	= 300000 × 30/100000 = 90	= 200000 × 20/100000 = 40
Profit (INR Lakhs)	= 300,000 × 4/100000 = 12	= 200,000 × 2.25/100000 = 4.5
Total Profit (INR Lakhs)	16.5	

Alternative i)

Particulars	Amount
Relative exchange rate based on EPS	4: 2.25
Number of shares of Y	200,000
New shares of X Issued to shareholders to Y	= 200,000/4 × 2.25 = 112,500
Total Profit in INR Lakhs	16.5
Total Number of shares	= 300,000 + 112,500 412,500
EPS in (Rs)	= 16,50,000/412,500 = 4

Particulars	X	Y
EPS Pre merger	4	2.25
EPS Post merger	4	2.25

Under Swap based on EPS the pre and post-merger EPS for shareholders of both companies is same. For Y shareholders who are getting shares of X on merger they get 9/16 shares of x for every share of Y and The revised EPS post-merger is 4 but as they have only 9/16 shares of X they will get EPS of  $9/16 \times 4$

Alternative ii)

Particulars	Amount
Shares of X	300,000
Shares of Y	200,000
New shares in X for shareholders of Y in ratio 0.5:1	= 200,000 × $\frac{1}{2}$ = 100,000





Revised share count	= 300,000 + 100,000 = 400,000
Post-Merger profit	16,50,000
Post-Merger share count	400,000
Post-Merger EPS X	= 16,50,000/400,000 4.125
EPS for shareholder of Y per share of X	4.125
No of shares of X held by each shareholder of Y	0.5
Implied EPS post merger for shareholder of Y	4.125/0.5 = 2.0625

	Shareholders of X	Shareholders of Y
Pre-Merger EPS	4	2.25
Post-Merger EPS	4.125	2.0625
Change in EPS	0.125	-0.1875

### 3. Illustration

A Ltd. is studying the possible acquisition of B Ltd. by way of merger. The following data are available:

Firm	After tax Earnings	No. of Equity Shares	Market Price per shares
A Ltd	₹ 10,00,000	2,00,000	₹ 75
B Ltd	₹ 3,00,000	50,000	₹ 60

- If the merger goes through by exchange of equity shares and the exchange ratio is set according to the current market prices, what is the new earnings per share for A Ltd.
- B Ltd. wants to be sure that its earning per share is not diminished by the merger. What exchange ratio is relevant to achieve the objective?

[ICAI SM, Nov'17 QP (Old)]

Solution:

Particulars	A	B
PAT	10,00,000	300,000
Share Count	200,000	50,000
CMP	75	60
EPS	5	6
PE	15	10
Exchange ratio per CMP	75	60
So, ratio will be	5 : 4	

For every 5 shares of B, shareholders of B will get 4 shares of A

Existing shares	50,000
Ratio	5:4
New shares issued	= 50,000 × 4/5 = 40,000
Total shares in A	= 200,000 + 40,000 = 240,000
Revised PAT post-merger	= 10,00,000 + 300,000 = 13,00,000



Revised EPS of A post-merger

$$= 13,00,000 / 240,000 = 5.42$$

If B wishes to ensure that it does not lose out on Revised EPS, then the exchange ratio should be based on EPS and not on MP, A:B = 5:6 (WN1)

I.e., for every 5 shares of B, shareholders of B will get 6 shares of A.

Number of shares issued to shareholders of B = 60,000

Total shares = 200,000 + 60,000 = 260,000

Revised PAT = 13,00,000

Revised EPS = 13,00,000 / 260,000 = 5

Shareholders of B have got 6 shares of A for 5 shares of B so they have got 1.2 shares of A for 1 share of B, implies that their effective EPS post-merger per share of B is 1.2 × 5

WN 1:

Particulars	A	B
PAT	10,00,000	300,000
Share count	200,000	50,000
CMP	75	90
EPS	5	6
PE	15	15
Exchange ratio based per CMP	75	90
Ratio	5 : 6	

#### 4. Illustration

Simpson Ltd. is considering a merger with Wilson Ltd. The data below are in the hands of both Board of Directors. The issue at hand is how many shares of Simpson should be exchanged for Wilson Ltd. Both boards are considering three possibilities 20,000, 25,000 and 30,000 shares. You are required to construct a table demonstrating the potential impact of each scheme on each set of shareholders:

		Simpson Ltd	Wilson Ltd	Combined Post merger Firm "A"
1	Current earnings per year	2,00,000	1,00,000	3,50,000
2	Shares outstanding	50,000	10,000	?
3	Earnings per share	4	10	?
4	Price per share	40	100	?
5	Price Earnings Ratio	10	10	10
6	Value of Firm	20,00,000	10,00,000	35,00,000
7	Expected Annual growth rate in earnings in foreseeable future	0	0	0

(ICAI SM)

Solution :

Particulars	Possibility 1	Possibility 2	Possibility 3
EPS :			
Wilson	10	10	10





<b>Simpson</b>	4	4	4
<i>Price :</i>			
<b>Wilson</b>	100	100	100
<b>Simpson</b>	40	40	40
New shares of Simpson	<b>20,000</b>	<b>25,000</b>	<b>30,000</b>
<b>Swap Ratio</b>	1:2	1:2.5	1:3
<b>Existing shares of Simpson</b>	50,000	50,000	50,000
<b>Revised share count of Simpson</b>	= 20,000 + 50,000 = 70,000	= 25,000 + 50,000 = 75,000	= 30,000 + 50,000 = 80,000
<b>Post-merger PAT</b>	350,000	350,000	350,000
<b>Post-merger EPS</b>	= 350,000/70,000 = <b>5</b>	= 350,000/75,000 = <b>4.67</b>	= 350,000/80,000 = <b>4.38</b>
<b>PE ratio</b>	10	10	10
<b>Post-merger Share price</b>	= 5 × 10 = <b>50</b>	= 4.67 × 10 = <b>46.7</b>	= 4.38 × 10 = <b>43.8</b>

#### Shareholders of Simpson (Loss)/Gain

<b>EPS</b>	= (5- 4)/4 × 100 = 25%	= (4.67- 4)/4 × 100 = 16.67%	= (4.38- 4)/4 × 100 = 9.38%
<b>Price</b>	= (50- 40)/40 × 100 = 25%	= (46.7- 40)/40 × 100 = 16.67%	= (43.8- 40)/40 × 100 = 9.38%

#### Shareholders of Wilson

<b>Equivalent shares ratio</b>	= 20,000/10,000 = 2	= 25,000/10,000 = 2.5	= 30,000/10,000 = 3
<b>Equivalent EPS</b>	= 5 × 2 = 10	= 4.67 × 2.5 = 11.67	= 4.38 × 3 = 13.13
<b>Original EPS</b>	10	10	10
<b>Gain in EPS</b>	Nil	16.67%	31.25%

#### Impact In Price

<b>Original Value per share</b>	100	100	100
<b>Equivalent shares</b>	2	2.5	3
<b>Revised share price</b>	50	46.67	43.75
<b>Revised Value of holding</b>	= 2 × 50 = 100	= 2.5 × 46.67 = 116.67	= 3 × 43.75 = 131.25
<b>Gain in Price</b>	Nil	16.67%	31.25%

<b>Simpson</b>			
<b>Value of original stake</b>	20,00,000	20,00,000	20,00,000
<b>Value of revised stake</b>	= 50,000 × 50 = 25,00,000	= 50,000 × 46.67 = 23,33,333	= 50,000 × 43.75 = 21,87,500
<b>Wilson</b>			



Value of original stake	10,00,000	10,00,000	10,00,000
Value of revised stake	= 20,000 × 50 = 10,00,000	= 25,000 × 46.67 = 11,66,667	= 30,000 × 43.75 = 13,12,500

## 5. Illustration

B Ltd. is a highly successful company and wishes to expand by acquiring other firms. Its expected high growth in earnings and dividends is reflected in its PE ratio of 17. The Board of Directors of B Ltd. has been advised that if it were to take over firms with a lower PE ratio than it own, using a share-for-share exchange, then it could increase its reported earnings per share. C Ltd. has been suggested as a possible target for a takeover, which has a PE ratio of 10 and 1,00,000 shares in issue with a share price of ₹ 15. B Ltd. has 5,00,000 shares in issue with a share price of ₹ 12. Calculate the change in earnings per share of B Ltd. if it acquires the whole of C Ltd. by issuing shares at its market price of ₹ 12. Assume the price of B Ltd. shares remains constant (ICAI SM)

Solution :

	PE Ratio	CMP	Shares	EPS	Total Earnings
B Ltd (Acquirer)	17	12	500,000	0.71	= 500000 × 0.71 = 352,941.18
C Ltd (Target)	10	15	100,000	1.5	= 100,000 × 1.5 = 1,50,000
Total					<b>502,941.18</b>

Market Price ratio of B:C	= 12:15
Exchange ratio for shareholders of C	15 shares of B for 12 shares of C
Number of shares of B issued to shareholders of C	= 100,000 × 15/12 = 125,000
Total shares of B post-merger	= 500,000 + 125,000 = 625,000
Total earnings of B post-merger	= 502,941.18
EPS of B post-merger	= 502,941.18/625,000 = 0.8
Pre-merger EPS of B	0.71
Post-merger EPS of B	0.8
Change in INR	= 0.8-0.71 = 0.10
Change in %	= 0.1/0.71=14%

## 6. Illustration

Elrond Limited plans to acquire Doom Limited. The relevant financial details of the two firms prior to the merger announcement are:

	Elrond Limited	Doom Limited
Market Price per Share	₹ 50	₹ 25
Number of shares outstanding	20 Lakhs	10 Lakhs

The merger is expected to generate gains, which have a present value of ₹ 200 lakhs. The exchange ratio agreed to is 0.5.

What is the true cost of the merger from the point of view of Elrond Limited?





Solution :

Particulars	Elron Ltd	Doom Ltd
MP in INR	50	25
Outstanding Shares	20	10
Market Capitalisation in INR Lakhs	1000	250
Exchange ratio	0.5	
Number of shares of Doom in Lakhs		10
Ratio		0.5
Shares of Elron issued to shareholders of Doom		=10 × 0.5 = 5
Post issue share count of Elron		25
Market cap revised post-merger (INR Lakhs)		
Existing Market Cap :		
Elron Ltd		1000
Doom		250
Synergy		200
New market cap of Elron		1450

Particulars	Amount (INR Lakhs)
Stake held by shareholders of Doom	= 500,000/25,00,000 = 20%
Market capitalisation of company post-merger	1,450
Market capitalisation of shares held by Doom's shareholders	= 1450 × 20% = 290
Less : Value of shares issued to Doom's shareholders	(250)
Cost for Enrol (INR Lakhs)	40
Market Cap of Enrol Pre merger	1000
Market Capitalisation of 80% stake held by shareholders of Enrol	1160
Gain made by Shareholders of Enrol	160

## 7. Illustration

MK Ltd. is considering acquiring NN Ltd. The following information is available

Company	Earnings after tax (₹)	No. of Equity Shares	Market Value per share (₹)
MK Ltd.	60,00,000	12,00,000	200
NN Ltd.	18,00,000	3,00,000	160

Exchange of equity shares for acquisition is based on current market value as above. There is no synergy advantage available.

- Find the earning per share for company MK Ltd. after merger, and
- Find the exchange ratio so that shareholders of NN Ltd. would not be at a loss.

(ICAI SM, MTP Oct'20 New & Old, RTP May'19 Old)





## Solution :

Particulars	PAT	No of Shares	EPS	CMP	Market Cap in Lakhs	PE
MK	60,00,000	12,00,000	$=60L/12L$ $= 5$	200	2400	$=200/5$ $= 40$
NN	18,00,000	300,000	$= 18L/3L$ $= 6$	160	480	$= 160/6$ $= 26.67$
<b>Total</b>	<b>78,00,000</b>				<b>2880</b>	

Ratio of CMP of MK and NN, i.e., 4 shares of MK for 5 Shares of NN	5:4
Shares of NN	300,000
Shares Issued in MK	$= 300,000 \times 4/5$ $= 240,000$
Revised share count MK	$= 12,00,000+240,000$ $= 14,40,000$
PAT Post merger	<b>78,00,000</b>
EPS post-merger	$= 78,00,000/14,40,000$ $= 5.42$
Equivalent Eps for shareholders of NN per share of NN	$= 5.42 \times 4/5$ $= 4.33$
<i>If NN's holders should not lose the exchange ratio should be linked to EPS</i>	<i>6 shares of Mk for 5 shares of NN</i>

The new shares issued to Shareholders of NN	360,000
Total Shares in MK	$=12,00,000+360,000$ $=15,60,000$
PAT Post merger	78,00,000
EPS Post merger	$= 78,00,000/15,60,000$ $= 5$
Equivalent EPS for shareholders of NN per share of NN	$= 5 \times 6/5$ $= 6$
<i>If Shareholders of NN should not lose out based on MV of shares received by them.</i>	
Post-merger PAT in INR Lakhs	78
Post-merger PE (assuming same as pre-merger)	40
Post-merger Market Capitalisation in INR Lakhs	3120
<i>If NN should not lose out then their Market Capitalisation post-merger should be same as pre-merger Market Cap</i>	
Pre-merger market cap of NN in Lakhs	480
Post-merger stake of NN Ltd shareholders in MK Ltd is	$= 480/3120$ $= 15.38\%$
Pre-merger shares in MK Ltd (INR Lakhs)	12





Shares issued to shareholders of NN in INR lakhs	N
Total Share count in INR Lakhs	12+N
% stake of shareholders in NN	15.38% = N/(12+N) = 15.38% × (12+N) = N
	1.84615 = N × (1-15.38%) 1.84615 = 84.62% × N N = 1.84615/84.62% N = 2.18182
Shares issued to Shareholders of NN Ltd in Lakhs	2.18182
Pre-merger share count of NN in Lakhs	300,000/100000 = 3
Swap ratio	= 2.18182 / 3 = 0.7273

For each share of NN Ltd if the shareholders get 0.7272 shares of MK Ltd & if PE of MK remains @ 40 x then the shareholders of NN Ltd will not lose.

## 8. Illustration

ABC Ltd. is intending to acquire XYZ Ltd. by merger and the following information is available in respect of the companies:

	ABC Ltd	XYZ Ltd
Number of Equity Shares	10,00,000	6,00,000
Earnings after tax	50,00,000	18,00,000
Market Value per Share (₹)	42	28

Required:

- What is the present EPS of both the companies?
- If the proposed merger takes place, what would be the new earning per share for ABC Ltd.? Assume that the merger takes place by exchange of equity shares and the exchange ratio is based on the current market price
- What should be exchange ratio, if XYZ Ltd. wants to ensure the earnings to members are same as before the merger takes place?

(ICAI SM)

Solution :

Particulars	ABC	XYZ
Number of shares in Lakhs	10	6
PAT (INR Lakhs)	50	18
CMP	42	28
EPS	=50/10 = 5	= 18/6 = 3

Exchange ratio based on CMP = 42:28 or 3:2.

Therefore, for every 3 shares of XYZ, 2 shares of ABC will be issued.





Shares of ABC issued to shareholders of XYZ (Lakhs)	$= 6 \times 2/3$ $= 4$
Total share count post-merger in Lakhs	$= 10 + 4$ $= 14$
Post-merger PAT	$= 50 + 18$ $= 68$
Post-merger EPS	$= 68/14$ $= 4.86$
Equivalent EPS per share for shareholder of XYZ	$= 4.86 \times 2/3$ $= 3.2389$
<i>If earnings have to remain same then exchange should be in ration of EPS</i>	5:3
<i>I.e., for every 5 shares of XYZ, 3 shares of ABC will be issued.</i>	
Total Shares issued	$= 6 \times 3/5$ $= 3.6$
Post-merger Share count	$= 10 + 3.6 = 13.6$
Post-merger PAT	68
Post-merger EPS	$= 68/13.6$ $= 5$
Equivalent EPS per share of XYZ for a shareholder of XYZ	
<i>If shares are issued in the ration of eps i.e., for every 5 shares of XYZ 3 shares of ABC are issued, then the Post-merger EPS will be the same for shareholders of XYZ</i>	

## 9. Illustration

The CEO of a company thinks that shareholders always look for EPS. Therefore, he considers maximization of EPS as his company's objective. His company's current Net Profits are ₹ 80.00 lakhs and P/E multiple is 10.5. He wants to buy another firm which has current income of ₹ 15.75 lakhs & P/E multiple of 10.

What is the maximum exchange ratio which the CEO should offer so that he could keep EPS at the current level, given that the current market price of both the acquirer and the target company are ₹ 42 and ₹ 105 respectively?

If the CEO borrows funds at 15% and buys out Target Company by paying cash, how much cash should he offer to maintain his EPS? Assume tax rate of 30%.

(ICAI SM, MTP Mar'22, RTP Nov'18 Old)

Solution :

Particulars	Acquirer	Target
Net profit in Lakhs	80	15.75
CMP	42	105
PE Multiple	10.5	10
EPS in INR	4	10.5
Share count in Lakhs	20	1.5

The ratio to be offered to Keep EPS at current level is inverse of EPS. EPS ratio is 4:10.5  
Hence, for every 4 shares of Target 10.5 shares of Acquirer have to be issued.

Let cash being offered is X

Interest paid on borrowings @15%	= 15% of X
Less : tax benefit of 30%	(30%)





Net interest paid	$=15\% (1-30\%) \times X$ $= 10.5\%X$
Pre-merger combined profits	95.75
Number of shares (since no new shares are issued, shares pre-merger and post-merger are same)	20
Post-merger profits less interest expense	$95.75 - 10.5\%X$
Post-merger EPS	$=(95.75 - 10.5\%X)/20$
Since premerger and post-merger EPS are same,	$4 = (95.75 - 10.5\%X)/20$ $80 = (95.75 - 10.5\%X)$ $10.5\%X = 15.75$ $X = 150$

Hence, the amount of cash to be paid is Rs. 150 Lakhs such that EPS pre and post-merger are same

### 10. Illustration

A Ltd. wants to acquire T Ltd. and has offered a swap ratio of 1:2 (0.5 shares for every one share of T Ltd.). Following information is provided:

	A Ltd	T Ltd
Profit after tax	₹18,00,000	₹ 3,60,000
Equity Shares Outstanding	6,00,000	1,80,000
EPS	₹ 3	₹ 2
PE Ratio	10 times	7 times
Market Price per Share	₹ 30	₹ 14

Required:

- The number of equity shares to be issued by A Ltd. for acquisition of T Ltd.
- What is the EPS of A Ltd. after the acquisition?
- Determine the equivalent earnings per share of T Ltd.
- What is the expected market price per share of A Ltd. after the acquisition, assuming its PE multiple remains unchanged?
- Determine the market value of the merged firm.

(ICAI SM)

Solution :

Particulars	A	T
PAT (INR Lakhs)	18	3.6
Number of shares outstanding	6	1.8
EPS in INR	3	2
PE Ratio	10	7
CMP	30	14

Exchange ratio: 0.5 shares of A for every share of T

Shares of T in Lakhs	1.8
Number of shares issued in A in Lakhs	$= 1.8 \times 0.5$ $= 0.9$





New shares outstanding in A	= 6 + 0.9 = 6.9
Post-merger profit in Lakhs	= 21.6
Post-merger EPS in INR	= 21.6/6.9 = 3.13
Equivalent EPS for shareholder of T per share of T	= 3.13 × 0.5 = 1.57
Post-merger EPS	3.13
PE Multiple	10
Post-merger Market price	= 3.13 × 10 = 31.3
Number of shares post-merger	6.9
Market Capitalisation in Lakhs	= 31.3 × 6.9 = 216

### 11. Illustration

The following information is provided related to the acquiring Firm Mark Limited and the target Firm Mask Limited:

	Firm Mark Limited	Firm Mask Limited
Earnings after tax (₹)	2,000 Lakhs	400 Lakhs
Number of shares outstanding	200 Lakhs	100 Lakhs
PE ratio (times)	10	5

Required:

- What is the Swap Ratio based on current market prices?
- What is the EPS of Mark Limited after acquisition?
- What is the expected market price per share of Mark Limited after acquisition, assuming P/E ratio of Mark Limited remains unchanged?
- Determine the market value of the merged firm.
- Calculate gain/loss for shareholders of the two independent companies after acquisition.

(ICAI SM, MTP Sept'23, RTP May'18 Old)

Solution :

Particulars	Mark - Acquirer	Mask - Target
PAT (INR Lakhs)	2000	400
Number of outstanding shares	200	100
EPS	= 2,000/200 = 10	= 400/100 = 4
PE Ratio	10	5
CMP	= 10 × 10 = 100	= 5 × 4 = 20

- The swap ratio based on CMP of 100 & 20 will be 5:1.  
I.e., for every 5 shares of Mask, 1 share of Mark will be issued.





ii)

Share issued to Mask based on Swap Ratio	= $100 \times 1/5$ = 20
Total Share count post-merger (Lakhs)	= $200+20$ = 220
PAT of Mark post-merger (INR Lakhs)	= $2,000 + 400$ 2,400
EPS of Mark post-merger	= $2400/220$ = 10.91

Hence, EPS of Mark post-merger is INR 10.91

iii) EPS of Mark post-merger = INR 10.91  
PE Ratio( Unchanged) = 10  
CMP = PE × EPS =  $10.91 \times 10 = \text{INR } 109.1$

iv) Market value of Merged firm = Number of outstanding shares × CMP  
=  $220 \text{ Lakhs} \times 109.1$   
= **24,000 Lakhs**

v)

Particulars	Mark	Mask
Shares in merger entity	200	20
CMP	109.1	109.1
Value of shares post-merger	= $200 \times 109.1$ = <b>21,818.18</b>	= $20 \times 109.1$ = <b>2,181.82</b>
<b>Pre-merger Value :</b>		
Number of O/s shares	200	100
CMP	100	20
Market Capitalisation Pre merger	<b>20,000</b>	<b>2,000</b>
Gain	= $21,818.18 - 20,000$ = <b>1,818.18</b>	= $2,181.82 - 2000$ = <b>181.82</b>

Total gain =  $1,818.18 + 181.82 = 2,000 \text{ Lakhs}$

## 12. Illustration

XYZ Ltd. wants to purchase ABC Ltd. by exchanging 0.7 of its share for each share of ABC Ltd. Relevant financial data are as follows:

Equity Shares Outstanding	10,00,000	4,00,000
EPS (₹)	40	28
Market Price per share (₹)	250	160

- Illustrate the impact of merger on EPS of both the companies.
- The management of ABC Ltd. has quoted a share exchange ratio of 1:1 for the merger. Assuming that P/E ratio of XYZ Ltd. will remain unchanged after the merger, what will be the gain from merger for ABC Ltd.?
- What will be the gain/loss to shareholders of XYZ Ltd.?
- Determine the maximum exchange ratio acceptable to shareholders of XYZ Ltd.

(ICAI SM, RTP Nov'19 Old)



Solution :

Particulars	XYZ - Acquirer	ABC - Target
Shares Outstanding (Lacs)	10	4
EPS ₹	40	28
PAT (INR Lakhs)	400	112
MP per share	250	160
PE Ratio = $CMP/EPs$	6.25	5.71
Market Capitalisation (INR Lakhs)	$= 10 \times 250$ $= 2,500$	$= 4 \times 160$ $= 640$

Shares issued to ABC Ltd = 0.7 shares per share

Number of shares issued =  $4 \times 0.7 = 2.8$  Lakhs

i) Post-merger EPS

Post-merger Profit (INR Lakhs) **512**

Revised Share Count	$= 10 + 2.8$ $= 12.8$
Post-merger EPS	$= 512/12.8$ $= 40$
Equivalent Shares of ABC	28
Pre-merger EPS shares of ABC	28

Both Shareholders of ABC and XYZ have no impact.

ii) If exchange ratio of 1:1 is considered then,

Shares issued to shareholders of ABC (Lakhs)	4
Total share count post-merger	$= 10+4$ $= 14$
Total post-merger profit (INR Lakhs)	512
EPS post-merger	36.57
Equivalent EPS per share for shareholders of ABC	36.57
Pre-merger EPS per share for shareholders of ABC	28
Increase in EPS per share for shareholders of ABC	$= (36.57/28)-1$ $= 30.61\%$

iii) Value of stake held by ABC

MP per share

EPS Post merger	36.57
PE Ratio	6.25
Market Price per share of XYZ - post merger	$= 36.57 \times 6.25$ $= 228.57$
Pre-merger share of ABC	160
Gain in MV / price in % terms for shareholders of ABC	$= (228.57/160)-1$ $= 68.57$





<b>Loss to shareholders of XYZ</b>	
<b>In Price terms</b>	
Pre-merger price	250
Post-merger price	228.57
Loss per share	<b>21.43 (i.e 8.5%)</b>
<b>Loss in EPS Terms</b>	
Pre-merger EPS	40
Post-merger EPS	36.57
Loss in EPS in INR/share	<b>3.43 (i.e 8.58%)</b>

- iv) On EPS basis if Shareholders of XYZ should not lose then the swap ratio is 0.7 shares of XYZ for every 1 share of ABC as per part 1

PAT of merged entity (INR Lakhs)	512
PE Multiple of merged entity	6.25
Market Capitalisation of merged entity	= 512 × 6.25 = 3200
Market Capitalisation of XYZ pre-merger to be maintained (INR Lakhs)	2500
Value available to ABC shareholders (INR Lakhs)	700
Price of share that is issued in exchange in INR	250
Number of shares issued in Lakhs	= 700/250 = 2.8
Pre-merger shares of Shareholders of ABC	4
Shares issued in Exchange	2.8
Swap Ratio	2.8 : 4 <b>0.7:1</b>

On Market Price basis if Shareholders of XYZ should not lose then the swap ratio is 0.7 shares of XYZ for every 1 share of ABC as per part 1

### 13. Illustration

XYZ Ltd., is considering merger with ABC Ltd. XYZ Ltd.'s shares are currently traded at ₹ 20. It has 2,50,000 shares outstanding and its earnings after taxes (EAT) amount to ₹ 5,00,000. ABC Ltd. has 1,25,000 shares outstanding; its current market price is ₹ 10 and its EAT are ₹ 1,25,000. The merger will be effected by means of a stock swap (exchange). ABC Ltd. has agreed to a plan under which XYZ Ltd., will offer the current market value of ABC Ltd.'s shares:

- What is the pre-merger earnings per share (EPS) and P/E ratios of both the companies?
- If ABC Ltd.'s P/E ratio is 6.4, what is its current market price? What is the exchange ratio? What will XYZ Ltd.'s post-merger EPS be?
- What should be the exchange ratio; if XYZ Ltd.'s pre-merger and post-merger EPS are to be the same?



(ICAI SM, Similar Nov'19 QP 8 marks)

Solution :

i)

Particulars	XYZ	ABC
Current Market Price	20	10
Number of shares outstanding	250,000	125,000
PAT	500,000	125,000
EPS	$=500,000/250,000=2$	$=125,000/125,000=1$
PE times	10	10

ii)

Revised PE	10	6.4
EPS	2	1
Revised CMP	20	6.4

Exchange ratio of 20 and 6.4 will be 3.125:1.

I.e., for every 3.125 shares ABC, 1 share of XYZ share will be issued.

iii)

Shares issued to ABC Ltd shareholders

Existing ABC Shares	125,000
Swap Ratio	3.125
New shares in XYZ	40,000
Total share count post-merger	$=250,000+40,000=290,000$
Total PAT of Merged Entity	625,000
Post-merger EPS of XYZ	$=625,000/2,90,000=2.16$
Pre-merger EPS of XYZ	2
Post-merger EPS	$=\text{Post merger PAT} / \text{Post merger share count}$ $2 = \text{Post merger PAT} / \text{Post merger share count}$ $2 = 625,000 / \text{Post merger share count}$
Post-merger share count	312,500
Pre-merger share count	250,000
Increase on account of merger. I.e., share issued to ABC Ltd	$=312,500 - 250,000 = 62,500$

For 125000 shares of ABC the shareholders received 62500 shares in XYZ - so the swap ratio is 2:1 Hence, For every 2 shares in ABC they received 1 share in XYZ or For every 1 shares in ABC they received 0.5 share in XYZ.

