

# DUMPS ARENA

## Exam I: Finance Theory Financial Instruments Financial Markets - 2015 Edition

PRMIA 8006

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**QUESTION NO: 1**

If the implied volatility is known for a call option, what can be said about the implied volatility for a put option with the same strike and maturity?

- A. The implied volatility for the put will be the same as that for the call but with a negative sign
- B. The implied volatility for the put will be the same as that for the call
- C. The implied volatility for the put will be given by the expression  $[1 - \sigma_c]$  where  $\sigma_c$  is the implied volatility for the call
- D. The implied volatility for the put cannot be determined from the implied volatility of the call

**ANSWER: B****Explanation:**

:

The implied volatility for a call and a put is identical if the two have the same strike and expiry. Therefore Choice 'b' is the correct answer and the remaining choices are incorrect.

**QUESTION NO: 2**

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  $\$100m \times 10\% \times 6/12 = \$5m$ . 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  $\$100m \times 12\% \times 6/12 = \$6m$ . 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  $\$1m / (1 + 12\% * 6/12) = \$1m / 1.06 = \$943,396$ . 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.

**QUESTION NO: 3**

Which of the following statements are true:

- I. Forward prices for a stock will fall if dividend expectations increase for the period the contract is alive
- II. Three month forward prices will decline if the 10 year rate goes up, and short term rates stay unchanged
- III. Futures exchanges require buyers but not sellers to deposit initial margins
- IV. Variation margin is to be deposited when a futures contract is entered into
- V. Futures exchanges requires hedgers and speculators to deposit identical margins
- VI. Interest rate futures contracts carry duration but no convexity due to the daily cash settlements

A. I and IV

B. I

C. II and III

D. I, II, V and VI

E. Forward prices for a stock will fall if dividend expectations increase for the period the contract is alive

II. Three month forward prices will decline if the 10 year rate goes up, and short term rates stay unchanged

III. Futures exchanges require buyers but not sellers to deposit initial margins

IV. Variation margin is to be deposited when a futures contract is entered into

F. Futures exchanges requires hedgers and speculators to deposit identical margins

VI. Interest rate futures contracts carry duration but no convexity due to the daily cash settlements

**ANSWER: B****Explanation:**

:

Statement I is correct - since forward prices are determined as  $(\text{Spot} - \text{PV of dividends}) * e^{(rt)}$ , an increase in dividends will reduce forward prices.

Statement II is incorrect as forward prices will be determined by near term interest rates, specifically by the borrowing rate for the period of the contract, and will stay unchanged if near term interest rates do not change.

Statement III is incorrect. Futures exchanges require both buyers and sellers to deposit initial margins as prices can move adversely for either of them.

Statement IV is incorrect, as the margin deposited when a contract is entered into is called initial margin. Margin calls thereafter resulting from movements in prices are called variation margin.

Statement V is incorrect. Most futures exchanges distinguish between hedgers and speculators and require different margins from each.

Statement VI is incorrect. Interest rate futures behave almost identically to their bond counterparts, and carry both duration and convexity.

**QUESTION NO: 4**

Which of the following statements are true in respect of a fixed income portfolio:

- I. A hedge based on portfolio duration is valid only for small changes in interest rates and needs periodic readjusting
- II. A duration based portfolio hedge can be improved by making a convexity adjustment
- III. A long position in bonds benefits from the resulting negative convexity
- IV. A duration based hedge makes the implicit assumption that only parallel shifts in the yield curve are possible

**A.** II and IV

**B.** I and II

**C.** I, II and IV

**D.** I and IV

**E.** A hedge based on portfolio duration is valid only for small changes in interest rates and needs periodic readjusting

II. A duration based portfolio hedge can be improved by making a convexity adjustment

III. A long position in bonds benefits from the resulting negative convexity

IV. A duration based hedge makes the implicit assumption that only parallel shifts in the yield curve are possible

**ANSWER: C****Explanation:**

:

A hedge based on portfolio duration alone makes the assumption that the price/yield relationship is linear, and ignores the convexity or non-linearity of the price/yield relationship. As prices change beyond small changes, the non-linear effect kicks in, which can be offset by making a convexity adjustment to the hedge. Therefore statements I and II are correct.

Statement III is incorrect - negative convexity has an adverse effect on bond prices regardless of whether prices rise or fall.

