

PAPER – 2 : STRATEGIC FINANCIAL MANAGEMENT

QUESTIONS

Foreign Exchange Risk Management

1. On 30th June 2009 when a forward contract matured for execution you are asked by an importer customer to extend the validity of the forward sale contract for US\$ 10,000 for a further period of three months.

Contracted Rate US\$1 = Rs.41.87

The US Dollar quoted on 30.6.2009

Spot	Rs. 40.4800/Rs. 40.4900
Premium July	0.1100/0.1300
Premium August	0.2300/0.2500
Premium September	0.3500/0.3750

Calculate the cost for your customer in respect of the extension of the forward contract. Rupee values to be rounded off to the nearest Rupee.

Margin 0.080% for Buying Rate

Margin 0.25% for Selling Rate

2. Wenden Co is a Dutch-based company which has the following expected transactions.

One month: Expected receipt of £2,40,000

One month: Expected payment of £1,40,000

Three months: Expected receipts of £3,00,000

The finance manager has collected the following information:

Spot rate (£ per €): 1.7820 ± 0.0002

One month forward rate (£ per €): 1.7829 ± 0.0003

Three months forward rate (£ per €): 1.7846 ± 0.0004

Money market rates for Wenden Co:

	Borrowing	Deposit
One year Euro interest rate:	4.9%	4.6
One year Sterling interest rate:	5.4%	5.1

Assume that it is now 1 April.

Required:

- (a) Calculate the expected Euro receipts in one month and in three months using the forward market.

- (d) Calculate the expected Euro receipts in three months using a money-market hedge and recommend whether a forward market hedge or a money market hedge should be used.
3. CQS plc is a UK company that sells goods solely within UK. CQS plc has recently tried a foreign supplier in Netherland for the first time and need to pay €250,000 to the supplier in six months' time. You as financial manager are concerned that the cost of these supplies may rise in Pound Sterling terms and has decided to hedge the currency risk of this account payable. The following information has been provided by the company's bank:

Spot rate (€ per £): 1.998 ± 0.002

Six months forward rate (€ per £): 1.979 ± 0.004

Money market rates available to CQS plc:

Borrowing Deposit

One year Pound Sterling interest rates: $6.1\% \text{ } 5.4\%$

One year Euro interest rates: $4.0\% \text{ } 3.5\%$

Assuming CQS plc has no surplus cash at the present time you are required to evaluate whether a money market hedge, a forward market hedge or a lead payment should be used to hedge the foreign account payable.

Capital Budgeting with Risk

4. MCL Technologies is evaluating new software for ERP. The software will have a 3-year life and cost €1,000 thousands. Its impact on cash flows is subject to risk. Management estimates that there is a 50-50 chance that the software will either save the company €1,000 thousands in the first year or save it nothing at all. If nothing at all, savings in the last 2 years would be zero. Even worse, in the second year an additional outlay of €300 thousands may be required to convert back to the original process, for the new software may result in less efficiency. Management attaches a 40 percent probability to this occurrence, given the fact that the new software "failed" in the first year. If the software proves itself, second-year cash flows may be either €1,800 thousands, €1,400 thousands, or €1,000 thousands, with probabilities of 0.20, 0.60, and 0.20, respectively. In the third year, cash, inflows are expected to be €200 thousands greater or €200 thousands less than the cash flow in period 2, with an equal chance of occurrence. (Again, these cash flows depend on the cash flow in period 1 being €1,000 thousands.) All the cash flows are after taxes.
- (a) Set up a probability tree to depict the foregoing cash-flow possibilities.
- (b) Calculate a net present value for each three-year possibility, using a risk-free rate of 5 percent.
- (c) What is the risk of the project?

5. Soft True P Ltd. is a company specializing in the development of business software. The company's managers believe that its future growth potential in the software sector is limited hence are considering diversifying into other activities. One suggestion from operation department is Internet auctions, and financial management team in consultation with the operation department has produced the following draft financial proposal.

(a) The initial cost of the project (capital outlay) of the project will be Rs. 27,00,000.

(b) The year-wise working capital requirement will be as follows:

Year	0	1	2	3	4
Working capital	4,00,000	24,000	24,000	25,000	26,000

(c) Details of inflows and other outflows is as follows:

Internet auctions project					
	Rs. '000				
Year	0	1	2	3	4
Auction fees	–	43,00	66,20	81,00	82,00
<i>Outflows:</i>					
Maintenance costs	–	12,10	18,50	19,20	21,25
Telephone Expenses	–	12,15	19,10	22,30	24,20
Wages	–	14,60	15,20	16,80	17,30
Salaries	–	400	550	600	650
Allocated head office overhead	–	85	90	95	1,00
Marketing	5,00	4,20	2,00	2,00	–
Royalty payments for use of technology	6,80	5,00	3,00	2,00	2,00
Research & Development	1,10		–	–	–
Rent of office	–	<u>2,80</u>	<u>2,90</u>	<u>3,00</u>	<u>3,10</u>
Total outflows	12,90	55,70	67,10	72,25	75,35
Profit before tax	(12,90)	(12,70)	(90)	8,75	6,65

Additional information:

(i) All data include the estimated effects of inflation on costs and prices wherever

relevant. Inflation in India is forecast to be 2% per year for the foreseeable future.

- (ii) The investment in IT infrastructure and the initial working capital will be financed by a 6 year 5.5% fixed rate term loan. Other years outlays will be financed from existing cash flows.
- (iii) It is expected that Government of India shall give a 1% per year subsidy to the cost of the loan to support the creation of jobs associated with this project.
- (iv) It is expected that highly skilled IT staff would need to be taken from other activities resulting in a loss of Rs.80,000 per year pre-tax contribution for three years.
- (v) Head office cash flows for overheads will increase by Rs. 50,000 as a result of the project in year one, rising by Rs.5,000 per year after year one.
- (vi) Corporate tax is at a rate of 24.5% per year, payable in the year that the tax liability arises. The company has other profitable projects.
- (vii) Tax allowable depreciation on IT infrastructure is 20% for the first year, and straight line thereafter. The IT infrastructure has an expected working life of six years after which major new investment would be required.
- (viii) The company's current weighted average cost of capital is 7.8%.
- (ix) The company's equity beta is 1.05.
- (x) The average equity beta of companies in the Internet auctions sector is 1.42.
- (xi) The market return is 9.5% per year and the risk free rate 4% per year.
- (xii) Soft True's capital gearing is:
Book value 55% equity, 45% debt
Market value 70% equity, 30% debt
- (xiii) The average gearing of companies in the Internet auction sector is 67% equity, 33% debt by market values.
- (xiv) The market research survey was undertaken three weeks ago.
- (xv) After tax operating net cash flows after year 4 are expected to stay approximately constant in real terms. The royalty payment will remain at Rs.200,000 in money terms.
- (xvi) Issue costs on debt are 1.5%. These costs are not tax allowable.

Required:

Suppose you are an external consultant and you have been approached by the Soft True to prepare a report on the proposed diversification of the company into Internet auctions.

- (a) The report must include a revised financial analysis. Make relevant assumptions as required.

- (b) Also include in your report discussion of other financial and non financial factors, including real options that Soft True might consider prior to making the investment decision.

Business Valuation

6. Suppose you are verifying a valuation done on an established company by a well-known analyst has estimated a value of Rs. 750 lakhs, based upon the expected free cash flow next year, of Rs. 30 lakhs, and with an expected growth rate of 5%.

You found that, he 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 following information:

- (a) Company has a cost of equity of 12%.
(b) After-tax cost of debt of 6%.
(c) 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 company.

7. ABC (India) Ltd., a market leader in printing industry, is planning to diversify into defense equipment businesses that have recently been partially opened up 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 a consultant with a request to take up valuation of his company with the following data for the year ended 2009:

Share Price	Rs. 66 per share
Outstanding debt	1934 lakh
Number of outstanding shares	75 lakh
Net income	17.2 lakh
EBIT	245 lakh
Interest expenses	218.125 lakh
Capital expenditure	234.4 lakh
Depreciation	234.4 lakh
Working capital	44 lakh
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% by 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.

Leasing Decision

8. Mr. Lee wants to acquire a mechanized feed spreader that cost €80,000. He intends to operate the equipment for 5 years, at which time it will need to be replaced. However, it is expected to have a salvage value of €10,000 at the end of the fifth year. The asset will be depreciated on a straight-line basis (€16,000 per year) over the 5 years, and Lee is in a 30 percent tax bracket. Two means for financing the feed spreader are available. A lease arrangement calls for lease payments of €19,000 annually, payable in advance. A debt alternative carries an interest of €19,000 annually, payable in advance. A debt alternative carries an interest cost of 10 percent. Debt payments will be at the start of each of the 5 years using mortgage type of debt amortization.
- (a) Using the present-value method, determine the best alternative.
- (b) Using the internal-rate-of-return method, which is the best alternative? Does your answer differ from that to part a ?
9. Ageit Charter has been asked to operate a very light aircraft plane for a mining company exploring north and west of Maastricht. Ageit will have a firm one-year contract with the mining company and expects that the contract will be renewed for the five-year duration of the exploration program. If the mining company renews at year 1, it will commit to use the plane for four more years.

Ageit Charter has the following choices.

- Buy the plane for €500,000.
- Take a one-year operating lease for the plane. The lease rate is €118,000, paid in advance.
- Arrange a five-year, noncancelable financial lease at a rate of €75,000 per year, paid in advance.

These are net leases: all operating costs are absorbed by Ageit Charter.