#### 14. Illustration

Following information is provided relating to the acquiring company Mani Ltd. and the target company Ratnam Ltd:

	Mani Ltd	Ratnam Ltd
Earnings after tax (₹ Lakhs)	2,000	4,000
No. of shares outstanding (lakhs)	200	1,000
PE Ratio	10	5



**Required:**

- (i) What is the swap ratio based on current market prices?
- (ii) What is the EPS of Mani Ltd. after the acquisition?
- (iii) What is the expected market price per share of Mani Ltd. after the acquisition, assuming its P/E ratio is adversely affected by 10%?
- (iv) Determine the market value of the merged Co.
- (v) Calculate gain/loss for the shareholders of the two independent entities, due to the merger.

(ICAI SM, RTP Nov'19, MTP Aug'18)

**Solution :**

Particulars	Mani	Ratnam
PAT (INR Lakhs)	2000	4000
Number of shares (Lakhs)	200	1000
PE Ratio	10	5
EPS (INR)	10	4
CMP (INR)	100	20
Market Capitalisation (INR Lakhs)	20,000	20,000

Swap Ratio based on CMP of 100 and 20 will be 5:1, i.e., for every 5 shares of Ratnam, one share of Mani will be issued.

i)

Shares of Ratnam	1000
Swap Ratio	5:1
Total shares issued	= $1000 \times 1/5$ = 200
Revised Share count	= $200 + 200$ = 400 Lakhs

ii)

Post-merger EPS of Mani	= Post-merger PAT/ Post-merger share count = $6000/400$ = 15
-------------------------	--

iii) Revised PE Ratio = Existing PE - 10%

$$= 10 - 10\% \text{ of } (10) = 10 - 1 = 9$$

$$\text{Revised CMP of Mani after acquisition} = 15 \times 9 = \mathbf{135}$$

iv) Market value of new company = Share count  $\times$  Current Market Price

$$= 135 \times 400$$

$$= \mathbf{INR 54,000 \text{ Lakhs}}$$

v)

Particulars	Mani	Ratnam
Market capitalisation old (INR Lakhs)	20,000	20,000
New shares held	200	200
Stake post-merger	50%	50%
Market Capitalisation New (INR Lakhs)	= $54,000 \times 50\%$ = 27,000	= $54,000 \times 50\%$ = 27,000





Increase in value (INR Lakhs)	= 27,000 - 20,000 = 7,000	=27,000- 20,000 = 7,000
Increase in value per share	= 7000/200 = 35	= 7000/1000 = 7
Increase in value per share %	= 35/100 = 35%	= 7/20 = 35%
<b>Impact on EPS</b>		
Pre-merger EPS	10	4
Equivalent Shares		5
Post-merger EPS per equivalent share	15	3
Increase in EPS (INR)	5	-1
Increase in EPS %	=5/10 = 50%	= -1/4 = (25%)

On CMP basis, the value of shares of both acquirer & target has increased by 35% each; but on EPS basis, the acquirer has gained by 50% but the target has lost by 25%

### 15. Illustration

You have been provided the following Financial data of two companies:

	Krishna Ltd.	Rama Ltd.
Earnings after taxes	₹ 7,00,000	₹ 10,00,000
No. of Equity shares	2,00,000	4,00,000
EPS	3.5	2.5
PE Ratio	10 times	14 times
Market Price per Share	₹ 35	₹ 35

Company Rama Ltd. is acquiring the company Krishna Ltd., exchanging its shares on a one-to-one basis for company Krishna Ltd. The exchange ratio is based on the market prices of the shares of the two companies.

Required:

- What will be the EPS subsequent to the merger?
- What is the change in EPS for the shareholders of companies Rama Ltd. and Krishna Ltd.?
- Determine the market value of the post-merger firm. PE ratio is likely to remain the same.
- Ascertain the profits accruing to shareholders of both the companies.

(ICAI SM)

Solution :

Particulars	Rama	Krishna
PAT (INR Lakhs)	10,00,000	700,000
Share outstanding	400,000	200,000
EPS (INR)	=10,00,000/400,000 = 2.5	= 700,000/200,000 = 3.5
PE	14	10
CMP	35	35
Market Capital (INR Lakhs)	140	70
Swap Ratio	1:1	
Existing share count	400,000	
New share of Krishna's share in 1:1	= 400,000 × $\frac{1}{2}$ = 200,000	
Post-merger share count	600,000	





i)

Post-merger EPS = Post merger PAT/ Post merger Share count  
 = 17,00,000/600,000  
 = 2.83

ii)

Particulars	Rama	Krishna
Pre-merger EPS	2.5	3.5
Post-merger EPS#	2.83	2.83
Change in EPS	0.33	(0.67)
Change in EPS %	13%	(19%)

#Since swap ratio is 1:1 the equivalent shares of Krishna for their shareholders is same

iii)

Particulars	Amount (INR)
Post-merger EPS	2.83
Post-merger PE	14
Post-merger CMP	= 2.83 × 14 = 39.67
Post-merger share count	600,000
Post-merger Market Capitalisation in INR Lakhs	=(39.67 × 600,000)/100,000 = 238

iv) Increase in value per share :

Particulars	Rama	Krishna
Pre-merger price per share	35	35
Equivalent EPS	1	1
Post-merger price per share	39.67	39.67
Increase in value per share	= 39.67 - 35 = 4.67	= 39.67 - 35 = 4.67
Total Shares	400,000	200,000
Increase in overall value per share (INR Lakhs)	= (400,000 × 4.67)/100,000 = 18.67	= (200,000 × 4.67)/100,000 = 9.33

## 16. Illustration

M Co. Ltd. is studying the possible acquisition of N Co. Ltd., by way of merger. The following data are available in respect of the companies:

Particulars	M Co. Ltd.	N Co. Ltd.
Earnings after tax (₹)	80,00,000	24,00,000
No. of Equity Shares	16,00,000	4,00,000
Market value per share (₹)	200	160

- (i) If the merger goes through by exchange of equity and the exchange ratio is based on the current market price, what is the new earning per share for M Co. Ltd.?
- (ii) N Co. Ltd. wants to be sure that the earnings available to its shareholders will not be diminished by the merger. What should be the exchange ratio in that case?

(ICAI SM)



Solution :

Particulars	M - Acquirer	N - Target
PAT (INR)	80,00,000	24,00,000
Number of equity shares	16,00,000	4,00,000
EPS (INR)	5	6
CMP (INR)	200	160
PE	40	27

Exchange ratio = 200: 160 or 5: 4

I.e., for every 5 shares of N, 4 shares of M will be issued.

i)

Particulars	Amount
Existing shares of M	16,00,000
Equivalent shares of M issued to N	= 400,000 × 4/5 = 320,000
Post-merger share count	19,20,000
Post-merger EPS = Post merger PAT/ Post merger share count	
Post-merger EPS	= (80,00,000 + 24,00,000) / 19,20,000 = 104,00,000 / 19,20,000 = 5.42

ii)

Pre-merger EPS to its shareholders = 6

Post-merger equivalent shares' EPS = 6

If earnings of N are not diminished then the swap ratio should be in the ratios of the EPS i.e., 5:6.

For every 5 shares of N 6 shares of M should be issued. Hence, 1.2 shares of M for every share of N.

Shares issued to shareholders of N is computed as follows :

Particulars	Amount (INR)
Existing shares	400,000
Swap ratio	1.2
Shares issued in M	= 400,000 × 1.2 = 480,000
Total share count in M	20,80,000
Post-merger Profit	1,04,00,000
Post-merger EPS for a shareholder in M	5
But for a shareholder of N equivalent M shares are	1.2
EPS for equivalent shares of N held by N shareholders	= 5 × 1.2 = 6

## 17. Illustration

Longitude Limited is in the process of acquiring Latitude Limited on a share exchange basis. Following relevant data are available:





	Longitude Ltd	Latitude Ltd
PAT (₹ in Lakhs)	120	80
Number of Shares (in lakhs)	15	16
EPS	8	5
PE Ratio	15	10

You are required to determine:

- (i) Pre-merger Market Value per Share, and
- (ii) The maximum exchange ratio Longitude Limited can offer without the dilution of
  - (1) EPS and
  - (2) Market Value per Share

Calculate Ratio/s up to four decimal points and amounts and number of shares up to two decimal points.

(ICAI SM, MTP Oct'19 Old)

Solution :

i)

Particulars	Longitude - Acquirer	Latitude - Target
PAT (INR Lakhs)	120	80
Shares in Lakhs	15	16
EPS In INR	8	5
PE	15	10
CMP - Pre-merger	$= 8 \times 15$ $= 120$	$= 5 \times 10$ $= 50$
Market Cap (INR Lakhs)	$= 15 \times 120$ $= 1800$	$= 16 \times 50$ $= 800$

ii) Part 1

Particulars	Amount (INR)
pre-merger & post-merger EPS for Longitude to be same	8
Post-merger EPS	$= \text{Post merger PAT} / \text{Post merger share count}$
Post-merger EPS	$= 200 / \text{Post-merger share count}$
8	$= 200 / \text{post -merger share count}$
Post-merger share count	$= 200 / 8$ $= 25 \text{ Lakhs}$
Pre-merger shares in Longitude	$= 15 \text{ Lakhs}$
Issue of shares to shareholders of Latitude	$= 25 \text{ Lakhs} - 15 \text{ Lakhs}$ $= 10 \text{ Lakhs}$
Existing shares held by shareholders of latitude	$= 16 \text{ Lakhs}$
Swap ratio is for 16 lakhs shares 10 lakhs shares are issued	
i.e., ratio is 8:5 ,1.6: 1 i.e., for 1.6 share 1 share is issued	
i.e., for 1 share if latitude 0.625 shares of longitude are issued	$= 1/1.6$ $= 0.625$



## Part 2

Particulars	Amount (INR)
Post-merger Market Capitalisation of Longitude	1800
Pre-merger Market Capitalisation of Longitude	1800
Total market capitalisation of combined firm (assuming no synergy benefits in PAT or increase in PE for combined EPS)	2600
Market capitalisation of latitude post-merger	= 2600 - 1800 = 800 Lakhs
Per share price of Longitude issued to get value of ₹ 800 Lakhs of Market Capitalisation of Latitude	120
Shares issued to Latitude share holders	= 800/120 = 6.67 Lakhs

These shares are issued against 16 lakhs shares held by them

Swap ratio is for 16 lakh shares of Latitude 6.67 lakh shares of longitude are issued. i.e., for 2.4 shares of latitude 1 share of longitude is issued.

Swap ratio is for 2.4 shares of latitude 1 share of longitude is issued. Swap ratio is for 1 shares of latitude 0.4167 shares of longitude is issued.

### 18. Illustration

P Ltd. is considering take-over of R Ltd. by the exchange of four new shares in P Ltd. for every five shares in R Ltd. The relevant financial details of the two companies prior to merger announcement are as follows

	P Ltd	R Ltd
Profit before Tax (₹ Crore)	15	13.5
No. of Shares (Crore)	25	15
PE Ratio	12	9
Corporate Tax Rate @ 30%		

You are required to determine:

- Market value of both the company.
- Value of original shareholders.
- Price per share after merger.
- Effect on share price of both the company if the Directors of P Ltd. expect their own pre-merger P/E ratio to be applied to the combined earnings.

(ICAI SM, May'22 QP 8 marks)

Solution :

Particulars	P Ltd - Acquirer	R Ltd - Acquirer
PBT (INR Crores)	15	13.5
Tax rate	30%	30%
PAT (INR Crores)	= 15 - 30% = 10.5	= 13.5 - 30% = 9.45
Share count (crores)	25	15
EPS	= 10.5/25 = 0.42	= 9.45/15 = 0.63
PE Ratio	12	9
CMP (INR)	= 0.42 × 12 = 5.04	= 0.63 × 9 = 5.67
Pre-merger Market Capitalisation	= 25 × 5.04 = 126	= 15 × 5.67 = 85.05





ii)

Existing share count in R (In Crores)	15
Swap Ratio	4 for every 5
Share issued in P (Crores)	$= 15 \times 4/5$ $= 12$
Total shares in P (Crores)	$= 25 + 12$ $= 37$
Ratio of P's shareholders in total value of P post-merger	$= 25/37$ $= 67.57\%$
Ratio of R's shareholders in total value of P post-merger	$= 100 - 67.57\%$ $= 32.43\%$

iii) Price per share post-merger

Particulars	Amount (INR)
Post-merger PAT in Crores	$= 10.5 + 9.45$ $= 19.95$
Post-merger share count	37
Post-merger EPS in INR	$= 19.95/37 = 0.54$
Post-merger PE ( Assume old PE continues)	12
Post-merger Price	$= 0.54 \times 12 = 6.47$

Summary:

Particulars	Pre	Post
Market Value :		
P	126	161.76
R	85.05	77.64
Total	211.05	239.40

Market Capitalisation post-merger is arrived at by multiplying shares held by each with the revised price of P post-merger

For P it is  $6.47 \times 25$  and for R it is  $12 * 6.47$

Particulars	Pre	Post	Change
Value of original shareholders			
P	59.70%	67.57%	
R	40.30%	32.43%	
Total	100%	100%	
<i>P share in total MV pe merger is <math>126/211.05</math> whereas R share is <math>85.05/211.05</math></i>			
Price per share			
P	5.04	6.47	28.38%
R Equivalent Shares	5.67	5.18	(8.71%)

Post-merger price of P is computed using Post merger PAT and dividing it by post-merger Share count arrived at after considering swap ratio of 4 shares of P for every 5 shares of R.



Post-merger Equivalent EPS of R is arrived at by adjusting the swap ratio to the EPS of the combined entity. Since The market is aware that Shareholders of P will gain and shareholders of R will lose, the price of P share will move up by 28.38% and price of R share will go down by 8.71% respectively.

## 19. Illustration

Simple Ltd. and Dimple Ltd. are planning to merge. The total value of the companies are dependent on the fluctuating business conditions. The following information is given for the total value (debt + equity) structure of each of the two companies

Business Condition	Probability	Simple Ltd. ₹ Lakhs	Dimple Ltd. ₹ Lakhs
High Growth	0.20	820	1050
Medium Growth	0.60	550	825
Slow Growth	0.20	410	590

The current debt of Dimple Ltd. is ₹ 65 lakhs and of Simple Ltd. is ₹ 460 lakhs. Calculate the expected value of debt and equity separately for the merged entity. (ICAI SM)

Solution :

Simple Ltd :

Business Condition	Probability	Combined Value in Lakhs	Debt in Lakhs	Equity in Lakhs	Prob weighted Debt in Lakhs	Prob weighted Equity in Lakhs
High	0.2	820	460	360	= 0.2 × 460 = 92	= 0.2 × 360 = 72
Medium	0.6	550	460	90	= 0.6 × 460 = 276	= 0.6 × 90 = 54
Slow #	0.2	410	410	0	= 0.2 × 410 = 82	= 0.2 × 0 = 0
Expected Value					<b>450</b>	<b>126</b>

#Under slow growth scenario, the debt holders will recover only ₹ 410 L of their total ₹ 460 Lakhs of debt and equity value cannot be less than 0 due to concept of Limited Liability.

Dimple Ltd :

Business Condition	Probability	Combined Value in Lakhs	Debt in Lakhs	Equity in Lakhs	Prob weighted Debt in Lakhs	Prob weighted Equity in Lakhs
High	0.2	1050	65	985	= 0.2 × 65 = 13	= 0.2 × 985 = 197
Medium	0.6	825	65	760	= 0.6 × 65 = 39	= 0.6 × 760 = 456
Slow	0.2	590	65	525	= 0.2 × 65 = 13	= 0.2 × 525 = 105
Expected Value					<b>65</b>	<b>758</b>





Combined Value	Simple Ltd		Dimple Ltd		Total Merged	
	Equity (Lakhs)	Debt (Lakhs)	Equity (Lakhs)	Debt (Lakhs)	Equity (Lakhs)	Debt (Lakhs)
Expected Value	126	450	758	65	884	515

## 20. Illustration

Yes Ltd. wants to acquire No Ltd. and the cash flows of Yes Ltd. and the merged entity are given below:

Year	1	2	3	4	5
Yes Ltd.	175	200	320	340	350
Merged Entity	400	450	525	590	620

Earnings would have witnessed 5% constant growth rate without merger and 6% with merger on account of economies of operations after 5 years in each case.

The cost of capital is 15%.

The number of shares outstanding in both the companies before the merger is the same and the companies agree to an exchange ratio of 0.5 shares of Yes Ltd. for each share of No Ltd.

PV factor at 15% for years 1-5 are 0.870, 0.756; 0.658, 0.572, 0.497 respectively.

You are required to:

- Compute the Value of Yes Ltd. before and after merger.
- Value of Acquisition and
- Gain to shareholders of Yes Ltd.

(ICAI SM, RTP Nov'18)

Solution :

Year	PVF	Cashflow - Yes	Cashflow - Merged	PV Y	PV Merged
1	0.87	175	400	= 175 × 0.87 = 152.25	= 400 × 0.87 = 348
2	0.756	200	450	= 200 × 0.756 = 151.2	= 450 × 0.756 = 340.2
3	0.658	320	525	= 320 × 0.658 = 210.56	= 525 × 0.658 = 345.45
4	0.572	340	590	= 340 × 0.572 = 194.48	= 590 × 0.572 = 337.48
5	0.497	350	620	= 350 × 0.497 = 173.95	= 620 × 0.497 = 308.14
Total				<b>882.44</b>	<b>1,679.27</b>
G		5%	6%		
Value				PVCF (1-5) + TV 5/(1+Ke) <sup>5</sup>	PVCF (1-5) + TV 5/(1+Ke) <sup>5</sup>





Terminal Value				CF6/(Ke-g)	CF6/(Ke-g)
Terminal Value				$= 350 \times \frac{1}{(1+5\%)(15\%-5\%)}$ $= 3,675$	$= 620 \times \frac{1}{(1+6\%)(15\%-6\%)}$ $= 7,302.22$
PV of TV				$= 3,675 \times 0.497$ $= 1,826.475$	$= 7,302.22 \times 0.497$ $= 3,629.2044$
(1) PV of all Cashflows				$= 882.44 + 1,826.475$ $= 2,708.9150$	$= 1,679.27 + 3,629.2044$ $= 5,308.4744$
Value increase / accretion due to acquisition - INR Lakhs (A)					$= 5,308.4744 - 2,708.9150$ $= 2,599.5594$
(2) Value of Stake of No limited in this $\frac{1}{3} \times 5308.4744$ (B)					1769.4915
(3) Gain to shareholders of Yes Ltd (A-B)					830.068
<i>For every 1 share of No 0.5 Shares of Yes were allotted &amp; both have same share count</i>					
<i>So, proportion of shares held by Yes is <math>\frac{1}{1.5}</math> i.e., 66.67%</i>					
<b>Stake held by Shareholders of Yes is 66.67%</b>					
Value of such stake post-merger					$= 5,308.4744 \times \frac{1}{1.5}$ $= 3,538.9830$
<b>Less: Pre merger value of stake held by Shareholders of Yes</b>					(2,708.9150)
Gain to shareholders of Yes Ltd					$= 830.068$

## 21. Illustration

The following information is provided relating to the acquiring company Efficient Ltd. and the target Company Healthy Ltd.

	Efficient Ltd	Healthy Ltd
No. of Shares (FV. ₹ 10 each)	10 Lakhs	7.5 Lakhs
Market Capitalisation	500 Lakhs	750 Lakhs
PE Ratio	10	5
Reserves and Surplus	300 Lakhs	165 Lakhs
Promoter's Holding (No. of Shares)	4.75 Lakhs	5 Lakhs

Board of Directors of both the Companies have decided to give a fair deal to the shareholders and accordingly for swap ratio the weights are decided as 40%, 25% and 35% respectively for Earning, Book Value and Market Price of share of each company:

- Calculate the swap ratio and also calculate Promoter's holding % after acquisition.
- What is the EPS of Efficient Ltd. after acquisition of Healthy Ltd.?
- What is the expected market price per share and market capitalization of Efficient Ltd. after acquisition, assuming P/E ratio of Firm Efficient Ltd. remains unchanged?
- Calculate free float market capitalization of the merged firm.





Solution :

i)

Particulars	Efficient - Acquirer	Healthy - Target
Share count (Lakhs)	10	7.5
FV per share (INR)	10	10
Market Capitalisation (INR Lakhs)	500	750
Price per share (INR)	= 500/10 = 50	= 750/7.5 = 100
PE	10	5
EPS (INR)	= 50/10 = 5	= 100/5 = 20
Reserves & Surplus (INR Lakhs)	300	165
Reserves & Surplus per share	= 300/10 = 30	= 165/7.5 = 22
Book value per share	= 10+30 = 40	= 10+22 = 32
Promoter holding (Lakhs Shares)	4.75	5
Promoter holding %	= 4.75/10 × 100 = 47.5%	= 5/7.5 × 100 = 66.67%

Particulars	Ratio of	Ratio	Shares issued in Acquirer for every share in target	Weights	Weighted Average
Earnings	5:20	1:4	4	40%	= 4 × 40% = 1.6
Book Value	40:32	1:0.8	0.8	25%	= 0.8 × 25% = 0.2
Market Price	50:100	1:2	2	35%	= 2 × 35% = 0.7
Total					2.5

For every 1 share in Target i.e., Healthy 2.5 shares of Acquirer i.e., Efficient are issued. Hence, swap ratio is 1:2.5.

Particulars	Efficient	Healthy
Existing share count	10	7.5
Swap ratio	1:2.5	
New shares issued in Efficient to shareholders of	= 7.5 × 2.5 = 18.75	
Total share count post-merger	= 10 + 18.75 = 28.75	
Promoter holding in Efficient Ltd in Lakhs Shares	4.75	
Promoter's holding of Target Co in Merged company in lakhs shares	66.67%	= 18.75 × 5/7.5 = 12.5



Total Promoter holding in Lakhs Shares		= 4.75 + 12.5 = 17.25
Promoter stake in %		= 17.25/28.75 × 100= 60%

ii) Post-merger PAT = Sum of pre-merger PAT of both companies

Particulars	Efficient	Healthy	Total
EPS	5	20	
Shares Lakhs	10	7.5	
PAT (INR Lakhs)	= 5 × 10 = 50	= 20 × 7.5 = 150	200

Post-merger EPS =  $\text{Post-merger PAT} / \text{Post-merger share count}$

= 200/28.75

= 6.96

iii)

Particulars	Amount (INR)
EPS Post-merger	6.96
PE Multiple	10
Post-merger Market Price in INR	= 6.96 × 10 = 69.6
Post-merger Share count Lakhs	28.75
Post-merger Market Capitalisation in INR Lakhs	= 69.6 × 28.75 = 2000

iv)

Particulars	Amount
Free float Market capitalisation	= Total Market Capitalisation - Promoter stake
Total Market Capitalisation	2000
Promoter stake	60%
Free float Market Capitalisation	= 2000 × (1- 60%) = 800

## 22. Illustration

Abhiman Ltd. is a subsidiary of Janam Ltd. and is acquiring Swabhiman Ltd. which is also a subsidiary of Janam Ltd. The following information is given

	Abhiman Ltd.	Swabhiman Ltd.
% Shareholding of promoter	50%	60%
Share Capital	₹ 200 Lakhs	₹ 100 Lakhs
Free Reserves and Surplus	₹ 900 Lakhs	₹ 600 Lakhs
Paid up value per share	₹ 100	₹ 10
Free Float Market Capitalisation	₹ 500 Lakhs	₹ 156 Lakhs
PE Ratio	10	4

Janam Ltd. is interested in doing justice to both companies. The following parameters have been assigned by the Board of Janam Ltd., for determining the swap ratio:

Book value	25%
------------	-----



Earnings Per Share	50%
Market Price	25%

You are required to compute

- (i) Swap Ratio  
(ii) The Book Value, Earning Per Share and Expected Market Price of Swabhiman Ltd., (assuming P/E Ratio of Abhiman remains the same and all assets and liabilities of Swabhiman Ltd. are taken over at book value.)

(ICAI SM)

Solution :

i)

Particulars	Abhiman - Acquirer	Swabhiman - Target
Promoter holding	50%	60%
Paid up value per share in INR	100	10
Share count in Lakhs	2	10
Reserves and Surplus in INR Lakhs	900	600
Reserves and Surplus in INR per share	= 900/2 = 450	= 600/10 = 60
Free float Market Capitalisation in INR Lakhs	500	156
Total Market capitalisation in INR Lakhs	= 500/(1-50%) = 1000	= 156/(1-60%) = 390
PE Ratio	10	4
PAT in Lakhs	= 1000/10 = 100	= 390/4 = 97.5
EPS In INR	= 100/2 = 50	= 97.5/10 = 9.75
Book value per share	= 450+100 = 550	= 60+10 = 70
Market Price per share in INR	= 1000/2 = 500	= 390/10 = 39

Swap basis	Ratio	Swap Ratio	Swap ratio i.e., No of shares of Abhiman per share of Swabhiman	Weight	Weighted Average
BV		550:70	= 70/550 = 0.127273	25%	= 0.127273 × 25% = 0.031818
EPS		50:9.75	= 9.75/50 = 0.195000	50%	= 0.195 × 50% = 0.0975
MP		500:39	= 39/500 = 0.078	25%	= 0.078 × 25% = 0.0195
Swap Ratio					0.148818
No. of shares issued to shareholders of Swabhiman in Lakhs					0.148818 × 10 = 1.48818
Total share count post-merger					= 2+1.48818





= 3.48818

ii)

Particulars	Abhiman	Swabhiman	Total
Share capital (INR Lakhs)	200	100	300
Reserves and Surplus (INR Lakhs)	900	600	1500
Total Equity (INR Lakhs)			1800

Asset - Liabilities = Equity, hence equity is the book value

Book value per share

$$= 1800/3.48818 = 516.028$$

EPS of merged entity	= PAT in Lakhs/Share count in Lakhs = 197.5/3.488182 = 56.62
PE Ratio of Abhiman	10
Market Price	= 56.62 × 10 = 566.2
No of shares of Abhiman issued for a share of Swabhiman	= 0.148818
Value per share of Swabhiman	= 566.2 × 0.148818 = 84.26

Shareholders of Swabhiman are gaining as pre-merger price is only ₹ 39

Summary	Merged Entity	Swabhiman Pre-merger	Swabhiman Equity post-merger
BV in INR per share	516.03	70	76.79
EPS in INR per share	56.62	9.75	8.43
MP in INR per share	566.20	39	84.26

### 23. Illustration

The following information is provided relating to the acquiring company E Ltd., and the target company H Ltd:

Particulars	E Ltd.	H Ltd.
Number of shares (FV of ₹ 10 each)	20 Lakhs	15 Lakhs
Market Capitalisation	1000 Lakhs	1500 Lakhs
PE Ratio	10	5
Reserves & Surplus in ₹	600 Lakhs	330 Lakhs
Promoter's Holding (No. of Shares)	9.50 Lakhs	10 Lakhs

The Board of Directors of both the companies have decided to give a fair deal to the shareholders. Accordingly, the weights are decided as 40%, 25% and 35% respectively for earnings (EPS), book value and market price of share of each company for swap ratio.

Calculate the following:

- Market price per share, earnings per share and Book Value per share
- Swap ratio



- (iii) Promoter's holding percentage after acquisition
- (iv) EPS of E Ltd. after acquisitions of H Ltd
- (v) Expected market price per share and market capitalization of E Ltd.; after acquisition, assuming P/E ratio of E Ltd. remains unchanged; and
- (vi) Free float market capitalization of the merged firm.

