ate :

1. The arbitrage opportunity present here is :-

1. Borrowing at 5% for 6 months.
2. Borrowing ~~between~~ for 3 months between 6^{th} and 9^{th} month at 7% FRA.
3. Lending for 9 months at 6%.

Borrow for 6 months.

$100 \times e^{0.05 \times 6/12} = 102.53$

Borrow for 3 months

$100 \times e^{0.07 \times 3/12} = 101.765$

Lend for 9 months

~~100 x e^0.07 x~~ $100 \times e^{0.06 \times 9/12} = 104.6027$

~~Net profit = 104.608 (102.53 + 101.765)~~

Net profit $= 4.60278 - 2.53 - 1.765$

$= \$0.3$

Date :

2) a) Here, the forward contract would lead to a slightly better ~~o~~ outcome. The company will make a loss on this ~~head~~ hedge. If the hedge is with a forward contract, the whole of the loss will be realized at the end. If it is with a futures contract, the loss will be realized day by day throughout the contract. On a ~~person~~ present value basis the latter is preferable.

b) Here, the future contract would lead to a slightly better outcome. The company will make a gain on the hedge. If the hedge is with forward contract, the gain will be realized at the end. If it is with a futures contract, the gain will be realized day by day ~~thro~~ throughout the life of the contract. On a present ~~valu~~ value basis the latter is preferable.

c) The futures contract would ~~be~~ lead to a slightly better outcome. This is because it would ~~invov~~ involve positive cash flows early and negative cash flows later.

d) In this case, the forward contract would lead to a slightly better outcome. This is ~~be~~ because, in the case of the ~~fu~~ futures contract, the early cash flows would be negative and the later cash flow would be positive.

Date :

3) It is likely that the bank will price the product on assumption that the company chooses the delivery date least favorable to the bank. If the foreign interest rate is higher than the domestic interest rate then
1. The earliest delivery date will be assumed when the company has a long position.
2. The latest delivery date will be assumed when the company has a short position.

If the foreign interest rate is lower than the domestic interest rate then
1. The latest delivery date will be assumed when the company has a long position.
2. The earliest delivery date will be assumed when the company has a short position.

4) The company treasurer can hedge the company's exposure by ~~sho~~ ~~showing~~ shorting Eurodollar futures contracts. The Eurodollar futures position leads to a profit if rates rise and a loss if they fall.
The duration of the commercial paper is twice that of the ~~European~~ ~~Eu~~ Eurodollar deposit underlying the Eurodollar futures contract. The contract price of a Eurodollar futures contract is 980,000. The ~~no~~ no. of contracts that should be shorted is, therefore,

$$\frac{4820,000}{980,000} \times 2 = \cancel{\$}9.84.$$

5) The no. of short futures contracts required is

$$\frac{100000000 \times 4.0}{122000 \times 9.0} = 364.3$$

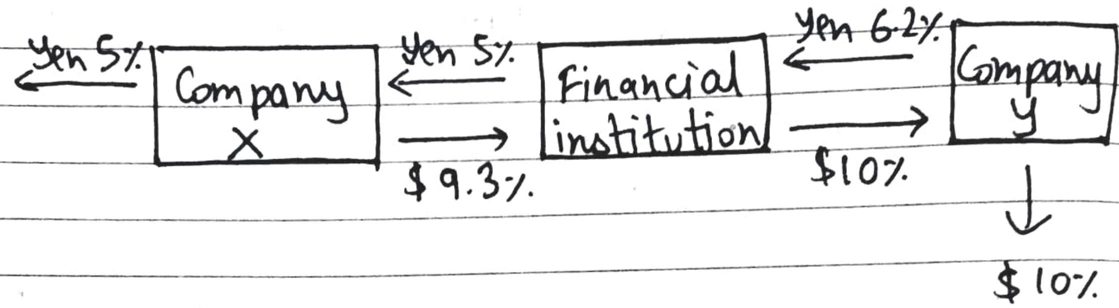
a) This increase the number of contracts that should be shorted to

$$\frac{100000000 \times 4.0}{122000 \times 7.0} = 468.4$$

b) In this case the gain on the short futures position is likely to be less than the loss on the bond portfolio. This is because the gain on the short futures position depends on the size of the movement in long-term rates and the loss on the bond portfolio depends on the size of the movements in medium-term rates. Duration-based hedging assumes that the movements in the two rates are the same.