How would you advise Bart Ageit, the charter company's CEO? Assume five-year, straight-line depreciation for tax purposes. The company's tax rate is 35 percent. The weighted-average cost of capital for the very light aircraft plane business is 14 percent, but Ageit can borrow at 9 percent. The expected inflation rate is 4 percent.

Ms. Ageit thinks the plane will be worth €300,000 after five years. But if the contract with the mining company is not renewed (there is a 20 percent probability of this outcome at year 1), the plane will have to be sold on short notice for €400,000.

If Ageit Charter takes the five-year financial lease and the mining company cancels at year 1, Ageit can sublet the plane that is, rent it out to another user.

Make additional assumptions as necessary.

International Capital Budgeting

10. OJ Ltd. Is a supplier of leather goods to retailers in the UK and other Western European countries. The company is considering entering into a joint venture with a manufacturer in South America. The two companies will each own 50 per cent of the limited liability company JV(SA) and will share profits equally . £ 450,000 of the initial capital is being provided by OJ Ltd. and the equivalent in South American dollars (SA\$) is being provided by the foreign partner. The managers of the joint venture expect the following net operating cash flows, which are in nominal terms:

	SA\$ 000	Forward Rates of exchange to the £ Sterling
Year 1	4,250	10
Year 2	6,500	15
Year 3	8,350	21

For tax reasons JV(SV) the company to be formed specifically for the joint venture, will be registered in South America.

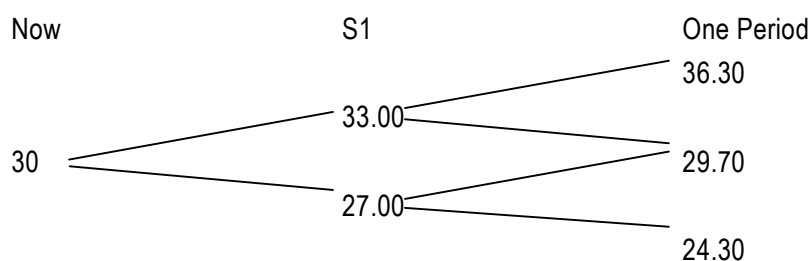
Ignore taxation in your calculations.

Assuming you are financial adviser retained by OJ Limited to advise on the proposed joint venture.

- (i) Calculate the NPV of the project under the two assumptions explained below. Use a discount rate of 18 per cent for both assumptions.
- Assumption 1: The South American country has exchange controls which prohibit the payment of dividends above 50 per cent of the annual cash flows for the first three years of the project. The accumulated balance can be repatriated at the end of the third year.
- Assumption 2 : The government of the South American country is considering removing exchange controls and restriction on repatriation of profits. If this happens all cash flows will be distributed as dividends to the partner companies at the end of each year.
- (ii) Comment briefly on whether or not the joint venture should proceed based solely on these calculations.

Options and Derivatives

11. Following is a two-period tree for a share of stock in CAB Ltd.:



Using the Binomial model, calculate the current fair value of a regular call option on CAB Stock with the following characteristics : X = Rs. 28, Risk Free Rate = 5 percent (per sub period). You should also indicate the composition of the implied riskless hedge portfolio at the valuation date.

12. In March, a derivatives dealer offers you the following quotes for June British pound option contracts (expressed in U.S. dollars per GBP):

Contract	Strike Price	MARKET PRICE OF CONTRACT	
		Bid	Offer
Call	USD 1.40	0.0642	0.0647
Put		0.0255	0.0260
Call	1.44	0.0417	0.0422
Put		0.0422	0.0427
Call	1.48	0.0255	0.0260
Put		0.0642	0.0647

- (a) Assuming each of these contracts specifies the delivery of GBP 31,250 and expires in exactly three months, complete a table similar to the following (expressed in dollars) for a portfolio consisting of the following positions:

- (1) Long a 1.44 call
- (2) Short a 1.48 call
- (3) Long a 1.40 put
- (4) Short a 1.44 put

June USD/GBP	Net Initial Cost	Call 1.44 Profit	Call 1.48 Profit	Put 1.40 Profit	Put 1.44 Profit	Net Profit
1.36	—	—	—	—	—	—
1.40	—	—	—	—	—	—
1.44	—	—	—	—	—	—
1.48	—	—	—	—	—	—
1.52	—	—	—	—	—	—

- (b) Graph the total net profit (i.e., cumulative profit less net initial cost, ignoring time value considerations) relationship using the June USD/GBP rate on the horizontal axis (be sure to label the breakeven point(s)). Also, comment briefly on the nature of the currency speculation represented by this portfolio.

- (c) If in exactly one month (i.e., in April) the spot USD/GBP rate falls to 1.385 and the effective annual risk-free rates in the United States and England are 5 percent and 7 percent, respectively, calculate the equilibrium price differential that should exist between a long 1.44 call and a short 1.44 put position.
13. You are trying to value a long term call option on the Standard and Poor's 500, expiring in 2 months, with a strike price of \$900. The index is currently at \$930, and the annualized standard deviation in stock prices is 20% per annum. The average dividend yield on the index is 0.3% per month, and is expected to remain unchanged over the next month. The treasury bond rate is 8%.
- Estimate the value of the long term call option.
 - Estimate the value of a put option, with the same parameters.
 - What are the implicit assumptions you are making when you use the Black-Scholes model to value this option?

Which of these assumptions are likely to be violated? What are the consequences for your valuation?

Dividend Policy

14. CMC plc has an all-common-equity capital structure. It has 200,000 shares of £2 par value equity shares outstanding. When CMC's founder, who was also its research director and most successful inventor, retired unexpectedly to settle down in the South Pacific in late 2005, CMC was left suddenly and permanently with materially lower growth expectations and relatively few attractive new investment opportunities. Unfortunately, there was no way to replace the founder's contributions to the firm. Previously, CMC found it necessary to plough back most of its earnings to finance growth, which averaged 12% per year. Future growth at a 5% rate is considered realistic; but that level would call for an increase in the dividend payout. Further, it now appears that new investment projects with at least the 14% rate of return required by CMC's shareholders ($k_e = 14\%$) would amount to only £800,000 for 2006 in comparison to a projected £2,000,000 of net income. If the existing 20% dividend payout were continued, retained earnings would be £16,000,000 in 2006, but, as noted, investments that yield the 14% cost of capital would amount to only £800,000.

The one encouraging thing is that the high earnings from existing assets are expected to continue, and net income of £20,000,000 is still expected for 2006. Given the dramatically changed circumstances, CMC's board is reviewing the firm's dividend policy.

- Assuming that the acceptable 2006 investment projects would be financed entirely by earnings retained during the year, calculate DPS in 2006, assuming that CMC uses the residual payment policy.
- What payout ratio does your answer to part (a) imply for 2006?

- (c) If a 60 % payout ratio is adopted and maintained for the foreseeable future, what is your estimate of the present market price of the equity share? How does this compare with the market price that should have prevailed under the assumptions existing just before the news about the founder's retirement? If the two values of P_0 are different. Comment on why?
- (d) What would happen to the price of the share if the old 20% payout were continued? Assume that if this payout is maintained, the average rate of return on the retained earnings will fall to 7.5% and the new growth rate will be
- $$G = (1.0 - \text{Payout ratio}) \times (\text{ROE})$$
- $$= (1.0 - 0.2) (7.5\%) = (0.8) (7.5\%) = 6.0\%$$
15. Seawell Corporation, a manufacturer of do-it-yourself hardware and housewares, reported earnings per share of € 2.10 in 2003, on which it paid dividends per share of €0.69. Earnings are expected to grow 15% a year from 2003 to 2008, during which period the dividend payout ratio is expected to remain unchanged. After 2008, the earnings growth rate is expected to drop to a stable 6%, and the payout ratio is expected to increase to 65% of earnings. The firm has a beta of 1.40 currently, and is expected to have a beta of 1.10 after 2008. The market risk premium is 5.5%. The Treasury bond rate is 6.25%.
- (a) What is the expected price of the stock at the end of 2008?
- (b) What is the value of the stock, using the two-stage dividend discount model?

Merger and Acquisition

16. AB Ltd. is a firm of recruitment and selection consultants. It has been trading for 10 years and obtained a stock market listing 4 years ago. It has pursued a policy of aggressive growth and specializes in providing services to companies in high-technology and high growth sectors. It is all-equity financed by ordinary share capital of Rs. 500 lakh in shares of Rs. 20 nominal (or par) value.

The company's results to the end of March 2009 have just been announced. Profits before tax were Rs.1,266 lakh. The Chairman's statement included a forecast that earnings might be expected to rise by 4%, which is a lower annual rate than in recent years. This is blamed on economic factors that have had a particularly adverse effect on high-technology companies.

YZ Ltd. is in the same business but has been established much longer. It serves more traditional business sectors and its earnings record has been erratic. Press comment has frequently blamed this on poor management and the company's shares have been out of favour with the stock market for some time. Its current earnings growth forecast is also 4% for the foreseeable future. YZ Ltd. has an issued ordinary share capital of Rs.1800 lakh in Rs.100 shares. Pre-tax profits for the year to 31 March 2009 were Rs.1,125 lakh.

AB Ltd. has recently approached the shareholders of YZ Ltd. with a bid of 5 new shares in AB Ltd. for every 6 YZ Ltd. shares. There is a cash alternative of Rs. 345 per share. Following the announcement of the bid, the market price of AB Ltd. shares fell 10% while the price of YZ Ltd. shares rose 14%. The P/E ratio and dividend yield for AB Ltd., YZ Ltd. and two other listed companies in the same industry immediately prior to the bid announcement are shown below.