(ICAI SM)

Solution :

Particulars	E Ltd - Acquirer	H Ltd - target
Share count in Lakhs	20	15
Face Value in INR	10	10
Paid up Capital in INR Lakhs	= 20 × 10 = 200	= 15 × 10 = 150
Reserves and Surplus in INR Lakhs	600	330
Net Worth in INR Lakhs	<b>800</b>	<b>480</b>
Market Capitalisation in INR Lakhs	1000	1500
PE Ratio	10	5
PAT in INR Lakhs	100	300
EPS in INR per share	= 100/20 = 5	= 300/15 = 20
Book Value per share (INR)	= 800/20 = 40	= 480/15 = 32
Promoter holding Share Lakhs	9.5	10
Promoter holding %	= 9.5/20 × 100 = 47.5%	= 10/15 × 100 = 66.67%
Market Price/Share in INR	50	100

i)

Particulars	E Ltd	H Ltd
Market Price per share	50	100
EPS	5	20
Book Value per share	40	32

ii)

Particulars	E Ltd	H Ltd	Ratio of Metric	Swap Ratio	Weight	Weighted Average
EPS	5	20	1:4	4	40%	1.6
Book Value per share	40	32	1:0.8	0.8	25%	0.2
Market Price per share	50	100	1:2	2	35%	0.7
Total						2.5

Swap ratio - for every 1 share of H a shareholder of H will get 2.5 shares of E.

Share count of H pre-merger in lakhs = 15

Swap Ratio = 2.5

Shares issued to shareholders of H in Lakhs = 15 × 2.5 = 37.5





iii)

Particulars	Amount (INR)
Promoter holding in H in %	66.67%
Shares issued to shareholders of H Ltd in Lakhs	37.5
Total shares issued to promoters of H in lakhs	= $37.5 \times 66.67\%$ = 25
Shares held by existing promoters of E	9.5
Post-merger shares held by both promoters in Lakhs	= $25 + 9.5$ = 34.5
Post-merger total share count in Lakhs	= $20 + 37.5$ = 57.5
Post-merger promoter holding in %	= $34.5/57.5 \times 100$ = 60%

iv)

Particulars	Amount (INR Lakhs)
EPS	= Post-merger PAT/Post-merger share count = $400 / 57.5 = 6.96$

v)

Particulars	Amount (INR )
EPS post-merger	6.96
PE Ratio post-merger (Times)	10
Post-merger share price in INR	= $6.96 \times 10$ = 69.6
Post-merger share count in Lakhs	57.7
Post-merger Market capitalisation in INR Lakhs	= $69.6 \times 57.7$ = 4000

vi)

Particulars	Amount (INR )
Promoter holding in Merged firm	60%
Free float holding in merged firm	40%
Total market capitalisation of merged firm in Lakhs	4000
Free float Market capitalisation in INR Lakhs	= $4000 \times 40\%$ = 1600

## 24. Illustration

The following information relating to the acquiring Company Abhiman Ltd. and the target Company Abhishek Ltd. are available. Both the Companies are promoted by Multinational Company, Trident Ltd. The promoter's holding is 50% and 60% respectively in Abhiman Ltd. and Abhishek Ltd.:

	Abhiman Ltd	Abhishek Ltd
Share Capital (₹)	200 Lakhs	100 Lakhs
Free Reserves and Surplus (₹)	800 Lakhs	500 Lakhs
Paid up value per share (₹)	100	10
Free Float Market Capitalisation (₹)	400 Lakhs	128 Lakh
PE Ratio	10	4



Trident Ltd. is interested to do justice to the shareholders of both the Companies. For the swap ratio weights are assigned to different parameters by the Board of Directors as follows:

Book Value	25%
Earnings per share	50%
Market Price	25%

- (a) What is the swap ratio based on above weights?  
 (b) What is the Book Value, EPS and expected Market price of Abhiman Ltd. after acquisition of Abhishek Ltd. (assuming P.E. ratio of Abhiman Ltd. remains unchanged and all assets and liabilities of Abhishek Ltd. are taken over at book value)  
 (c) Calculate:  
 (i) Promoter's revised holding in the Abhiman Ltd.  
 (ii) Free float market capitalization.  
 (iii) Also calculate No. of Shares, Earning per Share (EPS) and Book Value (B.V.), if after acquisition of Abhishek Ltd., Abhiman Ltd. decided to :  
 (1) Issue Bonus shares in the ratio of 1 : 2; and  
 (2) Split the stock (share) as ₹ 5 each fully paid.

(ICAI SM, Similar Nov'23 10 marks, RTP May'20 New & Old)

Solution :

Particulars	Abhiman Ltd - Acquirer	Abhishek Ltd - Target
Share capital INR Lakhs	200	100
Reserves and Surplus INR Lakhs	800	500
Net worth INR Lakhs	1000	600
FV per share fully paid up	100	10
Number of shares in Lakhs	2	10
Book Value per share INR	= 1000/2= 500	= 600/10= 60
Free float Market Capitalisation (INR Lakhs)	400	128
Promoter Holding %	50%	60%
Free float Holding %	= 1- 50%= 50%	= 1- 60%= 40%
Total Market Capitalisation INR Lakhs	= 400/50%= 800	= 128/60%= 320
Market Price per share	= 800/2= 400	= 320/10= 32
PE Ratio	10	4
EPS INR	=400/10 = 40	= 32/4= 8
PAT INR Lakhs	= 2 × 40= 80	= 10 × 8= 80

a)

Particulars	Ratios based on	Ratio	Shares allotted in Acquirer for 1 share in Target	Shares allotted in Acquirer for 1 share in Target	Weights	Weighted Average
Book Value	500:60	25:3	3/25	0.12	25%	=0.12 ×25% = 0.03





EPS	40:8	5:1	1/5	0.20	50%	=0.20 ×50% = 0.10
CMP	400:32	12.5:1	1/12.5	0.08	25%	=0.08 ×25% = 0.02

Total of weighted average = 0.15

Hence, For every 1 share in TG Abhishek, the shareholders of Abhishek will get 0.15 shares in Abhiman the Acquirer.

Pre-merger share count in Target (Lakhs) = 10

Swap Ratio = 0.15

No of shares issued in Acquirer (Lakhs) =  $10 \times 0.15 = 1.5$

b)

Particulars	Abhiman	Abhishek	Total
Net worth in Lakhs	1000	600	1600
Post-merger share count in Lakhs	2	1.5	3.5
Post-merger BVPS			= $1600/3.5$ = 457.14
Post-merger PAT (INR Lakhs)			= 80+80 = 160
Post-merger share count in Lakhs	2	1.5	3.5
Post-merger EPS in INR			= $160/3.5$ = 45.714
PE Ratio Post-merger			10
Post-merger MP = PE × EPS			= $45.714 \times 10$ = 457.14
Equity shares in Abhiman (Lakhs)	2	1.5	3.5
Promoter shareholding %	50%	60%	= $1.9/3.5 \times 100$ = 54.29%
Promoter shareholding (Lakhs)	= $2 \times 50%$ = 1	= $1.5 \times 60%$ = 0.9	1.9
Free float holding			= $100 - 54.29%$ = 45.71%
Post-merger MP in INR			457.14
Post-merger share count (Lakhs)			3.5
Total Market Capitalisation (Lakhs)			= $457.14 \times 3.5$ = 1600
Free float Market Capitalisation (INR Lakhs)			= $1600 \times 45.71%$ = 731.43

c)

Particulars	Amount (INR)
Post-merger share count (Lakhs)	3.5
Bonus issue ratio	1:2
Bonus share issued	= $3.5/2$ = 1.75





Post Bonus share count Lakhs	= 3.5 + 1.75 = 5.25
Current Face value	100
Post-split face value	5
Number of shares post-split for every one share	=100/5 = 20
Post-split share count in Lakhs	= 5.25 × 20 = 105
PAT INR Lakhs post-merger	160
EPS in INR	= 160/105 = 1.52381
Post-merger Net worth in INR Lakhs	1600
Post Bonus & split Share count in Lakhs	105
BVPS	=1600/105 = 15.24

Assumption : Bonus shares of 1 share issued for every two held

### 25. Illustration

T Ltd. and E Ltd. are in the same industry. The former is in negotiation for acquisition of the latter. Important information about the two companies as per their latest financial statements is given below:

	T Ltd	E Ltd
₹ 10 Equity shares outstanding	12 Lakhs	6 Lakhs
Debt:		
10% Debentures (₹ Lakhs)	580	
12.5% Institutional Loan (₹ Lakhs)		240
Earning before interest, depreciation and tax (₹ Lakhs)	400.86	115.71
Market price/Share	220	110

T Ltd. plans to offer a price for E Ltd., business as a whole which will be 7 times EBIDAT reduced by outstanding debt, to be discharged by own shares at market price.

E Ltd. is planning to seek one share in T Ltd. for every 2 shares in E Ltd. based on the market price. Tax rate for the two companies may be assumed as 30%.

Calculate and show the following under both alternatives - T Ltd.'s offer and E Ltd.'s plan:

- Net consideration payable.
- No. of shares to be issued by T Ltd.
- EPS of T Ltd. after acquisition.
- Expected market price per share of T Ltd. after acquisition.
- State briefly the advantages to T Ltd. from the acquisition.

Note: Calculations (except EPS) may be rounded off to 2 decimals in lakhs.

(ICAI SM, RTP May'18, MTP Oct'18)

Solution :

Particulars	T Ltd - Acquirer	E Ltd - Target
Share count (Lakhs)	12	6
FV per share	10	10
10% Borrowing INR Lakhs	580	0
12.5% Borrowing INR Lakhs	0	240
EBITDA INR Lakhs	400.86	115.71





Depreciation (assumed to be Nil)	0	0
Interest Expense INR lakhs	= $580 \times 10\% = 58$	= $240 \times 12.5\% = 30$
PBT INR Lakhs	= $400.86 - 58 = 342.86$	= $115.71 - 30 = 85.71$
Tax @30% INR Lakhs	= $342.86 \times 30\% = 102.86$	= $85.71 \times 30\% = 25.71$
PAT INR Lakhs	= $342.86 - 102.86 = 240$	= $85.71 - 25.71 = 60$
EPS INR	= $240/12 = 20$	= $60/6 = 10$
CMP INR	220	110
PE Ratio INR	= $220/20 = 11$	= $110/10 = 11$

Particulars	Amount (INR)
EV/EBITDA Multiple	7
EBITDA of E Ltd	115.71
Enterprise Value (Lakhs)	= $7 \times 115.71 = 809.97$
Less : Debt of E Ltd	(240)
Equity value of E Ltd	= $809.97 - 240 = 569.97$
Net consideration payable in Lakhs	<b>569.97</b>
<b>Discharge by using own Shares</b>	
CMP of shares of Acquirer T Ltd in INR	220
Shares issued in T Ltd to shareholders of E Ltd in Lakhs	= $569.97/220 = 2.59$
<b>PAT of T Ltd post-merger INR Lakhs</b>	
	= $240 + 60 = 300$
Shares of T Ltd (Lakhs)	12
Shares of E Ltd (Lakhs)	2.59
Post-merger Share count (Lakhs)	14.59
Post-merger EPS of T Ltd	= $300/14.59 = 20.56$
Post-Acquisition MP INR	
EBITDA Multiple	
Post- Acquisition EBITDA INR Lakhs	= $400.86 + 115.71 = 516.57$
Applicable EBITDA Multiple (WN)	8.03
Post-Acquisition EV (INR Lakhs)	= $516.57 \times 8.03 = 4149.47$
Less: Post-Acquisition Debt INR Lakhs	(820)
Post-Acquisition Market Capitalisation INR Lakhs	3,329.47(P)
Post-Acquisition share count in Lakhs	14.59
Post-merger MP in INR	= $3,329.47/14.59 = 228.20$
<b>PE Multiple</b>	
Post-Acquisition PAT INR Lakhs	300
Post-Acquisition Share count in Lakhs	14.59
Post-Acquisition EPS	20.56
Post-acquisition PE multiple	11
Post-Acquisition Market Price	= $20.56 \times 11 = 226.18$

#### Working Note :

Particulars	Amount (INR)
EBITDA Multiple of T Pre-merger	
Market Capitalisation INR Lakhs	2640
Debt INR Lakhs	580
Total EV INR Lakhs	3220
EBITDA INR Lakhs	400.86
EV/EBITDA	= $3220/400.86 = 8.03$



E Ltd Asks:

Particulars	Amount (INR)
Existing Share count of E Ltd (Lakhs)	6
Swap Ratio	1 in Acquirer, 2 in Target
Shares issued in Acquirer T Ltd	$= 6 \times \frac{1}{2} = 3$
CMP of shares of T Ltd	220
Total Consideration in Lakhs	$= 3 \times 220 = 660$
Post-acquisition PAT INR Lakhs	300
Post-acquisition share count Lakhs	15
Post-acquisition EPS in INR	$= 300/15 = 20$
PE multiple post-acquisition assumed same as pre-acquisition for T	11
Post-Acquisition MP of Shares of T in ₹	$= 20 \times 11 = 220$

E Limited Value using EBITDA Multiple based on swap ration of 1:2

Post Merger Mcap computed from EBITDA Multiple of 8.03 taken from (P) above	- ₹3329.47 Lacs
Post merger New Share count	- 15 Lacs
Post Merger EPS based on EV / EBITDA Multiple	- 221.96

Advantages:

- By issuing shares the Acquirer reduces its cash outflow.
- The Price of the share of the acquirer has gone up in 3 out of 4 cases discussed above
- E being a small company can be easily integrated into the acquirers business

## 26. Illustration

The following information is relating to Fortune India Ltd. having two division, viz. Pharma Division and Fast-Moving Consumer Goods Division (FMCG Division). Paid up share capital of Fortune India Ltd. is consisting of 3,000 Lakhs equity shares of Re. 1 each. Fortune India Ltd. decided to de-merge Pharma Division as Fortune Pharma Ltd. w.e.f. 1.4.2009. Details of Fortune India Ltd. as on 31.3.2009 and of Fortune Pharma Ltd. as on 1.4.2009 are given below:

Particulars	Fortune Pharma Ltd. (₹ in Lakhs)	Fortune India Ltd. (₹ in Lakhs)
<b>Outside Liabilities</b>		
Secured Loans	400	3,000
Unsecured Loans	2,400	800
Current Liabilities & Provisions	1,300	21,200
<b>Assets</b>		
Fixed Assets	7,740	20,400
Investments	7,600	12,300
Current Assets	8,800	30,200
Loans & Advances	900	7,300
Deferred tax/ Misc. Expenses	60	(200)

Board of Directors of the Company have decided to issue necessary equity shares of Fortune Pharma Ltd. of Re. 1 each, without any consideration to the shareholders of Fortune India Ltd. For that purpose, following points are to be considered:





- (a) Transfer of Liabilities & Assets at Book value.  
 (b) Estimated Profit for the year 2009-10 is ₹ 11,400 Lakh for Fortune India Ltd. & ₹ 1,470 lakhs for Fortune Pharma Ltd.  
 (c) Estimated Market Price of Fortune Pharma Ltd. is ₹ 24.50 per share.  
 (d) Average P/E Ratio of FMCG sector is 42 & Pharma sector is 25, which is to be expected for both the companies.

Calculate:

- The Ratio in which shares of Fortune Pharma are to be issued to the shareholders of Fortune India Ltd.
- Expected Market price of Fortune India (FMCG) Ltd.
- Book Value per share of both the Companies immediately after Demerger.

(ICAI SM)

Solution :

1.

Particulars	Pharma 1/04/09	Total 31/03/09	FMCG 01/04/09
Equity share Lakhs	1500	3000	3000
FV per share	1	1	1
Equity Share Capital	1500	3000	3000
Secured Loans	400	3000	2600
Unsecured Loans	2400	800	(1600)
Provision and Current Liabilities	1300	21200	19900
Outside Liabilities	4100	25000	20900
Fixed Assets	7740	20400	12660
Inventory	7600	12300	4700
Current Assets	8800	30200	21400
Loans and Advance	900	7300	6400
Deferred Tax / Miscellaneous Expense	60	(200)	(260)
Total Assets	25100	70000	44900
Profit 09/10 Lakhs	1470	NA	11400
Market Price	24.5	NA	= 42 × 3.8 = 159.6
PE INR	25	NA	42
EPS INR	=24.5/25 = 0.98		=11400/3000 = 3.8
Share Count Lakhs	1500	3000	3000

For every two shares in Fortune India Ltd, one share of Fortune pharma ltd is allotted

- Market Price of FMCG India Ltd = INR 159.6 (As calculated above)

Particulars	Pharma	FMCG
Total Assets	25,100	44,900
Outside Liabilities	4,100	20,900
Net Assets	21,000	24,000





Share count in Lakhs	1500	3000
BVPS	= 21,000/1500 = 14	= 24,000/3,000 = 8

## 27. Illustration

H Ltd. agrees to buy over the business of B Ltd. effective 1st April, 2012. The summarized Balance Sheets of H Ltd. and B Ltd. as on 31st March 2012 are as follows:

Balance sheet as at 31st March, 2012 (In Crores of Rupees)

Liabilities	H Ltd	B Ltd
Paid up share capital		
- Equity Shares of ₹ 100 each	350.00	
- Equity Shares of ₹ 10 each		6.50
Reserves and Surplus	950.00	25.00
Total	1300.00	31.50
Assets:		
Net Fixed Assets	220.00	0.50
Net Current Assets	1020.00	29.00
Deferred Tax Assets	60.00	2.00
Total	1300.00	31.50

H Ltd. proposes to buy out B Ltd. and the following information is provided to you as part of the scheme of buying:

- The weighted average post tax maintainable profits of H Ltd. and B Ltd. for the last 4 years are ₹ 300 crores and ₹ 10 crores respectively.
- Both the companies envisage a capitalization rate of 8%.
- H Ltd. has a contingent liability of ₹ 300 crores as on 31st March, 2012.
- H Ltd. to issue shares of ₹ 100 each to the shareholders of B Ltd. in terms of the exchange ratio as arrived on a Fair Value basis. (Please consider weights of 1 and 3 for the value of shares arrived on Net Asset basis and Earnings capitalization method respectively for both H Ltd. and B Ltd.)

You are required to arrive at the value of the shares of both H Ltd. and B Ltd. under:

- Net Asset Value Method
- Earnings Capitalisation Method
- Exchange ratio of shares of H Ltd. to be issued to the shareholders of B Ltd. on a Fair value basis (taking into consideration the assumption mentioned in point 4 above.)

(ICAI SM)

Solution :

Particulars	H Ltd	B Ltd
Equity Capital INR Crores	350	6.5
Face Value per share INR	100	10
Share count (Crores)	= 350/100 = 3.5	= 6.5/10 = 0.65
Networth Given (INR Crores)	1300	31.5





Contingent liability (INR Crore) (Entire value of Contingent liability becomes payable)	(300)	0
Adjusted Net worth (INR Crores)	1,000	31.5
i) Book value per share/Net worth	= 1000/3.5 = 285.71	= 31.50/0.65 = 48.46
Maintainable Future PAT INR Crores	300	10
Capitalisation Rate	8%	8%
Value of company	= 300/8% = 3,750	= 10/8% = 125
Less: Contingent Liability	(300)	0
Earnings Based Value (INR Cr)	3,450	125
Share count (Crores)	3.5	0.65
Earnings based value per share INR	= 3,450/3.5 = 985.71	= 125/0.61 = 192.307

Method	Value per share		Weight	Weighted Value per share	
	H Ltd	B Ltd		H & B	H Ltd
NAV	285.71	48.46	1	= 285.71 × 1 = 285.71	= 48.46 × 1 = 48.46
Earnings Cap	985.71	192.307	3	= 985.71 × 3 = 2,957.14	= 192.307 × 3 = 576.92
Fair Value INR	= 3,242.86/4 = 810.71	= 625.38/4 = 156.35	4	<b>3,242.86</b>	<b>625.38</b>
Swap Ratio	= 810.71/156.35 = 5.185	= 1/5.185 = 0.1928			

For every 5.185 share of B, one share of H will be allotted. i.e., for every 1 share of H, 0.192850 shares of B will be allotted.

## 28. Illustration

Reliable Industries Ltd. (RIL) is considering a takeover of Sunflower Industries Ltd. (SIL). The particulars of 2 companies are given below:

Particulars	Reliable Industries Ltd	Sunflower Industries Ltd
Earnings after Tax (EAT)	₹ 20,00,000	₹ 10,00,000
Equity Shares Outstanding	10,00,000	10,00,000
Earnings per Share (EPS)	2	1
PE Ratio	10	5

Required:

- What is the market value of each Company before merger?
- Assume that the management of RIL estimates that the shareholders of SIL will accept an offer of one share of RIL for four shares of SIL. If there are no synergic effects, what is



the market value of the Post-merger RIL? What is the new price per share? Are the shareholders of RIL better or worse off than they were before the merger?

- (iii) Due to synergic effects, the management of RIL estimates that the earnings will increase by 20%. What are the new post-merger EPS and Price per share? Will the shareholders be better off or worse off than before the merger? (ICAI SM, RTP May'19, MTP Oct'22, MTP Mar'18)

Solution :

Particulars	RIL	SIL	Combined
PAT (INR Lakhs)	20	10	30
PE Ratio	10	5	
Market Capitalisation (INR Lakhs)	= 20 × 10 = 200	= 10 × 5 = 50	= 200 + 50 = 250
<i>Swap ratio 1 share of RIL for 4 shares of SIL</i>			
Share Count (Lakhs)	10	10	
Shares issued in RIL based on swap ratio to shareholders of SIL lakhs	= 10/4 = 2.5		
Total post-merger share count Lakhs	= 10 + 2.5 = 12.5		
<i>Post-merger PAT (INR Lakhs)</i>			
Post-merger PAT (INR Lakhs)			30
<i>PE Ratio (Assumed RIL PE ratio of 10x will continue even post-merger)</i>			
PE Ratio (Assumed RIL PE ratio of 10x will continue even post-merger)			10
<i>Post-merger Market Capitalisation (INR Lakhs)</i>			
Post-merger Market Capitalisation (INR Lakhs)			= 30 × 10 = 300
<i>Share count post-merger lakhs</i>			
Share count post-merger lakhs			12.5
<i>Post-merger share price INR / share</i>			
Post-merger share price INR / share			= 300/12.5 = 24
<i>Pre-merger EPS per share</i>			
Pre-merger EPS per share	2	1	
<i>Pre-merger PE Ratio</i>			
Pre-merger PE Ratio	10	5	
<i>Pre-merger Share price</i>			
Pre-merger Share price	= 2 × 10 = 20	= 1 × 5 = 5	

*RIL share price has gone up from ₹ 20 to ₹ 24 an increase of 20% - so they are better off*

<i>Share price of SIL pre-merger per share</i>			
Share price of SIL pre-merger per share		5	
<i>Share price of Equity shares of RIL based on Swap ratio of 1 share of RIL for 4 shares of SIL</i>			
Share price of Equity shares of RIL based on Swap ratio of 1 share of RIL for 4 shares of SIL		= 5 × 4 = 20	
<i>Market Price per share</i>			
Market Price per share		24	

*SIL shareholders have also gained by 20% as the value of equivalent shares is ₹24 in market vs ₹ 20 based on swap ratio.*

Combined PAT ₹ Lacs			30
Add synergy benefits @ 20%			6
POST merger PAT ₹ Lacs			36
Post merger Share count			12.5





Revised EPS post merger			2.88
PE			10
Revised MP ₹			28.8

Shareholders of both Ril & SIL are better off than before merger as the new share price is ₹ 28.8 vs their respective equivalent pre merger share prices of ₹ 20 & ₹ 20

## 29. Illustration

AFC Ltd. wishes to acquire BCD Ltd. The shares issued by the two companies are 10,00,000 and 5,00,000 respectively:

- (i) Calculate the increase in the total value of BCD Ltd. resulting from the acquisition on the basis of the following conditions

Current expected growth rate of BCD Ltd.	7%
Expected growth rate under control of AFC Ltd., (without any additional capital investment and without any change in risk of operations)	8%
Current Market price per share of AFC Ltd.	₹ 100
Current Market price per share of BCD Ltd.	₹ 20
Expected Dividend per share of BCD Ltd.	₹ 0.60

- (ii) On the basis of aforesaid conditions calculate the gain or loss to shareholders of both the companies, if AFC Ltd. were to offer one of its shares for every four shares of BCD Ltd.
- (iii) Calculate the gain to the shareholders of both the Companies, if AFC Ltd. pays ₹ 22 for each share of BCD Ltd., assuming the P/E Ratio of AFC Ltd. does not change after the merger. EPS of AFC Ltd. is ₹ 8 and that of BCD is ₹ 2.50. It is assumed that AFC Ltd. invests its cash to earn 10%

(ICAI SM, RTP Nov'22)

Solution :

i)

Particulars	AFC Ltd Pre	BCD Pre	AFC Post
Number of shares	10,00,000	500,000	
G pre-merger		7%	
G Post-merger		8%	
CMP	100	20	
D1 INR		0.6	
D1 INR		$=0.6/(1+7\%)$ $= 0.56$	
PO = $D1/(ke-g)$		$20=0.6/(Ke- 7\%)$ $Ke - 7\% = 0.03$ $Ke = 10\%$	
PO if growth is 8%			
D0		0.5607	
D1 @ g of 8%		$=0.5607 \times (1+8\%)$ $= 0.6056$	
Assuming no change in Ke			
PO = $D1/(Ke - g\%)$		$= 0.6056/(10\%-8\%)$ $= 30.28$	





Pre-merger value of BCD in INR		$= 500,000 \times 20$ $= 100,00,000$	
Post-acquisition by AFC, Value of BCD in INR		$= 500,000 \times 30.28$ $= 151,40,187$	
Increase in value of BCD by		$= 151,40,187 - 100,00,000$ $= 51,40,187$	
Swap ratio 1 for 4 - gain / loss to shareholders			
Existing share count	10,00,000		
New share based on Swap Ratio	$= 500,000 \times \frac{1}{4}$ $= 125,000$		
Rev share count post-merger			11,25,000
Revised Value of both companies together	10,00,00,000	1,51,40,187	11,51,40,187
New share price in INR			$= 11,51,40,187 / 11,25,000$ $= 102.35$
Shareholders of AFC			
Price per share Pre-Acquisition	100		
Gain in INR per share	2.35		
Gain in per share %	2.35%		
Shareholders of BCD			
Share price post-acquisition			102.35
Equivalent share of BCD for share in AFC			4
Price per share of BCD swapped			$= 102.35 / 4$ $= 25.586$
Price per share of BCD pre-merger			20
Gain for shareholders of BCD post-merger in %			$= (25.586 / 20) - 1$ $= 27.93\%$
Gain in INR terms per share of BCD			$= 25.586 - 20$ $= 5.59$
Gain in INR terms per share of ACF			$= 5.59 \times 4$ $= 22.35$
MP per share in INR	100	20	
EPS per share in INR	8	2.5	
PE Ratio	$= 100 / 8$ $= 12.5$	$= 20 / 2.5$ $= 8$	
Share count	10,00,000	500,000	





PAT in INR Lakhs	=10,00,000 × 8 =80,00,000	= 500,000 × 2.5 = 12,50,000	92,50,000
Combined PAT			92,50,000
Less : Post-tax interest cost on cash paid			(11,00,000)
Per share consideration in INR	22		
Number of shares	500,000		
Total cash paid	= 22 × 500,000 =		
	1,10,00,000		
Interest Cost @10% P.a	11,00,000		
Revised PAT			81,50,000
Share count AFC Post			10,00,000
Revised EPS			= 81,50,000/10,00,000 = 8.15
Revised PE Ratio			12.5
Revised Market Price			= 8.15 × 12.5 = 101.875
Increase in EPS terms			=(8.15/8)-1 = 1.88%
Gain to shareholders of AFC in terms of MP per share in %			1.88%
Per share inc. in value in INR			1.875
Share count			10,00,000
Total value increase in ₹ for shareholders of AFC			= 1.875 × 10,00,000 = 18,75,000
Gain to shareholders of BCD			
CMP in INR		20	
Cash received in INR		22	
Gain in INR		=22-20= 2	
Gain in %		10%	
Gain in total value in ₹		= 500,000 × 2 = 10,00,000	

### 30. Illustration

R Ltd. and S Ltd. are companies that operate in the same industry. The financial statements of both the companies for the current financial year are as follows:

#### Balance Sheet

	R. Ltd (₹)	S. Ltd (₹)
Equity and Liabilities		
Shareholders' Funds		





Equity Capital (₹ 10 each)	20,00,000	16,00,000
Retained earnings	4,00,000	-
Non-Current Liabilities		
16% Long term debt	10,00,000	6,00,000
Current Liabilities	14,00,000	8,00,000
Total	<u>48,00,000</u>	<u>30,00,000</u>
Assets		
Non-Current Assets	20,00,000	10,00,000
Current Assets	28,00,000	20,00,000
Total	<u>48,00,000</u>	<u>30,00,000</u>

#### Income Statement

Particulars	R. Ltd (₹)	S. Ltd (₹)
A. Net Sales	69,00,000	34,00,000
B. Cost of goods sold	<u>55,20,000</u>	<u>27,20,000</u>
C. Gross Profit (A-B)	13,80,000	6,80,000
D. Operating Expenses	4,00,000	2,00,000
E. Interest	1,60,000	96,000
F. Earnings before taxes [C-(D-E)]	8,20,000	3,84,000
G. Taxes @ 35%	2,87,000	1,34,400
H. Earnings after tax (EAT)	5,33,000	2,49,600

#### Additional Information:

No. of equity shares	2,00,000	1,60,000
Dividend payment Ratio (D/P)	20%	30%
Market price per share	₹ 50	₹ 20

Assume that both companies are in the process of negotiating a merger through exchange of Equity shares:

You are required to:

- Decompose the share price of both the companies into EPS & P/E components. Also segregate their EPS figures into Return On Equity (ROE) and Book Value/Intrinsic Value per share components.
- Estimate future EPS growth rates for both the companies.
- Based on expected operating synergies, R Ltd. estimated that the intrinsic value of S Ltd. Equity share would be ₹ 25 per share on its acquisition. You are required to develop a range of justifiable Equity Share Exchange ratios that can be offered by R Ltd. to the shareholders of S Ltd. Based on your analysis on parts (i) and (ii), would you expect the negotiated terms to be closer to the upper or the lower exchange ratio limits and why?

