Index options

Just like index futures

Index options,

(a) Can be used as a hedge against risk of an adverse effect to changes in market prices

(b) Traded options (Index options) are traded on stock exchange index options market available on FTSE 100 share index.

(c) Each index denonated as a Contract

(d) £10 per point like index futures

(a) - (d) Similarities with index futures

(e) Exercise prices are set up at intervals of 50 index points
9400, 9450, 9500 e.t.c.

(f) Unlike index futures, index option is a choice (right to) not an obligation.

Proforma for Index option

Step (1a i) Determine whether Exercise price > or < Spot price

Step (1a ii) Determine the hedge by Protecting against ↑ or ↓ in market prices

Increase decrease

to guard against fall in portfolio value

i. Buy Put option (right to sell) ⇒ to hedge against ↓ in market prices

ii. Buy Call option (right to buy) ⇒ to hedge against ↑ in Market prices

Step 1b → Calculate the number of contracts

$$\frac{\text{Initial Market Value of Portfolio (MV) at opening date}}{\text{Notional Value of Contract}}$$

FTSE Spot Index (option price, agreed exercise or lock-in-price) price at opening date × £10

= × number of contracts (rounded up)

Step 1c ⇒ Total cost of option premium

⇒ Number of contracts × £10 per contract × option premium (given)

= £X

Step 2b ⇒ Total value of Payoff

Gain ⇒ C (Step 2a) × no of contracts × £10 per Contract = £X

loss ⇒ 0 → as negative ∴ holder will abandon

Step 3 Hedge Outcome (Net Position)

Net or Overall net value of Portfolio at Settlement date

Put option EP > SP
Call option EP < SP

Gain on exercising option

loss on option ∴ abandon

	£	£
MV of Portfolio at Settlement date	X	X
+ Gain on option (Step 2b)	X	0
	X	X
Total cost of option premium	(X)	(X)
Net or overall value of Portfolio at Settlement date	X	X

Minimum Lock-in value ≥ Initial MV at opening date.

Step 4 → Overall Increase/decrease in portfolio value at Settlement date

Initial MV of Portfolio at Opening date	±
	X
Net Value of Portfolio at Settlement date (Step 3)	(X)
Increase/(decrease) in PV at Settlement date	X / (X)

Step 5 → Hedge efficiency

$$\frac{\text{Gain on option (Step 2b)} - \text{Total option premium (Step 1c)}}{\text{Loss on Portfolio Value}} \times 100$$

→ PV at opening date (X)
PV at Settlement date (Y)

$$= X\%$$

if < 100% then hedge is inefficient.

Note ⓐ The option removes the downside risk but leaves the upside potential when position (Step 4) is evaluated (Inotherwords brings holder back to lock-in-Value Step 3)

ⓑ Reason for hedge inefficiency
(Same as index futures)

* Basis risk → where spot & option prices differs as contract gets closer to (exercise) Settlement date

* Indivisible Contracts → fractions/decimal in number of Contracts ∴ round up.

Example 1

You should assume for all parts of this question that today's date is 1 June 20X8.

The Investment Manager of Greyhound pension fund is concerned that share prices will fall over the next month and wishes to hedge against this using FTSE stock index options.

The Funds pension portfolio comprises investments which have a value of £4million on 1.6.20X8.

On 1.6.20X8, the following options are available:

FTSE 100 INDEX OPTION (4000) (£10 per full index point)

Exercise price	3900		3950		4000		4050		4100	
	Call	Put	Call	Put	Call	Put	Call	Put	Call	Put
June	135	30	100	44	70	66	45	95	30	130
July	210	90	180	110	150	130	120	155	100	185
August	270	130	240	150	215	175	185	195	160	220

Assume that the board decides to use options to protect the current value of the portfolio in one month's time.

Requirements

Explain, with supporting workings, what will happen in one month's time if:

(a) the portfolio's value falls to £3.8 million and the FTSE100 index rises to 3800

(b) the portfolio's value rises to £4.1 million and the FTSE100 index falls to 4100

(7 marks)

Greyhound Plc (Solution)

	(a)	(b)
(i) Exercise price	4000	4000
Spot price	3800	4100
∴	EP > SP	EP < SP

(ii) Hedge → Protect against fall in market prices of shares
∴ buy put option
(buy the right to sell.....)

(iii) No of Contracts

Inital MV of portfolio at 1.6.20X8

Notional Value × £10

↘ Exercise price or lock-in-price

⇒ £4,000,000 / 4000 × £10

↙ June put options

100 contracts | 100 contracts

(a)

EP > SP

4000 3800

(b)

EP < SP

4000 4100

iv) Total cost of option price

100 contracts x £10 x 66 points

£66,000

£66,000

→ at end of June (settlement) date

v) Payoffs

Gain / Loss on option

Positive

Gain on option as EP > SP

Negative

Loss on option EP < SP

Sell at EP	4000	4000
Sell at SP at 30.6.20X8	(3800)	(4100)
Gain/(Loss) on option	200	(100)

will exercise as favourable / in the money

will abandon as unfavourable / out of the money

vi) Total Value of Gain on option

200 x £10 x 100 contracts

(v) (iii)

⇒ £200,000

0 x £10 x 100

(v) (iii)

⇒ 0

vii)

4000 3800
EP > SP
(a) £

4000 4100
EP < SP
(b) £

Net position (Net value of Portfolio at 30.6.20X8)

MV of Portfolio at 30.6.20X8	3,800,000	4,100,000
+ Gain on option (vi)	200,000	0
	4,000,000	4100,000

← Minimum lock-in value which is ≥ MV of Portfolio at 1.6.20X8

Total Cost of option price/premium (iv)	(66,000)	(66,000)
Net Value of Portfolio at 30.6.20X8	3,934,000	4,034,000

(vii) Overall increase or decrease in Portfolio Value at 30.6.20X8

	£	£
Initial MV of Portf. 1.6.20X8	4,000000	4,000,000
Net Value of Portf. 30.6.20X8 (vii)	(3,934,000)	(4,034,000)
(Decrease)/Increase in Portfolio Value 30.6.20X8	(66,000)	34,000

ix) Hedge Efficiency

	(a) EP > SP	(b) EP < SP
Gain on option − Option price / Loss on portfolio value (initial MV of portf − MV of portf at settlement date)	200000 − 66000 (iv) / 4000000 − 3800000 (iii) × 100 = 67%	N/A as Loss on option abandon

67% < 100%

∴ % Hedge is inefficient

Conclusion

⇒ for (a), the put option holder will exercise option, as in the money & favourable whereas for (b), the put option holder will abandon and use the market or spot price at settlement date as option is out of the money and unfavourable

⇒ for both (a) & (b), the hedge will remove the downside risk by ensuring the Portfolio value remained at ≥ £4m i.e the minimum lock-in value

⇒ for (a), there will be an overall decrease in portfolio value at 30.6.20X8 to £3,934,000. This will be due

to the total cost of option premium of £66,000. The upside potential risk remains.

→ for (b), though the option will be abandoned & spot price at 30.6.20X8 used,

the net overall Portf value 30.6.20X8 > the Inital MV of £4m

resulting in a total increase of portfolio value of £34,000.

→ for (a) Hedge inefficiency of 67% due to

⇒ Basis risk (EP & SP differs as contract gets closer to 30.6.20X8)

for (b) Hedge efficiency not applicable as option will be abandoned.