2009				
High	Low	Company	P/E	Dividend yield %
425	325	AB Ltd.	11	2.4
350	285	YZ Ltd.	7	3.1

Both AB Ltd. and YZ Ltd. pay tax at 30%.

AB Ltd.'s post-tax cost of equity capital is estimated at 13% per annum and YZ Ltd.'s at 11% per annum.

Assuming that you are a shareholder in YZ Ltd. You have a large, but not controlling interest.

You bought the shares some years ago and have been very disappointed with their performance. Based on the information and merger terms available, plus appropriate assumptions, to forecast post-merger values, evaluate whether the proposed share-for-share offer is likely to be beneficial to shareholders in both AB Ltd. and YZ Ltd. Also identify why the price of share of AB Ltd. fell following the announcement of bid.

Note: As a benchmark, you should then value the two companies AB Ltd. and YZ Ltd. using the constant growth form of the dividend valuation model.

Portfolio Management

17. Mr. Sunil Mukharjee has estimated probable under different macroeconomic conditions for the following three stocks:

Stock	Current price (Rs.)	Rates of return(%) during different macroeconomic scenarios		
		Recession	Moderate growth	Boom
Him Ice Ltd	12	-12	15	35
Kalahari Biotech	18	20	12	-5
Puma Softech	60	18	20	15

Mr. Sunil Mukharjee is exploring if it is possible to make any arbitrage profits from the above information.

Required

Using the above information construct an arbitrage portfolio and show the payoffs under different economic scenarios.

18. Assume that you have half your money invested in T, the media company, and the other half invested in U, the consumer product giant. The expected returns and standard deviations on the two investments are summarized below:

	T	U
Expected Return	14%	18%
Standard Deviation	25%	40%

Estimate the variance of the portfolio as a function of the correlation coefficient (Start with -1 and increase the correlation to $+1$ in 0.2 increments).

19. Suppose Mr. X in a world where there are only two assets, gold and stocks. He is interested in investing his money in one, the other or both assets. Consequently he collects the following data on the returns on the two assets over the last six years.

	Gold	Stock Market
Average return	8%	20%
Standard deviation	25%	22%
Correlation	-	0.4

- Mr. X is constrained to pick just one, which one he would choose?
- Mr. Y, a friend of Mr. X argues that this is wrong. He says that Mr. X is ignoring the big payoffs that he can get on gold. How would Mr. X go about alleviating his concern?
- How would a portfolio composed of equal proportions in gold and stocks do in terms of mean and variance?
- Mr. X came to know that GPEC (a cartel of gold-producing countries) is going to vary the amount of gold it produces with stock prices in the country. (GPEC will produce less gold when stock markets are up and more when it is down.) What effect will this have on his portfolios? Explain.

Mutual Funds

20. Ms. Sunidhi is working with an MNC at Mumbai. She is well versant with the portfolio management techniques and wants to test one of the techniques on an equity fund she has constructed and compare the gains and losses from the technique with those from a passive buy and hold strategy. The fund consists of equities only and the ending NAVs of the fund he constructed for the last 10 months are given below:

Month	Ending NAV (Rs./unit)	Month	Ending NAV (Rs./unit)
December 2008	40.00	May 2009	37.00
January 2009	25.00	June 2009	42.00
February 2009	36.00	July 2009	43.00
March 2009	32.00	August 2009	50.00
April 2009	38.00	September 2009	52.00

Assume Sunidhi had invested a notional amount of Rs.2 lakhs equally in the equity fund and a conservative portfolio (of bonds) in the beginning of December 2008 and the total portfolio was being rebalanced each time the NAV of the fund increased or decreased by 15%.

You are **required** to determine the value of the portfolio for each level of NAV following the Constant Ratio Plan.

Economic Value Added

21. 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 Rs. 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 Rs. 40 lakhs for the patent rights. Herbal's assets include Rs. 20 lakhs of working capital and Rs. 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)?

Bond Valuation

22. (a) Phototech plc has in issue 9% bonds which are redeemable at their par value of £100 in five years' time. Alternatively, each bond may be converted on that date into 20 ordinary shares of the company. The current ordinary share price of Phototech plc is £4.45 and this is expected to grow at a rate of 6.5% per year for the foreseeable future. Phototech plc has a cost of debt of 7% per year.

Required:

Calculate the following current values for each £ 100 convertible bond:

- (i) market value;
 - (ii) floor value;
 - (iii) conversion premium.
- (b) On 1 June 2003 the financial manager of Gadgets Corporation's Pension Fund Trust is reviewing strategy regarding the fund. Over 60% of the fund is invested in fixed rate long-term bonds. Interest rates are expected to be quite volatile for the next few years.

Among the pension fund's current investments are two AAA rated bonds:

- 1) Zero coupon June 2018
- 2) 12% Gilt June 2018 (interest is payable semi-annually)

The current annual redemption yield (yield to maturity) on both bonds is 6%. The semi-annual yield may be assumed to be 3%. Both bonds have a par value and redemption value of \$100.

Required:

Estimate the market price of each of the bonds if interest rates (yields):

- (i) increase by 1%;
- (ii) decrease by 1%.

[Given PVF (2.5%, 30) = 0.4767, PVF (3%, 30) = 0.412, PVF (3.5%,30) = 0.3563]

Right Issue

- 23. The stock of the Soni plc is selling for £50 per common stock. The company then issues rights to subscribe to one new share at £40 for each five rights held.
 - (a) What is the theoretical value of a right when the stock is selling rights-on?
 - (b) What is the theoretical value of one share of stock when it goes ex-rights?
 - (c) What is the theoretical value of a right when the stock sells ex-rights at £50?
 - (d) John Speculator has £1,000 at the time Soni plc goes ex-rights at £50 per common stock. He feels that the price of the stock will rise to £60 by the time the rights expire. Compute his return on his £1,000 if he (1) buys Soni plc stock at £50, or (2) buys the rights as the price computed in part c, assuming his price expectations are valid.
- 24. Explain the various types of risks to which the Swap Dealer is exposed to.
- 25. Write Short Notes on
 - (i) Enumerate the basic differences between cash and derivatives market.
 - (ii) Application of Double taxation agreements on Global depository receipts.
 - (iii) Repo and a Reverse Repo.

SUGGESTED ANSWERS/HINTS

- 1. This extension of forward Contract involves following steps
 - 1. Cancel the contract at TT buying rate.
 - 2. Rebook the contract for three months at the current rate of exchange.

Accordingly

Step 1: Cancel the contract at TT buying rate on 30.6.2009

	Rs.
Spot US\$ 1	40.4800
Less: Margin 0.080%	<u>0.0324</u>
	<u>40.4476</u>

Hence TT buying rate Rs.40.45 (Rounded off)

US\$ 10,000 @ Rs.40.45 Rs.4,04,500/-

US\$ 10,000 @ Rs.41.87 Rs.4,18,700/-

Difference in favour of the bank Rs. 14,200/-.

Step 2: New contract to be booked at the appropriate forward rate.

Three months forward rate is as under:

US\$ 1 Rs.40.4900 Spot Selling

Add: September Premium Rs. 0.3750

Rs. 40.8650

Add: Margin (0.25%) Rs. 0.1022

Rs. 40.9672

Forward rate to be quoted to the customer is US\$ 1 = Rs. 40.97

Thus cost to customer Rs. 14,200/-.

2. (a) Forward market evaluation

Net receipt in 1 month = £2,40,000 – £1,40,000 = £1,00,000

WendenCo needs to sell Sterlings at an exchange rate of (1.7829 + 0.0003)= £1.7832 per €

Euro value of net receipt = 1,00,000/ 1.7832 = €56,079

Receipt in 3 months = £3,00,000

Wenden Co needs to sell Sterlings at an exchange rate of 1.7846 + 0.0004 = £1.7850 per €

Euro value of receipt in 3 months = 3,00,000/ 1.7850 = €1,68,067

(b) Evaluation of money-market hedge

Expected receipt after 3 months = £300,000

Sterling interest rate over three months = 5.4/ 4 = 1.35%

Sterlings to borrow now to have £300,000 liability

after 3 months = 300,000/ 1.0135 = £296,004

Spot rate for selling Sterling = 1.7820 + 0.0002 = £1.7822 per €

Euro deposit from borrowed Sterling at spot = 296,004/ 1.7822 = €166,089

Euro interest rate over three months = 4.6/ 4 = 1.15%

Value in 3 months of Euro deposit = 166,089 x 1.0115 = €167,999

The forward market is marginally preferable to the money market hedge for the Sterling receipt expected after 3 months.

3. Money market hedge

CQS plc should place sufficient Euros on deposit now so that, with accumulated interest, the six-month liability of €250,000 can be met. Since the company has no surplus cash at the present time, the cost of these Euros must be met by a short-term Pound Sterling loan.

Six-month Euro deposit rate = 3.5/2 = 1.75%
 Current spot selling rate = € 1.998 – 0.002 = €1.996 per £
 Six-month Pound Sterling borrowing rate = 6.1/2 = 3.05%
 Euros deposited now = 250,000/1.0175 = € 2,45,700
 Cost of these Euros at spot = 245,700/1.996 = £ 1,23,096
 Pound Sterling value of loan in six months' time = 123,096 x 1.0305 = £ 1,26,850

Forward market hedge

Six months forward selling rate = € 1.979 – € 0.004 = € 1.975 per £
 Pound Sterling cost using forward market hedge = € 2,50,000/1.975 = £ 1,26,582

Lead payment

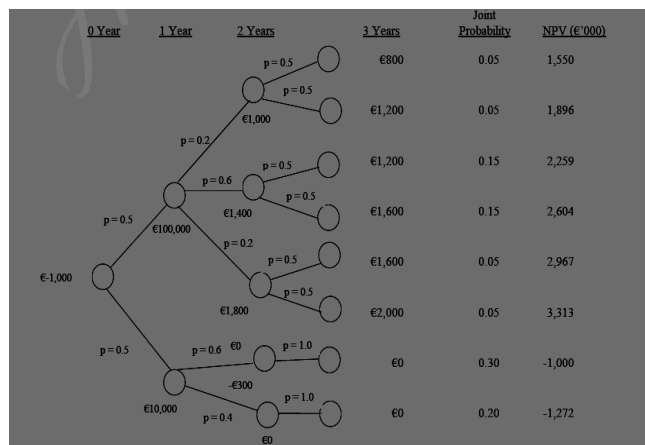
Since the Euro is appreciating against the Pound Sterling, a lead payment may be worthwhile.

