Birla Institute of Technology and Science, Pilani

MID SEMESTER EXAMINATION, II SEMESTER 2016-17 PART –A (Closed Book)

Course Number : ECON F354/ FIN F311
Maximum Marks /Weight: 20 / 10%
ID Number: 2015B3A3525P

Course Title: Derivatives and Risk Management
Time: 30 minutes

Name: HARSH JAISWAL

Please answer your options in the table given below:

1	2	3	4	5	6	7	8	9	10
D	B	D	D	C	B	A	D	D	B
11	12	13	14	15	16	17	18	19	20
C	C	E	A	B	B NA	A	A	C	B

1. Which of the following best describes the nature of a forward contract? With a forward contract, the two parties agree to:
   A. exchange an item of a specific quality for cash at a future predetermined date.
   B. exchange an item for an agreed amount of cash at a future predetermined date.
   C. exchange a given amount of an item for an agreed amount of cash at a future predetermined date.
   D. exchange a given amount of an item of a specific quality for an agreed amount of cash at a future predetermined date.

2. If you have a ____ sensitivity to changes in market prices, you would be said to be ____ and would benefit from an ____ in the market price. Which is correct?
   A. positive long the risk increase
   B. positive short the risk decrease
   C. negative long the risk decrease
   D. negative short the risk increase

3. Which of the following correctly describes a futures contract?
   A. A futures is an instrument whose value depends on the values of other more basic underlying variables.
   B. An exchange-traded contract to buy or sell a specific amount of an asset or security for a specific price or rate on a specific future date.
   C. An agreement to buy or sell an asset at a certain time in the future for a certain price (the delivery price).
   D. All of A, B, and C.

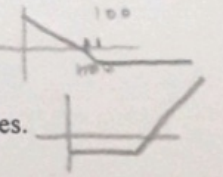
4. Which of the following is not a fundamental financial instrument?
   A. A share.
   B. A call option on a share.
   C. A bond.
   D. A bank loan.

5. The spot price of a commodity is $1200 and its forward price in one year is $1255. The one-year interest rate is 4 per cent per annum. Which of the following is correct? An arbitrageur can create a replicating portfolio by:
   A. borrowing and buying the commodity in the cash market and buying the forward contract to give a profit of $55.
   B. selling the commodity in the cash market and investing and buying the forward contract to give a profit of $7.
   C. borrowing and buying the commodity in the cash market and selling the forward contract to give a profit of $7.
   D. selling the commodity in the cash market and investing and selling the forward contract to give a profit of $55.

C –

14. An investor can simultaneously be "in the money" yet have a negative not profit on the basis of

A. having to cover the initial cost of the option.
B. the absence of transaction costs.
C. a failure to exercise an option.
D. uncertainty in the price of the underlying instrument.



15. Selling a call differs from selling a put in that a

A. put has possibly unlimited losses.
B. call has possibly unlimited losses.
C. put will sell for a lower price.
D. call will sell for a lower price.

16. A long position is an obligation to _____ whereas a short position is an obligation to _____.

A. sell; purchase
B. purchase; sell
C. exercise a call; exercise a put
D. exercise a put; exercise a call

17. A major difference between a forward contract and a future contract is that only a future contract is

A. a standardized contract that is traded over an exchange.
B. available exclusively from commercial banks.
C. limited to large contracts.
D. available for any amount and maturity.

18. An option on a financial instrument gives the holder the

A. right to purchase or sell an underlying financial instrument at a given price.
B. obligation to purchase or sell an underlying financial instrument at a given price.
C. right to purchase or sell an underlying financial instrument at its future spot price.
D. obligation to purchase or sell an underlying financial instrument at its future spot price.

19. A call option gives the holder the right to _____an instrument whereas a put option gives the holder the right to _____.

A. exercise; confiscate
B. sell; purchase
C. purchase; sell
D. transfer; sell

20. If an investor wants to speculate on the direction of the entire stock market, the most efficient method would be to acquire

A. an exchange forward.
B. a stock index future.
C. a portfolio of stocks and bonds.
D. a portfolio containing stocks of all traded companies

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Course Number : ECON F354/ FIN F311
Maximum Marks /Weight: 40 / 20%
ID Number: 2015B3A3525P

Course Title: Derivatives and Risk Management
Time: 60 minutes
Name: HARSH JAISWAL

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Use annual compounding only

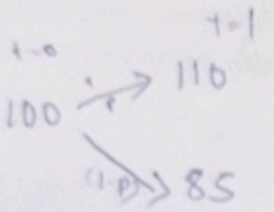
1. If the current or spot market gold price is $ 400 per ounce, the forward market price with one year delivery is $450 per ounce and the one-year interest rate In US dollar is 4 percent, is there any possibility of arbitrage profit? Will the answer be different if forward market price $ 400 per ounce? If there exist an arbitrage opportunity, how will you exploit? Give all the calculations to justify your answer. (12 Marks)

We can buy the stock at ~~market~~ spot price of $400 per ounce, and then take a short position in a ~~future~~ forward with market ~~rate~~ value = $450 per ounce.