Statement IV is correct, a bond hedge based on duration alone may be mismatched along the yield curve (eg, hedging a 10 year maturity bond with a 3 year futures contract, even though of identical total durations), which is based upon the implicit assumption that all rates will move together (ie parallel shifts).

**QUESTION NO: 5**

An investor believes that the market is likely to stay where it is. Which of the following option strategies will help him profit should his view be proven correct (assume all strategies described below are long only)?

- A. Strangle
- B. Collar
- C. Butterfly spread
- D. Straddle

**ANSWER: C****Explanation:**

:

Only the butterfly spread has a payoff profile that benefits when prices do not move much. The collar benefits during declining markets, the straddle and the strangle benefit from sharp movements in the markets. Therefore Choice 'c' is the correct answer.

**QUESTION NO: 6**

Which of the following statements is false:

- A. The value of an FRA at expiration is determined by the spot interest rate prevailing at expiration
- B. The value of an FRA (forward rate agreement) at inception is zero.
- C. An FRA can be valued at anytime in its lifetime using the spot interest rate for the period to which the FRA relates
- D. Notional principals are exchanged at the start and the end of an FRA to eliminate credit risk

**ANSWER: D****Explanation:**

:

:

Notional principals are not exchanged at the start and the end of an FRA. In fact, if the notional principals were to be exchanged, it would increase credit risk and not decrease it by introducing settlement risk. Therefore Choice 'd' is incorrect.

All other choices correctly describe various aspects of an FRA.

### QUESTION NO: 7

[According to the PRMIA study guide for Exam 1, Simple Exotics and Convertible Bonds have been excluded from the syllabus. You may choose to ignore this question. It appears here solely because the Handbook continues to have these chapters.]

Which of the following best describes a shout option

- A. an option in which the holder of the option has the right to reset the strike price to be at-the-money once during the life of the option
- B. an option which kicks in as a plain vanilla option if the underlying hits an agreed threshold
- C. an option in which the buyer of the option has the option to extend the expiry of the option upon the payment of an extra premium
- D. an option whose expiry is automatically extended if it finishes out of the money.

**ANSWER: A**

#### Explanation:

: Choice 'c' correctly describes a 'holder extendible option'. Choice 'd' describes a 'writer extendible option'. Choice 'a' describes a 'shout option'. Choice 'b' describes a 'knock in' option.

### QUESTION NO: 8

The effectiveness of a hedge is determined by which of the following expressions, where  $x,y$  is the correlation between the asset being hedged and the hedge position:

A)

$$1 - \rho_{x,y}^2$$

B)

$$\rho_{x,y}^2$$

C)

$$\sqrt{1 - \rho_{x,y}^2}$$

D)

$$\sqrt{1 + \rho_{x,y}^2}$$

- A. Option A
- B. Option B
- C. Option C
- D. Option D

**ANSWER: C**

**Explanation:**

:

The effectiveness of the hedge is solely determined by the correlation between the position being hedged, and the position being used as the hedge. A hedge can be perfect when correlation is 1, and will be less than perfect when it is anything other than 1. The effectiveness of the optimal hedge is given by the formula (1-2), where  $\rho$  is the correlation between the two. Therefore Choice 'c' is the correct answer. Standard deviations affect the hedge ratio, not the effectiveness of the hedge.

#### QUESTION NO: 9

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.)

**QUESTION NO: 10**

If  $r$  be the yield of a bond, which of the following relationships is true:

- A. - Modified Duration /  $(1 + r) =$  Macaulay Duration
- B. - Modified Duration  $\times (1 + r) =$  Macaulay Duration
- C. Modified Duration  $\times (1 + r) =$  Macaulay Duration
- D. Modified Duration /  $(1 + r) =$  Macaulay Duration

**ANSWER: C**

**Explanation:**

:

To calculate the Modified Duration from Macaulay's duration, we use the relationship  $MD = D/(1+r)$ , where MD is the modified duration and D the Macaulay Duration. Therefore Choice 'c' is the correct answer.

**QUESTION NO: 11**

A trader finds that a stock index is trading at 1000, and a six month futures contract on the same index is available at 1020. The risk free rate is 2% per annum, and the dividend rate is 1% per annum. What should the trader do?