Pound Sterling cost now = € 2,50,000/1.996 = £ 1,25,251
 This cost must be met by a short-term loan at a six-month interest rate of 3.05%
 Pound Sterling value of loan in six months' time = £ 1,25,251 x 1.0305 = £ 1,29,071

Evaluation of hedges

The relative costs of the three hedges can be compared since they have been referenced to the same point in time, i.e. six months in the future. The most expensive hedge is the lead payment, while the cheapest is the forward market hedge. Using the forward market to hedge the account payable currency risk can therefore be recommended.

4. (a)



Tabular Presentation

Period 0	Period 1		Period 2		Period 3		Overall	
Cash Flow Thousands €	Prob.	Cash Flow Thousands €	Cond. Prob.	Cash Flow Thousands €	Cond. Prob.	Cash Flow Thousands €	Joint Prob	Present Value Thousands €
-1,000	0.5	0	0.4	-€300	1.0	0	0.2	-€1,272
			0.6	0	1.0	0	0.3	-€1,000
					0.5	€800	0.05	€1,550
					0.2	€1,000	0.05	€1,896
	0.5	€1,000			0.5	€1,200	0.15	€2,259
					0.5	€1,200	0.15	€2,604
					0.5	€1,600	0.05	€2,967
					0.5	€1,600	0.05	€3,313

(b) The expected value of net present value of the project is found by multiplying together the last two columns above and totaling them as follows.

(c) The standard deviation is :

$$[0.2(-1,272-661)^2 + 0.3(-1,000-661)^2 + 0.05(1,550-661)^2 + 0.05(1,896 -661)^2 + 0.15(2,259-661)^2 + 0.15(2,604-661)^2 + 0.05(2,967-661)^2 + 0.05(3,313-661)^2]^{1/2} = €1,805 \text{ thousands}$$

Thus, the dispersion of the probability distribution of possible net present values is very wide. In turn, this is due to 50 percent probability of a zero outcome or less.

5. Report on the proposed Internet auction investment.

(a) Normally IT infrastructure requires major new investment after six years, therefore our period of the financial evaluation is six years. The adjusted present value technique (APV) will be used for the evaluation of the proposal requiring the estimation of the base case NPV of operating cash flows, and, separately, the present value of any financing side effects.

Assumptions:

- (i) The market research is a sunk cost.
- (ii) Working capital is assumed to be released at the end of year 6. Working capital in year 5 is assumed to increase by the 2% inflation rate in India.

- (iii) The financing side effects of the investment are the tax relief on interest payments, the issue costs and the benefit from the government subsidy.

Workings:

- (i) The discount rate for the base case NPV should be the ungeared cost of equity, taking into account the risk of the investment. In order to reflect the risk of the investment, the ungeared equity beta of the Internet auction sector will be used.

Assuming corporate debt to be virtually risk free:

$$\text{Beta ungeared} = \text{Beta equity} \times \frac{E}{E + D(1-t)}$$

$$\text{Beta ungeared} = 1.42 \times \frac{67}{67 + 33(1-0.245)} = 1.035$$

Using CAPM

$$K_{\text{eug}} = R_f + (R_m - R_f) \text{Beta}$$

$$K_{\text{eug}} = 4\% + (9.5\% - 4\%) 1.035 = 9.69\% \text{ rounded to } 10\%$$

10% will be used as the discount rate to estimate the base case NPV.

- (ii) **Tax relief on interest payments**

The benefit from the tax shield will be estimated based upon the debt used for the investment, although it could be argued that this should be based upon the percentage debt capacity of the company.

Total borrowing for the investment is Rs.31,00,000

Annual tax relief on borrowing Rs.31,00,000 x 4.5% (net of the subsidy) x 0.245 = Rs. 34,177.

The discount rate used will be the risk free rate as the tax relief is offered by a highly stable government in India.

The present value of tax relief for 6 years is: Rs. 34,177 x 5.242 = Rs.1,79,158

- (iii) **Government subsidy**

The benefit from the government subsidy is an interest saving of 1% per year.

Rs. 31,00,000 x 1% = Rs.31,000

The present value for six years, discounted at the risk free rate, is Rs.31,000 x 5.242 = Rs.162,502

(iv) **Issue costs**

Issues costs are Rs.31,00,000 x 1.5% = Rs.46,500

The estimated present value of the financial side effects is:

Rs. 1,79,158 + Rs. 1,62,502 – Rs. 46,500 = Rs. 2,95,160

Revised financial data:

		<i>Internet auctions project</i>						
		<i>Rs. '000</i>						
Year	0	1	2	3	4	5	6	
Auction fees	–	4,300	6,620	8,100	8,200	8,364	8,531	
<i>Outflows:</i>								
IT Maintenance costs	–	1,210	1,850	1,920	2,125	2,168	2,211	
Telephone costs	–	1,215	1,910	2,230	2,420	2,468	2,518	
Wages	–	1,460	1,520	1,680	1,730	1,765	1,800	
Salaries	–	400	550	600	650	663	676	
Allocated head office overhead	–	50	55	60	65	66	68	
Marketing	500	420	200	200	–	–	–	
Royalty payments for use of technology	680	500	300	200	200	200	200	
Lost contribution		80	80	80	–	–	–	
Rental of premises		280	290	300	310	316	323	
Tax allowable depreciation		<u>540</u>	<u>432</u>	<u>432</u>	<u>432</u>	<u>432</u>	<u>432</u>	
Total outflows	1,180	6,155	7,187	7,702	7,932	8,078	8,228	
Profit before tax	(1,180)	(1,855)	(567)	398	268	286	303	
Tax (24.5%)	289	454	139	(98)	(66)	(70)	(74)	
	<u>(891)</u>	<u>(1,401)</u>	<u>(428)</u>	<u>300</u>	<u>202</u>	<u>216</u>	<u>229</u>	
Add back depreciation		540	432	432	432	432	432	
<i>Other outflows</i>								
IT infrastructure	(2,700)							
Working capital	<u>(400)</u>	<u>(24)</u>	<u>(24)</u>	<u>(25)</u>	<u>(26)</u>	<u>(10)</u>	<u>509</u>	

Net flows	(3,991)	(885)	(20)	708	608	638	1,170
Discount factors (10%)		0.909	0.826	0.751	0.683	0.621	0.564
Present values	(3,991)	(804)	(17)	531	415	396	660

The expected base case NPV is (Rs. 2,810,000)

The estimated APV of the investment is (Rs.28,10,000) – Rs.2,95,160 = (Rs.25,14,840)

From a financial perspective this appears to be a very poor investment.

However, there are a number of other factors to consider. The data contains no information about what happens after four years, or in the case of the revised estimates, six years. Although major new investment would be needed after six years there is likely to be a realisable value or going concern value at that time which could be substantial. Several real options could exist at year six, including the option to reinvest and possibly expand operations, or perhaps to use the existing Internet auction clientele for other purposes such as Internet marketing. The initial investment decision should ideally take into account the expected present value from real call options such as these, although even if sophisticated option pricing models are used, real options are very difficult to accurately value. It would also be useful to investigate the effect on cash flow of the option to abandon the project part way through its expected life (effectively a put option).

- (b) Although from financial perspective this proposal appears to be a very poor investment. However, there are other important factors which need to be considered is as follows:
- (i) The accuracy of data. How confident is Soft True that the forecast sales and costs will occur?
 - (ii) Sensitivity and/or simulation analysis would be useful to investigate the impact of different assumptions on net cash flows.
 - (iii) Has the risk of the venture been accurately assessed? The discount rate of the operating cash flows is based on CAPM, and is subject to its theoretical and practical problems.
 - (iv) Are there new technologies involved in the investment which are not yet fully developed and proven?
 - (v) What will be the reaction of other Internet auction providers? Will they cut auction listing costs?
 - (vi) Are there alternative investments that would provide a better strategic fit for Trosoft?
 - (vii) Are there existing or possible future government regulations that would affect the investment?

