Queen Mary
University of London

January Examination Period 2025

ECN358 Futures and Options Duration: 2 hours

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Answer ALL questions

Cross out any answers that you do not wish to be marked

Non programmable calculators are permitted in this examination. Please state on your answer book the name and type of machine used.

Complete all rough workings in the answer book and cross through any work that is not to be assessed.

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Examiners: S. Mouabbi

Question 1

The SP500 index is currently at 5,100. The two-month interest rates in the UK and in the US are, respectively, 3% and 6% per annum, while the dividend yield over the next two months is 1% per annum. Estimate the foward price of the index for the two-month contract. All interest rates and dividend yields are continuously compounded.

[10 marks]

Question 2

An investor sells a 4-month European put on a share for 7 USD. The current stock price is 30 USD and the strike price is 40 USD. Provide the profit function for this position at maturity, display it graphically and explain under what circumstances will the option be exercised?

[10 marks]

Question 3

Define the optimal hedge ratio and discuss what the hedging ratio would be equal to if a trader wanted to be fully hedged when the asset underlying the futures contract is the same as the asset being hedged.

[10 marks]

Question 4

A currency swap has a remaining life of 14 months. It involves exchanging interest at 10% on 20 million GBP for interest at 6% on 30 million USD once a year. The term structure of interest rates in both the United Kingdom and the United States is currently flat and if the swap were negotiated today the interest rates exchanged would be 4% in dollars and 7% in sterling. All interest rates are quoted with continuous compounding. The current exchange rate is 1.30 USD per 1 GBP. Compute the value of the swap to the party paying sterling using bonds.

[15 marks]

Question 5

Assume the following Delta, Gamma and Vega:

	Delta	Gamma	Vega
Portfolio	0	-3000	-5000
Option A	0.5	0.5	2
Option B	0.4	0.8	1

What position in Option A and the underlying asset will make the portfolio Delta and Gamma neutral?

[15 marks]

Question 6

Compare the portfolio composition, payoff outcomes and cost of a straddle and a strangle.

[20 marks]

Question 7

A stock price is currently 30 GBP. 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 5% per annum with continuous compounding.

a) What is the value of a six-month European put option with a strike price of 31 GBP?

[10 marks]

b) What is the value of a one-year American put option with a strike price of 31 GBP?

[10 marks]

End of Paper