(ICAI SM)

#### Solution :

i)

Particulars	R Ltd (INR)	S Ltd (INR)
CMP in INR	50	20
PAT in INR	5,33,000	2,49,600
Share Count	200,000	160,000
EPS in INR	= 533,000/200,000 = 2.665	= 2,49,600/160,000 = 1.56
PE in Times	= 50/2.665 = 18.76	= 20/1.56 = 12.82





Equity Share Capital	20,00,000	16,00,000
Reserves and Surplus	400,000	
Networth	= 20,00,000 + 400,000 = 24,00,000	16,00,000
Share count In Number	200,000	160,000
Book value per share in INR	12	10
EPS in INR	2.665	1.56
Return on Equity (%)	= 2.665/12 = 22.21%	= 1.56/10 = 15.6%

ii)

$$g = \text{Retention Ratio} \times \text{ROE}$$

Payout ratio in %	20%	30%
Retention Ratio in %	80%	70%
ROE in %	22.21%	15.6%
g	= 80% × 22.21% = 17.77%	= 70% × 15.6% = 10.92%

iii)

R will acquire S

			No of shares of S per share of R	No of shares of S per share of R
Intrinsic Value /MP in INR	50	25	= 50/25 = 2	=1/2 =0.5
Book Value in INR	12	10	=12/10 =1.2	=1/1.2= 0.83
Market Value in INR	50	20	= 50/20 =2.5	=1/2.5 =0.4
EPS in INR	2.67	1.56	=2.67/1.56 = 1.71	=1/1.71 = 0.59
Lower end of the range	0.4 shares of R per 1 share of S			
Higher end of the range	0.83 shares of R per share of S			

Given that R has better EPS, PE, EPS Growth rates & ROE it will negotiate closer to the lower end of the range i.e., it will want to issue few shares of its own for every 1 share of S.

### 31. Illustration

BA Ltd. and DA Ltd. both the companies operate in the same industry. The Financial statements of both the companies for the current financial year are as follows:

#### Balance Sheet

	BA Ltd (₹)	DA Ltd (₹)
Current Assets	14,00,000	10,00,000
Fixed Assets (Net)	10,00,000	5,00,000





Total (₹)	<u>24,00,000</u>	<u>15,00,000</u>
Equity Capital (₹ 10 each)	10,00,000	8,00,000
Retained Earnings	2,00,000	
14% Long term debt	5,00,000	3,00,000
Current Liabilities	7,00,000	4,00,000
Total (₹)	<u>24,00,000</u>	<u>15,00,000</u>

#### Income Statement

	BA Ltd. (₹)	DA Ltd. (₹)
Net Sales	34,50,000	17,00,000
Cost of Goods sold	27,60,000	13,60,000
Gross profit	6,90,000	3,40,000
Operating expenses	2,00,000	1,00,000
Interest	70,000	42,000
Earnings before taxes	4,20,000	1,98,000
Taxes @ 50%	2,10,000	99,000
Earnings after taxes (EAT)	2,10,000	99,000
Additional Information		
No. of Equity shares	1,00,000	80,000
Dividend payment ratio (D/P)	40%	60%
Market price per share	₹ 40	₹ 15

Assume that both companies are in the process of negotiating a merger through an exchange of equity shares. You have been asked to assist in establishing equitable exchange terms and are required to:

- Decompose the share price of both the companies into EPS and P/E components; and also segregate their EPS figures into Return on Equity (ROE) and book value/intrinsic value per share components.
- Estimate future EPS growth rates for each company.
- Based on expected operating synergies BA Ltd. estimates that the intrinsic value of DA's equity share would be ₹ 20 per share on its acquisition. You are required to develop a range of justifiable equity share exchange ratios that can be offered by BA Ltd. to the shareholders of DA Ltd. Based on your analysis in part (i) and (ii), would you expect the negotiated terms to be closer to the upper, or the lower exchange ratio limits and why?
- Calculate the post-merger EPS based on an exchange ratio of 0.4: 1 being offered by BA Ltd. and indicate the immediate EPS accretion or dilution, if any, that will occur for each group of shareholders.
- Based on a 0.4: 1 exchange ratio and assuming that BA Ltd.'s pre-merger P/E ratio will continue after the merger, estimate the post-merger market price. Also show the resulting accretion or dilution in pre-merger market prices.

(ICAI SM, MTP Apr'18)





**Solution :**

i)

Particulars	BA Ltd	DA Ltd
Total Assets	24,00,000	15,00,000
Less : Current Liabilities	(700,000)	(400,000)
Less : Debt	(500,000)	(300,000)
Net Assets	12,00,000	800,000
PAT	2,10,000	99,000
Share count	100,000	80,000
Face Value	10	10
EPS In INR	= 210,000/100,000 = 2.1	=99,000/80,000 = 1.24
Market price per share	40	15
PE Ratio	=40/2.1 = 19.05	= 15/1.24 = 12.12
Book Value per share	=12,00,000/100,000 = 12	= 800,000/80,000 = 10
Return on Equity	=2.10/12 × 100 = 17.5%	= 1.24/10 ×100 = 12.4%

ii)

Dividend Payout Ratio	40%	60%
Retention ratio	60%	40%
ROE	17.5%	12.4%
EPS g	= 17.5% × 60% = 10.5%	= 40% × 12.4% = 4.95%

iii)

Particulars	BA	DA	Ratios		
Intrinsic value (Intrinsic value for BA Ltd is considered at CMP)	40	20	=40/20 =2	=1/2 = 0.5	1 for every 2 share
CMP in INR	40	15	=40/15 = 2.6667	=1/2.6667 = 0.375	1 for every 2.67 shares
BVPS	12	10	=12/10 =1.2	=1/1.2 = 0.833	1 for every 1.2 share
EPS	2.1	1.24	=2.1/1.24 =1.6969	=1/1.6969 =0.589	

**No of shares of acquirer given per share of target**

Upper limit of exchange ratio				0.8333	
Lower limit of exchange ratio				0.375	

Given that key metrics of growth , eps, roe BV etc are better in case of the acquirer, the exchange ratio will be in their favour so fewer no of shares of acquirer will be issued per share of target.



So, the negotiated terms will be closer to the lower part of range of exchange ratios.

iv) Exchange ratio = 0.4:1, 0.4 shares of acquirer for share in target.

Particulars	BA	DA	Combined
PAT	210,000	99,000	309,000
Share Count	100,000	80,000	
EPS	2.1	1.24	
New share issued in BA			= 0.4 × 80,000 = 32,000
New share count			= 100,000 + 32,000 = 132,000
Revised EPS			= 309,000/132,000 = 2.3409
Pre-merger EPS of BA			2.1
Increase in EPS			= 2.3409 - 2.1 = 0.2409
Increase in EPS in %			= 0.2409/2.1 × 100 = 11.47%

EPS Accretion for shareholders of BA Ltd is ₹ 0.2409 per share i.e., 11.47%

Pre-merger share count of DA		80,000	
Post-merger share count of DA's shareholders		32,000	
Equivalent Shares		0.4	
EPS of BA post-merger		2.3409	
Equivalent EPS for shareholder of DA per share of DA held		= 0.4 × 2.3409 = 0.9364	
Pre-merger EPS of DA		1.24	
Reduction in EPS		= 0.9364 - 1.24 = (0.3011)	
Reduction in EPS in % for shareholders of DA		= (0.3011)/1.24 = (24.33%)	

v)

Particulars	Combined
Post-merger EPS	2.34
Post-merger PE	19.05
Post-merger MP	= 2.34 × 19.05 = 44.59
Pre-merger MP INR of BA	40
Increase in MP for BA shareholder in INR	= 44.59 - 40 = 4.59
Increase in MP for BA shareholder in %	= 4.59/40 × 100 = 11.47%
Pre-merger MP INR of DA	15
Post-merger Eq share MP	= 0.4 × 44.59 = 17.84





Increase in MP for DA shareholder in	= 17 - 15 = 2.84
Increase in MP for DA shareholder in %	= $2.84/15 \times 100$ = 18.90%

### 32. Illustration

During the audit of the Weak Bank (W), RBI has suggested that the Bank should either merge with another bank or may close down. Strong Bank (S) has submitted a proposal of merger of Weak Bank with itself. The relevant information and Balance Sheets of both the companies are as under:

Particulars	Weak Bank (W)	Strong Bank (S)	Assigned Weights (%)
Gross NPA (%)	40	5	30
Capital Adequacy Ratio (CAR)	5	16	28
Total Capital/ Risk Weight Asset			
Market price per Share (MPS)	12	96	32
Book Value			10
Trading on Stock Exchange	Irregular	Frequent	

Particulars	Weak Bank (W)	Strong Bank (S)
Paid up Share Capital (₹ 10 per share)	150	500
Reserves & Surplus	80	5,500
Deposits	4,000	44,000
Other Liabilities	890	2,500
Total Liabilities	<u>5,120</u>	<u>52,500</u>
Cash in Hand & with RBI	400	2,500
Balance with Other Banks	-	2,000
Investments	1,100	19,000
Advances	3,500	27,000
Other Assets	70	2,000
Preliminary Expenses	50	-
Total Assets	<u>5,120</u>	<u>52,500</u>

You are required to

- Calculate Swap ratio based on the above weights
- Ascertain the number of Shares to be issued to Weak Bank
- Prepare Balance Sheet after merger; and
- Calculate CAR and Gross NPA of Strong Bank after merger.

[ICAI SM, MTP Apr'22, MTP Oct'19, May'18 (Old)]

Solution :

a)

Particulars	Strong (INR Lakhs)	Weak (INR Lakhs)
Paid Up capital	500	150
Reserves and Surplus	5500	80
Less : Preliminary Expenses	0	(50)
Net Worth	6000	180
FV Per share in INR	10	10
Share count in Lakhs	= $500/10$ = 50	= $150/10$ = 15



Book Value per share

$$=6000/50$$

$$=120$$

$$=180/15$$

$$=12$$

Swap Ratio Computation			Swap Ratio	Weight	Weighted Average
Gross NPA %	5	40	$=5/40$ $=0.125$	30%	$=0.125 \times 30\%$ $=0.0375$
CAR %	16	5	$=5/16$ $=0.3125$	28%	$=0.3125 \times 28\%$ $=0.0875$
CMP INR	96	12	$=12/96$ $=0.125$	32%	$=0.125 \times 32\%$ $=0.04$
BVPS INR	120	12	$=12/120$ $=0.1$	10%	$=0.1 \times 10\%$ $=0.01$
					<b>0.175</b>

Swap Ratio : Per 1 share of weak bank 0.175 shares of strong bank will be swapped.

b)

Particulars	Amount
Pre-merger share count in Lakhs	15
Swap Ratio	0.175
Total shares issued in strong bank for shareholders of weak bank lakhs	$=15 \times 0.175$ $=2.6250$
Paid up capital w.r.t shares issued at Face Value INR 10	$=2.6250 \times 10$ $=26.25$

c) Balance Sheet

Liabilities	Strong	Weak	Combined	Assets	Strong	Weak	Combined
Equity Capital	500			Cash in Hand	2500	400	2900
Equity cap issued to Weak share holders		26.25	526.25	Balance with other banks	2000	0	2000
Reserves and Surplus (WN)	5500	153.75	5653.75	Investments	19000	1100	20100
Deposits	44000	4000	48000	Advances	27000	3500	30500
Other Liabilities	2500	890	3490	Other Assets	2000	70	2070
Total	<b>52,500</b>	<b>5,070</b>	<b>57,570</b>		<b>52,500</b>	<b>5,070</b>	<b>57,570</b>

WN :

Net worth of weak (INR Lakhs)	180
Share cap issued by Strong to shareholders of weak	26.25
Capital Reserve on Acquisition	$=180 - 26.25$ $=153.75$





d)

Particulars	Strong	Weak	Combined
CAR	16%	5%	
Total Capital + Reserves	6000	180	
Risk Weighted Assets = Total Cap/CAR	= 6000/16% = 37,500	=180/5% = 3,600	41,100
Revised Capital			=526.25 +5,653.75 =6,180
Revised CAR			=6,180/41,100 × 100 = 15.04%
GNPA %	5%	40%	
Advances INR Lakhs	27,000	3,500	30,500
GNPA INR Lakhs	= 27,000 × 5% = 1,350	= 3,500 × 40% = 1,400	2,750
Revised Combined GNP			=2750/30,500 × 100 = 9.02%

### 33. Illustration

M/s Tiger Ltd. wants to acquire M/s. Leopard Ltd. The balance sheet of Leopard Ltd. as on 31st March, 2012 is as follows:

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Capital (70,000 shares)	7,00,000	Cash	50,000
Retained earnings	3,00,000	Debtors	70,000
12% Debentures	3,00,000	Inventories	2,00,000
Creditors and other liabilities	3,20,000	Plants & Eqpt.	13,00,000
	<u>16,20,000</u>		<u>16,20,000</u>

#### Additional Information:

- Shareholders of Leopard Ltd. will get one share in Tiger Ltd. for every two shares. External liabilities are expected to be settled at ₹ 5,00,000. Shares of Tiger Ltd. would be issued at its current price of ₹ 15 per share. Debenture holders will get 13% convertible debentures in the purchasing company for the same amount. Debtors and inventories are expected to realize ₹ 2,00,000.
- Tiger Ltd. has decided to operate the business of Leopard Ltd. as a separate division. The division is likely to give cash flows (after tax) to the extent of ₹ 5,00,000 per year for 6 years. Tiger Ltd. has planned that, after 6 years, this division would be demerged and disposed of for ₹ 2,00,000.
- The company's cost of capital is 16%.

Make a report to the Board of the company advising them about the financial feasibility of this acquisition.

Net present values for 16% for ₹ 1 are as follows:





Years	1	2	3	4	5	6
PV	0.862	0.743	0.641	0.552	0.476	0.410

(ICAI SM, Jan'21 QP 6 marks, MTP Apr'24)

Solution :

Outflow for Tiger Ltd :

Issuing shares @ 15 per share 1 for every 2 shares in Leopard.

Existing Share count of Leopard	70,000
Swap ratio is 1 for 2	
Share issued to shareholders of leopard	$= 70,000 \times \frac{1}{2}$ = 35,000
Per share price INR	15
Total Amount paid to equity shareholders	$= 35,000 \times 15$ = 525,000
Debentures Issued	300,000
External Liabilities paid in INR	500,000 or 3,00,000
Less : Received	
Cash	(50,000)
Debts & Inventory realisation	(200,000)
Total Outflow/Consideration Paid	10,75,000 or 7.75.000

Inflow for Tiger Ltd:

Years	1-6	TV 6
CFAT	500,000	200,000
PVF for inflow @ 16% for 6 years	3.684	0.41
PVCF	$= 500,000 \times 3.684$ = 1,84,20,000	$= 200,000 \times 0.41$ = 82,000
Total PVCF	19,24,000	

NPV = Inflow less outflow = 19,24,000 - 10,75,000 or 7,75,000 = 849,000 or 11,49,000

NPV is positive and hence acquisition of leopard Ltd is feasible.

### 34. Illustration

B Ltd. Wants to acquire S Ltd. and has offered a swap ratio of 2:3 (2 shares for every 3 share of S Ltd.). Following information is available:

Particulars	B Ltd.	S Ltd.
Profit after tax (in ₹)	21,00,00	4,50,000
Equity shares outstanding (Nos.)	0	1,80,000
EPS (₹)	6,00,000	2.5
PE Ratio	3.5	7 times
Price quoting per share on BSE before the merger announcement (₹)	10 times	17.50
	35.00	

Required:

- The number of equity shares to be issued by B Ltd. for acquisition of S Ltd.
- What is the EPS of B Ltd. after the acquisition?



- (iii) Determine the equivalent earnings per share of S Ltd. and calculate per share gain or loss to shareholders of S Ltd.
- (iv) What is the expected market price per share of B Ltd. after the acquisition, assuming its PE Multiple remains unchanged?
- (v) Determine the market value of the merged firm.
- (vi) After the announcement of merger, price of shares of S Ltd. rose by 10% on BSE. Mr. X, an investor, having 10,000 shares of S Ltd. is having another investment opportunity, which yields annual return of 14% is seeking your advice whether he needs to offload the shares in the market or accept the shares from B Ltd.

Expected market price of share

[RTP May'22, Jan'21 QP (Old)]

Solution :

Given,

Particulars	B Ltd - Acquirer	S Ltd - target
Share O/s Number	6,00,000	1,80,000
PAT in INR	21,00,000	450,000
EPS in INR	$21,00,000/600,000$ = 3.5	$= 450,000/180,000$ = 2.5
PE Ratio	10	7
Market price Pre-merger	$= 3.5 \times 10 = 35$	$= 2.5 \times 7 = 17.5$

i)

Existing share count of S	180,000
Swap Ratio	2:3
Shares issued to shareholders of S	$= 180,000 \times 2/3$ $= 120,000$

ii)

Particulars	B Ltd (INR)	S Ltd (INR)	Total
PAT	21,00,000	4,50,000	25,50,000
Existing shares of B			600,000
New shares issued to shareholders of S			120,000
Total shares in B Post-merger			720,000
Post-merger EPS in INR per share			$= 25,50,000/720,000$ $= 3.5417$

iii)

Particulars	Amount
Post-merger EPS	3.5417
Equivalent EPS for Shareholders of S based on swap ratio of 2 shares for every 3 shares	$= 3.5417 \times 2/3$ $= 2.3611$
Pre-merger EPS per share for shareholder of S	2.5
Loss per shareholder of S in INR	$= 2.3611 - 2.5$ $= (0.1389)$

iv)

Post-merger EPS of B Ltd	3.5417
PE	10



Post-merger MP in INR

$$= 3.5417 \times 10$$

$$= 35.471$$

v)

Market Value in INR (PAT × PE)

$$= 25,50,000 \times 10$$

$$= 2,55,00,000$$

Market Value in INR (MP × Share count )

$$= 720,000 \times 35.471$$

$$= 2,55,00,000$$

vi)

Particulars	Amount
Pre-merger MP of S Ltd in INR	17.5
Increase in price on merger @10%	$= 17.5 \times 10\%$ $= 1.75$
Revised Price in INR	$= 17.5 + 1.75$ $= 19.25$
Equivalent EPS for shareholder of S Ltd	2.3611
New PE Ratio	10
Price per share for shareholder of S	$= 2.3611 \times 10$ $= 23.611$
Potential upside left assuming PE ratio of shares of B remains at 10x	$= [(23.611/19.25) - 1] \times 100$ $= 22.66\%$
Post-merger price of Shares of B Ltd	35.42
Equivalent Share value per share for S Ltd shareholder	$= 35.42 \times 2/3$ $= 23.61$
Potential upside left assuming PE ratio of shares of B remains at 10x	$= (23.61 / 19.25 - 1) \times 100$ $= 22.65\%$

Since there is further upside available of 22.65% which is higher than alternative opportunity of 14%, Mr. x should continue to hold shares of S and realise higher value.

Earnings yield = EPS/CMP

$$= 2.3611/19.25 \times 100$$

$$= 12.27\%$$

Opportunity Cost in %

14%

Since Earnings yield is lower than opportunity cost, offload S Ltd shares and invest in alternative opportunity.

### 35. Illustration

KMPS Limited wants to purchase BRB Ltd by exchanging 0.7 its shares for each share of BRB Ltd. Relevant financial data is as follows:

	KMPS	BRB
Outstanding Shares	20,00,000	8,00,000
EPS ₹	40	28
Market price per share ₹	250	160

- Illustrate the impact of merger on EPS of both companies.
- The management of M/s. BRB Ltd., has quoted share exchange ratio of 1:1 for the merger. Assuming that P/E ratio of M/s. KPMS Ltd. will remain unchanged after the merger, what will be the gain from merger for M/s. BRB Ltd?
- Find out the gain/loss to the shareholders of M/s. KPMS Ltd. if the exchange ratio is 1:1 Determine the maximum exchange ratio acceptable to share-holders of M/s. KPMS Ltd.

(Dec'21 QP 8 marks)



Solution:

i)

Particulars	KMPS	BRB	Combined
Outstanding Shares	20,00,000	800,000	
EPS in INR	40	28	
PAT in INR	= 20,00,000 × 40 = 8,00,00,000	= 800,000 × 28 = 2,24,00,000	10,24,00,000
MP per share	250	260	
PE Ratio	=250/40 = 6.25	= 260/28 =5.71	
Swap Ratio			0.7:1
Shares of KMPS issued to shareholders of BRB @ 0.7:1			=800,000 × 0.7 = 5,60,000
Revised share count of KMPS post-merger			25,60,000
Post-merger PAT of KMPS in INR			10,24,00,000
Share count of KMPS			25,60,000
Revised EPS of KMPS in INR			=10,24,00,000/25,60,000 = 40
Equivalent EPS of KMPS for shareholders of BRB			=40 × 0.7 = 28

There is no impact on EPS post-merger on shareholders of KMPS or BRB as the Swap ratio is in line with the ratios of EPS of both the companies

ii)

Particulars	Total
Revised Swap Ratio	1:1
Shares allotted based on this swap ratio	800,000
Total share count post-merger of KMPS	=20,00,00 +800,000 = 28,00,000
Post-merger PAT in INR	10,24,00,000
Post-merger EPS in INR	= 10,24,00,000/28,00,000 = 36.57
Post-merger PE assuming same as KMPS pre-merger	6.25
Post-merger Market price of KMPS in INR	= 36.57 × 6.25 = 228.57
Equivalent value per share of BRB @ swap ratio 1:1	228.57
Pre-merger share price of BRB	160
Gain made by shareholders of BRB per share in INR	= 228.57 - 160 = 68.57
Total gain made by shareholders of BRB in INR	=800,000 × 68.57 = 5,48,57,143

iii)

Particulars	Amount
Pre-merger Share price of KMPS in INR	250





Post-merger share price in INR	228.57
Loss per share for shareholder of KMPS in INR	=228.57 - 250 = (21.43)
Total shares of KMPS in Number	20,00,000
Total loss in INR for all shareholders of KMPS	= (21.43) × 20,00,000 = (4,28,57,143)

- iv) The shareholders of KMPS will not lose out if MP remains at ₹ 250 & PE @ 6.25 times. This implies post-merger EPS should be  $250/6.25$  i.e., ₹ 40

Post-merger EPS is at ₹ 40 when swap ration is 0.7 share of KMPS for every share of BRB as already computed in part (i).

So max exchange rate is 0.7 :1

### 36. Illustration

X Limited proposes to acquire Y Limited. The relevant financial details of the two firms prior to the merger announcement are as follows

Particulars	X Ltd	Y Ltd
Market price per share	₹ 80	₹ 40
No. of outstanding shares	10 Lakhs	5 Lakhs

The merger is expected to generate gains with a present value of ₹ 120 Lakhs. The X Ltd. will issue 1 share of it for 2 shares of Y Ltd.

You are required to find out the true cost of merger for X Ltd.

[Dec'21 QP (Old)]

Solution :

Particulars	X Ltd	Y Ltd	Total
CMP in INR	80	40	
Shares Outstanding in Lakhs	10	5	
Market Capitalisation in INR Lakhs	= $80 \times 10$ = 800	= $40 \times 5$ = 200	1000
Present Value of synergy Benefits in INR Lakhs			120
Share count of Y in Lakhs		5	
Swap Ratio		1 for 2 (1 share of X for 2 shares of Y)	
Shares issued in X Ltd in Lakhs to shareholders of Y in lakhs		= $5 \times \frac{1}{2}$ = 2.5	
Market Price per share in INR		80	
Total MV of shares issue to Y Ltd in INR Lakhs		= $2.5 \times 80$ = 200	
Market Capitalisation revised of X Ltd post-merger in INR Lakhs			
Share count in Lakhs		12.5	
Market Price per share in INR		80	





Market Value of X Ltd post-merger before synergy in INR Lakhs		=80 × 12.5 = 1,000	
Add : Present value of synergy benefits		120	
Market Value of X Ltd post-merger in INR Lakhs		=1,000 +120 = 1,120	

True Cost of merger :

Shares held by org shareholders of X in Lakhs		10
Shares held by shareholders of Y in X Ltd in Lakhs		2.5
Total Share count		12.5
% stake held by Y Ltd share holders		=2.5/12.5 × 100 = 20%
Value of shares held in X Ltd by Shareholders of Y Ltd in INR lakhs		=1,120 × 20% = 224
Price paid i.e shares issued to Shareholders of Y Ltd in INR Lakhs		200
True cost of merger in INR Lakhs		= 224 - 200 = 24

### 37. Illustration

SM Limited has a market capitalization of ₹ 3,000 crore and the current earnings per share (EPS) is ₹ 200 with a price earnings ratio (PER) of 15. The Board of directors is considering a proposal to buy back 20% of the shares at a premium which can be supported by the financials of the company. The Board expects post buy back market price per share (MPS) of ₹ 3057. Post buy back PER will remain same. The company proposes to fund the buy back by availing 8% bank loan since available resources are committed for expansion plans.

Applicable income tax rate is 30%. You are required to calculate

- The interest amount which can be paid for availing the bank loan
- The loan amount to be raised and
- The premium per share and percentage premium paid. over the current MPS.