- 6 Step 1: Solve for the cost of capital used by the analyst by applying Free Cash Flow to Firm (FCFF) Model as follows:

$$\text{of Firm} = V_0 = \frac{\text{FCFF}_1}{k_c - g_n}$$

where

FCFF₁ = Expected FCFF

k_c = Cost of Capital

g_n = Growth rate forever

Thus

$$\text{Rs. 750 lakhs} = \text{Rs. 30 lakhs} / (k_c - g)$$

$$\text{Since } g = 5\%$$

$$\text{then } k_c = 9\%$$

Step 2: Let X be the weight of Debt

Given Cost of equity = 12%; Cost of debt = 6%

then

$$12\% (1-X) + 6\% X = 9\%$$

Hence X = 0.50 : So book value weight for debt was 50%

Step3: Correct weights should be 75% of equity and 25% of debt

$$\text{Cost of capital} = k_c = 12\% (0.75) + 6\% (0.25) = 10.50\%$$

Step 4: Correct firm value = Rs. 30 Lakhs / (0.105-0.05) = Rs. 545.45 lakhs

7. i. **Computation of tax rate**

$$\text{EBIT} = \text{Rs. 245 lakh}$$

$$\text{Interest} = \text{Rs. 218.125 lakh}$$

$$\text{PBT} = \text{Rs. 26.875 lakh}$$

$$\text{PAT} = \text{Rs. 17.2 lakh}$$

$$\text{Tax paid} = \text{Rs. 9.675 lakh}$$

$$\text{Tax rate} = \text{Rs. 9.675} / 26.875 = 0.36 = 36\%$$

- ii. **Computation for increase in working capital**

$$\text{Working capital (2009)} = \text{Rs. 44 lakh}$$

$$\text{Increase in 2010} = \text{Rs. 44} \times 0.08 = \text{Rs. 3.52 lakh}$$

It will continue to increase @ 8% per annum.

iii. Weighted average cost of capital

Present debt = Rs. 1934 lakh
 Interest cost = Rs. 218.125 lakh / Rs. 1934 = 11.28 %
 Equity capital = 75 lakh X Rs. 66 = 4950 lakh

$$K_c = \frac{4950}{1934 + 4950} \times 16\% + \frac{1934}{1934 + 4950} \times 11.28 (1 - 0.36)$$

$$= 11.51 + 2.028 = 13.54$$

iv. As capital expenditure and depreciation are equal, they will not influence the free cash flows of the company.

v. Computation of free cash flows upto 2012

Year	2010	2011	2012	2013	2014
	Rs.	Rs.	Rs.	Rs.	Rs.
EBIT (1-t)	169.344 lakh	182.89 lakh	197.52 lakh	213.32 lakh	230.39 lakh
Increase in working capital	3.52 lakh	3.80 lakh	4.11 lakh	4.43 lakh	4.79 lakh
Debt repayment	-	-	-	-	1934 × 0.30 = 580.2 lakh
Free cash flows	165.824 lakh	179.09 lakh	193.41 lakh	208.89 lakh	-354.6 lakh
PVF @ 13.54%	0.8807	0.7757	0.6832	0.6017	0.53
PV of free cash flow @ 13.54%	146.10 lakh	138.97 lakh	132.10 lakh	125.75 lakh	-187.93 lakh

Present value of free cash flows upto 2014 = Rs. 354.99 lakh

vi. Cost of capital

Debt = 0.7 X Rs. 1934 = Rs. 1353.8 lakh
 Equity = Rs. 4950 lakh

$$K_c = \frac{4950}{4950 + 1353.8} \times 16\% + \frac{1353.8}{4950 + 1353.8} \times 13.54 (1 - 0.36) = 14.42\%$$

viii. Continuing value

$$\frac{240.336}{0.1442 - 0.06} \times (1/1.1354)^5$$

= Rs. 1,512.735 lakh

(a) Value of the firm = PV of free cash flows upto 2005 + continuing value – Market value of outstanding debt

$$= \text{Rs. } 354.99 \text{ lakh} + \text{Rs. } 1,512.735 \text{ lakh} - \text{Rs. } 1,353.80 \text{ lakhs}$$

$$= \text{Rs. } 513.925 \text{ lakh}$$

(b) Value per share = Rs. 513.925 lakh / 75 lakh = Rs. 6.852 < Rs. 66
(present market price)

Therefore, the share price is overvalued in the market.

8. (a) (i) Lease Alternative:

End of Year	(1) Lease Payment (€)	(2) Tax Shield (1) x 0.30 (€)	(3) Cash Out Flow (1) - (2) (€)	PVF @ 7 %*	(4) PV of Cash Outflows (€)
0	19,000	0	19,000	1	19,000
1-4	19,000	5,700	13,300	3.3872	45,050
5		5,700	(5,700)	0.713	(4,064)
					<u>€59,986</u>

* 10% (1-0.30)

The present value of cash outflows is €59,986.

(ii) Debt Alternative:

Annual debt repayments are:

Let X be the annual installment for loan repayment

$$\text{Then } \text{€}80,000 = X + 3.1699X \text{ (3.1699 = PV factor for 4-year annuity at 10\%)}$$

$$X = \text{€}80,000 / 4.1699$$

$$X = \text{€}19,185$$

End of Year	Debt Payment (€)	Principal Amount Owing (€)	Annual Interest (€)
0	19,185	60,815	0
1	19,185	47,712	6,082
2	19,185	33,298	4,771
3	19,185	17,443	3,330
4	19,187	0	1,774

The principal amount of €80,000 is reduced by the amount of the first payment of €19,185 to give €60,815 at time 0. The last debt payment is slightly higher due to rounding.

Statement showing the Cash Outflows (Debt Alternative)

End of Year	(1) Debt Repayment (€)	(2) Interest (€)	(3) Depreciation (€)	(4) Tax Shield 0.30x [(2)+(3)] (€)	(5) Out-flows (1) - (4) (€)	PV @ 7%	(6) PV Cash of Out flows (€)
0	19,185	0	0	0	19,185	1	19,185
1	19,185	6,082	16,000	6,625	12,560	0.9346	11,738
2	19,185	4,771	16,000	6,231	12,954	0.8734	11,315
3	19,185	3,330	16,000	5,799	13,386	0.8163	10,927
4	19,187	1,774	16,000	5,332	13,855	0.7629	10,570
5	0	0	16,000	4,800	(4,800)	0.7130	(3,422)
5					(7,000)†	0.7130	(4,991)
							<u>55,322</u>

†Residual value x (1 - 0.30)

Conclusion: As the present value of cash outflows under the debt alternative is lower i.e. €55,322 versus €59,986, hence debt option would be preferred.

(b) Schedule of Cash Flows: IRR Analysis of Lease

End of Year	(1) Cost (€)	(2) Lease Payment (€)	(3) Depreciation (€)	(4) Excess Tax Shield 0.30x (L-D) (€)	(5) Post tax Residual Value (€)	(6) Net cash Flows (€)
0	80,000	19,000	0	0		61,000
1		19,000	16,000	900		(18,100)
2		19,000	16,000	900		(18,100)
3		19,000	16,000	900		(18,100)
4		19,000	16,000	900		(18,100)
5		0	16,000	900	7,000	(6,100)

Solving for the internal rate of return for the last column, we find it to 10.11 percent. The after tax cost of borrowing of 7 percent is lower, and it dominates. The answer is the same as in the present value method of analysis, as we would expect.

9. Firm's after-tax borrowing rate: $0.65 \times 0.09 = 0.0585 = 5.85\%$

Consider first the choice between buying and a five-year financial lease. Ignoring salvage value, the incremental cash flows from leasing are shown in the following table:

	€'000					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Buy: 0.80 probability that contract will be renewed for 5 years						
Initial cost of plane	500.00					
Depreciation tax shield		-35.00	-35.00	-35.00	-35.00	-35.00
Lease payment	-75.00	-75.00	-75.00	-75.00	-75.00	
Lease payment tax shield						
	<u>26.25</u>	<u>26.25</u>	<u>26.25</u>	<u>26.25</u>	<u>26.25</u>	<u> </u>
Total cash flow (1)	<u>451.25</u>	<u>-83.75</u>	<u>-83.75</u>	<u>-83.75</u>	<u>-83.75</u>	<u>-35.00</u>
Buy: 0.20 probability that contract will not be renewed						
Initial cost of plane	500.00	-	-	-	-	-
Depreciation tax shield	-	-35.00	-	-	-	-
Lease payment	-75.00	-	-	-	-	-
Lease payment tax shield						
	<u>26.25</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Total cash flow (2)	<u>451.25</u>	<u>-35.00</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Expected cash flow = 0.80(1) + 0.20 (2)	451.25	-74.00	-67.00	-67.00	-67.00	-28.00
PVF (at 5.85%)	1	0.9447	0.8925	0.8432	0.7966	0.7526
PV (at 5.85%)	451.25	-69.91	-59.80	-56.49	-53.37	-21.07
Total PV(at 5.85%) =	€190.61					

The table above shows an apparent net advantage to leasing of €190610.

However, if Ageit buys the plane, it receives the salvage value. There is an 80% probability that the plane will be kept for five years and then sold for € 3,00,000 (less taxes) and there is a 20% probability that the plane will be sold for € 4,00,000 in one

year. Discounting the expected cash flows at the company cost of capital (these are risky flows) gives:

$$0.80 \times \left(\frac{3,00,000 \times (1 - 0.35)}{(1.14)^5} \right) + 0.20 \times \left(\frac{4,00,000}{(1.14)^1} \right) = 151200$$

The net gain to a financial lease is: (€ 1,90,610 - € 1,51,200) = € 39,410

(Note that the above calculations assume that, if the contract is not renewed, Ageit can, with certainty, charge the same rent on the plane that it is paying, and thereby zero-out all subsequent lease payments. This is an optimistic assumption.)

