Written Exam for the B.Sc. or M.Sc. in Economics 2009-II

International Finance

Master's Course

April 18, 2009

4-hour closed book exam

Aids allowed: calculator

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by "eksamen på dansk" in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students' self-service system.

Written exam for the M. Sc in Economics
International Finance

1. **Which of the following statements are correct? Remember to provide a brief explanation.**

   (a) Official intervention on the foreign exchange market is when the Central Bank buys or sells foreign assets, for example foreign bonds.

   (b) If domestic and foreign bonds are perfect substitutes, then official intervention has no effect on the exchange rate.

   (c) Arbitrage is the purchase of assets undertaken when an agent's expectations differ from the market's expectation.

   (d) A call option that gives you the right to buy the Yen also gives you the right to sell the US$.

   (e) Synthetic assets and liabilities can be constructed by combining assets denominated in the other currencies with a forward or futures contract of similar maturity and a spot contract.

   (f) An order flow on the foreign exchange market must always be positive.

2. **Futures and Forward contracts.**

   Consider a US importer who has to pay €10m in three months for a delivery of goods from a German company. The importer is worried that the dollar will depreciate and decides to hedge using futures. The current spot exchange rate is \$1.25/€ and the three month futures rate is \$1.255/€ (with contract size €125000).

   (a) What is the position taken by the US importer?

   (b) Suppose the spot rate in three months is \$1.30/€. Compute the net cost (measured in USD) of buying the euros. Assume that there is no actual delivery and that the importer is using the spot market to buy the €.

   (c) Suppose instead that the spot rate in three months is \$1.20/€. Compute the net cost in this case. Compare with your answer in (b) and comment.

(d) In this example we assumed that the maturity dates matched. Explain how a delta hedge can be constructed in case the maturity dates on the € delivery and the futures contract differ.

(e) An alternative to futures is to use forwards to hedge the position. What are the basic differences between futures and forwards?

3. **Options.**

(a) Derive the one–period binomial *put* option price formula (for a currency option) using the idea of replicating portfolio.

(b) Apply the same idea of replicating portfolio to derive the put–call parity relation.

(c) The continuous time option pricing model is

$$C = S \exp(-r^*T)N(d_1) - X \exp(-rT)N(d_2)$$

and

$$P = X \exp(-rT)N(-d_2) - S \exp(-r^*T)N(-d_1).$$

Verify the that you obtain the same put–call parity condition by using the continuous time model.

(d) The expressions for d_1 and d_2 are given by

$$d_1 = \frac{\ln S/X + (r - r^* + \sigma^2/2)T}{\sigma\sqrt{(T)}}$$

and

$$d_2 = \frac{\ln S/X + (r - r^* - \sigma^2/2)T}{\sigma\sqrt{(T)}}.$$

Show that the call option price C converges to zero when the option is deep out–of–the–money, i.e., when S/X converges to zero. Show also that the call option price C converges to the value of a forward purchase when the option is deep in–the–money, i.e., when S/X converges to plus infinity.