

Economics 380
Homework #3

Due: Tuesday November 13, 2007

Name: _____

Division: _____

1. Banks of transfer and interbank clearance

This problem proceeds through the steps in the example of banks of transfer and interbank clearance from the lecture notes. The tables used in the notes to show endowments, allocations, trades, and merchants' balances at the banks are all provided in the problem. You need to fill in all blank cells of the tables. Table 1 shows an example of market prices, merchants' endowments, and merchants' allocations after trading is finished.

Commodities						Commodities					
	Dyes	Linen	Spices	Wool		Dyes	Linen	Spices	Wool		
p	8	7	8	9	Value	p	8	7	8	9	Cost
E1	—	—	—	10	90	E1	5	—	5	—	
F2	—	10	—	—		F2	5	—	5	—	
I1	10	—	—	—		I1	—	10	—	—	
I2	—	—	10	—		I2	—	—	—	10	

Table 1: Commodity endowments and their values (left); commodity allocations and their costs (right)

- (a) (1 point) Using the prices in the row labeled p , fill in the value of each merchant's endowment on the left side of table 1 and fill in the cost of each merchant's allocation on the right side of table 1.

Buy.	Sell.	Comm.	Units	Price	Cost	Buy.	Sell.	Comm.	Units	Price	Cost
E1	I1	Dyes	5	8	£40	F2		Dyes			£
E1		Spices			£	F2		Spices			£
I1		Linen			£	I2		Wool			£

Table 2: Transactions cleared at bank B1 (left) and at bank B2 (right)

- (b) (1 point) Table 2 shows the buyer for each of six trades that lead from the endowments to the allocations in table 1. Complete the table by filling in the cells that are blank.

Merch.	Credit	Debit	Bal. (A)	Bal. (B)	Merch.	Credit	Debit	Bal. (A)	Bal. (B)
E1	£	£	£	£	F2	£	£	£	£
I1	£	£	£	£	I2	£	£	£	£

Table 3: Merchants' accounts at bank B1 (left) and at bank B2 (right)

- (c) (1 point) Table 3 shows a ledger for the account of each merchant. Assume that merchants E1 and I1 have accounts at bank B1; assume that merchants F2 and I2 have accounts at bank B2. Show all the debits for each merchant and show the credits that result from trades with merchants who have an account at the same bank. Show the balance for these trades in the column labeled “Bal. (A).”
- (d) (1 point) There are some trades that clear across banks. After these trades are cleared across banks, some merchants will have an additional credit. In the column labeled “Bal. (B),” show the balance of each merchant after these interbank trades are credited appropriately.
- (e) (1 point) What is the amount of money that needs to be transferred between the two banks? The transfer payment that one of the banks makes is a debit of the bank. Show that it has an equal offsetting credit. The transfer payment received by the other bank is a credit of the bank. Show that it has an equal offsetting debit.

2. Problem 5.1 from the lecture notes (4 points) The demand for agent j is given in equation (5.7). Use that equation, evaluated at the market equilibrium interest rate for this example, to find the demand for loans or supply of loans by each agent. (If the demand for loans is negative for an agent, that means that that agent will supply loans at the market equilibrium interest rate.) How much will each agent consume in the first period? How much will each consume in the second period? Which agent consumes more in total across the two periods? What is the cause of the difference in total consumption?

3. Market interest rates Suppose that each of two agents in an exchange economy have the demand function

$$z_1^j(i) = \frac{1}{\beta + 1} \left(\frac{\omega_2}{1 + i} - \beta \omega_1 \right) \quad (1)$$

for loans. Assume that agent 1 has the discount factor $\beta_1 = 10/11$ and agent 2 has the discount factor $\beta_2 = 10/12$.

(a) (1 point) Suppose that agent 1 has the endowment $(\omega_1, \omega_2) = (300, 0)$ and agent 2 has the endowment $(\omega_1, \omega_2) = (0, 300)$. Write down the demand for each agent. Use equation (1) to find the demand function $z_1^1(i)$ for agent 1 and the demand function $z_2^2(i)$ for agent 2. Write down the market demand for loans.

(b) (1 point) Equate the market demand to the market supply to determine the market equilibrium interest rate i^* .

4. Yield of a treasury bill (1 point) If the price of a simple bond that pays \$100 after a one year maturity is \$96, what is the yield (or the interest rate i) on the bond? (Think of this as a bond with a single coupon payment $C = \$100$ in one year.)

5. Problem 5.2 in the lecture notes (2 points) What was the range for the interest rate on the Monte Vecchio between 1320 and 1350 when prices varied between 80 and 102?

6. Finite term bonds and perpetual bonds Suppose that a bond makes two coupon payments. Each payment is C . The first payment is made one year after the issue date of the bond and the second payment is made two years after the issue date. Use the convention that the bond is issued at year 0, the first coupon payment is made after one year (which we call year 1), and the second payment is made after two years (which we call year 2).

(a) (1 point) Find the present value (at year 0) of the bond. Your present value formula should be a function of the interest rate i and the coupon payment C . (Hint: Find the present value of the first coupon and the second coupon separately and add them together to get $PV = PV_1 + PV_2$.)

(b) (1 point) In the lecture and the lecture notes we found that the present value (also at year 0) of a perpetual bond with payments C every year forever is $PV = C/i$ where i is the interest rate or yield on the bond. Imagine that the perpetual bond B is separated into two parts. One part B_b includes the first two coupon payments; the other part B_e includes all of the coupon payments after the first two coupon payments. (The subscripts are b for 'beginning' and e for 'end'.) The present value of this perpetual bond at year 0 is $PV = PV_b + PV_e$. We also know that at year 2 the present value of PV_e is C/i . What is the present value of PV_e at year 0?

(c) (1 point) The bond in part (a) is equivalent to acquiring a perpetual bond today and selling it two years from today. In other words, the bond in part (a) is equivalent to the bond PV_b in part (b). Find the present value of PV_b as the difference $PV_b = PV - PV_e$.

(d) (1 point) Evaluate your formula from part (a) when the coupon payment is $C = 100$ and the interest rate is 25%. (This interest rate is unnaturally high, but it makes the equation work out simply.)

(e) (1 point) Evaluate your formula from part (c) when the coupon payment is $C = 100$ and the interest rate is 25%.

7. Problem 6.1 in the lecture notes (1 point) If Bill B is payable after three months, what is the interest rate earned by Marsden on the bill? (Recall that there were 20 shillings per £.)