The after-tax cost of the operating lease for the first year is:

$$(1 - 0.35) \times €1,18,000 = €76,700$$

Assume that a five-year old plane is as productive as a new plane, and that plane prices increase at the inflation rate (i.e., 4% per year). Then the expected payment on an operating lease will also increase by 4% per year. Since there is an 80% probability that the plane will be leased for five years, and a 20% probability that it will be leased for only one year, the expected cash flows for the operating lease are as shown in the table below:

	€'000					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Lease: 0.80 probability that contract will be renewed for 5 years						
After-tax lease payment	-76.70	-79.77	-82.96	-86.28	-89.73	0.00
Lease: 0.20 probability that contract will not be renewed						
After-tax lease payment	-76.70					
Expected cash flow	-76.70	-63.81	-66.37	-69.02	-71.78	0.00
PVF (at 14%)	1	0.8772	0.7695	0.6750	0.5921	0.5194
PV (at 14%)	-76.70	-55.97	-51.07	-46.59	-42.50	0.00
Total PV (at 14%) =	€-272.83					

These cash flows are risky and depend on the demand for light aircraft. Therefore, we discount these cash flows at the company cost of capital (i.e., 14%). The present value of these payments is greater than the present value of the payments from the financial lease, so it appears that the financial lease is the lower cost alternative. Notice, however,

our assumption about future operating lease costs. If old planes are less productive than new ones, the lessor would not be able to increase lease charges by 4% per year.

10. (i) (a) With Exchange Controls

Year	Profit after tax SA\$000	OJ share SA\$000	50% div SA\$000	OJ Share £000	Disc Factor @ 16%	Disc Cash flow £ 000
0				(450)	1.000	(450)
1	4,250	2,125	1,062	106	0.862	91
2	6,500	3,250	1,625	108	0.743	80
3	8,350	4,175	2,088	100	0.641	64
			4,775	227	0.641	146
Net Present Value						(69)

(b) Exchange controls removed and all earnings distributed as dividends

Year	Profit after tax SA\$000	OJ Share SA \$000	OJ Share £000	Disc Factor @16%	Disc Cash flow £000
0			(450)	(1.000)	(450)
1	4,250	2,125	212	0.862	183
2	6,500	3,250	217	0.743	161
3	8.350	4,175	199	0.641	127
Net Present Value					21

(ii) If exchange controls exist in the south American Country the project has a negative and should not be undertaken, Investing in countries with a history of high inflation and political volatility adds to the risk of the project and OJ Ltd should proceed with caution.

11. $u = 33.00/30.00 = 36.30/33.00 = 1.10$ $d = 27.00/30.00 = 24.30/27.00 = 0.90$

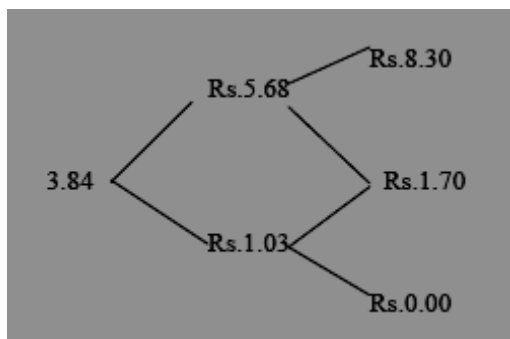
$r = (1 + .05)^{1/2} = 1.0247$

$p = \frac{r - d}{u - d} = \frac{1.0247 - 0.90}{1.10 - 0.90} = 0.1247/0.20 = 0.6235$

$C_{uu} = \text{Max} [0, 36.30 - 28] = 8.30$

$C_{ud} = \text{Max} [0, 29.70 - 28] = 1.70$

$C_{dd} = \text{Max} [0, 24.30 - 28] = 0$



$$C_U = \frac{(0.6235)(8.30) + (0.3765)(1.70)}{1.025} = \frac{5.175 + 0.64}{1.025} = 5.815/1.025 = \text{Rs. } 5.675$$

$$C_D = \frac{(0.6235)(1.70) + (0.3765)(0.00)}{1.025} = \frac{1.05995}{1.025} = \text{Rs. } 1.0340$$

$$C_0 = \frac{(0.6235)(5.675) + (0.3765)(1.0340)}{1.025} = \frac{3.538 + 0.3895}{1.025} = \text{Rs. } 3.83$$

$$h = (33.00 - 27.00) / (5.68 - 1.03) = 6.00 / 4.65 = 1.29$$

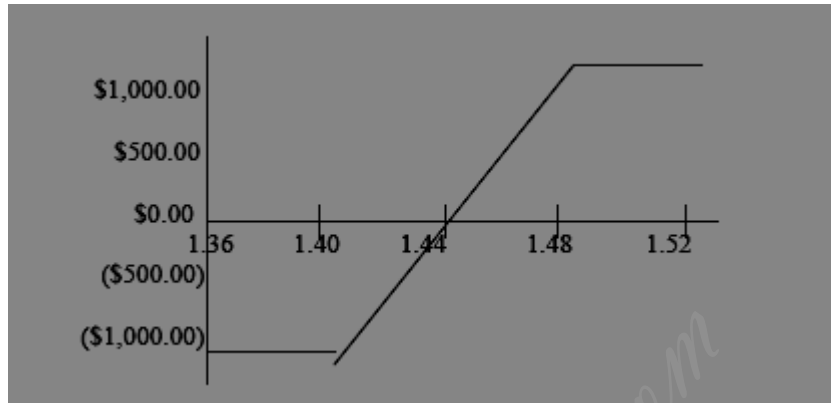
12. (a) Initial Cost

	<u>Cost/Contract</u>	<u>x 31,250</u>
long 1.44 Call	0.0422	(\$1,318.75)
short 1.48 Call	0.0255	\$ 796.88
long 1.40 Put	0.0260	(\$ 812.50)
short 1.44 Put	0.0422	<u>\$1,318.75</u>
		<u>(\$ 15.62)</u>

June	Net Initial	Long Call	Short Call	Long Put	Short Put	Total Net
USD/GBP	Cost	1.44 Profit	1.48 Profit	1.40 Profit	1.44 Profit	Profit
1.36	(\$15.62)	0	0	1250	-2500	(\$1,265.62)
1.40	(\$15.62)	0	0	0	-1250	(\$1,265.62)
1.44	(\$15.62)	0	0	0	0	(\$15.62)
1.48	(\$15.62)	1250	0	0	0	\$1,234.38
1.52	(\$15.62)	2500	-1250	0	0	\$1,234.38

Example: Long Call 1.44 profit = (1.48 - 1.44) x 31,250 = \$1250

(b)



This position resembles a bull vertical spread. The purchaser of this portfolio is probably moderately bullish on the exchange rate. We see this from the willingness to give up the extreme upside in exchange for limiting the downside.

(c) This is a simple application of put-call parity

$$C - P = R * \exp(-rf * dt) - X * \exp(-rd * dt)$$

where R is the exchange rate (1.385), X is the exercise price (1.44)

rd (rf) is the domestic (foreign) risk-free rate,

dt is the time to expiration.

$$C - P = 1.385 * \exp(-.07 * .1667) - 1.44 * \exp(-.05 * .1667) = (\$0.0591)$$

13. (a) $S_0 = 930$

$$K = 900$$

$$t = 2/12$$

$$r_f = 8\%$$

$$r = 3\%$$

$$\sigma^2 = (0.20)^2$$

$$c = S_0 e^{-r_f T} N(d_1) - X e^{-r T} N(d_2)$$

$$\text{where } d_1 = \frac{\ln(S_0 / X) + (r - r_f + \sigma^2 / 2) T}{\sigma \sqrt{T}}$$

$$d_2 = \frac{\ln(S_0 / X) + (r - r_f + \sigma^2 / 2) T}{\sigma \sqrt{T}}$$

$$d_1 = \frac{\ln(930 / 900) + (0.08 - 0.03 + 0.2^2) / 12}{0.2 \sqrt{2/12}} = 0.544$$

$$d_2 = \frac{\ln(930/900) + (0.08 - 0.3 + 0.2^2) \cdot 2/12}{0.2\sqrt{2/12}} = 0.4628$$

$$N(d_1) = 0.7069$$

$$N(d_2) = 0.6782$$

$$C = \$930 \times 0.7069 \times e^{-0.03 \times 2/12} - \$900 \times 0.6782 \times e^{-0.08 \times 2/12}$$

$$C = \$930 \times 0.7069 \times 0.9950 - \$900 \times 0.6782 \times 0.9867$$

$$C = \$654.13 - \$602.26$$

$$C = \$51.87$$

(b) Value of put with same parameters

$$P = Xe^{-rT} N(-d_2) - S_0 e^{-rT} N(-d_1)$$

$$N(-d_1) = 0.2932$$

$$N(-d_2) = 0.3217$$

$$P = \$900 \times 0.3217 \times 0.9867 - \$930 \times 0.2932 \times 0.9950$$

$$P = \$285.68 - \$271.31$$

$$P = \$14.37$$

- (c) (1) The variance will be unchanged for the life of the option. This is likely to be violated because stock price variances do change substantially over time.
- (2) There will be no early exercise. This is reasonable and is unlikely to be violated.
- (3) Any deviations from the option value will be arbitrated away.

While there are plenty of arbitrageurs eager to exploit deviations from true value, arbitrating an index is clearly more difficult to do than arbitrating an individual stock.

14. (a)

Projected net income	£2,000,000
Less projected capital investments	<u>(£800,000)</u>
Available residual	<u>£1,200,000</u>
Shares outstanding	200,000

$$DPS = £1,200,000 / 200,000 \text{ shares} = £6 = D_1$$

(b) EPS = £2,000,000 / 200,000 shares = £10

$$\text{Payout ratio} = DPS / EPS = £6 / £10 = 60\% \text{ or}$$

$$\text{Total dividends / NI} = £1,200,000 / £2,000,000 = 60\%$$

(c) Currently, $P_0 = \frac{D_1}{K_e - g} = \frac{\text{£}6}{0.14 - 0.05} = \frac{\text{£}6}{0.09} = \text{£}66.67$

Under the former circumstances, D_1 would be based on a 20% payout on £10 EPS, or £2. With $K_S = 14\%$ and $g=12\%$, we solve for P_0 :

$$P_0 = \frac{D_1}{K_e - g} = \frac{\text{£}2}{0.14 - 0.12} = \frac{\text{£}2}{0.02} = \text{£}100$$

Although CMC has suffered a server setback, its existing assets will continue to provide a good income stream. More of these earnings should now be passed on to the shareholders, as the slowed internal growth has reduced the need for funds. However, the net result is a 33 % decrease in the value of the shares.

