

COMM 377 EXERCISES (Practice Questions for Midterm - not to be handed in)

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More challenging questions are denoted by an asterisk \*. The more asterisks, the more challenging the question.

1. You are a Canadian speculator in the foreign exchange market. You expect the spread between the Canadian interest rate and the Euro interest rate to decrease in the next few weeks, but you are not sure about movement in the exchange rate. Explain in words what you would do to speculate on your expectation about the interest rate differential.
2. You are the CFO of an investment house. You are investigating the actions of 4 members of a trading desk. They are suspected of breaching their trading limits by selling a large amount of Euros, 6 months forward, against the Canadian Dollar. It is your job to unwind this trade, but you don't know how many Euros were sold forward. You ask each member of the trading desk, what the notional amount is. They respond as follows:

Alice: I am telling the truth and we sold 100 B EUR.

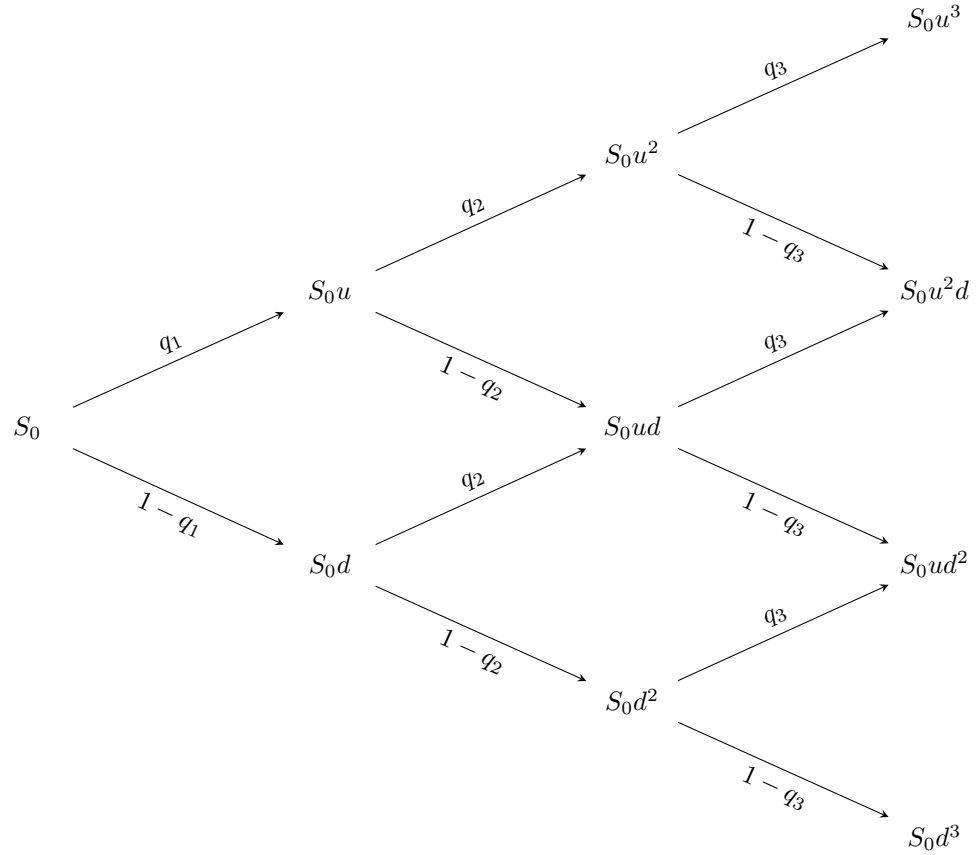
Barbara: Alice is telling the truth and we sold 100 B EUR

Charles: Barbara is telling the truth and we sold 100 B EUR

David: Charles is lying. We sold 1000 B EUR.

If only one person is telling the truth, what is the notional amount?

3. The current, i.e. date 0 CAD/GBP spot price is denoted by  $S_0 = 1.6$ . The CAD/GBP spot price is assumed to evolve such that it can only move up or down each month, as shown in the binomial tree below:



You are given the following CAD/GBP forward rates and GBP interest rates

Table 1: default

Maturity	Forward Rate	GBP LIBOR rate, p.a.
1 mth	1.61	1.1%
2 mth	1.62	1.2%
3 mth	1.63	1.3%

Suppose that  $u = 1.001$  and  $d = 1/u$ .

- (a) Find the annualized CAD risk-free rates for 1 mth, 2mth and 3mth deposits.
  - (b) Find  $q_1$ ,  $q_2$  and  $q_3$ .
  - (c) Find the date-0 prices of the following Arrow-Debreu claims:
    - i. The Arrow-Debreu security which pays off 1 CAD when the CAD/GBP spot rate in 3 months time equals  $1.6(1.001)^3$  and zero otherwise and zero otherwise
    - ii. The Arrow-Debreu security which pays off 1 CAD when the CAD/GBP spot rate in 3 months times equals  $1.6(1.001)$  and zero otherwise
    - iii. The Arrow-Debreu security which pays off 1 CAD when the CAD/GBP spot rate in 3 months times equals  $1.6(1.001)^{-1}$  and zero otherwise
    - iv. The Arrow-Debreu security which pays off 1 CAD when the CAD/GBP spot rate in 3 months times equals  $1.6(1.001)^{-3}$  and zero otherwise
  - (d) Find the date-0 price in CAD of a 3mth European call option on 1 GBP with a strike of 1.596 CAD/GBP.
4. \* The current time is denoted by 0. The HC/FC spot rate 1 year from now is given by

$$\tilde{S}_1 = F_{0,1} \tilde{M}_1,$$

where  $F_{0,1}$  is the one year forward rate, and  $\tilde{M}_1$  is a random variable which can take two values, 1/2 and 2. You believe that  $\tilde{M}_1 = 1/2$  with probability 0.1. The home currency 1 year risk-free rate is 1% p.a. and the foreign currency 1 year risk-free rate is 10% p.a. The spot rate,  $S_0$ , is 1 HC/FC.

- (a) Describe carefully in words the risky trade you would undertake to exploit the large difference between foreign and home risk-free rates.
  - (b) Use your answer to the previous question to write down an expression for the risky return on the trade you suggested. What is your assessment of the expected return on the trade you suggested? Make sure your answer is numerical.
  - (c) What is the risk-adjusted probability of  $\tilde{M}_1$  being equal to 1/2?
5. \*\* You are facing the following gamble. There are three boxes. There is 1M CAD inside just one of the boxes.

Your utility from  $x$  CAD is  $u(x) = \frac{x^{1-\gamma}}{1-\gamma}$ , where  $\gamma = 1/2$ . Suppose you have already decided to open one of the boxes. How much money would you be willing to pay to change your mind about which box to open, after seeing someone who knows what is in the boxes open one of the empty boxes?