

Corpfm Mod 20 Option combination payoff practice exam questions

(The attached PDF file has better formatting.)

Question 20.1: Long position in a European call option

What is the payoff from a European call option bought by the investor?

Answer 20.1:

- If the stock price S is more than the exercise price E at the expiration date, the investor gets $S - E$.
- If the stock price S is less than the exercise price E at the expiration date, the European call option expires unexercised.

Question 20.2: Short position in a European call option

What is the payoff from a European call option sold by the investor?

Answer 20.2:

- If the stock price S is more than the exercise price E at the expiration date, the investor pays $S - E$.
- If the stock price S is less than the exercise price E at the expiration date, the European call option expires unexercised.

Question 20.3: Long position in a European put option

What is the payoff from a European put option bought by the investor?

Answer 20.3:

- If the stock price S is more than the exercise price E at the expiration date, the European put option expires unexercised.
- If the stock price S is less than the exercise price E at the expiration date, the investor gets $E - S$.

Question 20.4: Short position in a European put option

What is the payoff from a European put option sold by the investor?

Answer 20.4:

- If the stock price S is more than the exercise price E at the expiration date, the European put option expires unexercised.
- If the stock price S is less than the exercise price E at the expiration date, the investor pays $E - S$.

Question 20.5: Option combination (long, short, call, put)

An investor buys two European call options on Stock XYZ with exercise prices of 30 and 50 and sells one European put option on Stock XYZ with an exercise price of 65.

The investor receives Z for the put option and pays Z for the two call options, so the net outlay for the options is zero. All options have the same expiration date. The amount Z does not affect the solution to the problem.

What is the net profit to the investor on the expiration date as a function of the stock price? The net profit is the payoff received from the call options minus the amount paid to the buyer on the put option.

Answer 20.5: We consider four scenarios, based on the range in which the stock price falls.

If the stock price S is less than 30 on the expiration date, both call options expire unexercised and the short put option pays $65 - S$ from the investor to the buyer.

If the stock price S is more than 30 but less than 50 on the expiration date, the call option at 50 expires unexercised, the call option at 30 pays $S - 30$ to the investor, and the short put option pays $65 - S$ from the investor to the buyer.

The net profit to the investor is $S - 30 + (S - 65) = 2S - 95$

If the stock price S is more than 50 but less than 65 on the expiration date, the call option at 50 pays $S - 50$ to the investor, the call option at 30 pays $S - 30$ to the investor, and the short put option pays $65 - S$ from the investor to the buyer.

The net profit to the investor is $S - 30 + (S - 50) - (65 - S) = 3S - 145$.

If the stock price S is more than 65 on the expiration date, the call option at 50 pays $S - 50$ to the investor, the call option at 30 pays $S - 30$ to the investor, and the short put option expires unexercised.

The net profit to the investor is $S - 30 + (S - 50) = 2S - 80$.

Question 20.6: Option combination (numerical problem)

An investor buys two European call options on Stock XYZ with exercise prices of 30 and 50 and sells one European put option on Stock XYZ with an exercise price of 65.

The investor receives Z for the put option and pays Z for the two call options, so the net outlay for the options is zero. All options have the same expiration date. The amount Z does not affect the solution to the problem.

At expiration, the investor's net profit is 1.62. The net profit is the payoff received from the call options minus the amount paid to the buyer on the put option.

What is the stock price on the expiration date?

Answer 20.6: We evaluate the four scenarios, based on the range in which the stock price falls.

If the stock price S is less than 30 on the expiration date, both call options expire unexercised and the short put option pays $65 - S$ from the investor to the buyer.

The net profit to the investor is $-(65 - S) = S - 65$. We solve

$$S - 65 = 1.62$$

$$\Rightarrow S = 1.62 + 65 = 66.62$$

This scenario is not possible, since 66.62 is not less than 30.

If the stock price S is more than 30 but less than 50 on the expiration date, the call option at 50 expires unexercised, the call option at 30 pays $S - 30$ to the investor, and the short put option pays $65 - S$ from the investor to the buyer.

The net profit to the investor is $S - 30 + (S - 65) = 2S - 95$. We solve

$$2S - 95 = 1.62$$

$$\Rightarrow S = (1.62 + 95) / 2 = 48.31$$

This scenario is possible, since 48.31 is more than 30 but less than 50.

If the stock price S is more than 50 but less than 65 on the expiration date, the call option at 50 pays $S - 50$ to the investor, the call option at 30 pays $S - 30$ to the investor, and the short put option pays $65 - S$ from the investor to the buyer.

The net profit to the investor is $S - 30 + (S - 50) - (65 - S) = 3S - 145$. We solve

$$3S - 145 = 1.62$$

$$\Rightarrow S = (1.62 + 145) / 3 = 48.87$$

This scenario is not possible, since 48.87 is less than 50.

If the stock price S is more than 65 on the expiration date, the call option at 50 pays $S - 50$ to the investor, the call option at 30 pays $S - 30$ to the investor, and the short put option expires unexercised.

The net profit to the investor is $S - 30 + (S - 50) = 2S - 80$. We solve

$$2S - 80 = 1.62$$

$$S = (1.62 + 80) / 2 = 40.81$$

This scenario is not possible, since 40.81 is less than 65.

The only possible scenario is $S = 48.31$.