- (d) If the payout ratio were continued at 20%, even after internal investment opportunities had declined, the price of the stock would drop to $\text{£}2/(0.14-0.06) = \text{£}25$ rather than to £66.67. Thus, an increase in the dividend payout is consistent with maximizing shareholder wealth.

Because of the downward-sloping IOS curve, the greater the firm's level of investment, the lower the average ROE. Thus, the more money CMC retains and invests, the lower its average ROE will be. We can determine the average ROE under different conditions as follows.

Old situation (with founder active and 20% payout):

$$g = (1.0 - \text{Payout ratio})(\text{Average ROE})$$

$$12\% = (1.0 - 0.2)(\text{Average ROE})$$

$$\text{Average ROE} = 12\% / 0.8 = 15\% > k_e = 14\%$$

Note that the *average* ROE is 15 %, whereas the *marginal* ROE is presumably equal to 14 %.

New situation (with founder retired and a 60 % payout)

$$g = 6\% = (1.0 - 0.6)(\text{ROE})$$

$$\text{ROE} = 6\% / 0.4 = 15\% > k_s = 14\%$$

This suggests that the new payout is appropriate and that the firm is taking on investments down to the point at which marginal returns are equal to the cost of capital.

15. The expected rate of return on equity after 2008 = $0.0625 + 1.1(0.055) = 12.3\%$

The dividends from 2003 onwards can be estimated as:

Year	2003	2004	2005	2006	2007	2008	2009
Earnings Per Share (€)	2.1	2.415	2.78	3.19	3.67	4.22	4.48

Dividends Per Share (€)	0.69	0.794	0.913	1.048	1.206	1.387	2.91
PV of dividends (€)*		0.70	0.70	0.70	0.70	0.70	

- a. The price as of 2008 = €2.91/ (0.123 - 0.06) = €46.19
- b. The required rate of return upto 2008 = $0.0625 + 1.4(0.055) = 13.95\%$. The dividends upto 2008 are discounted using this rate.

The current price = $€5(0.70) + €46.19/(1.1395)^5 = €27.54$.

* Values have been rounded off.

16. Assumption: Though in the question it is assumed that there is no operating synergy and so no increase on the combined earnings; it is unlikely a bid would be launched if substantial synergy was not estimated.

Share for share offer

	AB Ltd.	YZ Ltd.	Combined
Profit before tax (Rs. lakh)	1,266.00	1,125.00	2,391.00
Less: Tax @ 30%	379.80	337.50	717.30
Profit after Tax	886.20	787.50	1,673.70
Number of shares (lakh)	25.00	18.00	40.00
Earnings Per Share (Rs.)	35.45	43.75	41.84
P/E ratio	11	7	
Share price (pre bid) (Rs.)	389.93	306.25	381.52*
Market Value of company (Rs. lakh)	9,748.20	5,512.50	15,260.70
* $\frac{\text{Rs. } 15,260.70 \text{ lakh}}{40 \text{ lakh}} = \text{Rs. } 381.52$			

Post Bid Price (Combined Entity)

Rs. 41.84 X 11 = Rs. 460 per share

Share for Cash offer

Rs. 460 per share

Thus cash offer is more beneficial for AB Ltd.

Reasons (partially) for the fall in the market price of the shares in the market

Wealth of a shareholder of YZ Ltd. holding 6 shares in YZ Ltd. (Rs.306.25 X 6) Rs. 1,837.50

Wealth of a shareholder of YZ Ltd. holding 5 shares in combined entity (Rs.381.52 X 5) Rs. 1,907.60

Thus there seems to be transfer of wealth from the AB Ltd. to YZ Ltd.

Value of shares using the Dividend Growth Model

$$AB = \frac{(35.45 \times 1.04)}{(0.13 - 0.04)} = \text{Rs. } 409.66$$

$$YZ = \frac{(43.75 \times 1.04)}{(0.11 - 0.04)} = \text{Rs. } 650.00$$

This would suggest that AB is slightly undervalued, but that YZ is hugely undervalued in the marketplace. It is possible that the market does not believe YZ's growth estimates, given its poor performance to date.

17. The rates of return in different scenarios should be changed in to rupee pay – off per share as indicated below:

Stock	Price	Price under various Macroeconomic Scenarios		
		Recession	Moderate Growth	Boom
Him Ice Ltd.	12	12(1-0.12) = 10.56	12(1+0.15) = 13.8	12(1+0.35) = 16.20
Kalahari Biotech	18	18(1+0.20) = 21.60	18(1+0.12)=20.16	18(1-0.05)=17.10
Puma Softech	60	60(1+0.18)=70.80	60(1+0.20)=72.00	60(1+0.15)=69.00

Construction of an arbitrage portfolio requires formation of a zero investment portfolio. The essential condition is that portfolio must not give a negative return.

If we short sell two stocks each of the Him Ice Ltd and Kalahari Biotech one stock of Puma Softech can be purchased and this portfolio will qualify as zero investment portfolio.

$$(-2) \times \text{Rs. } 12 + (-2) \times \text{Rs. } 18 + \text{Rs. } 60 = 0$$

The payoff from this arbitrage portfolio under different market conditions:

	Price	No. of Shares	Investment	Scenarios		
				Recession	Moderate Growth	Boom
	Rs.		Rs.	Rs.	Rs.	Rs.
Him Ice Ltd.	12	-2	-24	-21.12	-27.60	-32.40
Kalahari Biotech	18	-2	36	-43.20	-40.32	-34.20
Puma Softech	60	+1	+60	+70.80	+72.00	+69.00
Net Payoff			0	+6.48	+4.08	+2.40

Net payoff from the portfolio clearly shows that this is an arbitrage portfolio as it has produced positive return in all the market scenarios.

18. T σ	25%	
U σ	40%	
correlation	Portfolio Variance	S.D.
- 1	56.25	7.50%
- 0.8	156.25	12.50%
- 0.6	256.25	16.01%
- 0.4	356.25	18.87%
- 0.2	456.25	21.36%
0	556.25	23.58%
0.2	656.25	25.62%
0.4	756.25	27.50%
0.6	856.25	29.26%
0.8	956.25	30.92%
1	1056.25	32.50%

The variance of the portfolio shall be computed by using the following formula.

$$\sigma^2_{\text{portfolio}} = w_A^2 \sigma_A^2 + (1 - w_A)^2 \sigma_B^2 + 2 w_A w_B \rho_{AB} \sigma_A \sigma_B$$

For Correlation of -0.8 the variance will be as follows:

$$= (0.50)^2 (25)^2 + (0.50)^2 (40)^2 + 2 (0.50) (0.50) (25) (40) (-0.8) = 156.25$$

Other variances have been computed accordingly.

19. (a) Mr. X would pick the stock market portfolio, since it dominates gold on both average return and standard deviation.
- (b) The higher possible returns on gold are balanced by the lower possible returns at other times. Note that the average return on gold is much less than that on the stock market.
- (c) The expected return on this portfolio would be $(8+20)/2 = 14\%$. The variance would equal $(0.5)^2(25)^2 + (0.5)^2(22)^2 - 2(0.5)(0.5)(25)(22)(0.4) = 167.25$; the standard deviation equals 12.93%
- (d) If the supply of gold is negatively correlated with the level of the market, and the price of gold is inversely related to the supply of gold, there is a positive correlation between the return on the market and the return on gold. This would make gold less desirable, since it does not help as much in reducing portfolio variance. The optimal amount to invest in gold would drop.

20. Constant Ratio Plan:

Stock Portfolio NAV (Rs.)	Value of buy – hold strategy (Rs.)	Value of Conservative Portfolio (Rs.)	Value of aggressive Portfolio (Rs.)	Total value of Constant Ratio Plan (Rs.)	Revaluation Action	Total No. of units in aggressive portfolio
40.00	2,00,000	1,00,000	1,00,000	2,00,000	-	2500
25.00	1,25,000	1,00,000	62,500	1,62,500	-	2500
	1,25,000	81,250	81,250	1,62,500	Buy 750 units	3250
36.00	1,80,000	81,250	1,17,000	1,98,250	-	3250
	1,80,000	99,125	99,125	1,98,250	Sell 496.53 units	2753.47
32.00	1,60,000	99,125	88,111.04	1,87,236.04	-	2753.47
38.00	1,90,000	99,125	1,04,631.86	2,03,756.86	-	2753.47
	1,90,000	1,01,878.43	1,01,878.43	2,03,756.86	Sell 72.46 units	2681.01
37.00	1,85,000	1,01,878.50	99,197.37	2,01,075.87	-	2681.01
42.00	2,10,000	1,01,878.50	1,12,602.42	2,14,480.92	-	2681.01
43.00	2,15,000	1,01,878.50	1,15,283.43	2,17,161.93	-	2681.01
50.00	2,50,000	1,01,878.50	1,34,050.50	2,35,929	-	2681.01
	2,50,000	1,17,964.50	1,17,964.50	2,35,929	Sell 321.72 units	2359.29
52.00	2,60,000	1,17,964.50	1,22,683.08	2,40,647.58	-	2359.29

Hence, the ending value of the mechanical strategy is Rs.2,40,647.58 and buy & hold strategy is Rs.2,60,000.

