**Individual data set**

Each of you will receive an individual data set describing the spot exchange rate over a one year period. This data set has been produced from a simulation for an exchange rate that follows a lognormal probability distribution over a time interval .

where

is the current (spot) exchange rate.

is the exchange rate at time

is the risk-free interest rate for domestic cash flows

is the risk-free interest rate for foreign cash flows

is the exchange rate volatility

is the time interval

Note that your individual data set is a single sample from a population governed by the above probability distribution.

**Questions**

This question explores some potential trading strategies for trading in foreign currency.

The following data is to be used throughout the question

* The currencies involved in this questions are the Yen () and the Euro ().
* Current exchange rate:
* Risk-free interest for Yen cash flows: per annum with continuous compounding.
* Risk-free interest for Euro cash flows: per annum with continuous compounding
* Exchange rate volatility: 8% per annum
* Duration of contracts: 1 year

1. Describe the differences and similarities between a forward contract, a European style call option and a European style put option.

**[12 marks]**

1. Show that the 1-year forward exchange rate is equal to

**[3 marks]**

1. A 1-year forward contract is purchased to buy Euros at the forward exchange rate of . You have been provided with an individual data set for the spot exchange rate over this 1-year period. Use your data set to produce a graph that shows the spot exchange rate ( and the value ( of the forward exchange rate from the instant the forward contract is bought to its expiry after one year. For best effect you will need to make use of primary and secondary vertical axes.

Provide a concise explanation of how you created your graph including the method used to calculate the value of the forward contract at a given instant in time.

**[16 marks]**

1. A trader secures an under-priced contract where the 1-year forward exchange rate is quoted as . Explain how the trader would be able to use this market rate to achieve a risk-free profit. Calculate the risk-free profit per .

**[14 marks]**

1. An option-based strategy is created whereby a 1-year European style put option is sold with an exercise price of and a 1-year European style call option is bought with an exercise price of
2. Calculate the initial cost of the strategy **[10 marks]**
3. Present diagrams that show the pay-off and profit per at expiry. **[5 marks]**
4. Explain how the strategy enables Euros to be purchased at an exchange rate in the interval regardless of the value of the spot exchange rate in 1-years’ time

**[7 marks]**

1. Calculate the probability that the exchange rate paid by the trader is equal to .

**[5 marks]**

1. A speculator creates a trading strategy whereby a 1-year European call option is purchased with exercise price equal to and two 1-year call options are sold with exercise price equal to . The speculator selects a value of such that the initial cost of the strategy is equal to zero

1. Determine the value of .

Note that

**[10 marks]**

1. Analyse and comment on how the strategy would be expected to perform under different market conditions and the extent to which any assumptions made would have been appropriate for your individual sample.

**[18 marks]**