

Problem Set

PROBLEM SET: Derivatives

Exercise 1.

What is the difference between a European option and an American option? Are European options available exclusively in Europe and American options available exclusively in the United States?

Exercise 2.

[1]

3) Which of the following statements is FALSE?

A) The option buyer, also called the option holder, holds the right to exercise the option and has a long position in the contract.

B) The market price of the option is also called the exercise price.

C) If the payoff from exercising an option immediately is positive, the option is said to be in-the-money.

D) As with other financial assets, options can be bought and sold. Standard stock options are traded on organized exchanges, while more specialized options are sold through dealers.

Exercise 3.

8) Using options to reduce risk is called:

A) speculation.

B) a naked position.

C) hedging.

D) a covered position.

Exercise 4.

[1]

14) The market price of an option is called the:

A) American premium.

B) European premium.

C) option premium.

D) exercising premium.

Exercise 5.

[1]

15) As the seller of an option, you are guaranteed to receive the:

A) exercise price.

B) strike price.

C) risk premium.

D) option premium.

Exercise 6.

[2]

8) Which of the following statements is FALSE?

A) The option price is more sensitive to changes in volatility for at-the-money options than it is for in-the-money options.

B) A share of stock can be thought of as a put option on the assets of the firm with a strike price equal to the value of debt outstanding.

C) In the context of corporate finance, equity is at-the-money when a firm is close to bankruptcy.

D) Because the price of equity is increasing with the volatility of the firm's assets, equity holders benefit from a zero-NPV project that increases the volatility of the firm's assets.

Exercise 7.

[2]

You want to calculate the price for a European call option on a stock using Black Scholes. You know the option's exercise price and date, the price and volatility of the underlying stock and the risk free interest rate. Which of the following additional information do you need to evaluate the Black Scholes price?

1. Information about dividend payments for the stock.

2. The expected market return.
3. The expected return on the stock.
4. The beta of the stock.
5. I choose not to answer.

Exercise 8.

You are working in a Norwegian Oil Company. You are concerned about the possible losses due to large adverse movements in the oil price. While you are currently paying various consultants in countries around the world, such as Iran, to give information about the short term oil production levels, you are wondering whether there are ways to use financial markets to hedge oil price risk. Specifically, you are considering the use of options to hedge your oil price risk, where the options are written with the oil price as the underlying security. In that context you want to price a 6 month oil option. You have contacted a broker who says it is possible to trade call options where the underlying oil price is quoted in Norwegian kroner. You want to price these options using an option price formula such as the Black Scholes formula. Which of the following information will enter your option price calculation?

- (a) The expected oil price six months hence.
- (b) The expected OPEC production cuts during the next six months.
- (c) The oil price variability, measured by its volatility (standard deviation).
- (d) The American six month interest rate.
- (e) I choose not to answer.

Exercise 9.

[3]

The Black-Scholes option pricing model is dependent on which five parameters?

- A) Stock price, exercise price, risk free rate, probability, and time to maturity.
- B) Stock price, risk free rate, probability, time to maturity, and variance.
- C) Stock price, risk free rate, probability, variance and exercise price.
- D) Stock price, exercise price, risk free rate, variance and time to maturity.
- E) Exercise price, probability, stock price, variance and time to maturity.

Exercise 10.

[5]

Verma Violin Manufacturing Corporation has issued debt with \$10 million of principal due. In terms of viewing the equity of the firm as a call option, what happens to the equity of the firm if the cash flow of the firm is greater than \$10 million?

- A) The option is in-the-money and the stockholders earn the difference between the cash flow and the bondholder's promised payment.
- B) The option is in-the-money and the bondholders earn the entire cash flow.
- C) The option is out-of-the-money, the stockholders walk away, and the bondholders receive the entire cash flow.
- D) The option is out-of-the-money, and the stockholders make up the difference so that the bondholders receive full payment.
- E) None of the above.

Exercise 11.

[5]

When a firm in financial distress accepts very risky projects, the stockholders benefit at the expense of the bondholders. In terms of option theory, the gain to the stockholders occurs because

- A) the stock is a put option on the firm's assets, and risky projects decrease the exercise price of the option.
- B) the stock is a put option on the firm's assets, and risky projects increase the exercise price of the option.
- C) the stock is a call option on the firm's assets, and risky projects increase the volatility of those assets.

- D) the stock is a call option on the firm's assets, and risky projects decrease the volatility of those assets.
- E) None of the above.

Exercise 12.

Use the Black-Scholes model to determine the option price for a call option which will expire in 1 year. The strike price is \$17.50, and the current stock price is \$20. The appropriate measure of volatility is 1. The interest rate on a T-bill that matures in one year is 7%.