21. EVA = Income earned – (Cost of capital x Total Investment)

Total Investments

Particulars	Amount
Working capital	Rs. 20 lakhs
Property, plant, and equipment	Rs. 80 lakhs
Patent rights	Rs. 40 lakhs
Total	Rs. 140 lakhs

Cost of Capital 15%

EVA = Rs. 12 lakh – (0.15 x Rs. 140 lakhs) = Rs. 12 lakh – Rs. 21 lakh = -Rs. 9 lakh

Thus Herbal Gyan has a negative EVA of Rs. 9 lakhs.

22. (a) Calculation of market value of each convertible bond

Expected share price in five years' time = £4.45 x (1.065)⁵ = £6.10

Conversion value = £6.10 x 20 = £122

Compared with redemption at par value of £100, conversion will be preferred

The current market value will be the present value of future interest payments, plus the present value of the conversion value, discounted at the cost of debt of 7% per year.

Market value of each convertible bond = (£9 x 4.100) + (£122 x 0.713)
= £123.89

Calculation of floor value of each convertible bond

The current floor value will be the present value of future interest payments, plus the present value of the redemption value, discounted at the cost of debt of 7% per year.

Floor value of each convertible bond = (£9 x 4.100) + (£100 x 0.713)
= £108.20

Calculation of conversion premium of each convertible bond

Current conversion value = £4.45 x 20 = £89.00

Conversion premium = £123.89 – £89.00 = £34.89

This is often expressed on a per share basis,

i.e. £34.89/20 = £1.75 per share

(b) The current market prices of the two bonds may be estimated to be:

Zero coupon = \$41.73 $\frac{\$100}{(1.06)^{15}}$ = \$41.73

12% gilt with a semi-annual coupon

Present value of an annuity for 30 periods at 3% is $\frac{1-(1.03)^{-30}}{0.03} = 9.6004$

	\$
Present value of interest payments \$6 × 9.6004 =	117.60
Present value of redemption using PVF (3%, 30) [\$100 × 0.4120] =	<u>41.20</u>
	<u>158.80</u>

(i) If interest rates increase by 1%

$$\text{Zero coupon } \frac{\$100}{(1.07)^{15}} = \$36.25, \text{ a decrease of } \$5.48 \text{ or } 13.1\%$$

12% gilt

$$\text{Present value of an annuity for 30 periods at 3.5\% is } \frac{1 - (1.035)^{-30}}{0.035} = 18.3920$$

Present value of interest payments $\$6 \times 18.3920 =$	\$ 110.35
Present value of redemption using PVF(3.5%, 30) [$\$100 \times 0.3563$] =	<u>35.63</u>
	<u>145.98</u>

This is a decrease of \$12.82 or 8.1%

(ii) If interest rates decrease by 1%:

$$\text{Zero coupon } \frac{\$100}{(1.05)^{15}} = \$48.10, \text{ an increase of } \$6.37 \text{ or } 15.3\%$$

12% gilt with a semi-annual coupon

$$\text{Present value of an annuity for 30 periods at 2.5\% is } \frac{1 - (1.025)^{-30}}{0.025} = 20.9303$$

Present value of interest payments $\$6 \times 20.9303 =$	\$ 125.58
Present value of redemption using PVF (2.5%, 30) [$\$100 \times 0.4767$] =	<u>47.67</u>
	<u>173.25</u>

This is an increase of \$14.45 or 9.1%

23. (a) $R_0 = \frac{P_0 - S}{N+1} = \frac{\pounds 50 - \pounds 40}{5+1} = \pounds 1.67$

(b) $P_x = \frac{(P_0 \times N) + S}{N+1} = \frac{(\pounds 50 \times 5) + \pounds 40}{6} = \pounds 48.33$

(c) $R_x = \frac{P_x - S}{N} = \frac{\pounds 50 - \pounds 40}{5} = \pounds 2.00$

(d) (1) $\pounds 1,000 / \pounds 50 = 20 \text{ shares} \times \pounds 60 = \pounds 1,200$
 $\pounds 1,200 - \pounds 1,000 = \pounds 200$

(2) $\pounds 1,000 / \pounds 2 = 500 \text{ rights} \times \pounds 4^* = \pounds 2,000$
 $\pounds 2,000 - \pounds 1,000 = \pounds 1,000$
 $*R_x = (\pounds 60 - \pounds 40) / 5 = \pounds 4$

24. In the process of swap, the role of swap dealer is significant insofar as it brings together two counter-parties whose interests are complementary to each other. For this role, it takes a small part of the interest payment flow. Since the principal amount is large, even a small percentage of the interest payment adds considerably to its profit. But, on the other hand, the swap dealer has to face a variety of risks. It is a fact that the swap dealers are professional bodies and they anticipate almost with certainty the changes in interest rate or the exchange rate. But there is every possibility that their anticipation proves wrong. In that case, they have to bear the interest rate exposure or the exchange rate exposure. In addition to these two forms of risk, there are some other forms of risk that they are exposed to. These different forms of risks as follows:

(a) Interest-rate Risk : Interest-rate risk arises when the interest rate on a particular loan fails to keep abreast of the movement of the market interest rate. Thus it can be said that the fixed loans under the swap carry higher risk. On the contrary, floating interest rate should not be risky because it changes with the changing profile of the money market. But it does carry risk at least between two reset dates when the interest rate of a particular loan may not be reset despite changes in the market interest rates.

The swap dealer is faced with the interest-rate risk, especially when it has a naked position in the swap. Suppose the swap dealer pays fixed-rate interest to the end-user or to the counter-party; and in exchange it receives LIBOR. If LIBOR moves to the swap dealer's disadvantage, it will have to pay more in form of interest. But the risk can be reduced if the swap dealer does not have a naked position and passes on the risk to another counter-party.

(b) Exchange-rate Risk : Changes in the exchange rate are a common affair in the foreign exchange market. If the swap dealer pays fixed rate of interest on a loan denominated in a currency which is going to depreciate, it will have to pay a greater amount of interest to the end-user. Here it may be noted that if the swap dealer faces both the interest-rate risk and the exchange-rate risk simultaneously, the quantum of risk will be very large. If the two risks are positively correlated, the risk will be still higher. But if they are negatively correlated or uncorrelated, the risk will not be so high.

(c) Credit Risk : Credit risk arises when a counter-party defaults payment to the swap dealer. In such cases, the contract is terminated. However, termination of the contract does not protect the swap dealer from loss. This is because the contract is terminated only with one counter-party. The other needs payment which the swap dealer has to make.

(d) Mismatch Risk : There are occasions when it is difficult for the swap dealer to find a perfect match for a counter-party. When a perfect match is not available, the swap dealer offers concessions to attract suitable counter-party. Any such concession causes loss to it. Sometimes after giving concessions, perfect match is not available on different counts, such as notional principal, maturity, swap coupon, reset dates, etc. The swap dealer may have to pay more interest.

- (e) **Sovereign Risk:** Sovereign risk arises when the government of a country to which one of the two counter-party belongs, puts restrictions on the flow of foreign exchange. This entails upon payments received by the swap dealer. It should not be called to default risk or credit risk because the counter-party is willing to make payments. It is the governmental restriction that comes in the way.
 - (f) **Delivery Risk:** Delivery risk arises when the two counter-parties are located in two different time zones so that the date of maturity differs by one day. However, the swap dealer is not very much affected by it.
25. (i) The basic differences between Cash and the Derivative market are enumerated below:-
- (a) In cash market tangible assets are traded whereas in derivative market contracts based on tangible or intangibles assets like index or rates are traded.
 - (b) In cash market, we can purchase even one share whereas in Futures and Options minimum lots are fixed.
 - (c) Cash market is more risky than Futures and Options segment because in "Futures and Options" risk is limited upto 20%.
 - (d) Cash assets may be meant for consumption or investment. Derivative contracts are for hedging, arbitrage or speculation.
 - (e) The value of derivative contract is always based on and linked to the underlying security. Though this linkage may not be on point-to-point basis.
 - (f) In the cash market, a customer must open securities trading account with a securities depository whereas to trade futures a customer must open a future trading account with a derivative broker.
 - (g) Buying securities in cash market involves putting up all the money upfront whereas buying futures simply involves putting up the margin money.
 - (h) With the purchase of shares of the company in cash market, the holder becomes part owner of the company. While in future it does not happen.
- (ii) (a) During the period of judiciary ownership of shares in the hands of the overseas depository bank, the provisions of avoidance of double taxation agreement entered into by the Government of India with the country of residence of the overseas depository bank will be applicable in the matter of taxation of income from dividends from the underline shares and the interest on foreign currency convertible bounds.
- (b) During the period if any, when the redeemed underline shares are held by the non-residence investors on transfer from fudiciary ownership of the overseas depository bank, before they are sold to resident purchasers, the avoidance of double taxation agreement entered into by the government of India with the country of residence of the non-resident investor will be applicable in the matter of taxation of income from dividends from the underline shares, or

interest on foreign currency convertible bonds or any capital gains arising out of the transfer of the underline shares.

- (iii) A Repo deal is one where eligible parties enter into a contract another to borrow money at a predetermined rate against the collateral of eligible security for a specified period of time. The legal title of the security does changes. The motive of the deal is to fund a position. Though the mechanics essentially remains the same and the contract virtually remains the same, in case of reverse Repo deal the underlying motive of the deal is to meet the security/instrument specific needs or to lend the money. Indian Repo market is governed by Reserve Bank of India. At present Repo is permitted between 64 players against Central and State Government Securities (including T-Bills) at Mumbai.