[May 23'QP 8 marks, Jul'21 QP (Old)]

Solution :

Particulars	Amount (INR)
Market Capitalisation in Crores	3000
EPS	200
PE times	15
Price per share	= 200 × 15 = 3000
Share Outstanding	= 3000/3000 =1
Pre buy back PAT in INR CR	200
Tax Rate	30%
Pre buy back PBT in INR CR	= 200/(1-30%)= 285.7142
Share Bought Back	20%
Shares bought back	= 1Cr × 20% 20 Lakhs
Post buy back share price in INR	3,057
Post buy Back PE ratio ( times)	15
Post buy back EPS in INR	=3057/15=203.8
Post buy back share count in cr	=1 -0.2= 0.8
Post buy back PAT in INR Cr	=203.8 × 0.8= 163.04
Post buy back PBT in INR cr	=163.04/(1-30%)= 232.9142





- i) Interest amount paid in INR Crores = Pre-buyback - post-buyback  
= 285.71 - 232.91 = 52.80
- ii) Loan Amount = Interest Amount / Interest % = 52.80/8% = 660
- iii)

Particulars	Amount
Buy-Back amount in INR Crores	660
Shares bought back in INR	0.2
Price per share bought pack in INR	=660/0.2 = 3,300
Pre-buyback in INR	3000
Premia paid per share in INR for buy back	=3,300 - 3,000= 300
% Premia Paid	=300/3000 × 100= 10%

### 38. Illustration

Long Ltd., is planning to acquire Tall Ltd., with the following data available for both the companies:

	Long Ltd	Tall Ltd
Expected EPS	₹ 12	₹ 5
Expected DPS	₹ 10	₹ 3
No. of shares	30 Lakhs	18 Lakhs
Current market price per share	₹ 180	₹ 50

As per an estimate Tall Ltd., is expected to have steady growth of earnings and dividends to the tune of 6% per annum. However, under the new management the growth rate is likely to be enhanced to 8% per annum without additional investment.

- (i) Calculate the net cost of acquisition by Long Ltd., if ₹ 60 is paid for each share of Tall Ltd.
- (ii) If the agreed exchange ratio is one share of Long Ltd., for every three shares of Tall Ltd., in lieu of the cash acquisition as per (i) above, what will be the net cost of acquisition?
- (iii) Calculate Gain from acquisition.

(July'21 QP 8 marks, RTP Nov'24, MTP Mar'23)

Solution :

Particulars	Long-Acquirer	Tall-Target	Total
E1	12	5	
D1	10	3	
Shares Outstanding in Number	30,00,000	180,00,000	
Current Market Price	180	50	
PAT in INR-Expenses	= 30,00,000 × 12 =3,60,00,000	= 180,00,000 × 5 =90,00,000	4,50,00,000
Dividend in INR-ECP	=30,00,000 × 10 =3,00,00,000	54,00,000	





<b>Market Capitalisation in INR</b>	$=30,00,000 \times 180$ $=54,00,00,000$	$=180,00,000 \times 50$ $=9,00,00,000$	63,00,00,000
<b>PE Ratio</b>	$=180/12$ $=15$	$=50/5$ $=10$	
<b>G1 pre-merger</b>		6%	
<b>G1 post-merger</b>		8%	
<b>i) Method 1 : (Value of tall pre-merger)</b>			
<b>Gross cost of Acquisition</b>		60x18 Lakh shares	
<b>Gross cost of Acquisition in INR</b>		10,80,00,000	
<b>Less: Pre merger Market Capitalisation</b>		9,00,00,000	
<b>Net cost of Acquisition</b>		1,80,00,000	
<b>Method 2 : (Value of tall post-merger)</b>			
<b>Gross cost of Acquisition</b>		60x 18 lakh shares	
<b>Gross cost of Acquisition in INR</b>		10,80,00,000	
<b>Less: value of business acquired</b>		(13,77,00,000)	
<b>Net cost of Acquisition</b>		(2,97,00,000)	
<b>WN-1</b>			
<b>Value per share of Tall</b>	Pre-merger		
<b>PO</b>	50		
<b>D1</b>	3		
<b>G</b>	6%		
<b>DO</b>	$=3/(1+6\%)=2.830$		
<b>PO</b>			
<b>Ke</b>	$=6\%+3/50 \times 100=12\%$		
<b>PO Post Merger</b>			
<b>DO</b>	2.830		
<b>G</b>	8%		
<b>D1</b>	$=2.830/(1+8\%)=3.06\%$		
<b>Ke</b>	12%		
<b>PO revised</b>	$=3.06/(12\%-8\%)=76.5$		
<b>Revised Mcap</b>	$76.5 \times 18,00,000$		
<b>Revised Market Capitalisation or value of Tall</b>	13,77,00,000		





Particulars	Amount
Share swap of 1 share of Long for 3 shares of tall	
Price per share of Long	180
No of shares of Tall	18,00,000
Shares issued @ swap ratio of 1 for 3	=18,00,000 × 1/3 =6,00,000
Total value of shares issued at Current Market Price	10,80,00,000
Gross consideration in INR	10,80,00,000
<b>Method 1: Net consideration assuming CMP of tall</b>	
Gross consideration when shares are swapped	10,80,00,000
Less: Market Capitalization of tall	9,00,00,000
Net Consideration	<b>1,80,00,000</b>
<b>Method 2: Net consideration after computing value of tall post-merger</b>	
Gross consideration when shares are swapped	10,80,00,000
Les: value of tall post-merger (WN1)	(13,77,00,000)
Net Consideration	(2,97,00,000)

iii)

*EPS gain in case of cash payment cannot be computed as impact on int income / expense is not available*

*EPS gain only in case of share swap can be computed*

Particulars	Long	Tall	Combined
Pre-merger PAT in INR in Period 1	3,60,00,000	90,00,000	
Pre-merger PAT in INR in Period 0		=90,00,000/1.06 =84,90,556	
PAT 1 post-merger in INR	36,00,00,000	=84,90,556 × (1+8%) =91,69,811.32	4,51,69,811.3
Share count existing long			30,00,000
Share count new issued tall			6,00,000
Share count total			36,00,000
Post-merger EPS			=4,51,69,811.3/ 36,00,000





			=12.55
<i>Long limited shareholders EPS has gone up from Rs.12 to Rs.12.55</i>			
Increase of INR 0.55 i.e., 4.56%			4.56%
Impact on Equivalent EPS for shareholders of tall			
Post-merger EPS			12.55
Equivalent EPS at swap ratio of 1 for 3			=12.55/3 =4.18
Pre-merger EPS of Tall			5
Reduction in EPS for tall shareholders			=4.18/5 - 1 =(16.4)%
Market value / Share price Shareholders of Long			
Revised EPS			12.55
PE - assuming same pe continues			15
Revised Market Price in INR			=12.55 × 15 =188.21
Org Mkt Price			180
Increase in Market Price in Rs			=188.21-180 =8.21
Increase in Market Price in %			=8.21/180 × 100 =4.56%
No of shares held by old shareholders of long			30,00,000
Increase in Market Value for shareholders of long			=30,00,000 × 8.21 =2,46,22,642
Impact on shareholders of Tall			
Pre-merger share price			50
Post-merger equivalent share price			62.74
Increase in value per share in INR			=62.74-50 =12.74
Increase in total Market value			12.74 × 18 lakh shares
Increase in total Market value in INR for shareholders of tall			2,29,24,528
Gain from acquisition method 3			
Pre-merger Market Capitalisation	54,00,00,000	9,00,00,000	63,00,00,000



Post-merger PAT without inc earn			=3,60,00,000 +90,00,000 =4,50,00,000
Post-merger PAT With inc earnings			4,51,69,811.3
PE applicable			15
Post-merger value of company without increased earnings			=4,50,00,000 × 15 =67,50,00,000
Post-merger value of company with increased earnings			=4,51,69,811.3 × 15 =67,75,47,170
Gain from acquisition - without increased earnings			=67,50,00,000 - 63,00,00,000 =4,50,00,000
Gain from acquisition - with increased earnings			=67,75,47,170 - 63,00,00,000 =4,75,47,170

### 39. Illustration

ICL is proposing to take over SVL with an objective to diversify. ICL's profit after tax (PAT) has grown @ 18 per cent per annum and SVL's PAT is grown @ 15 per cent per annum. Both the companies pay dividend regularly. The summarised Profit & Loss Account of both the companies are as follows:

Particulars	₹ in Crores	
	ICL	SVL
Net Sales	4,545	1,500
PBIT	2,980	720
Interest	750	25
Provision for Tax	1,440	445
PAT	790	250
Dividends	235	125

	ICL		SVL	
Fixed Assets				
Land & Building (Net)	720		190	
Plant & Machinery (Net)	900		350	
Furniture & Fixtures (Net)	30	1,650	10	550
Current Assets		775		580
Less: Current Liabilities				
Creditors	230		130	
Overdrafts	35		10	
Provision for Tax	145		50	
Provision for dividends	60	470	50	240
Net Assets		1,955		890
Paid up Share Capital (₹ 10 per share)	250		125	
Reserves and Surplus	1,050	1,300	660	785
Borrowing		655		105
Capital Employed		1,955		890

Market Price Share (₹)	52	75
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ICL's Land & Buildings are stated at current prices. SVL's Land & Buildings are revalued three years ago. There has been an increase of 30 per cent per year in the value of Land & Buildings.

SVL is expected to grow @ 18 per cent each year, after merger.

ICL's Management wants to determine the premium on the shares over the current market price which can be paid on the acquisition of SVL. You are required to determine the premium using:

- Net Worth adjusted for the current value of Land & Buildings plus the estimated average profit after tax (PAT) for the next five years.
- The dividend growth formula.
- ICL will push forward which method during the course of negotiations?

Period (t)	1	2	3	4	5
FVIF (30%, t)	1.300	1.690	2.197	2.856	3.713
FVIF (15%, t)	1.15	2.4725	3.9938	5.7424	7.7537

(Nov'20 QP 12 marks, MTP Oct'24)

Solution :

i)

Particulars	Amount(INR Crores)
Book value of Assets	890
Book value of Land & Building	190
Revised value of land and Building after 30% YoY increase#	=190 × (1+30%) <sup>3</sup> = 417.43
Increase in value of Land and Building	= 417.43 - 190 =227.43
Less : Borrowing	(105)
Adjusted Net Worth	1012.43
PAT for CY	250
FVIF (18%,5 Years) (WN)	8.442
FVIF (15%,5 Years)	7.7537
Cumulative profits for next 5 years @18%	=250 × 8.442 =2,110.5
@15%	=250 × 7.7537 =1,938.425
Average Profit @18%	=2,110.5/5 =422.10
@15%	=1,938.425/5 =387.69
Adjusted NW + Average future PAT @ 18%	=1,012.43 + 422.10 =1,434.53
Adjusted NW + Average future PAT @ 15%	=1,012.43 + 387.69 =1,400.12





Paid Up share capital in INR Crores	125
Face Value per share in INR	10
Share count in Number	12.5
Price per share considered @ 18% PAT growth	$=1,434.53/12.5$ $=114.76$
Price per share considered @ 15% PAT growth	$=1,400.12/12.5$ $=112.01$
CMP in INR	75
Premium per share considered @ 18% PAT growth	$=(114.76/75)-1$ $=53.02\%$
Premium per share considered @ 15% PAT growth	$=(112.01/75)-1$ $=49.35\%$

# Land & Building Book value of ₹ 190 Cr is same as what it was 3 years ago and no depreciation / additions / deletions were / are made to it in last 3 years.

WN :

Year	0	1	2	3	4	5
FVF @18%	1	$=1 \times 1.18$ $=1.18$	$=1.18 \times 1.18$ $=1.3924$	$=1.3924 \times 1.18$ $=1.6430$	$=1.6430 \times 1.18$ $=1.9388$	$=1.9388 \times 1.18$ $=2.2878$
FVIF for 5 Years @18%				8.4420		

ii)

Particulars	Amount (INR)
P0	75
D0 Total in Crores	125
Share count in Crores	12.5
D0 per share	$=125/12.5$ $=10$
g for CMP	15%
D1 per share	$=10 \times 1.15$ $=11.5$
Ke	$= D1/P0 + g = 11.5/75 + 15\%$ $=30.33\%$
Value of SVL based on revised growth	
Ke	30.33%
D0	10
g	18%
D1	$=10 \times 1.18$ $=11.8$
P0	$=D1/(Ke-g) = 11.8/(30.33\%-18\%)$ $=95.68$
CMP in INR	75
Premium of DDM based valuation over CMP	$=(95.68/75) - 1$ $=27.57\%$



iii) As premium over CMP is lower in case of DDM based valuation, ICL will push for Second method during negotiations.

#### 40. Illustration

ABC Ltd. is intending to acquire XYZ Ltd. by way of merger and the following information is available in respect of these companies:

	ABC Ltd.	XYZ Ltd.
Total Earnings (E) (in lakh)	₹ 1200	₹ 400
Number of outstanding shares (S) (in lakh)	400	200
Price earnings ratio (P/E)	8	7

- (a) Determine the maximum exchange ratio acceptable to the shareholders of ABC Ltd., if the P/E ratio of the combined firm is expected to be 8?
- (b) Determine the minimum exchange ratio acceptable to the shareholders XYZ Ltd., if the P/E ratio of the combined firm is expected to be 10?

Note: Make calculation in lakh multiples and compute ratio up to 4 decimal points.

(RTP May'21 New & Old)

Solution :

Particulars	ABC - Acquirer	XYZ - Target	Combined
PAT INR Lakhs	1200	400	1600
Share count Lakhs	400	200	
EPS in INR	= 1200/400 = 3	= 400/200 = 2	
PE Ratio	8	7	
Current Market Price	= 3 × 8 = 24	= 2 × 7 = 14	
Market Capitalisation in Lakhs	= 400 × 24 = 9,600	= 200 × 14 = 2,800	

a)

Particulars	Amount
Combined PAT in INR Lakhs	1600
PE (Combined Firm)	8
Post-merger Market Capitalisation	= 1,600 × 8 = 12,800
Least value gain for ABC mean max gain for XYZ This will happen when ABC shareholders' Market Capitalisation remains the same	9,600
Balance Market value attributable to shareholders of XYZ	= 12,800 - 9,600 = 3,200
Implies % stake held by them post-merger	= 3,200/12,800 × 100 = 25%
Pre-merger share count of ABC in Lakhs	400
Post-merger % stake held by ABC	= 100% - 25%





	=75%
Total share count post-merger of ABC in Lakhs	=400/75% =533.33
Shares held by XYZ post-merger in Lakhs	= 533.33 - 400 =133.33
Shares of XYZ pre-merger in Lakhs	200
Swap ratio / exchange ratio for shareholders of XYZ is 0.6667 shares of ABC for 1 share of XYZ	=133.33/200 = 0.667

b)

Particulars	Amount (INR Lakhs)
Post-merger Profit	1,600
PE of Combined Firm	10
Post-merger Market Capitalisation	= 1,600 × 10 = 16,000
Least value for XYZ implies max value is for ABC. Least value expected by XYZ is their existing MV in INR Lakhs	2,800
Post-merger MV of shares held by ABC	=16,000 - 2,800 =13,200
Stake held by ABC post-merger	=13,200/16,000 = 82.5%
Shares held pre-merger by ABC in Lakhs	400
Total shares post-merger in Lakhs	=400/82.5% = 484.85
Increase in shares / shares allotted to XYZ	=484.85 - 400 = 84.85
Pre-merger share count of XYZ in lakhs	200
So, for 200 lakhs shares of XYZ its shareholders will get 84.85 lakh shares	=84.85/200 = 0.4242

That implies a swap ration of 0.4242 shares of ABC per 1 share of XYZ.

#### 41. Illustration

Cauliflower Limited is contemplating acquisition of Cabbage Limited. Cauliflower Limited has 5 lakh shares having market value of ₹ 40 per share while Cabbage Limited has 3 lakh shares having market value of ₹ 25 per share. The EPS for Cabbage Limited and Cauliflower Limited are ₹ 3 per share and ₹ 5 per share respectively. The managements of both the companies are discussing two alternatives for exchange of shares as follows:

- (i) In proportion to relative earnings per share of the two companies.
- (ii) 1 share of Cauliflower Limited for two shares of Cabbage Limited.

Required:

- (i) Calculate the EPS after merger under both the alternatives.
- (ii) Show the impact on EPS for the shareholders of the two companies under both the alternatives.





Solution :

i)

Particulars	Cauliflower Acquirer	Cabbage (Target)	Combined
Share count (Lakhs)	5	3	
Current Market Price	40	25	
Market Capitalisation (INR Lakhs)	=40 × 5 =200	=3 × 25 =75	
EPS in INR	5	3	
PAT in INR Lakhs	=5 × 5 =25	= 3 × 3 = 9	34
EPS Ratio	5	3	
<i>Swap ratio / exchange ratio will be for 5 shares of cabbage 3 shares of cauliflower or for every share of cabbage 0.6 shares of cauliflower</i>			
Current share count in Lakhs		3	
Shares issued in Acquirer based on Swap ratio 3:5 in Lakhs		=3 × 0.6 =1.8	
Total share count post-merger		=5+1.8 =6.8	
Post-merger PAT in INR Lakhs		34	
Post-merger EPS in INR		=34/6.8 =5	
<i>Impact of merger on shareholders of both companies</i>			
Pre-merger EPS	5	3	
Post-merger EPS	5		
Post-merger Equivalent EPS		=5 × 0.6 =3	
Impact	0%	0%	

When Merger swap ratio is based on pre-merger EPS, the merger will not have any impact on post-merger EPS of either company.

ii) Swap ratio of 1 share of cauliflower for 2 shares of cabbage

Particulars	Cauliflower	Cabbage	Combined
Pre-merger share count in Lakhs		3	
Share issued on merger in Lakhs		=3 × $\frac{1}{2}$ =1.5	
Post-merger PAT in Lakhs			34
Post-merger Share count in Lakhs	5	1.5	6.5
Post-merger EPS in INR			=34/6.5 =5.23





<b>Impact of merger in both the companies</b>			
Pre-merger EPS	5	3	
Post-merger EPS	5.23		
Post-merger Equivalent EPS		=5.23 × 0.5 =2.62	
Impact Gain/(loss) in INR	0.23	(0.38)	
Impact Gain/(loss) in %	=(5.23/5)-1 =4.62%	=(0.38)/3 -1 =(12.82%)	

Hence, EPS for shareholders of Cauliflower is up by 4.62% whereas EPS for shareholders of cabbage is down by 12.82%.

#### 42. Illustration

X Ltd. is studying the possible acquisition of Y Ltd. by way of merger. The following data are available in respect of both the companies.

Particulars	X Ltd.	Y Ltd.
Market Capitalization (Rs.)	75,00,000	90,00,000
Gross Profit Ratio	20%	20%
Inventory Turnover Ratio	5 times	4 times
Debtor Turnover Ratio	3 times	5 times
12% Debenture (Rs.)	10,00,000	-
10% Debenture (Rs.)	-	14,40,000
No. of Equity Shares	1,00,000	60,000
Operating Expenses	86%	78%
Corporate Tax Rate	30%	30%
Closing Stock (Rs.)	15,00,000	5,00,000
Debtors (Rs.)	10,00,000	8,00,000

You are required to calculate:

- Swap ratio based on EPS & MPS respectively as weightage of 40% and 60%.
- Post-Merger EPS
- Post-Merger market price assuming same PE Ratio of X Ltd.
- Post-Merger gain or loss in EPS.

(MTP May'20 New & Old)

**Solution :**

i)

Particulars	X Ltd - Acquire r	Y Ltd - Target	Combined
Market Capitalisation (INR Lakhs)	75	90	
GP Ratio	20%	20%	
Inventory Turnover ratio	5	4	
Closing Stock (INR Lakhs)	15	5	
COGS = Inventory T/o × Closing Stock (INR Lakhs)	=5 × 15 = 75	= 4 × 5 =20	





Debtors Turnover Ratio	3	5	
Closing Debtors	10	8	
Sales (INR Lakhs)	= 3 × 10 =30	= 5 × 8 = 40	
<i>Sales / COGS arrived at based on Drs TO ratio do not look meaningful and hence ignoring them</i>			
COGS (INR Lakhs)	75	20	
GP Ratio	20%	20%	
COGS%	=1 - 20% = 80%	=1 - 20% = 80%	
Sales (INR Lakhs)	= 75/80% =93.75	=20/80% =25	
Opex Ratio	86%	78%	
Opex (Including COGS%)	86%	78%	
Total operating exp including COGS Lakhs (Sales × Opex%)	= 93.75 × 86% =80.625	= 25 × 78% =19.5	
EBIT (INR Lakhs)	=93.75 - 80.625 =13.125	=25 - 19.5 =5.5	
Interest Rate %	12%	10%	
Debentures in INR Lakhs	10	14.4	
Interest INR Lakhs	= 10 × 12% =1.2	= 14.4 × 10% = 1.44	
PBT (INR Lakhs) (EBIT - Interest)	=13.125 - 1.2 = 11.925	= 5.5 - 1.44 = 4.06	
Tax @ 30%	= 11.925 × 30% = (3.5775)	= 4.06 × 30% =(1.218)	
Profit After Tax	= 11.925 - 3.5775 = 8.3475	= 4.06 - 1.218 =2.842	11.1895
Number of equity shares in Lakhs	1	0.6	
EPS in INR	= 8.3475/1 = 8.3475	= 2.842/0.6 = 4.7367	
Market Price in INR	= 75/1 = 75	= 90/0.6 = 150	
PE Ratio	= 75/8.3475 = 8.98	= 150/4.7367 =31.67	
Market price in INR	75	150	
Ratio based on Market Price	1:2		

*Swap ratio will be 2 shares of X for 1 share of Y*



EPS in INR	8.3475	4.7367
Ratio based on EPS	1.7623:1	

Swap ratio will be for 1.7623 shares of Y 1 share of X or 0.5674 shares of X for 1 share of 1

Particulars	MP Basis	EPS
Shares of X for 1 share of Y	2	0.5674
Weight	60%	40%
Weighted Average	= 2 × 60% = 1.2	= 0.5674 × 40% = 0.22696

The combined SWAP Ratio Is 1.4270 shares of X for 1 share of Y

ii)

Particulars	X Ltd	Y Ltd	Combined
Post-merger PAT (INR Lakhs)			11.1895
Shares issued to shareholders of Y Ltd		= 0.6 × 1.420 = 0.8561	
Shares held by shareholders of X	1		
Post-merger share count			= 1 + 0.8561 = 1.8561
Post-merger EPS			= 11.1895/1.8561 = 6.0283
Post-Merger PE (Same as that of X pre-merger)			8.98
Post-Merger EPS in INR			6.0283
Post-merger MP in INR			= 8.98 × 6.0283 = 54.16
Pre-merger EPS in INR	8.3475	4.7367	
Post-merger EPS in INR	6.0283	6.0283	
Post-merger EPS in INR for Equivalent shares		= 6.0283 × 1.427 = 8.6023	
Change in EPS in INR	= 6.0283 - 8.3475 = (2.3192)	= 8.6023 - 4.7367 = 3.8657	
Change in EPS in %	= (2.3192)/8.3475 = (27.78%)	= 3.8657/4.7367 × 100 = 81.61%	

### 43. Illustration

C Ltd. and P Ltd. both companies operating in the same industry decided to merge and form a new entity S Ltd. The relevant financial details of the two companies prior to merger announcement are as follows:

	C Ltd.	P Ltd.
Annual Earnings after Tax (Rs. lakh)	10000	5800
No. Shares Outstanding (lakh)	4000	1000
PE Ratio (No. of Times)	8	10





The merger will be affected by means of stock swap (exchange) of 3 shares of C Ltd. for 1 share of P Ltd.

After the merger it is expected that due to synergy effects, Annual Earnings (Post Tax) are expected to be 8% higher than sum of the earnings of the two companies individually. Further, it is expected that P/E Ratio of S Ltd. shall be average of P/E Ratios of two companies before the merger.

You are required to determine the extent to which shareholders of P Ltd. will be benefitted per share from the proposed merger.

(MTP Apr'21 New & Old)

Solution :

Particulars	C Ltd	P Ltd	Combined S Ltd
PAT INR Lakhs	10,000	5,800	15,800
Synergy Benefits @ 8% in INR Lakhs			= 15,800 × 8% = 1,264
Revised PAT in INR Lakhs			17,064
Share Outstanding in Lakhs	4,000	1,000	
EPS in INR	2.5	5.8	
PE Ratio	8	10	
PE ratio of S at Average of C and P			= (8+10)/2 = 9
Market Price in INR	= 2.5 × 8 = 20	= 5.8 × 10 = 58	
Swap ratio			3 of C for 1 of P
Shares in C Ltd issued to shareholders of P ( Lakhs)			= 1,000 × 3 = 3,000
Existing shares of C in Lakhs			4,000
Total share count in S Ltd Lakhs			7,000
Post-merger PAT in Lakhs			17,064
Post-merger share count in INR Lakhs			7,000
Post-merger EPS in INR			= 17,064/ 7,000 = 2.4377
Post-merger PE			9
Post-merger Price in INR			= 2.4377 × 9 = 21.94
Equivalent EPS of S for shareholder of P			= 2.4377 × 3 = 7.31
EPS of S × swap ratio			
Equivalent Price of S for shareholder of P in INR			
MP of S × Swap ratio			65.82
Pre-merger EPS of P in INR			5.8
Pre-Merger Share price of P in			58





Increase in EPS per share in INR			= 7.31 - 5.80 = 1.51
Increase in Value per share in INR			= 65.82 - 58 = 7.82
Increase in EPS per share in % (W.r.t MRP)			= $1.51/5.8 \times 100$ = 26.09%
Increase in Value per share in % (W.r.t MP)			= $7.82/58 \times 100$ = 13.48%

#### 44. Illustration

A Ltd. (Acquirer company's) equity capital is ₹ 2,00,00,000. Both A Ltd. and T Ltd. (Target Company) have arrived at an understanding to maintain debt equity ratio at 0.30 : 1 of the merged company. Pre-merger debt outstanding of A Ltd. stood at ₹ 20,00,000 and T Ltd at ₹ 10,00,000 and marketable securities of both companies stood at ₹ 40,00,000.

You are required to determine whether liquidity of merged company shall remain comfortable if A Ltd. acquires T Ltd. against cash payment at mutually agreed price of ₹ 65,00,000.

(RTP May'15)

Solution :

Particulars	A Ltd	T Ltd	A Ltd (Merged)
Equity Capital in INR	2,00,00,000	NA	2,00,00,000
Debt Equity Ratio Max permissible			0.3:1
Max debt in combined entity			= 2,00,00,000 × 0.3 = 60,00,000
Existing Debt (INR)	20,00,000	10,00,000	30,00,000
Balance Debt that can be taken in INR			= 60,00,000 - 30,00,000 = 30,00,000
Combined Value of potential Marketable Securities in INR			40,00,000
Total cash available for acquisition including cash from potential debt in INR			= 30,00,000 + 40,00,000 = 70,00,000
Consideration for Acquisition of T Ltd			65,00,000
Further liquidity available within the D:E ratio cap of 0.3:1 is			= 70,00,000 - 65,00,000 = 5,00,000

Yes the liquidity of the merger company will be comfortable to discharge the purchase obligation of INR 65 lakhs towards acquisition of T Ltd.