Date :

6)



X has a comparative advantage in yen market and wants to buy dollars.
Y has a comparative advantage in dollar market and wants to buy yen.

This provides the basis for the swap.

1.5% → yen rates
0.4% → dollar rates

Total gain from swap = (1.5 − 0.4)%
= 1.1% per annum

Bank requires 0.5% per annum
leaving 0.3% per annum for X and Y each.

X borrows dollars @ 9.6 − 0.3 = 9.3%

Y borrow yen @ 6.5 − 0.3 = 6.2%

7) A swap rate is particular maturity is the average of the bid and offer fixed rates that a market maker is prepared to ~~exch~~ exchange for LIBOR in a ~~st~~ standard ~~pla~~ plain vanilla swap with that ~~matu~~ maturity. The swap rate for a particular maturity is the LIBOR/swap par yield for that maturity.

8) The bank is paying a floating-rate on the deposits and receiving a fixed-rate on the loans. It can offset its risk by entering into interest rate swaps in which it contracts to pay fixed and ~~received~~ receive floating.

9) The corrected discount rate is:

12% per annum with quartely compounding

OR 11.82% per annum with continuous compounding

Immediately after the next payment the floating-rate bond will be worth \$100 million.

The next floating payment is (in \$ millions):

$$0.118 \times 100 \times 0.25 = 2.95$$

The value of the floating-rate bond is therefore.

$$102.95 e^{-0.1182 \times 2/12} = 100.941$$

ate :

The value of the fixed-rate bond is

$$2.5e^{-0.1182\times 2/12} + 2.5e^{-0.1182\times 5/12} + 2.5e^{-0.1182\times 8/12} + 2.5e^{-0.1182\times 11/12} + 102.5e^{-0.1182\times 14/12}$$

$= 98.678$

The value of the swap is therefore
$100.941 - 98.678 = \$2.268$ million.

10) Forward price = 8%
Strike price = 7.6%.
Time to maturity = 4 years.
Volatility ~~= 25~~ = 25%
~~RFR~~ RF_R = 8%.

Payoff from swaption = max [0.076 − R, 0]

Value of annuity at the end of 5, 6, 7, 8 & 9 years

$$\sum_{i=5}^{9} e^{-0.076i} = 2.972.$$

~~Fr~~ The value of swaption in million dollars =
~~2.914 [0.076 N (-d2)]~~
$2.914\,[0.076\,\Phi(-d_2) - 0.08\,\Phi(d_1)]$

$$d_1 = \frac{\ln\left(\frac{0.08}{0.076}\right) + 0.25^2\times 2}{0.25\sqrt{4}} = 0.3526$$

$$d_2 = \frac{\ln\left(\frac{0.08}{0.076}\right) - 0.25^2 \times 2}{0.25\sqrt{4}} = -0.1474$$

$$\text{Swaption} = 2.914\left[0.076\,\Phi(0.1474) - 0.68\,\Phi(0.3526)\right]$$

$= 0.0401$

$= \$40,100$

11) ~~$S_0 = 0.06$~~

$$S_0 = \frac{1}{1.48} = 0.6757$$

$$K = \frac{1}{1.50} = 0.6667$$

$r = 0.08$, $\sigma = 0.12$, $q = 0.04$, $T = 1$

Value of derivative $= 10,000\,\Phi(-d_2)\,e^{-0.08 \times 1}$

~~Here~~ Here ;

$$d_2 = \ln(0.6757/0.6667) + \left(0.8 - 0.04\,\frac{(0.12)^2}{2}\right)$$

$= 0.3852$

$\because \Phi(-d_2) = 0.3501$

$10,000 \times 0.3501 \times e^{-0.08} = 3231.83$

In dollars, $3231.83 \times 1.48 = \$4782$

Date :

12) In an Asian option the payoff becomes more certain as the time passes and the delta always approaches zero as the maturity date is approached. ~~The~~ ~~t~~ This makes delta hedging easy.

13) This is a cash-or-nothing call.

Value is $100\,\Phi(d_2)\,e^{-0.08\times 0.5}$ where

$$d_2 = \frac{\ln\left(\frac{960}{1000}\right) + \left(0.08 - 0.03 + \frac{0.02^2}{2}\right)\times \frac{1}{2}}{0.02\sqrt{1/2}}$$

$= 0.1826$

Because $\Phi(d_2) = 0.4276$

Value $= 100 \times 0.4276 \times e^{-0.08\times 0.5}$

$= \underline{\$41.08}$.