- A. Buy the index spot and sell the futures contract
- B. Buy the futures contract and sell the index spot
- C. Buy the index spot and buy the futures contract
- D. Sell the futures contract

**ANSWER: A**

**Explanation:**

:

The fair price for the futures contract should be  $[1000 \times (1 + (2\% - 1\%)/2)] = 1005$ . This means the futures contract is 'rich' at 1020. The trader should therefore short the futures contract, and buy the index spot. To buy the spot index, he will incur a borrowing cost of 2%, which will be partly offset by the dividend yield of 1%, and at the end of six months he will owe a net amount of 1005 and hold the index. At the same time the futures contract would expire too, and he would be able to sell at the agreed price of 1020, making a risk free profit of 15.

**QUESTION NO: 12**

A refiner may use which of the following instruments to simultaneously protect against a fall in the prices of its products and a rise in the prices of its inputs:

- A. crude oil swaps
- B. options on the crack spread
- C. crude oil futures
- D. calendar spread options

**ANSWER: B****Explanation:**

:

The crack spread is the difference between the price of refined products and crude oil. An option on the crack spread can protect a refiner from both a fall in the price of its output and a rise in the price of its inputs. Calendar spreads are options with different maturities. Crude oil futures and swaps only protect against an adverse change in the price of crude, and not that of refined products. Choice 'b' is the correct answer.

**QUESTION NO: 13**

Which of the following assumptions underlie the 'square root of time' rule used for computing volatility estimates over different time horizons?

- I. asset returns are independent and identically distributed (i.i.d.)
  - II. volatility is constant over time
  - III. no serial correlation in the forward projection of volatility
  - IV. negative serial correlations exist in the time series of returns
- A. I and II
- B. I and III

C. III and IV

D. I, II and III

E. asset returns are independent and identically distributed (i.i.d.)

II. volatility is constant over time

III. no serial correlation in the forward projection of volatility

IV. negative serial correlations exist in the time series of returns

**ANSWER: D**

**Explanation:**

:

The square root of time rule can be used to convert, say a 1-day volatility to a 10-day volatility, by multiplying the known volatility number by the square root of time to get the volatility over a different time horizon. However, there are key assumptions that underlie the application of this rule, and statements I to III correctly state those assumptions. If serial correlations (whether negative or positive) exist, then asset returns are not independent as they are affected by the prior day or prior period's returns, and we cannot use the square root of time rule. Therefore Choice 'd' is the correct answer.

In order to use the 'square root of time' rule, asset returns should be iid, volatility should stay constant (ie there should be no volatility clustering), and no serial correlations (ie the returns of one day should not be affected by the returns of the prior periods). Choice 'd' is the correct answer.

**QUESTION NO: 14**

Which of the following correctly describes a "reverse repo"?

A. An asset swap that is offset by an identical but opposite swap

B. Lending cash with securities as a collateral

C. Borrowing cash while posting securities as a collateral

D. A repo with an undefined maturity period

**ANSWER: B**

**Explanation:**

:

A repo, or a repurchase agreement, is the lending of securities in return for cash, with an agreement to buy the securities back at a later date at the borrowed amount plus interest. It is a form of collateralized borrowing. A 'reverse repo' is exactly the opposite of a repo transaction, ie where cash is lent and securities borrowed. Therefore Choice 'b' is the correct answer. In any repo transaction, the counterparty will therefore always have a 'reverse repo' position.

A reverse repo is a useful transaction - not merely for the purpose of lending short term funds, but more importantly to enable short positions. For example, if an investor wishes to short a bond, he can borrow the bond on a 'reverse repo' and sell it. Of course, he will have to return the bond when the reverse repo matures, but hopefully by that time prices of the bond would have fallen to allow him to do so profitably. Short positions in physical bonds are nearly always facilitated by reverse repos.

**QUESTION NO: 15**

When graphing the efficient frontier, the two axes are:

- A. Asset beta and standard deviation of the market portfolio
- B. Expected return and asset's beta
- C. Portfolio return and market standard deviation
- D. Portfolio return and portfolio standard deviation

**ANSWER: D****Explanation:**

:

The efficient frontier is plotted on a graph with portfolio return (mean) as the y-axis and portfolio volatility, or standard deviation, on the x-axis. Asset beta and standard deviation of the market portfolio have nothing to do with the determination of the efficient portfolio. Therefore Choice 'd' is the correct answer, and the rest of the choices are incorrect.