## 45. Illustration

ABC Ltd. is a company operating in the software industry. It is considering the acquisition of XYZ Ltd. which is also into software industry. The following information are available for the companies:

	ABC Ltd.	XYZ Ltd.
Earnings after tax (₹)	9,00,000	2,40,000
Number of equity shares	1,50,000	60,000
P/E ratio (no. of times)	14	10

ABC Ltd. is planning to offer a premium of 25% over the market price of XYZ Ltd. Required:

- What is the swap ratio based on current market price?
- Find the number of shares to be issued by ABC Ltd. to the shareholders of XYZ Ltd.
- Compute the new EPS of ABC Ltd. after merger and comment on the impact of merger.
- Determine the market price of the share when PE Ratio remains unchanged
- Compute the market price when PE declines to 12 and comment on the results

[May-25 Similar 4M Nov'19 QP (Old)]

**Solution :**

Particulars	ABC Ltd	XYZ Ltd	ABC Post-Merger
PAT INR	900,000	240,000	11,40,000
Share Count	150,000	60,000	
EPS	=900,000/150,000 =6	=240,000/60,000 =4	
PE Ratio (Times)	14	10	
Market Price in INR	=6 × 14 =84	=4 × 10 =40	
Market Capitalisation In INR	= 150,000 × 84 = 1,26,00,000	= 60,000 × 40 = 240,000	
CMP	84	40	
Premium over MP - 25%		10	
Revised Prices for Swap Ratio	84	50	
Revised Prices for Swap Ratio	=84/50 =1.68	=50/50 =1	

For every 1.68 shares of XYZ one share of ABC is allotted or For every 1 share of XYZ 0.5952 shares of ABC are allotted

Number of shares to be issued to shareholders of XYZ			
Share count of XYZ	60,000		
No of shares to be allotted based on swap ratio	= 60,000 × 1/1.68 = 35,714		
Existing Shares in ABC			150,000
New Shares Issued			35,714





Total Post-merger share count			185,714
Post-merger PAT in INR			11,40,000
Post-merger EPS in INR			6.1385

Assuming PE ratio ABC remains at 14 times its earnings the impact of the merger is as follows

Impact on EPS			
Pre-merger EPS in INR	6	4	
Equivalent EPS of XYZ shareholders in ABC for 1 share of XYZ based on swap ratio		$6.1385 \times 0.5952$	
Post-merger EPS in INR	6.1385	3.6536	
Increase / ( Dec) in EPS INR	$= 6.1385 - 6$ $= 0.1385$	$= 3.6536 - 4$ $= (0.3464)$	
Increase / ( Dec) in EPS %	$= 0.1385/6 \times 100$ $= 2.31\%$	$= (0.3464)/4 \times 100$ $= (8.66\%)$	
Impact on Market Price			
Pre-merger MP in INR	84	40	
Post-merger EPS	6.1385	6.1385	
Post-merger PE	14	14	
Post-merger MP	$= 6.1385 \times 14$ $= 85.94$	$= 6.1385 \times 14$ $= 85.94$	
Post-merger Equivalent MP in INR per share of XYZ at swap ratio of 0.5952		$= 85.94 \times 0.5952$ $= 51.15$	
Change in MV per share post-merger in INR	$= 85.94 - 84$ $= 1.94$	$= 51.15 - 40$ $= 11.15$	
Change in MV per share post-merger in %	$= 1.94/84 \times 100$ $= 2.31\%$	$= 11.15/40 \times 100$ $= 27.88\%$	

The impact of merger is Positive on EPS as well as MP front for shareholders of ABC Ltd

The impact of merger is negative on EPS and positive on MP for shareholders of XYZ Ltd

v) When PE Ratio is 12			
Post-merger EPS			6.1385
			12





Post-merger MP in INR			$= 6.1385 \times 12$ $= 73.66165$
Pre-merger MP in INR	84	40	
Post-merger Equivalent MP	73.66	$73.66 \times 0.5952$	
Post-merger Equivalent MP	73.66	$= 73.66 \times 0.5952$ $= 43.84$	
Change in MP per share in INR gain / ( loss)	$= 84 - 73.66$ $= 10.34$	$= 43.84 - 40$ $= 3.84$	

The MV per share has gone down for shareholder of ABC and it has increased for shareholder of XYZ.

#### 46. Illustration

Given is the following information:

	Day Ltd.	Night Ltd.
Net Earnings	₹ 5 crores	₹ 3.5 crores
No. of Equity Shares	10,00,000	7,00,000

The shares of Day Ltd. and Night Ltd. trade at 20 and 15 times their respective P/E ratios. Day Ltd. considers taking over Night Ltd. By paying ₹ 55 crores considering that the market price of Night Ltd. reflects its true value. It is considering both the following options:

- Takeover is funded entirely in cash.
- Takeover is funded entirely in stock.

You are required to calculate the cost of the takeover and advise Day Ltd. on the best alternative. (May'19 QP 8 marks)

Solution :

Particulars	Day	Night	Combined
PAT in Crores	5	3.5	8.5
Share Count in Crores	0.1	0.07	
EPS in INR	$= 5/0.1$ $= 50$	$= 3.5/0.07$ $= 50$	
PE Ratio	20	15	
MP in INR	$= 50 \times 20$ $= 1000$	$= 50 \times 15$ $= 750$	
Market Capitalisation in Crores	$= 1000 \times 0.1$ $= 100$	$= 750 \times 0.07$ $= 52.5$	152.5
Purchase Consideration in INR Crores when paid in Cash		55	
Net Cost of takeover in INR Crores = Price Paid less Value Received		$= 55 - 52.5$ $= 2.5$	
Purchase consideration in Crores		55	
Price per share of Day Ltd in INR		1000	





Shares issued in Day Ltd in exchange for acquiring the business of Night Ltd		=55 Cr/1000 = 550,000	
<b>In case combined Market Assets remains same as pre-merger value of both firms then</b>			
Post-merger Market Capitalisation of combined entity is in INR Cr			152.5
Share count of Day Ltd			10,00,000
Share issued to Night share holding			550,000
Total share count Post-merger			15,50,000
Stake held by Shareholders of Night post-merger			=550,000/15,50,000 × 100 = 35.48%
MV of stake held by Shareholders of Night post-merger in INR Crores			=152.5 × 35.48% = 54.11
MV of Night Pre merger in INR Crores			52.50
Purchase Consideration in INR Crores			55
Consideration Actually received by night share holders - What was supposed to be paid			= 54.11 - 55 = -0.887
-0.887 is a net benefit & not a cost for Day Ltd's shareholders			
<i>Given that the cost of acquisition is negative in case the takeover is funded by stock as compared to ₹2.5 Cr of cost when the merger is funded by cash, it is better to fund the takeover through issuance of shares</i>			
<b>If Combined Entity PE is 20 then the solution will be as below</b>			
Acquirer Pre-merger PE			20
Share-count in Number			15,50,000
Post-merger PAT in INR Crores			8.5
Post-merger PE is also assumed at			20
Post-merger Market Capitalization in Crores			=20 × 8.5 = 170
Stake of Night limited Shareholders in Day limited			35.48%
Value derived by Shareholders of Night Limited			Total Market Capitalisation × Night Stake = 170 × 35.48% = ₹60.32Cr
Alternative Cost of Merger			₹60.32 cr - ₹55 Cr = 5.32 Cr



Value of stake held by Shareholders of Day Limited			= $170 \times 64.52\%$ = ₹109.68Cr
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If post acquisition PE is same as acquirer PE then both companies have gained in the merger process and cost of merger is lower in cash alternative as compared to stock swap

#### 47. Illustration

ABB Ltd. has a surplus cash balance of ₹ 180 lakhs and wants to distribute 50% of it to the equity shareholders. The company decides to buyback equity shares. The company estimates that its equity share price after re-purchase is likely to be 15% above the buyback price. if the buyback route is taken.

Other information is as under:

- Number of equity shares outstanding at present (Face value ₹ 10 each) is ₹ 20 lakhs.
- The current EPS is ₹ 5.

You are required to calculate the following:

- The price at which the equity shares can be re-purchased, if market capitalization of the company should be ₹ 400 lakhs after buy back.
- Number of equity shares that can be repurchased
- The impact of equity shares re-purchase on the EPS, assuming that the net income remains unchanged

(Nov-24 Similar 4M, May'19 QP 8 marks)

Solution :

i)

Particulars	Amount (INR)
Surplus Cash in Lakhs	180
Buyback Distribution %	50%
Buyback Distribution in INR Lakhs	= $180 \times 50\%$ = 90
Number of equity shares in Lakhs	20
Face Value per share	10
Total share Capital in Lakhs	200
Current EPS in INR	5
PAT in Lakhs	= $20 \times 5$ = 100
Post-Buyback Market Capitalisation in Lakhs	400
Current Market Price	P
Post-Buyback Market price in INR	1.15P
Current Market Capitalisation in Lakhs	= 20 Lakhs × P
Post-Buyback Market Capitalisation in Lakhs	= Post Buyback MP × Post Buyback Shares
Post Buyback share count	= Pre Buyback share count - Numbers of Shares bought back
Post Buy back Share count in Lakhs	= 20 Lakhs Shares - 90Lakhs/P
Post Buyback Market Capitalisation in INR Lakhs	INR 400 Lakhs





$$400 \text{ Lakhs} = \text{Post buy back shares} \times \text{post buy back MP}$$

$$400 \text{ Lakhs} = (20L - 90L/P) \times 1.15P$$

$$400 \text{ Lakhs} = (20LP - 90L) \times 1.15$$

$$(400 \text{ Lakhs}/1.15) + 90L = 20LP$$

$$437.83/20L = P$$

$$P = \text{INR } 21.89$$

Hence CMP is INR 21.89

ii)

$$\text{No of equity shares that can be Repurchased} = \text{Total Buyback Value/Price per share}$$

$$= 90L/21.89$$

$$= 4,11,147$$

iii)

PAT Pre & Post Buy Back in INR Lakhs	100
Post Buyback share count	= 20 Lakhs - 4,11,147 = 15,88,853
Post Buyback EPS in INR	6.29
Pre Buyback EPS in INR	5
Increase in EPS In INR	= 6.29 - 5 = 1.29
Increase in EPS in %	= 1.29/5 × 100 = 25.88%

#### 48. Illustration

AXE Ltd. is interested to acquire PB Ltd. AXE has 50,00,000 shares of ₹ 10 each, which are presently being quoted at ₹ 25 per share. On the other hand PB has 20,00,000 share of ₹ 10 each currently selling at ₹ 17. AXE and PB have EPS of ₹ 3.20 and ₹ 2.40 respectively.

You are required to:

- Show the impact of merger on EPS, in case if exchange ratio is based on relative proportion of EPS.
- Suppose if AXE quote an offer of share exchange ratio of 1:1, then should PB accept the offer or not, assuming that there will be no change in PE ratio of AXE after the merger.
- The maximum ratio likely to acceptable to management of AXE.

(RTP May'12)

Solution :

Particulars	AXE Ltd - Acquirer	PB Ltd - Target	Combined
Share count in Lakhs	50	20	
Face Value in INR	10	10	
Share capital in Lakhs	= 50 × 10 = 500	= 20 × 10 = 200	
Market Price of Shares in INR	25	17	
Market Capitalisation in Lakhs	= 50 × 25 = 1250	= 20 × 17 = 340	1590
EPS in INR	3.2	2.4	
PE Times	= 25/3.2= 7.81	= 17/2.4= 7.08	
PAT in INR Lakhs	= 50 × 3.2 = 160	= 20 × 2.4 = 48	208





a)

Particulars	Axe Ltd	PB Ltd
EPS	3.2	2.4
Ratio of EPS	4:3	
Swap ratio is	For 4 shares of target 3 shares of acquirer	
Shares allotted to shareholders of Target in Acquirer Axe		
Existing share count of PB	20	
Shares allotted to acquirer in Lakhs	$= 20 \times \frac{3}{4}$ = 15	
Existing shares of Axe in Lakhs	50	
Post-merger share count in Lakhs	65	
Post-merger PAT in Lakhs	208	
Post-Merger EPS in INR	$= 208/65$ = 3.2	
Impact of merger in Axe	NIL	
Impact on PB		
Post-merger EPS	3.2	
Post-merger Equivalent EPS	$= 3.2 \times \frac{3}{4}$ = 2.4	
Pre-merger EPS of PB Ltd	2.4	
Impact of Merger on EPS of PB the target	NIL	

b)

Particulars	Amount(INR)
Existing share count of PB in Lakhs	20
Shares allotted in Axe in Ratio 1:1	20
Shares of acquirer Axe pre-merger	50
Total share count in Lakhs post-merger	70
Post-merger PAT in INR Lakhs	208
Post-merger EPS in INR	$= 208/70$ = 2.97
Post-merger PE Ratio	7.81
Post-merger price per share of axe in INR	$= 7.81 \times 2.97$ = 23.21

Since pre-merger price per share of PB is ₹ 17 vs post-merger price of ₹ 23.21, PB should accept the offer of shares at 1:1 exchange ratio.

c)

Particulars	Amount
Post-merger PAT in Lakhs	208
Post-merger PE	7.81
Post-merger Market Capitalisation in INR Lakhs	$= 208 \times 7.81$ = 1625
Max value to PB means minimum value to Axe	





Min value acceptable to Axe in INR Lakhs is its pre-merger Market Capitalisation	1250
Market Capitalisation in INR Lakhs attributable to PB	= 1625 - 1250 = 375
Price per share of Axe in INR allotted to PB	25
Shares of Axe allotted to PB in Lakhs	= 375/25 = 15
Existing share count of PB in Lakhs	20

Swap ratio is for 20 lac shares 15 lac shares are allotted i.e., for 1 share 0.75 shares are allotted. Hence, For 1 share of PB Ltd 0.75 shares of Axe Ltd are allotted.

#### 49. Illustration

Two companies Bull Ltd. and Bear Ltd. recently have been merged. The merger initiative has been taken by Bull Ltd. to achieve a lower risk profile for the combined firm in spite of fact that both companies belong to different industries and disclose a little co-movement in their profit earning streams. Though there is likely to synergy benefits to the tune of ₹ 7 crore from proposed merger. Further both companies are equity financed and other details are as follows:

	Market Capitalization	Beta
Bull Ltd.	₹ 1000 crore	1.50
Bear Ltd.	₹ 500 crore	0.60

Expected Market Return and Risk-Free Rate of Return are 13% and 8% respectively. Shares of merged entity have been distributed in the ratio of 2:1 i.e. market capitalization just before merger. You are required to:

- Calculate return on shares of both companies before merger and after merger.
- Calculate the impact of merger on Mr. X, a shareholder holding 4% shares in Bull Ltd. and 2% share of Bear Ltd.

(RTP Nov'15)

Solution :

a)

Particulars	Bull Ltd	Bear Ltd	Combined
Market Capitalisation in INR Crores	1000	500	
Beta	1.5	0.6	
MR	13%	13%	13%
RF	8%	8%	8%
ER = $R_f + B (MRP) -$ Pre merger	$= 8\% + 1.5 \times (13\% - 8\%)$ $= 15.5\%$	$= 8\% + 0.6 \times (13\% - 8\%)$ $= 11\%$	
Ratio of holding in Post-merger Company	2	1	3
Beta	1.5	0.6	$= 3.6/3$ $= 1.2$
Weighted Beta	$= 2 \times 1.5$ $= 3$	$= 1 \times 0.6$ $= 0.6$	3.6
	Beta	Weight	Weighted Asset Beta
Bull	1.5	0.67	1
Bear	0.6	0.33	0.2





Total			1.2
Post-Merger ER			= 8% + 1.2 × (13% - 8%) = 14%

b)

Particulars	Bull	Bear	Combined
Mr X Holding Pre-merger	4%	2%	
Value of holding - Market Capitalisation × Stake	= 1000 × 4% = 40	= 500 × 2% = 10	50
Mr X Holding Post-merger			
Stake Pre-merger	4%	2%	
% of shares allotted in merger	0.67	0.33	
Stake Post-merger	2.67%	0.67%	3.33%
ER Pre Merger			
Market Capitalisation in INR Crores	1000	500	
Return in %	15.5%	11%	
Return in INR Crores	= 1000 × 15.5% = 155	= 500 × 11% = 55	210
Synergy Benefit in INR Crores			7
Total ER in INR Crores - Post-merger			217
ER% Post-Merger			14%
Post-merger Market Capitalisation in INR Crores			= 217/14% = 1,550
Stake held by Mr X Post-merger			3.33%
Value of stake held by Mr. X post-merger in INR CR			= 1,550 × 3.33% = 51.67
Pre-merger value of stake of Mr. X in ₹ cr			50
Increase in Value of Stake of Mr X in INR Crores			= 51.67 - 50 = 1.67

### 50. Illustration

Teer Ltd. is considering acquisition of Nishana Ltd. CFO of Teer Ltd. is of opinion that Nishana Ltd. will be able to generate operating cash flows (after deducting necessary capital expenditure) of ₹ 10 crore per annum for 5 years.

The following additional information was not considered in the above estimations.

- Office premises of Nishana Ltd. can be disposed of and its staff can be relocated in Teer Ltd.'s office not impacting the operating cash flows of either businesses. However, this action will generate an immediate capital gain of ₹ 20 crore.
- Synergy Gain of ₹ 2 crore per annum is expected to be accrued from the proposed acquisition.
- Nishana Ltd. has outstanding Debentures having a market value of ₹15 crore. It has no other debts.
- It is also estimated that after 5 years if necessary, Nishana Ltd. can also be disposed of for an amount equal to five times its operating annual cash flow.



Calculate the maximum price to be paid for Nishana Ltd. if cost of capital of Teer Ltd. is 20%. Ignore any type of taxation.

(RTP Nov'17)

Solution :

Figures are in INR Crores

Particulars/Years	0	1	2	3	4	5
Operating Cashflow after Capex		10	10	10	10	10
Proceeds on Disposal of office	20					
Synergy Gain per Annum		2	2	2	2	2
TV at the end of Year 5						= 10 × 5 = 50
Sum of Cashflows	20	12	12	12	12	62
Ke = 20%						
Present Value Factor	1	0.833	0.694	0.579	0.482	0.402
PVCF	= 20 × 1 = 20	= 12 × 0.833 = 10	= 12 × 0.694 = 8.333	= 12 × 0.579 = 6.944	= 12 × 0.482 = 5.787	= 62 × 0.402 = 24.916
PVCF	75.981					
Enterprise Value	75.981					
Less : Debentures	(15)					
Equity	60.981					

### 51. Illustration

MS Stones has different divisions of home interiors products. Recently, due to economic slowdown, the Managing Director of the Company expressed its desire to divestiture its ceramic tile business. The relevant financial details of this business are as follows:

Estimated Pre-Tax Cash Flow Next year	₹ 200 Crore
Book Value of Liabilities	₹ 780 Crore

In an order to increase its share in the ceramic tile market, the Tripati Tiles Ltd. showed its interest in the acquisition of this unit and offered a proceed of Rs. 950 Crore for the same to MS Stones.

The other data pertaining to the business are as follows:

Tax Rate	30%
Growth Rate	4%
Applicable Discount Rate for Tile Business	12%

If market value of liabilities are Rs. 40 Crore more than book value, you are required to advise MD whether she should go for divestiture of the tile business or not.

(MTP March'17 Old)

Solution :

Particulars	Amount (INR Crores)
Pre Tax Cash Flow	200
Tax Rate	30%





Post-tax CF	= $200 \times (1-30\%) = 140$
Discount Rate ( $K_e$ )	12%
Growth Rate ( $g$ )	4%
Value of Business (Enterprise Value)	= $FCFF / (K_e - g)$ = $140 / (12\% - 4\%)$ = 1750
Enterprise Value	1,750
Book Value of Liabilities	780
Additional Liabilities	40
Equity (Market Value of Liabilities)	= $1750 - 780 - 40 = 930$

The MD of MS stones should divest the tiles business @ ₹ 950 cr as the value offered is higher than its equity value.

## 52. Illustration

Personal Computer Division of Distress Ltd., a computer hardware manufacturing company has started facing financial difficulties for the last 2 to 3 years. The management of the division headed by Mr. Smith is interested in a buyout on 1 April 2013. However, to make this buy-out successful there is an urgent need to attract substantial funds from venture capitalists.

Ven Cap, a European venture capitalist firm has shown its interest to finance the proposed buy-out. Distress Ltd. is interested to sell the division for ₹ 180 crore and Mr. Smith is of opinion that an additional amount of ₹ 85 crore shall be required to make this division viable. The expected financing pattern shall be as follows:

Source	Mode	Amount(₹ Crore)
Management	Equity Shares of ₹ 10 each	60.00
VenCap VC	Equity Shares of ₹ 10 each	22.50
	9% Debentures with attached warrant of ₹ 100 each	22.50
	8% Loan	160.00
<b>Total</b>		<b>265.00</b>

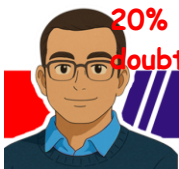
The warrants can be exercised any time after 4 years from now for 10 equity shares @ ₹ 120 per share.

The loan is repayable in one go at the end of 8th year. The debentures are repayable in equal annual instalment consisting of both principal and interest amount over a period of 6 years.

Mr. Smith is of view that the proposed dividend shall not be kept more than 12.5% of distributable profit for the first 4 years. The forecasted EBIT after the proposed buyout is as follows:

Year	2013-14	2014-15	2015-16	2016-17
EBIT (₹ crore)	48	57	68	82

Applicable tax rate is 35% and it is expected that it shall remain unchanged at least for 5-6 years. In order to attract VenCap, Mr. Smith stated that book value of equity shall increase by 20% during above 4 years. Although, VenCap has shown their interest in investment but are doubtful about the projections of growth in the value as per projections of Mr. Smith. Further



VenCap also demanded that warrants should be convertible in 18 shares instead of 10 as proposed by Mr. Smith.

You are required to determine whether or not the book value of equity is expected to grow by 20% per year. Further if you have been appointed by Mr. Smith as advisor then whether you would suggest to accept the demand of VenCap of 18 shares instead of 10 or not.

(Old PM, MTP Mar'19 Old, MTP Aug'18 Old)

Solution :

Figures in INR Crores

Particulars/Year	2013-14	2014-15	2015-16	2016-17
EBIT	48	57	68	82
Less : Interest on Debentures @9% (WN1)	(2.0250)	(1.7558)	(1.4625)	(1.1427)
Less : Interest on loan of 160 Crores	(12.80)	(12.80)	(12.80)	(12.80)
PBT	33.1750	42.4442	53.7375	68.0573
Less : Tax@35%	(11.6113)	(14.8555)	(18.8081)	(23.8201)
PAT	21.5638	27.5887	34.9294	44.2373
Less : Dividend paid @12.5% of PAT	(2.6955)	(3.4486)	(4.3362)	(5.5297)
Retained Earnings	18.8683	24.1401	30.5632	38.7076
Management	60			
Venture Capital	22.5			
Total Equity Value	82.5			
Add: Retained Earnings	18.8683	24.1401	30.5632	38.7076
Closing Share Capital + Retained Earnings	= 82.5+18.8683 = 101.3683	= 101.3683 + 24.1401 = 125.5084	= 125.5084 + 30.5632 = 156.0716	= 156.0716 + 38.7076 = 194.7792
CAGR Computation	= $(194.7792/82.5)^{(1/4)}$ - 1 = 23.96%			

Yes BV will grow by 20% for next 4 years





	April 2013		April 2017		April 2017	
	Share Count	% Stake	Share Count	% Stake	Share Count	% Stake
		<b>Current</b>	<b>10 Shares Warrant</b>		<b>18 Shares Warrant</b>	
Management	6	= $6/8.25 \times 100$ = 72.73%	6	57.14%	6	48.78%
VC Existing	2.25	= $2.25/8.25 \times 100$ = 27.27%	2.25	21.43%	2.25	18.29%
VC New on Warrant Conversion	0		2.25	21.43%	4.05	32.93%
Total VC	2.25	= $2.25/8.25 \times 100$ = 27.27%	4.5	42.86%	6.3	51.22%
Grand Total	8.25	100%	10.5	100%	12.3	100%

We will suggest that Mr. Smith not accept the demand for 18 equity share per debenture as warrant feature because if he does so, the management stake will come down below 50% and they will lose control.

#### WN 1:

Loan amount in INR Crores	22.5
Interest	9%
Loan Tenure	6 Years
EMI	= $22.5/4.486 = 5.0156$
PVIFA	4.486

Years	PVF	Opening Loan	Add : Interest	Less: EMI	Closing Loan	P paid
1	0.917	22.50	2.03	(5.02)	19.51	= 2.03 - 5.02 = (2.99)
2	0.842	19.51	1.76	(5.02)	16.25	= 1.76 - 5.02 = 3.26
3	0.772	16.25	1.46	(5.02)	12.70	= 1.46 - 5.02 = 3.55
4	0.708	12.70	1.14	(5.02)	8.82	= 1.14 - 5.02 = (3.87)
5	0.650	8.82	0.79	(5.02)	4.60	= 0.79 - 5.02 = (4.22)
6	0.596	4.60	0.41	(5.02)	0	= 0.41 - 5.02 = (4.60)
PVIFA	4.486					(22.50)

#### WN 2:

Particulars	Amount (INR)
9% of Debt of INR 100 each in Crores	22.5
Debt count in Lakhs	22,50,000





Warrants for 10 Equity shares for 1 Debenture @ 120	
Shares issued @ 10 for 1 deb - Number of shares	= 22,50,000 × 10 = 2,25,00,000
FV per share	10
Total Share Capital	22,50,00,000

WN 3:

Particulars	Amount (INR)
9% of Debt of INR 100 each in Crores	22.5
Debenture count in Lakhs	22,50,000
Warrants for 10 Equity shares for 1 Debenture @ 120	
Shares issued @ 18 for 1 deb - Number of shares	= 22,50,000 × 18 = 4,05,00,000
FV per share	10
Total Share Capital	40,50,00,000

### 53. Illustration

The Nishan Ltd. has 35,000 shares of equity stock outstanding with a book value of Rs.20 per share. It owes debt ₹ 15,00,000 at an interest rate of 12%. Selected financial results are as follows.

Income and cash flow		Capital	
EBIT	₹ 80,000	Debt	₹ 15,00,000
Interest	₹ 1,80,000	Equity	₹ 7,00,000
EBT	(₹ 1,00,000)		₹ 22,00,000
Tax	0		
EAT	(₹ 1,00,000)		
Depreciation	₹ 50,000		
Principal Repayment	(₹ 75,000)		
Cash Flow	(₹ 1,25,000)		

Restructure the financial line items shown assuming a composition in which creditors agree to convert two thirds of their debt into equity at book value. Assume Nishan will pay tax at a rate of 15% on income after the restructuring, and that principal repayments are reduced proportionately with debt. Who will control the company and by how big a margin after the restructuring?

(MTP Mar'19, Old PM)

Solution :

Restructures Profit and Loss	Amount (INR)
EBIT	80,000
Interest (WN1)	(60,000)
EBT	20,000
Less : Tax @15%	(3,000)
EAT	17,000
Add : Depreciation (Assuming same)	50,000
Less : Principal Repayment (WN2)	(25,000)
CF	42,000





## Restructures B S

Particulars	Shares	BVPS INR	Amount in INR	Stake Held
Existing Equity	35,000	20	= 35,000 × 20 = 7,00,000	= 35,000/85,000 × 1000 = 41.18%
New Equity issued to lenders (WN 3)	50,000	20	= 50,000 × 20 = 10,00,000	= 50,000/85,000 × 100 = 58.82%
Borrowing (WN 1)			500,000	
<b>Total</b>	<b>85,000</b>			

Post restructuring The lenders will control the company . They will have a stake of 58.82% i.e., 17.65% higher than pre restructuring shareholders stake in Nishan Ltd which is 41.18

### WN 1:

Particulars	Amount
Existing Loan in INR Loan Rate 12%	15,00,000
Loan Converted to Equity	2/3
Loan Converted to Equity in INR	10,00,000
Balance Loan	5,00,000
Assuming similar position, int on borrowing @ 12 % of new loan will be	60,000

### WN 2:

Particulars	Amount
Original Repayment	75,000
Reduction in repayment in ratio of reduction in principal	
Reduction in principal repayment	2/3
Reduction in principal repayment in INR	= 75,000 × 2/3 = 50,000
Revised principal repayment in INR	= 75,000 - 50,000 = 25,000

### WN 3:

Loan Converted to equity	10,00,000
Conversion at BVPS of INR 20	20
Number of shares issued to Lenders	= 10,00,000/20 = 50,000

## 54. Illustration

ABC, a large business house is planning to acquire XYZ another business entity in similar line of business. XYZ has expressed its interest in making a bid. XYZ expects that after acquisition the annual earning of KLM will increase by 10%.

