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Exam : 8013

**Title : PRM Exam 1: Finance
Foundations**

Version : DEMO

1. The rate of dividend on a stock goes up.

What is the effect on the price of a call option on this stock?

- A. It may affect the call value either way depending upon the risk-free rate
- B. It decreases the value of the call
- C. It increases the value of the call
- D. It does not affect the value of the call

Answer: B

Explanation:

Everything else remaining the same, an increase in the rate of dividends causes the value of call options to fall and the value of put options to rise. Therefore, Choice 'b' is the correct answer. (In the exam, the question could address either a call or a put option, so be aware of the answer in either case).

To understand this, consider how dividends are accounted for when valuing an option using the Black Scholes model. Future dividends are discounted to the present using the risk free rate and this discounted value is reduced from the spot price used in the BSM valuation. Effectively, this reduces the spot price used in the BSM formula. When the spot price reduces, and the exercise price remains the same, then the value of the call option goes down. In the same way, when spot price is reduced by the present value of dividends (and the exercise price stays the same), obviously the put option becomes more valuable. Therefore an increase in the rate of dividends increases the value of the put option.

There is another intuitive way to think about this: A call option is like a long position in the stock, but the holder of the call option is not entitled to receive dividends (unlike the holder of the stock). Since the holder of the call option has to forego the dividends, he is willing to pay less for the option; or in other words, the value of the call reduces.

In the same way, a put option is like having a short position in the stock. The holder of the short position has to borrow the stock in order to get into the short position in the first place. When dividends are paid, the holder of the short stock position has to make good any dividends that might be paid to the lender of the stock. The holder of a put option does not have to make any such payments. Therefore the put option is more valuable, and the existence of dividends (or an increase in dividends) increases the value of the put option.

(Try this out using the Black Scholes Excel model given under the tutorials by varying the spot price.)

2. Futures initial margin requirements are

- A. determined based on the client's credit history
- B. determined by the members based on the SPAN framework
- C. determined based on the length of the settlement period
- D. determined by the exchange

Answer: D

Explanation:

Futures initial margins are determined by the exchange. SPAN is the name of a framework the CME uses to determine margins. Only Choice 'd' is correct.

3. What is the approximate delta of an exactly at-the-money call option?

- A. Close to -0.5
- B. Close to 0.5
- C. Close to 0

D. Close to 1

Answer: B

Explanation:

The delta of an at-the-money call option is close to 0.5. It is close to 1 when it is deep in the money. It is close to 0 when it is deep out of the money. It is never negative. Therefore Choice 'b' is the correct answer.

4. An investor holds a portfolio of mortgage backed securities valued at \$100m. Using a Monte Carlo based pricing model, he determines that the value of the portfolio would rise to \$102m if interest rates were to fall by 45 basis points, and fall to \$97m if interest rates were to rise by 45 basis points. What is the estimated modified duration of the investor's portfolio?

A. 5

B. 5.56

C. 11.12

D. None of the above

Answer: B

Explanation:

For fixed income portfolios where standard cash flow discounting models are not available, duration calculations are based upon estimated price moves in response to a change in rates. Recall that we define duration as the percentage change in price expected for a 1% change in yield. In this case, we have three price points known to us: Line | Price | Yield
a | \$102 | $r - 45\text{bps}$
b | \$100 | r
c | \$97 | $r + 45\text{bps}$

(where r is the current yield)

The change in price from line a to line c is $\$102\text{m} - \$97\text{m} = \$5\text{m}$. We use the middle point, ie \$100m, to calculate the percentage change. Therefore the percentage change in price is $\$5\text{m}/\$100\text{m} = 5\%$.

The change in yield between lines a and c is 90 basis points $[(r+45\text{bps}) - (r-45\text{bps})]$. In other words, the change in price is 5% for a 90 bps change in yield. So the duration can be calculated as $5/(90/100) = 5.56$. The other answers are incorrect.

5. What can the buyer of a 6 x 12 FRA expect to receive (or pay) if the contracted rate is 10% and the settlement rate is 12%? Assume contract notional is \$100m.

A. Pay \$1,000,000

B. Receive \$1,000,000

C. Pay \$943,396

D. Receive \$943,396

Answer: D

Explanation:

The buyer of the FRA gets to borrow \$100m at 10% per annum for 6 months at the end of 6 months from the contract date. Thus, the interest due is $\$100\text{m} * 10\% * 6/12 = \5m . However, at the end of the 6 months (when the notional borrowing period begins), the spot rate is 12%. The interest due on a borrowing at the spot rate would be $\$100\text{m} * 12\% * 6/12 = \6m . Since the buyer gets to borrow cheaper than the going rate, he or she has made a gain of \$1m on the FRA. However, this amount is not due immediately, it is due at the end of the 6 month borrowing period (ie, 12 months from the date the contract was entered into). The seller of the FRA can make the buyer whole by paying the buyer the

present value of \$1m due in 6 months time, which is $\$1m / (1 + 12\% \cdot 6/12) = \$1m / 1.06 = \$943,396$. Thus, Choice 'd' is the correct answer. Remember that the FRA gets settled at the beginning of the notional borrowing period as all future cash flows, and the applicable discount rates are known with certainty. The buyer and the seller do not need to wait for the entire period to get over first. The cash settlement allows the buyer to borrow at the market rate and still have the same net borrowing cost as he or she had initially contracted for in the FRA.