Queen Mary
University of London

May Examination Period 2022-23

ECN358 Futures and Options *Duration: 2 hours*

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Answer ALL questions

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Examiner: Sarah Mouabbi

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Question 1

Assume a Portfolio and two options have the following Delta, Gamma and Vega.

	Delta	Gamma	Vega
Portfolio	0	-3000	-6000
Option 1	0.5	0.3	1.2
Option 2	0.4	0.6	0.9

What position in Option 1 and the underlying asset will make the portfolio Delta and Vega neutral?

[10 marks]

Question 2

Assume a swap that allows an investor to receive 5% in yen and pay 7% in dollars, annually, for a period of 2 years. The principals underlying this swap are 10,000 dollars and 1,200,000 yen. The current exchange rate is 105 yen per dollar. All Japanese swaps rates are 3%, while all US swap rates are 8%.
What is the value of the swap in USD? Solve the question using the bond valuation method.

[10 marks]

Question 3

Provide and explain one argument in favour of hedging and one argument against hedging.

[10 marks]

Question 4

Assume that a 9-month forward price of an asset paying a known cash income is 886.60 GBP. Assume that the underlying asset is currently worth 900 GBP and pays a known income of 40 GBP in 4 months, with present value of 39.60 GBP.
Compute the 4-month and 9-month zero rates.

[15 marks]

Question 5

a) Suppose that a 1-year European call with a strike price equal to 18 EUR is priced at 3 EUR. Assume that the underlying asset is currently priced at 20 EUR and pays no income, and that the risk-free rate is 10% per annum (in continuous compounding). Using known bounds to option prices, is there an arbitrage opportunity? If so, detail and justify your arbitrage strategy.

[10 marks]

b) Provide a lower bound for European call option prices and for American call option prices.

[5 marks]

Question 6

a) A call with a strike price of 60 USD costs 6 USD. A put with the same strike price and expiration date costs 4 USD. Construct a table that shows the profit from a straddle. For what range of stock prices would the straddle lead to a loss?

[10 marks]

b) Construct a table showing the payoff from a bull spread when puts with strike prices K_1 and K_2 are used, where K_2 is greater than K_1.

[10 marks]

Question 7

a) A stock price is currently 100 USD. Over each of the next two six-month periods it is expected to go up by 10% or down by 10%. The risk-free interest rate is 8% per annum with continuous compounding. What is the value of a one-year European call option with a strike price of 100 USD?

[10 marks]

b) For the situation considered in question 7a), what is the value of a one-year European put option with a strike price of 100 USD? For your ease, use put–call parity.

[10 marks]

End of Examination/ Sarah Mouabbi