

Chapter Tests of SFM of CA Ashish Lalaji 9825856155

Solution of Test of Futures

Q 1

(a) PV of Dividend, $I = De^{-rt}$

| | Particulars | A | B | C |
|----|-------------|--|---|--|
| a) | DPS | 50 | 20 | 50 |
| b) | e^{-rt} | $e^{-0.09(2/12)}$ $= e^{-0.015}$ $= 1 / 1.015$ | $e^{-0.09(3/12)}$ $= e^{-0.0225}$ $= 1 / 1.023$ | $e^{-0.09(4/12)}$ $= e^{-0.03}$ $= 1 / 1.03$ |
| c) | I (a x b) | 49.26 | 19.55 | 48.54 |

Valuation of Futures:

$$F = (S - I) e^{rt}$$

| | Particulars | A | B | C |
|----|----------------------|-------------|--------------|--------------|
| a) | S | 4,550 | 360 | 900 |
| b) | I | 49.26 | 19.55 | 48.54 |
| c) | e^{rt} | 1.046 | 1.046 | 1.046 |
| d) | F | 4,707.77 | 356.11 | 890.63 |
| e) | Actual Futures Price | 4,600 | 390 | 920 |
| f) | Pricing | Underpriced | Overpriced | Overpriced |
| g) | Action | Buy Futures | Sell Futures | Sell Futures |

(b) Valuation of Futures:

$$\begin{aligned}
 F &= Se^{rt} \\
 &= 170 e^{0.12 (6/12)} \\
 &= 170 e^{0.06} \\
 &= 170 (1.062) \\
 &= \text{Rs.180.54}
 \end{aligned}$$

Actual futures price is Rs.175. Futures are underpriced.

Arbitrage strategy is to short sell share at spot price and buy futures.

Determination of Arbitrage Gain:

Spot price is Rs.170.

Short sell share and receive Rs.170.

Lend Rs.170 at 12% p.a. for 6 months.

Effective receipt on short selling 1 share is Rs.180.54, which is eventually purchased for Rs.175 resulting into arbitrage gain of Rs.5.54 per share.

Q 2 Using Index Futures to Change Portfolio Beta:

$$\text{Number of Index Futures Contracts} = \frac{\text{Value of Portfolio (Target } \beta_p - \text{ Existing } \beta_p)}{\text{Spot Price in Futures Market X Lot Size}}$$

Case M:

$$90 = \frac{\text{Value of Portfolio (1.8 - 1.2)}}{4,000 \times 100}$$

$$\text{Portfolio Value} = 90 \times 4,000 \times 100 / 0.6 = \text{Rs.6,00,00,000}$$

Case N:

$$45 = \frac{3,60,00,000 (2.3 - \text{Existing } \beta_p)}{4,000 \times 100}$$

$$0.5 = 2.3 - \text{Existing } \beta_p$$

$$\text{Existing } \beta_p = 1.8$$

Case O: Bearish; Sell

Case P:

$$48 = \frac{6,40,00,000 (\text{Target } \beta_p - 1.1)}{4,000 \times 100}$$

$$0.3 = \text{Target } \beta_p - 1.1$$

$$\text{Target } \beta_p = 1.4$$

Case Q:

$$\text{Number of Index Futures Contracts} = \frac{2,50,00,000 (1 - 1.4)}{4,000 \times 100}$$

$$= -25$$

Case R:

$$-45 = \frac{5,00,00,000 (1.25 - \text{Existing } \beta_p)}{4,000 \times 100}$$

$$-0.36 = 1.25 - \text{Existing } \beta_p$$

$$\text{Existing } \beta_p = 1.61$$

Q 3**(a)** Storage Cost = $230 \times 5\% \times 6/12 = \text{Rs.}5.75$

Fair Futures price is –

$$\begin{aligned}
 F &= S + St + C \\
 &= 230 + 5.75 + (235.75 \times 10\% \times 6/12) \\
 &= \text{Rs.}247.54
 \end{aligned}$$

Futures price for 1 ton (1,000 kgs.) is Rs.2,47,540.

True worth of futures is Rs. 2,47,540 but it trades in the market at lower rate of Rs.2,42,000. Futures are undervalued. Recommended action is to buy futures.

(b) In order to hedge its position, trader shall short on futures at current futures price of Rs.59 per kg.No. of contracts shorted = $22,000 / 1,000 = 22$ **Determination of Effective Sale Proceeds and Selling Price per kg. after 3 months:****Spot Market:**

| | |
|-----------------------------|------------------|
| a) Spot Price per kg. | 57 |
| b) Quantity sold | 22,000 kgs. |
| c) Sale Proceeds (A) | 12,54,000 |

Futures Market:

| | |
|--|------------------|
| a) Spot price per kg. (for buying) | 58 |
| b) Contracted futures price per kg. (for selling) | 59 |
| c) Gain per kg. | 1 |
| d) Quantity | 22,000 kgs. |
| e) Total Gain (Cash Inflow) (B) | Rs.22,000 |

Effective Sale Proceeds (A + B) 12,76,000**Sale Proceeds per kg. Rs.58 per kg.****Solution prepared by CA. Ashish Lalaji**

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