Following information, ignoring any potential synergistic benefits arising out of possible acquisitions, are available:

	XYZ	ABC	Proxy entity for XYZ & ABC in the same line of business
Paid up Capital (₹ Crore)	1025	106	--
Face Value of Share is ₹ 10			
Current share price	₹ 129.60	₹ 55	--





Debt:Equity (at market values)	1:2	1:3	1:4
Equity Beta	--	--	1.1

Assume Beta of debt to be zero and corporate tax rate as 30%, determine the Beta of combined entity.

(RTP Nov'16)

**Solution :**

For the Proxy Entity

BE	1.1
D	1
E	4
BA	?
Tax Rate	30%

$$BA = \frac{Be \times E}{E+D(1-t)} + \frac{Bd \times D(1-t)}{E+D(1-t)}$$

$$BA / \text{Unlevered Beta for proxy entity \& industry} = 1.1 \times 4 / (4 + 1 \times 0.7) + 0$$

$$= 4.4 / 4.7$$

$$= 0.9362$$

Geared beta / Be for XYZ & ABC	XYZ	ABC
BA	0.9362	0.9362
D:E	1:2	1:3
Debt	1	1
Equity	2	3
Total Capital	3	4
Tax Rate	30%	30%
Be = (E + D (1-t)) x Ba / E	= (2+1(1-30%)) x 0.9362/2 = 1.2639	= ((3+1 x (1-30%)) x 0.9362/3) = 1.1546

Particulars	XYZ	ABC	Combined
Paid Up Capital in INR Crores	1025	106	
Face Value per share INR	10	10	
Share Count	= 1025/10 = 102.5	= 106/10 = 10.6	
CMP Per share in INR	129.6	55	
Market Capitalisation in INR Crores	= 102.5 x 129.6 = 13,284	= 10.6 x 55 = 583	13,867
Equity Beta	1.2639	1.1546	
Beta x Market Capitalisation of Equity	= 13,284 x 1.2639 = 16,789.2491	= 583 x 1.1546 = 673.1590	17,462.4081
WA Beta	= Beta x Market Capitalisation / Market Capitalisation = 17,462.4081 / 13,867 = 1.2593		





## 55. Illustration

ABC, a large business house is planning to sell its wholly owned subsidiary KLM. Another large business entity XYZ has expressed its interest in making a bid for KLM. XYZ expects that after acquisition the annual earning of KLM will increase by 10%.

Following information, ignoring any potential synergistic benefits arising out of possible acquisitions, are available:

- Profit after tax for KLM for the financial year which has just ended is estimated to be ₹ 10 Crores
- KLM's after-tax profit has an increasing trend of 7% each year and the same is expected to continue.
- Estimated post tax market return is 10% and risk-free rate is 4%. These rates are expected to continue.
- Corporate tax rate is 30%.

	XYZ	ABC	Proxy entity for KLM in the same line of business
No. of shares	100 lakhs	80 lakhs	--
Current share price	₹ 287	₹ 375	--
Dividend pay out	40%	50%	50%
Debt: Equity at market values	1: 2	1: 3	1: 4
P/E ratio	10	13	12
Equity beta	1	1. 1	1.1

Assume gearing level of KLM to be the same as for ABC and a debt beta of zero. You are required to calculate:

- Appropriate cost of equity for KLM based on the data available for the proxy entity.
- A range of values for KLM both before and after any potential synergistic benefits to XYZ of the acquisition.

(Old PM)

Solution :

Particulars	Proxy Company Details
Equity Beta	1.1
Debt Equity	1:4
Debt	1
Equity	4
BA Unlevered	$= B_e \times E / (E + D \text{ INR } (1 - t))$ $= (1.1 \times 4) / (4 + 1 \text{ INR } (1 - 30\%))$ 0.9362
Levered Beta for KLM	
Debt	1
Equity	3
BA	$= B_e \times E / (E + D \text{ INR } (1 - t))$ $0.9362 = B_e \times 3 / (3 + \times (1 - 30\%))$ $0.9362 = 3 B_e / (3.7)$ $B_e = 0.9362 \times 3.7 / 3$ $B_e = 1.1546$



$$K_e = R_f + B \times (\text{MRP})$$

$$= 4\% + 1.1546 \times (10\% - 4\%)$$

$$= 10.93\%$$

PE Based Valuation	Pre-Synergy	Post-Synergy
PAT in INR Crores	10	= 10 × 1.1 = 11
Value of Entity @ PE of 10 Times in INR Crores	100	= 100 × 1.1 = 110
Value of Entity @ PE of 12 Times in INR Crores	120	= 120 × 1.1 = 132
Value of Entity @ PE of 13 Times in INR Crores	130	= 130 × 1.1 = 143
DDM @ Dividend Payout of 40%		
PAT in INR Crores	10	11
Dividend @ Payout ratio of 40% - D0	4	= 4 × 1.1 = 4.4
D1 @ Growth rate of 7%	= 4 × 1.07 = 4.28	= 4.4 × 1.07 = 4.708
g	7%	7%
Ke	10.93%	10.93%
Equity Value in INR Crores	= 4.28/(10.93% - 7%) = 108.97	= 4.708/(10.93% - 7%) = 119.87
DDM @ Dividend Payout of 50%		
Dividend @ Payout ratio of 50% - D0	5	= 5 × 1.1 = 5.5
D1 @ Growth rate of 7%	= 5 × 1.07 = 5.35	= 5.5 × 1.07 = 5.885
g	7%	7%
Ke	10.93%	10.93%
Equity Value in INR Crores	= 5.35/(10.93% - 7%) = 136.22	= 5.885/(10.93% - 7%) = 149.84
Range of Valuation		
Maximum	136.22	149.84
Minimum	100	110

### 56. Illustration

The equity shares of XYZ Ltd. are currently being traded at ₹ 24 per share in the market. XYZ Ltd. has total 10,00,000 equity shares outstanding in number; and promoters' equity holding in the company is 40%.

PQR Ltd. wishes to acquire XYZ Ltd. because of likely synergies. The estimated present value of these synergies is ₹ 80,00,000.

Further PQR feels that management of XYZ Ltd. has been over paid. With better motivation, lower salaries and fewer perks for the top management, will lead to savings of ₹ 4,00,000 p.a. Top management with their families are promoters of XYZ Ltd. Present value of these savings would add ₹ 30,00,000 in value to the acquisition.

Following additional information is available regarding PQR Ltd.:

Earnings per share - ₹4



Total number of equity shares outstanding - 15,00,000

Market price of equity share - ₹ 40

Required:

- (i) What is the maximum price per equity share which PQR Ltd. can offer to pay for XYZ Ltd.?
- (ii) What is the minimum price per equity share at which the management of XYZ Ltd. will be willing to offer their controlling interest?

(ICAI SM, May'24 QP 6 marks, MTP Sept'22)

Solution :

Particulars	XYZ	PQR
Share Count	10,00,000	15,00,000
CMP	24	40
Promoter Holding	40%	
EPS		4
Synergy Value in INR		80,00,000
PA Saving in Salaries		4,00,000
PV of all saving in Salaries		30,00,000

- i) Maximum Price per equity share which PQR can offer = Intrinsic Value + Value of savings

Particulars	Amount (INR)
Share count in Number	10,00,000
Current Market Price in INR	24
Market Capitalisation / Intrinsic Value	= 10,00,000 × 24 = 2,40,00,000
Add: Present Value of Synergy	80,00,000
Add : Present Value of Saving	30,00,000
Total	3,50,00,000
Maximum Price per share in INR	= 3,50,00,000/10,00,000 = 35

- ii)

Particulars	Amount
Intrinsic Value	2,40,00,000
Share of promoters	40%
Intrinsic Value of shares held by promoters	= 2,40,00,000 × 40% = 96,00,000
Present Value of Salaries Lost	30,00,000
Total value lost to promoter in case of sale	= 96,00,000 + 30,00,000 = 1,26,00,000
Total Shares in XYZ	10,00,000
Promoter stake	40%
Shares held by them	= 10,00,000 × 40% = 4,00,000
Minimum Price expected per share in INR	= 1,26,00,000/400,000 = 31.50





## 57. Illustration

The Company X Ltd. proposes to take over Y Ltd. The chief executive of a company thinks that shareholders always look for the earnings per share. Therefore he considers maximization of the earnings per share as his company's objective. The following information is available in respect of X Ltd. and Y Ltd.

	X Ltd.	Y Ltd.
Net profit	80 lakh	15.75 lakh
P/E ratio	10.50	10
Current market price per share	₹ 42	₹ 85

(Case Based MCQ Nov'24 QP 2 marks each)

From the information given above, choose the correct answer to the Question no. 1 to 3:

- Maximum exchange ratio which the company should offer so that the company could keep EPS at current level is:
  - 1: 0.952
  - 1: 2.125
  - 1: 2.023
  - 1: 0.196
- If the company borrows funds @15% rate of interest and buys out Target Company by paying cash, how much should he offer to maintain his EPS assuming tax rate as 30%:
  - 210 lakhs
  - 315 lakhs
  - 150 lakhs
  - 105 lakhs
- No. of shares to be issued by X Ltd.
  - 3.9375 lakhs
  - 4.8753 lakhs
  - 7.8458 lakhs
  - 0.3631 lakhs

Solutions:

	X Ltd	Y Ltd
PAT ₹	80,00,000.00	15,75,000.00
CMP ₹	42.00	85.00
PE (#)	10.50	10.00
EPS= CMP / PE ₹	4.00	8.50
Share count = PAT / EPS (#)	20,00,000.00	1,85,294.12

Q1: Ratio of EPS = 4:8.50 = 1:2.125 - Option B

Q 2: EPS to remain same means PAT will remain same as No new shares are issued since it is a buy out using Debt. That means PAT of Target = Post Tax Interest Expense

$$\Rightarrow 15.75 = \text{Loan} \times 15\% \times (1-30\%) \Rightarrow 15.75 = \text{Loan} \times 10.5\%$$

$$\text{Loan} = 15.75/10.5\% = \text{₹150 Lacs} - \text{Option C}$$

Q 3: Shares issued by X - To be assumed as Shares Issued in ratio of EPS

$$\text{For 1 Share of Y } 2.125 \text{ shares of X as per Q 1} = 185294.12 \times 2.125 = 393750 - \text{Option A}$$





## 58. Illustration

Big Ltd. (BL), a listed company, is enjoying a price earnings ratio (PER) of 15 on an Earnings Per Share (EPS) of ₹ 5. The total number of outstanding shares are 2,00,000.

BL is proposing to acquire Small Pvt Ltd. (SPL) an unlisted company by issuing shares in the ratio 4:5 i.e. for 5 shares of SPL 4 shares of BL will be issued. The outstanding shares of SPL are 50,000. SPL will be listed before the actual merger to discover its value. The EPS of the merged entity will be 5.5.

No other information is available for SPL.

You are required to calculate:

(i) Pre-merger EPS of SPL.

(ii) Expected Market Price per Share of SPL at the time of listing, if it expects a PER of 10 and,

(iii) Number of shares of BL to be issued to SPL if pre-merger EPS of BL is to be maintained.

(8 Marks - May '23 Q 6(a))

**Solution:**

**Part 1**

	Working	BL - Acquirer	SPL - Target
EPS ( ₹/ Share)	A	5	
PE Ratio	B	15	
CMP ( ₹/ Share)	C = A × B	75	
Shares Outstanding	D	2,00,000	50,000
PAT ₹	E = A × D	10,00,000	
M cap ₹	F = E × B	1,50,00,000	

Swap ratio: 5 Shares of SPL = 4 shares of BL

Shares issues to shareholder of SPL =  $50,000 \times 4 / 5 = 40,000$

Post Merger share count of BL =  $2,00,000 + 40,000 = 2,40,000$

Post merger EPS of BL = ₹ 5.5 per share

Post Merger PAT of BL = ₹ 5.5 per share × 2,40,000 shares = ₹13,20,000

Assuming PAT of either company does not change post-merger,

Pre-Merger Pat of SPL = Post merger PAT of combined operations - Pre Merger PAT of BL

i.e Pre-Merger Pat of SPL =  $13,20,000 - 10,00,000$

= ₹3,20,000

Pre Merger EPS Of SPL = Pre merger PAT of SPL / SPL Share count

=  $₹3,20,000 / 50,000$  shares

= ₹6.4 per share

**Part 2**

Expected market price of SPL on listing of PE = 10

MP = PE × EPS

=  $10 \times ₹6.4$  per share

= ₹64 per share

**Part 3**

Number of shares of BL to be issued to SPL so that pre merger EPS Of BL is maintained

Post merger PAT in ₹ = 13,20,000



- Post merger EPS of BL in ₹ per share = 5  
 Pre merger Share count of BL = 2,00,000  
 Post merger EPS =  $13,20,000 / (2,00,000 + x)$  i.e number of shares issued to shareholders of SPL)  
 $13,20,000 / (2,00,000 + x) = 5$   
 ⇒  $13,20,000 = 10,00,000 + 5x$   
 ⇒  $5x = 13,20,000 - 10,00,000$   
 ⇒  $X = 64,000$   
 ⇒ Swap ratio of 64,000 shares of BL for 50,000 shares of SPL i.e swap ratio of 6.4:5

This can also be alternatively computed as inverse of EPS ratio should be swap ratio  
 EPS ratio of BL:SPL = 5:6.4

Inverse = 6.4:5 i.e 6.4 shares of BL for 5 shares of SPL

### 59. Illustration

GL Ltd. is having a Price Earnings Ratio (P/E Ratio) of 16 times and Earnings per Share (EPS) of ₹ 5. The total numbers of outstanding shares are 2,80,000.

FL Ltd. another company is also in the same industry. The GL Ltd. is in negotiation for acquisition of the FL Ltd. by issuing shares in the ratio of 4:5, i.e., for 5 shares of FL Ltd., 4 shares of GL Ltd. will be issued. The outstanding shares of FL Ltd. are 50,000. The EPS of the merged entity will be ₹ 5.4.

You are required to calculate-

(i) Pre-merger EPS of FL Ltd.

(ii) Number of shares of GL Ltd. to be issued to FL Ltd. if pre-merger EPS of GL Ltd. is to be maintained.

(May'25 4(b) - 4 Marks)

Solution :

Given

Details	GL ( Acquirer)	FL ( Target)	Combined
PE ratio	16		
EPS ₹ (A)	5		5.4
CMP ₹ (B)	80		
Outstanding Shares (C)	2.8 Lakhs	50,000	
Market Cap ( D = B × C)	₹224 Lakhs		
PAT ( A × C)	₹14 lakhs		
Swap ratio			4 of GL for 5 of FL

#### Part 1: Find out Pre Merger EPS of FL

Shares allotted in GL in ratio of 4:5 for all 50,000 shares of FL  
 $= 4 \times 50,000 / 5 = 40,000$

- Post Merger share count of GL =  $2,80,000 + 40,000 = 3,20,000$   
 Post Merger EPS of GL = ₹5.4 / Share  
 Post Merger PAT of GL = ₹5.4 / Share × 3,20,000 shares  
 Post Merger PAT of GL = ₹17,28,000





- Given Pre merger PAT of GL = ₹14,00,000
- ⇒ Pre Merger PAT of FL = ₹17,28,000 - ₹14,00,000 = ₹3,28,000
- ⇒ Pre Merger EPS of FL = ₹3,28,000 / 50,000 shares = ₹6.56/ share

## Part 2: Shares to be issued to maintain EPS of GL post merger

### Method 1

Allotment of shares in Inverse of ratio of EPS will result in No Post merger accretion or Dilution for either party.

i.e 6.56 : 5

i.e 6.56 shares of GL for 5 shares of FL

i.e 50,000 shares of FL × 6.56 / 5

= 65,600 shares of GL to be allotted for shareholders of FL

### Method 2:

Pre merger EPS of GL ( ₹5 per share) = Its post merger EPS

⇒ Post Merger PAT of GL / Post Merger share count of GL = ₹5

⇒ ₹ 17,28,000 / ( 2,80,000 existing shares of GL + X\*) = ₹5

\* X is shares of GL allotted to shareholders of FL

⇒ ₹17,28,000 = ₹5 × 2,80,000 + ₹5X

⇒ ₹17,28,000 - ₹14,00,000 = ₹5X

⇒ X = ₹3,28,000 / ₹5

⇒ X = 65,600 Shares

## 60. Illustration

Ujwal Bank Ltd. (UBL) and Suraksha Bank Ltd. (SBL) are Scheduled Banks to merge.

UBL is strong Private Sector Bank with stable capital adequacy, while SBL has negative CRAR due to heavy NPAs. Data of both the Banks is as follows:

Particulars	UBL	SBL
Book Value per share (₹)	50	25
Market Price per share (₹)	200	50
CRAR%	12	(-) 2
NPA%	2	12
No. of shares in thousands	50000	20000
Price Earning Ratio (PE Ratio)	20	10

Weights for swap ratio are Book Value per share 20%, Market Price per share 40%, CRAR (%) 20% and balance for NPA%. ( Jan 26 - MCQ 6 Marks)

From the information given above, choose the correct answer

1. The swap ratio based on information given shall be for 1 share of UBL for .....shares of SBL.

- (A) 1.07
- (B) 0.20 ( Ratio is actually 1 Share of UBL for 5 shares of SBL - Question is incorrectly framed)
- (C) 0.86
- (D) 1.73

(2 Marks)





2. Based on swap ratio total number of shares issued by UBL to SBL shall be (in Thousands).

- (A) 21,400 shares
- (B) 24,000 shares
- (C) 17,200 shares
- (D) 4,000 shares  $20000 \text{ shares of SBL} \times 0.2 = 4000 \text{ shares}$  (2 Marks)

3. Post merger Earning Per Share (EPS) of UBL shall be ₹ .

- (A) ₹ 11.11
- (B) ₹ 12.50
- (C) ₹ 8.50
- (D) ₹ 10.00 (2 Marks)

Solution:

(1)

Metric	Weight	UBL	SBL	Ratio
Book Value	20%	50	25	2:1
Market price	40%	200	50	4:1
CRAR %	20%	12	-2	6:-1
NPA	20%	2	12	6:1 (Not 1:6 because lower the NPA the better)

These both cancel out each out

Final Weights :

20% 2:1 i.e 1 share of UBL for every 2 shares of SBL =  $\frac{1}{2} = 0.5$

40% 4:1 i.e 1 share of Ubl for 4 shares of SBL =  $\frac{1}{4} = 0.25$

$20\% \times 0.5 + 40\% \times 0.25 = 10\% + 10\% = 20\% = 0.20$

⇒ 1 share of UBL for 5 shares of SBL

(3)

Metric	UBL	SBL	Total
MP	200	50	
PE	20	10	
=>EPS(MP/PE)	10	5	
Shares	50000	20000	
PAT ( Shares × EPS)	500000	100000	600000
Shares post swap ( From Q 2)	50000	4000	54000



Revised EPS

600000/54000 =

11.11

**61. Illustration (For Practice)**

The following are the financial statements of A Ltd. & B Ltd. for the financial year ended 31st March 2020. Both the companies are working in the same industry.

**Balance Sheet (₹)**

Particulars	A Ltd.	B Ltd.
Total Current Assets	15,00,000	12,00,000
Total Net Fixed Assets	12,00,000	6,00,000
Total Assets	27,00,000	18,00,000
Equity Capital (Face Value ₹ 10)	10,00,000	8,00,000
Retained Earnings	3,00,000	
14% Long Term Debt	7,00,000	5,00,000
Total Current Liabilities	7,00,000	5,00,000
Total Liabilities	27,00,000	18,00,000

**Income Statement (₹)**

Particulars	A Ltd.	B Ltd.
Net Sales	33,10,000	16,60,000
Gross Profit	6,90,000	3,40,000
Operating Expenses	2,00,000	1,00,000
Interest	98,000	70,000
EBT	3,92,000	1,70,000
Tax @ 30%	1,17,600	51,000
PAT	2,74,400	1,19,000
Additional information		
Dividend Pay-out Ratio	40%	60%
Market Price per Share	40	15

You are required to calculate

- Earnings Per share (EPS), Profit Earning Ratio (PER), Return on Equity (ROE) and Book Value Per Share (BVPS) for both the firms.
- Estimate future EPS growth rate for both the firms.
- If on acquisition of B Ltd. by A Ltd., intrinsic value of B Ltd., will be ₹ 20 per share, develop range of justifiable Exchange Ratio (ER) that can be offered by A Ltd., to shareholders of B Ltd.
- Based on your analysis in (i) and (ii) whether the negotiated ratio will be close to upper or lower range. Justify.
- Post-merger EPS on an ER of 0.4:1. What will be immediate accretion or dilution to EPS to the shareholders of both the firms '?
- Post-Merger MPS on the basis of ER of 0.4:1

(Jan'21 QP)

**Solution :**

i)

Particulars	A Ltd	B Ltd
Profit After Tax	2,74,400	1,19,000
Number of Shares	= 10,00,000/10	= 800,000/10





	= 1,00,000	= 80,000
<b>Market Price of Share</b>	40	15
EPS	= 274,400/100,000 = 2.744	= 119,000/80,000 = 1.4875
P/E ratio	= 40/2.744 = 14.58	= 15/1.4875 = 10.08
<b>Equity Capital</b>	10,00,000	800,000
<b>Retained Earning</b>	300,000	
<b>Networth</b>	13,00,000	8,00,000
Book Value per share (BVPS)	= 13,00,000/ 100,000 = 13	= 800,000/80,000 = 10
Return on Equity	= 2,74,400/13,00,000 × 100 = 21.11%	= 1,19,000/800,000 × 100 = 14.88%

ii) Estimation of growth rate in EPS of A Ltd and B Ltd

Particulars	A Ltd	B Ltd
<b>Dividend Payout ratio</b>	40%	60%
<b>Retention Ratio</b>	= 100% - 40% = 60%	= 100 - 60% = 40%
<b>Return on Equity</b>	21.11%	14.88%
<b>Growth Rate = Retention Ratio × ROE</b>	= 60% × 21.11% = 12.67%	= 40% × 14.88% = 5.95%

iii) Range of Justifiable Exchange ratio :

- Intrinsic Value Based =  $20/40 = 0.5:1$  (Upper Limit)
  - Market Price Based =  $MP \text{ of B Ltd} / MP \text{ of A Ltd} = 15/40 = 0.375:1$  (Lower Limit)
- iv) Since, A Ltd has higher EPS, ROE, P/E Ratio and even higher EPS growth expectations, the negotiable terms would be expected to close to the lower limit, based on existing share prices.
- v) ER= 0.4:1

Particulars	A Ltd	B Ltd	Combined
<b>PAT</b>	2,74,400	1,19,000	3,93,400
<b>Shares Outstanding</b>	100,000	80,000	
<b>Shares issued to B Ltd based on Exchange ratio of 0.4:1</b>		= 80,000 × 0.4 = 32,000	
<b>Total Shares</b>			= 100,000 + 32,000 = 132,000
<b>EPS</b>	= 2.744	= 1.4875	= 3,93,400/132,000 = 2.980
<b>Equivalent EPS for B</b>		= 1.4875 × 0.4 = 1.192	
<b>EPS Accretion/(Dilution)</b>	= 2.98 - 2.744 = 0.236	= 1.192 - 1.4875 = (0.296)	

vi)

Particulars	A Ltd	B Ltd	Combined
<b>EPS</b>	2.744	1.4875	2.980





PE Ratio	14.58	10.08	14.58
MPS	= 2.744 × 14.58 = 40	= 10.08 × 1.4875 = 15	= 2.980 × 14.58 = 43.45

## 62. Illustration (For Practice)

The following information is provided relating to the acquiring company Efficient Ltd. and the target company Healthy Ltd.:

Particulars	Efficient Ltd.	Healthy Ltd.
No. of Shares (F.V. ₹ 10 each)	20 Lakhs	15 Lakhs
Market Capitalization	₹ 800 Lakhs	₹ 1,200 Lakhs
P/E Ratio (times)	10	5
Reserves and Surplus	₹ 400 Lakhs	₹ 273 Lakhs
Promoter's Holding (No. of shares)	8.65 Lakhs	9 Lakhs

Board of Directors of both the companies have decided to give a fair deal to the shareholders and accordingly for swap ratio the weights are decided as 45%, 20% and 35% respectively for Earning, Book Value and Market Price of share of each company.

Required:

- Calculate the swap ratio and also calculate Promoter's holding % after acquisition.
- What is the EPS of Efficient Ltd. after acquisition of Healthy Ltd.?
- What is the expected market price per share and market capitalization of Efficient Ltd. after acquisition, assuming P/E ratio of Efficient Ltd. remains unchanged?
- Calculate free float market capitalization of the merged firm.

[RTP May'23, Nov'20 QP (Old)]

Solution :

Particulars	Efficient - Acquirer	Healthy - Target
Share count (Lakhs)	20	15
FV per share (INR)	10	10
Market Capitalisation (INR Lakhs)	800	1200
Price per share (INR)	= 800/20 = 40	= 1200/15 = 80
PE	10	5
EPS (INR)	= 40/10 = 4	= 80/5 = 16
Reserves & Surplus (INR Lakhs)	400	273
Reserves & Surplus per share	= 400/20 = 20	= 273/15 = 18.2
Book value per share	= 10+20 = 30	= 10+18.2 = 28.2
Promoter holding (Lakhs Shares)	8.65	9
Promoter holding %	= 8.65/20 × 100 = 43.25%	= 9/15 × 100 = 60%

Particulars	Ratio of	Ratio	Shares issued in Acq. for every share in target	Weights	Weighted Average
Earnings	4:16	1:4	4	45%	= 4 × 45% = 1.8





<b>Book Value</b>	30:28.2	1:0.94	0.94	20%	=0.94 × 20% = 0.1880
<b>Market Price</b>	40:80	1:2	2	35%	=2 × 35% = 0.7
<b>Total</b>					<b>2.6880</b>

For every 1 share in Target i.e., Healthy 2.688 shares of Acquirer i.e., Efficient are issued. Hence, swap ratio is 1:2.5.

Particulars	Efficient	Health
Existing share count	20	15
Swap ratio	1:2.688	
New shares issued in Efficient to shareholders of	= 15 × 2.688 = 40.32	
Total share count post-merger	= 20 + 40.32 = 60.32	
Promoter holding in Efficient Ltd in Lakhs Shares	8.65	
Promoter's holding of Target Co in Merged company in lakhs shares		= 40.32 × 9/15 = 24.192
Total Promoter holding in Lakhs Shares		= 8.65 + 24.192 = 32.842
Promoter stake in %		= 32.842/60.32 × 100 = 54.45%

i)

Post-merger PAT = Sum of pre-merger PAT of both companies

Particulars	Efficient	Healthy	Total
EPS	4	16	
Shares Lakhs	20	15	
PAT (INR Lakhs)	= 4 × 20 = 80	= 16 × 15 = 240	320

Post-merger EPS = Post-merger PAT / Post-merger share count  
= 320/60.32  
= 5.305

ii)

Particulars	Amount (INR)
EPS Post-merger	5.305
PE Multiple	10
Post-merger Market Price in INR	= 5.305 × 10 = 53.05
Post-merger Share count Lakhs	60.32
Post-merger Market Capitalisation in INR Lakhs	= 53.05 × 60.32 = 3,200





iii)

Free float Market capitalisation

= Total Market Capitalisation - Promoter stake

Total Market Capitalisation	3,200
Promoter stake	54.45%
Free float Market Capitalisation	= 3,200 × (1- 54.45%) = 1,457.59

**63.Illustration (For Practice)**

C Ltd. & D Ltd. are contemplating a merger deal in which C Ltd. will acquire D Ltd. The relevant information about the firms are given as follows:

	C Ltd.	D Ltd.
Total Earnings (E) (in millions)	Rs. 96	Rs. 30
Number of outstanding shares (S) (in millions)	20	14
Earnings per share (EPS) (Rs.)	4.8	2.143
Price earnings ratio (P/E)	8	7
Market Price per share (P)(Rs.)	38.4	15

- (i) What is the maximum exchange ratio acceptable to the shareholders of C Ltd., if the P/E ratio of the combined firm is 7?
- (ii) What is the minimum exchange ratio acceptable to the shareholders of D Ltd., if the P/E ratio of the combined firm is 9?