To buy we borrow at the market at 4% interest.
So at t=1 the cost of buying at t=0 is = 400 × (1.04)
= $416 per ounce.
So there exists an arbitrage profit = $(450 − 416) per ounce
= $34 per ounce.

If the forward market price = $400 per ounce there will be no arbitrage opportunity as $400 at t=0 ≠ $400 at t=1.
$400 at t=0 ≠ $416 at t=1 which is > than $400 so we will incur loss.

A stock currently trades at a price of $100. The stock price can go 10% or go down 15%, The risk free interest rate is 6.5%, Use a one-period binomial model to calculate the price of a call option with an exercise price of $90. (12 Marks)

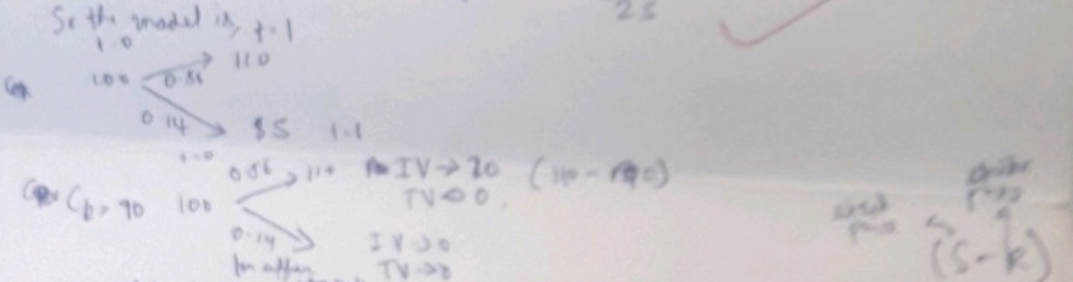


at t=1 Expected value of stock = 100 × (1.065) = 106.5

$= 110 \times p + 85(1-p)$

$\Rightarrow 106.5 = 25p + 85$

$\Rightarrow p = \frac{21.5}{25} = 0.86$



At t=1 Time value = 0 and Intrinsic value = 20

E[t=1] of option = 0.86 × 20 = $17.2

to find the Present value we discount at rate of 6.5%.

So the price of call option = $\frac{17.2}{(1.065)} = \$16.15$

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...e bond prices of zero coupon bonds are given as follows:

a. B(0,1) 94.34
b. B(0,2) 87.34
c. B(0,3) 79.38

Calculate the forward rates for the period of 1X2 and 2X3. If a person holds one bond of B(0,1) , two bonds of B(0,2) and three bonds B(0,3), what will be the portfolio duration? Give all the calculations. (16 Marks)

$B(0,1) = \frac{100}{(1+y_1)} = 94.34 \Rightarrow y_1 = 5.98\% \approx 6\%$.

$B(0,2) = \frac{100}{(1+y_2)^2} = 87.34 \Rightarrow y_2 = 7\%$.

$B(0,3) = \frac{100}{(1+y_3)^3} = 79.38 \Rightarrow y_3 = 8\%$.

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Now for $f_{1\times2}$

$100 \times (1+y_1)(1+f_{1\times2}) = 100(1+y_2)^2$

$\Rightarrow (1.06)(1+f_{1\times2}) = (1.07)^2$

$\Rightarrow 1+f_{1\times2} = 1.08$

$\Rightarrow f_{1\times2} = 8\%$. (Ans)

Now for $f_{2\times3}$

$100 \times (1+y_1)(1+f_{1\times2})(1+f_{2\times3}) = 100 \times (1+y_3)^3$

$\Rightarrow 1+f_{2\times3} = \frac{(1.08)^3}{(1.08)\times(1.08)}$

$\Rightarrow 1+f_{2\times3} = 1.10$

$\Rightarrow f_{2\times3} = 10\%$. (Ans)

Term Structure

Period	Zero Rates
0 - 1	6%
0 - 2	7%
0 - 3	8%

Forward Rates Period	Forward rate
0 - 1	6%
1 - 2	8%
2 - 3	10%

Duration calculation

Price of Portfolio = $1 \times B(0,1) + 2 \times B(0,2) + 3 \times B(0,3)$

$= 94.34 + 2 \times 87.34 + 3 \times 79.38$

$= 507.16$

Weightage of $B_1 = \frac{94.34}{507.16} = 0.186$