[MTP Mar'21 New &amp; Old, Nov'18 QP (Old)]

Solution :

Particulars	C - Acquirer	D - Target	Combined
PAT INR Lakhs	960	300	1260
Share count Lakhs	200	140	
EPS in INR	=960/200 =4.8	=300/140 =2.143	
PE Ratio	8	7	
Current Market Price	38.4	15	
Market Capitalisation in Lakhs	= 200 × 38.4 =7,680	= 140 × 15 = 2,100	

i)

Particulars	Amount
Combined PAT in INR Lakhs	1260
PE (Combined Firm)	7
Post-merger Market Capitalisation	= 1,260 × 7 = 8,820
Least value gain for C mean max gain for D	
This will happen when C shareholders' Market Capitalisation remains the same	7,680
Balance Market value attributable to shareholders of D	=8,820 - 7,680 = 1140
Implies % stake held by them post-merger	=1,140/8,820 × 100 = 12.925%





Pre-merger share count of C in Lakhs	200
Post-merger % stake held by C	= 100%-12.925% =87.075%
Total share count post-merger of C in Lakhs	=200/87.075% =229.687
Shares held by D post-merger in Lakhs	= 229.68 - 200 =29.68
Shares of D pre-merger in Lakhs	140
Swap ratio / exchange ratio for shareholders of XYZ is 0.212 shares of C for 1 share of D	=29.68/140 = 0.212

ii)

Particulars	Amount
Combined PAT in INR Lakhs	1260
PE (Combined Firm)	9
Post-merger Market Capitalisation	= 1,260 × 9 = 11,340
Least value for D implies max value is for C. Least value expected by D is their existing MV in INR Lakhs	2,100
Post MV of shares held by C	=11,340 - 2,100 = 9,240
Implies % stake held by C post-merger	=9,240/11,340 × 100 = 81.48%
Pre-merger share count of C in Lakhs	200
Total share count post-merger of C in Lakhs	=200/81.48% =245.45
Shares held by D post-merger in Lakhs	= 245.45 - 200 =45.45
Shares of D pre-merger in Lakhs	140
Swap ratio / exchange ratio for shareholders of XYZ is 0.325 shares of C for 1 share of D	=45.45/140 = 0.325

#### 64. Illustration (For Practice)

TK Ltd. and SK Ltd. are both in the same industry. The former is in negotiation for acquisition of the latter. Information about the two companies as per their latest financial statements are given below:

	TK Ltd.	SK Ltd.
₹ 10 Equity shares outstanding	24 Lakhs	12 Lakhs
Debt:		
10% Debentures (₹ Lakhs)	1160	-
12.5% Institutional Loan (₹Lakhs)	-	480
Earnings before interest, depreciation and tax (EBIDAT) (₹ Lakhs)	800.00	230.00
Market Price/Share (₹)	220.00	110.00

TK Ltd. plans to offer a price for SK Ltd. business, as a whole, which will be 7 times of EBIDAT as reduced by outstanding debt and to be discharged by own shares at market price.



SK Ltd. is planning to seek one share in TK Ltd. for every 2 shares in SK Ltd. based on the market price. Tax rate for the two companies may be assumed as 30%. Calculate and show the following under both alternatives -TK Ltd.'s offer and SK Ltd.'s plan

- (i) Net consideration payable.
- (ii) No. of shares to be issued by TK Ltd.
- (iii) EPS of TK Ltd. after acquisition.
- (iv) Expected market price per share of TK Ltd. after acquisition.
- (v) State briefly the advantages to TK Ltd. from the acquisition.
- (vi) Calculations may be rounded off to two decimals points.

(ICAI SM, Nov'18 QP 12 marks)

Solution :

Particulars	TK Ltd - Acquirer	SK Ltd - Target
Share count (Lakhs)	24	12
FV per share	10	10
10% Debentures INR Lakhs	1,160	0
12.5% Loan INR Lakhs	0	480
EBITDA INR Lakhs	800	230
Depreciation (assumed to be Nil)	0	0
Interest Expense INR lakhs	= $1160 \times 10\%$ = 116	= $480 \times 12.5\%$ = 60
PBT INR Lakhs	= $800 - 116$ = 684	= $230 - 60$ = 170
Tax @30% INR Lakhs	= $684 \times 30\%$ = 205.2	= $170 \times 30\%$ = 51
PAT INR Lakhs	= $684 - 205.2$ = 478.8	= $170 - 51$ = 119
EPS INR	= $478.8/24$ = 19.95	= $119/12$ = 9.91
CMP INR	220	110
PE Ratio INR	= $220/19.95$ = 11.03	= $110/9.91$ = 11.10

Particulars	Amount (INR)
EV/EBITDA Multiple	7
EBITDA of SK Ltd	230
Enterprise Value (Lakhs)	= $7 \times 230 = 1,610$
Less : Debt of SK Ltd	(480)
Equity value of SK Ltd	= $1610 - 480 = 1,130$
Net consideration payable in Lakhs	<b>1,130</b>
Discharge by using own Shares	
CMP of shares of Acquirer TK Ltd in INR	220
Shares issued in TK Ltd to shareholders of E Ltd in Lakhs	= $1130/220 = 5.14$
PAT of TK Ltd post-merger INR Lakhs	= $478.8 + 119 = 597.8$





Shares of TK Ltd (Lakhs)	24
Shares of SK Ltd (Lakhs)	5.14
Post-merger Share count (Lakhs)	29.14
Post-merger EPS of TK Ltd	$= 597.8 / 29.14$ $= 20.52$
<b>Post-Acquisition MP INR EBITDA Multiple</b>	
Post- Acquisition EBITDA INR Lakhs	$= 800 + 230$ $= 1030$
Applicable EBITDA Multiple (WN)	8.05
Post-Acquisition EV (INR Lakhs)	$= 1030 \times 5.15$ $= 8,291.5$
Less: Post-Acquisition Debt INR Lakhs	(1640)
Post-Acquisition Market Capitalisation INR Lakhs	6,651.5
Post-Acquisition share count in Lakhs	29.14
Post-merger MP in INR	$= 6,651.5 / 29.14$ $= 228.26$
<b>PE Multiple</b>	
Post-Acquisition PAT INR Lakhs	597.8
Post-Acquisition Share count in Lakhs	29.14
Post-Acquisition EPS	20.52
Post-acquisition PE multiple	11.03
Post-Acquisition Market Price	$= 20.52 \times 11.03$ $= 226.34$

**Working Note :**

Particulars	Amount (INR)
EBITDA Multiple of TK Pre-merger	
Market Capitalisation INR Lakhs	5,280
Add: Debt INR Lakhs	1,160
Total EV INR Lakhs	6,440
EBITDA INR Lakhs	800
EV/EBITDA	$= 6,440 / 800$ $= 8.05$

**SK Ltd Asks:**

Particulars	Amount (INR)
Existing Share count of SK Ltd (Lakhs)	12
Swap Ratio	1 in Acquirer, 2 in Target
Shares issued in Acquirer TK Ltd (Lakhs)	$= 12 \times \frac{1}{2}$ $= 6$
CMP of shares of TK Ltd (Rs.)	220
Total Consideration in Lakhs	$= 6 \times 220$ $= 1,320$
Post-acquisition PAT INR Lakhs	597.8
Post-acquisition share count Lakhs	30
Post-acquisition EPS in INR	$= 597.8 / 30$ $= 19.93$





PE multiple post-acquisition assumed same as pre-acquisition for TK	11
Post-Acquisition MP of Shares of TK in ₹	= 19.93 × 11 = 219.23

Advantages of Acquisition of TK Ltd:

- Synergy, Cost Reduction, and operating efficiency.
- Better Market Share
- Avoidance of Competition

### 65. Illustration (For Practice)

Trupti Co. Ltd. promoted by a multinational group "INTERNATIONAL INC" is listed on stock exchange holding 84% i.e., 63 lakhs shares.

Profit after Tax is ₹ 4.80 crores.

Free Float Market Capitalisation is ₹ 19.20 crores.

As per the SEBI guidelines promoters have to restrict their holding to 75% to avoid delisting from the stock exchange. Board of Directors has decided not to delist the share but to comply with the SEBI guidelines by issuing Bonus shares to minority shareholders while maintaining the same P/E ratio.

Calculate

- P/E Ratio
- Bonus Ratio
- Market price of share before and after the issue of bonus shares
- Free Float Market capitalization of the company after the bonus shares.

(Old PM)

Solution:

Particulars	Amount(INR)
Promoter Holding	84%
Promoter Shares in Lakhs	63
Total Shares	= 63/84% = 75
Minority Shares	= 75-63 = 12
Profit After Tax in Lakhs	480
EPS in INR	= 480/75 = 6.4
Free Float Market Capitalisation in Lakhs	1,920
Free float %	= 100% - 84% = 16%
Total Market Capitalisation in Lakhs	= 1,920/16% = 12,000
CMP	= 12,000/75 = 160
i) PE Ratio	= 160/6.4 = 25
ii) Total Shares held by Promoter in Lakhs.	63
Promoter holding to be maintained	75%
Total shares which should have been in order to maintain 75% Promoter holding	= 63/75% = 84
Minority Shares	12
Total shares should have been with Minority	= 84 - 63 = 21
Bonus to be issued to Minority in Lakhs	= 21-12 = 9





Ratio of Bonus	= 9:12 = 3:4 I.e., for every 4 shares with Minority, 4 will be issued to them.
iii) Market Price before Bonus	160
Revised EPS	= 480/84 = INR 5.71
PE Ratio (Same as pre-merger)	25
Revised CMP	= 25 × 5.7 = INR 142.75
iv) Free float Market Capitalisation	= CMP × Shares held by minority = 142.75 × 21 Lakhs = 2,997.75 Lakhs or 29.9775 Crores

### 66. Illustration (For Practice)

Bank 'R' was established in 2005 and doing banking in India. The bank is facing DO OR DIE situation. There are problems of Gross NPA (Non-Performing Assets) at 40% & CAR/CRAR (Capital Adequacy Ratio/ Capital Risk Weight Asset Ratio) at 4%. The net worth of the bank is not good. Shares are not traded regularly. Last week, it was traded @ ₹ 8 per share. RBI Audit suggested that bank has either to liquidate or to merge with other bank. Bank 'P' is professionally managed bank with low gross NPA of 5%. It has Net NPA as 0% and CAR at 16%. Its share is quoted in the market @ ₹ 128 per share. The board of directors of bank 'P' has submitted a proposal to RBI for take over of bank 'R' on the basis of share exchange ratio. The Balance Sheet details of both the banks are as follows:

	Bank 'R' Amt. in ₹ lakhs	Bank 'P' Amt. In ₹ lakhs
Paid up share capital (F.V. ₹ 10 each)	140	500
Reserves & Surplus	70	5,500
Deposits	4,000	40,000
Other liabilities	890	2,500
Total Liabilities	<u>5,100</u>	<u>48,500</u>
Cash in hand & with RBI	400	2,500
Balance with other banks	-	2,000
Investments	1,100	15,000
Advances	3,500	27,000
Other Assets	100	2,000
Total Assets	<u>5,100</u>	<u>48,500</u>

It was decided to issue shares at Book Value of Bank 'P' to the shareholders of Bank 'R'. All assets and liabilities are to be taken over at Book Value.

For the swap ratio, weights assigned to different parameters are as follows:

Gross NPA	30%
CAR	20%
Market price	40%



- (a) What is the swap ratio based on above weights?  
 (b) How many shares are to be issued?  
 (c) Prepare Balance Sheet after merger.  
 (d) Calculate CAR & Gross NPA % of Bank 'P' after merger.

(Old PM)

Solution :

a)

Particulars	Bank R	Bank P	Ratio	Weight	Weighted Average
Gross NPA	40	5	$=5/40=0.125$	30%	$=0.125 \times 30% = 0.0375$
CAR	4	16	$=4/16=0.25$	20%	$=0.25 \times 20% = 0.050$
Market Price	8	128	$=8/128=0.0625$	40%	$=0.0625 \times 40% = 0.025$
Book Value per share	15	120	$=15/120=0.125$	10%	$=0.125 \times 10% = 0.0125$
Total					<b>0.125</b>

Hence, for every 1 share of Bank R, 0.125 share of Bank P will be issued.

b) Number of equity shares to be issued = INR 140 Lakhs/INR 10 × 0.125 = 1.75 Lakhs shares

c) Balance Sheet After Merger

Particulars	Amt. In INR lakhs
Paid up share capital (F.V. INR 10 each)	517.5
Reserves & Surplus (WN 1)	5,692.5
Deposits	40,000
Other liabilities	3,390
Total Liabilities	<b>53,600</b>
Cash in hand & with RBI	2,900
Balance with other banks	2,000
Investments	16,100
Advances	30,500
Other Assets	2,100
Total Assets	<b>53,600</b>

WN 1:

Particulars	Amount (INR Lakhs)
Capital Reserve :	
Book Value of shares	210





Less : Value of shares issued	= 1.75 × 10 = (17.5)
Capital Reserve Balance	192.5
Reserves and Surplus	= 5,500
Total Reserves and Surplus	= 5,692.5

d)

Particulars	Bank R	Bank P	Combined
CAR	4%	16%	
Total Capital in INR Lakhs	210	6,000	6,210
Risky Weighted Assets in INR Lakhs	5,250	37,500	42,750

$$\text{CAR} = 6,210 / 42,750 \times 100 = 14.53\%$$

Particulars	Bank R	Bank P	Combined
GNPA	0.40	0.05	
Gross NPA	0.40 = GNPA/3,500 = 3,500 × 0.4 = INR 1,400 Lakhs	0.05 = GNPA/27,000 = 27,000 × 0.05 = INR 1,350 Lakhs	INR 2,750 Lakhs

### 67. Illustration (For Practice)

XML Bank was established in 2001 and doing banking business in India. The bank is facing very critical situation. There are problems of Gross NPA (Non-Performing Assets) at 40% & CAR/CRAR (Capital Adequacy Ratio/Capital Risk Weight Asset Ratio) at 2%. The net worth of the bank is not good. Shares are not traded regularly. Last week, it was traded ₹ 4 per share.

RBI Audit suggested that bank has either to liquidate or to merge with other bank.

ZML Bank is professionally managed bank with low gross NPA of 5%. It has net NPA as 0% and CAR at 16%. Its share is quoted in the market @ ₹ 64 per share. The Board of Directors of ZML Bank has submitted a proposal to RBI for takeover of bank XML on the basis of share exchange ratio.

The Balance Sheet details of both the banks are as follows

PARTICULARS	XML Bank (₹) (Amount in Crores)	ZML BANK (₹) (Amount in Crores)
<b>Liabilities</b>		
Paid up share capital (₹ 10)	70	250
Reserve and Surplus	35	2,750
Deposits	2,000	20,000
Other Liabilities	445	1,250
Total Liabilities	2,550	24,250
<b>Assets</b>		
Cash in hand and with RBI	200	1,250
Balance with other banks	0	1,000
Investments	550	7,500
Advances	1,750	13,500
Other Assets	50	1,000
Total Assets	2,550	24,250



It was decided to issue shares at Book Value of ZML Bank to the shareholders of XML Bank.  
 All Assets & Liabilities are to be taken over at Book Value.  
 For the Swap Ratio, weights assigned to different parameters are as follows

Gross NPA	40%
CAR	10%
Market Price	40%
Book Value	10%

You are required to

- Calculate swap ratio based on above rates.
- Calculate number of shares are to be issued
- Prepare Balance Sheet after Merger.

(May'17 QP Old)

Solution :

Particulars	Bank XML	Bank ZML	Ratio	Weight	Weighted Average
Gross NPA	40	5	$=5/40=0.125$	40%	$=0.125 \times 40\% = 0.05$
CAR	2	16	$=2/16=0.125$	10%	$=0.125 \times 10\% = 0.0125$
Market Price	4	64	$=4/64=0.0625$	40%	$=0.0625 \times 40\% = 0.025$
Book Value per share	$=105/7=15$	$=3000/25=120$	$=15/120=0.125$	10%	$=0.125 \times 10\% = 0.0125$
Total					0.1

Hence, For Every share of XML bank, 0.1 share of ZML bank shall be issued. Number of equity shares to be issued = INR 70 Crores/INR 10 × 0.1 = 70 Lakhs shares

Balance Sheet After Merger

Particulars	Amt. In INR Crores
Paid up share capital (F.V. INR 10 each)	257
Reserves & Surplus (WN 1)	2,848
Deposits	22,000
Other liabilities	1,695
Total Liabilities	<u>26,800</u>
Cash in hand & with RBI	1,450
Balance with other banks	1,000
Investments	8,050





Advances	15,250
Other Assets	1,050
Total Assets	<u>26,800</u>

WN 1:

Particulars	Amount (INR Crores)
<b>Capital Reserve :</b>	
Book Value of shares	105
Less : Value of shares issued	= 70 × 10 = (7)
<b>Capital Reserve Balance</b>	98
<b>Reserves and Surplus</b>	= 2,750
<b>Total Reserves and Surplus</b>	= <b>2,848</b>

### 68. Illustration (For Practice)

The following is the Balance-sheet of Grape fruit Company Ltd as at March 31st, 2011.

Liabilities	(₹ in lakhs)	Assets	(₹ in lakhs)
Equity shares of ₹100 each	600	Land and Building	200
14% preference shares of ₹ 100/- each	200	Plant and Machinery	300
13% Debentures	200	Furniture and Fixtures	50
Debenture interest accrued and payable	26	Inventory	150
Loan from bank	74	Sundry debtors	70
Trade creditors	340	Cash at bank	130
		Preliminary expenses	10
		Cost of issue of debentures	5
		Profit and Loss account	525
	<u>1440</u>		<u>1440</u>

The Company did not perform well and has suffered sizable losses during the last few years. However, it is felt that the company could be nursed back to health by proper financial restructuring.

Consequently, the following scheme of reconstruction has been drawn up

- Equity shares are to be reduced to ₹ 25/- per share, fully paid up
- Preference shares are to be reduced (with coupon rate of 10%) to equal number of shares of ₹ 50 each, fully paid up.
- Debenture holders have agreed to forgo the accrued interest due to them. In the future, the rate of interest on debentures is to be reduced to 9 percent.
- Trade creditors will forego 25 percent of the amount due to them.
- The company issues 6 lakh of equity shares at ₹ 25 each and the entire sum was to be paid on application. The entire amount was fully subscribed by promoters.
- Land and Building was to be revalued at ₹ 450 lakhs, Plant and Machinery was to be written down by ₹ 120 lakhs and a provision of ₹ 15 lakhs had to be made for bad and doubtful debts.



**Required:**

- (i) Show the impact of financial restructuring on the company's activities.  
 (ii) Prepare the fresh balance sheet after the reconstruction is completed on the basis of the above proposals.

(MTP Aug'18, RTP Nov'23, RTP Nov'18 Old, RTP Nov'19 Old, RTP Nov'20 Old, Old PM)

**Solution :**

- i) Impact of Financial Restructuring

Particulars	Amount (INR in Lakhs)
Reduction of Liabilities Payable	
Reduction in Equity Share Capital (6 Lakhs shares × INR 75 per share)	450
Reduction in Preference Share Capital (2 Lakhs shares × INR 50 Per share)	100
Waiver of Outstanding Debenture Interest	26
Waiver from trade Creditors ( INR 340 Lakhs × 0.25)	85
	661
Revaluation from Assets	
Appreciation of Land and Building (INR 450 Lakhs - INR 200 Lakhs)	250
<b>Total</b>	<b>911</b>
Amount of INR 911 Lakhs utilised to write off losses , fictitious and overvalued assets	
Writing off Profit and Loss account	
	5
Cost of issue of Debentures	5
Preliminary Expenses	10
Provision for bad and doubtful debts	15
Revaluation of Plant & Machinery (INR 300 - INR 180 Lakhs)	120
<b>Total</b>	<b>675</b>
Capital Reserve	= 911 - 675 = 236

- ii)

Liabilities	INR akhs)	in	Assets	(INR in lakhs)
12 Lakhs Equity shares of ₹25 each	300		Land and Building	450
10% preference shares of ₹ 50/- each	100		Plant and Machinery	180
Capital Reserve	236		Furniture and Fixtures	50
9% Debentures	200		Inventory	150





Loan from bank	74	Sundry debtors (70 - 15)	55
Trade creditors	255	Cash at bank (130+150)	280
	<u>1165</u>		<u>1165</u>

Illustration (For Practice)

A Ltd. wants to acquire T Ltd. and has offered a swap ratio of 1:2 (0.5 shares for every one share of T Ltd.). Following information is provided:

Particulars	A Ltd	T Ltd
Profit after tax	₹ 18,00,000	₹ 3,60,000
Outstanding Equity Shares	6,00,000	1,80,000
EPS	₹ 3	₹ 2
PE Ratio	10 times	7 times
Market Price	₹ 30	₹ 14

Required:

- The number of equity shares to be issued by A Ltd. for acquisition of T Ltd.
- What is the EPS of A Ltd. after the acquisition?
- Determine the equivalent earnings per share of T Ltd.
- What is the expected market price per share of A Ltd. after the acquisition, assuming its PE multiple remains unchanged?
- Determine the market value of the merged firm.
- If you are a shareholder of T Limited holding 100 shares - would you be interested in selling your stake? Why?

(Old PM, Nov'22 QP, 8 marks, Similar May'18 QP)

Solution :

i)

Particulars	Amount (INR)
Number of shares of T Ltd	180,000
Swap Ratio	1:2
Number of equity shares to be issued by A Ltd	= 180,000 × 0.5 = 90,000

ii)

Particulars	Amount (INR)
Total PAT	= 18,00,000 + 360,000 = 21,60,000
Total Number of shares	= 6,00,000 + 90,000 = 690,000
EPS	= 21,60,000 / 690,000 = 3.13





iii)

Particulars	Amount (INR)
EPS	3.13
Swap Ratio	1:2
Equivalent EPS	= $3.13 \times 0.5$ = 1.57

iv)

Particulars	Amount (INR)
EPS after merger	3.13
PE Ratio	10
Expected Market Price in INR	= $3.13 \times 10$ = 31.3

v)

Particulars	Amount (INR)
Total Number of shares	690,000
Expected Market Price in INR	31.3
Total Market Capitalisation of merged entity	= $690,000 \times 31.3$ = INR 2,15,97,000

- vi) As a shareholder of T Limited, one should exchange the shares as value of 100 shares of T on a stand alone basis is Rs.1400 but post merger the shareprice of equivalent shares would be 50 Shares of A Limited Valued at Rs.1,565

### 69. Illustration (For Practice)

The following is the Balance Sheet of XYZ Ltd. as at 31st March, 2016

Liabilities	₹ in Lakhs	Assets	₹ in Lakhs
Equity Shares of ₹ 10 each	500	Land and Buildings	150
11% Preference shares of ₹ 10 each	100	Plant and Machinery	200
12% Debentures	100	Furniture and Fixtures	60
Debenture Interest accrued and payable	12	Inventory	60
Loan from Bank	60	Sundry Debtors	50
Trade Creditors	300	Cash at Bank	50
		Preliminary Expenses	15
		Cost of Issue of Debentures	7
		Profit and Loss account	480
	<u>1072</u>		<u>1072</u>

The Company's performance is not good and has suffered sizable losses during the last few years. The Company can be nursed back to health with proper financial restructuring. As such, the following scheme is prepared

- (i) Equity Shares are to be reduced to ₹ 2 per Share, fully paid-up.
- (ii) Preference Shares are to be reduced (with coupon Rate of 9%) to equal number of Shares of ₹ 5 each, fully paid-up.
- (iii) Debenture holders have agreed to forgo the accrued interest due to them and for the future the rate of interest on Debentures to be 10%.





- (iv) Trade Creditors will forgo 20% of the amount due to them.
- (v) The Company to issue 50 Lakh Shares at ₹ 2 each to be paid fully. on Application. The entire amount is fully subscribed by Promoters.
- (vi) Land and Building to be revalued at ₹ 350 Lakhs, Plant and Machinery value to be taken at ₹ 150 Lakhs and a provision of ₹ 5 Lakhs to be made for Bad and Doubtful Debts.

You are required to

- (i) Show the impact of Financial Restructuring on the Company's activities.
- (ii) Prepare the fresh Balance Sheet after the reconstruction is completed on the basis of above proposals.

(May'17 QP)

Solution :

i)

Impact of Financial Restructuring

Particulars	Amount (INR in Lakhs)
Reduction of Liabilities Payable	
Reduction in Equity Share Capital (50 Lakhs shares × INR 8 per share)	400
Reduction in Preference Share Capital (10 Lakhs shares × INR 5 Per share)	50
Waiver of Outstanding Debenture Interest	12
Waiver from trade Creditors ( INR 300 Lakhs × 0.20)	60
Revaluation from Assets	
Appreciation of Land and Building (INR 350 Lakhs - INR 150 Lakhs)	200
<b>Total</b>	<b>722</b>
<i>Amount of INR 722 Lakhs utilised to write off losses , fictitious and overvalued assets</i>	
Writing off Profit and Loss account	480
Cost of issue of Debentures	7
Preliminary Expenses	15
Provision for bad and doubtful debts	5
Revaluation of Plant & Machinery (INR 200 - INR 150 Lakhs)	50
<b>Total</b>	<b>557</b>
<b>Capital Reserve</b>	<b>= 722 - 557 = 165</b>

ii)

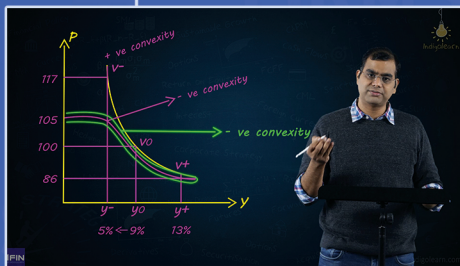
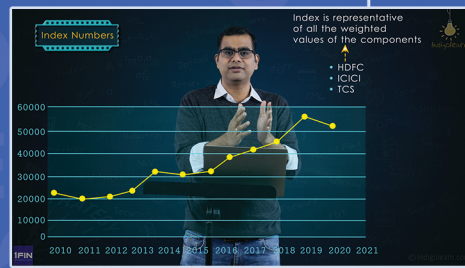
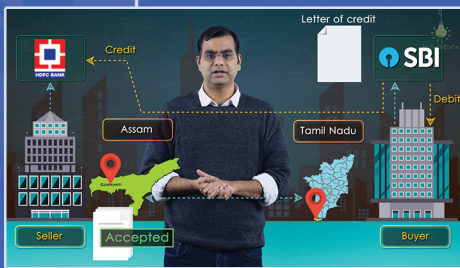
Liabilities	(INR in lakhs)	Assets	(INR in lakhs)
100 Lakhs Equity shares of ₹2 each	200	Land and Building	350
9% preference shares of ₹ 5/- each	50	Plant and Machinery	150
Capital Reserve	165	Furniture and Fixtures	60
10% Debentures	100	Inventory	60
Loan from bank	60	Sundry debtors (50 - 5)	45
Trade creditors (300-60)	240	Cash at bank (50+100)	150
	<b>815</b>		<b>815</b>



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