

## Introduction to Macroeconomics · M5 · 2014-15

### Problem set 2

1. **Properties of money.** Find some good or financial asset that: (i) could be medium of exchange and store of value but not, or hardly, unit of account; (ii) could be medium of exchange but neither store of value nor unit of account; (iii) could be store of value and unit of account but not medium of exchange; and (iv) nor medium of exchange, nor store of value, nor unit of account.

2. **Reserve ratio.** Let  $M_0 = 1,000$ ,  $M_1 = 4,000$ , and  $r = 0.1$ . (i) What change in the liquidity ratio  $l$  would neutralize the effect on  $M_1$  of a 10% fall in  $M_0$ ? Let  $M_0 = 1,000$ ,  $M_1 = 4,000$ , and  $l = 0.1$ . (ii) What change in the reserve ratio  $r$  would neutralize the effect on  $M_0$  of a 10% increase in  $M_0$ ?

3. **Money multiplier.** Using derivatives, find the effect on the money multiplier of a rise in  $r$  and a fall in  $l$ .

4. **Currency held by the public.** The money multiplier is 2. Bank reserves are  $R = 100$ . Sight deposits are  $D = 1,000$ . Ascertain the currency  $E$  held by the public.

5.  **$M_0$ ,  $M_1$ .** (i) Explain two differences between  $M_0$  and  $M_1$ . (ii) Can  $M_0$  be greater than  $M_1$ ? And smaller than  $M_1$ ? And equal to  $M_1$ ?

6.  **$M_0$ ,  $M_1$ .** Let  $M_1 = 4,000$ ,  $mm = 2$ , and  $r = 0.3$ . (i) Find  $M_0$  and  $l$ . (ii) Find  $M_1$  if, given the results in (i),  $r$  dropped to zero. Explain the mechanism that produces the change in  $M_1$  (reason what happens to loans, expenditure, revenues, deposits, and  $M_1$  when  $r$  becomes 0).

7. **Money multiplier.** Find the money multiplier if: (i) the liquidity ratio is 0.1, the monetary base is 500, and the money stock is 1,000; (ii) the liquidity ratio is 0.1, the monetary base is 550, and the currency  $E$  held by the public is 100.

8. **Monetary aggregates.** The monetary base is €37,000, bank reserves amount to €12,000, and the liquidity ratio is 1/10. (i) Calculate (to two decimal places only) the currency held by the public, the money stock  $M_1$ , deposits, the reserve ratio, and the money multiplier. (ii) If the aim of the central bank is to increase the money stock by 10%, which change in the reserve ratio would accomplish that goal? (iii) In the initial situation, what is the effect on  $M_1$  of a €2,000 increase in  $M_0$ ?

9.  **$M_0$ ,  $M_1$ ,  $M_2$ .** Can  $M_0$  rise and, at the same time,  $M_1$  drop? (ii) Can  $M_0$  fall and, at the same time,  $M_2$  rise?

10. **Money multiplier.** Find the money multiplier if the liquidity ratio is 0.1, the monetary base is 550, and the currency the public holds is 100.

11. **Cash and deposits.** Determine the amount of cash  $E$  and deposits  $D$  if the money stock  $M_1$  equals 900 and the liquidity ratio is 1/2.

12. **Money creation process.** (i) Explain how an increase in unemployment is likely to affect the money multiplier process. (ii) Considering the money multiplier process, indicate three events that could lower the money multiplier. (iii) How is the money stock likely to be affected by an increase in the number of people that do not repay bank loans?

13.  **$M_0$ .** Find the monetary base if the money multiplier is 3/2, reserve and liquidity ratios coincide, and the currency the public holds is 150.

14. **Currency and liquidity ratio.** With  $M_1 = 1,000$ ,  $M_0 = 500$ , reserve ratio equal to 3/8, and deposits  $D = 800$ , find the liquidity ratio  $l$  and the currency  $E$  held by the public.

15. **Reserve ratio.** With  $M_1 = 1,200$  and  $M_0 = 300$ , find the reserve ratio if the reserve ratio is half the liquidity ratio.

16.  **$M_0$ .** Calculate  $M_0$  if  $M_1 = 1,200$ , the reserve ratio is 1/10 and the currency held by the public is 200.

**17. Deposits and M0.** In the textbook model of money (deposits) creation find the formula that expresses  $D$  as a function of  $M0$  (and the rest of parameters of the model).

**18. Loans and M1.** In the alternative model of money (deposits) creation (section 20 of the notes), consider the expression (4) that relates  $M1$  with  $L$ . Calculate the partial derivatives of this expression with respect to  $r$  and with respect to  $l$ , and interpret the results.

**19. Rates of return.** The government of Spain issues T-bills. With probability  $2/3$  the government pays the full nominal value of the T-bill at maturity, in which case the profit an investor obtains from buying a T-bill is €60. With probability  $1/3$  the government defaults and the investor loses €30 from each T-bill bought.

The government of Greece also issues T-bills. With probability  $1/2$  the government pays the full nominal value of the T-bill at maturity, in which case the profit an investor obtains from buying a T-bill is €120. With probability  $1/3$  the government defaults and the investor loses €60 from each T-bill bought.

(i) Let option 1 consists of purchasing two T-bills issued by the government of Greece and option 2 consists of purchasing one T-bill issued by the government of Greece and one T-bill issued by the government of Spain. Calculate the return of each option assuming that the default risks are uncorrelated.

(ii) Calculate the return of each option assuming that the government of Spain defaults if and only if government of Greece defaults (suppose that the probability that the Spanish government defaults is determined by the Greek probability).

(iii) In the setting described by (ii), replace the values 120 and -60 corresponding to the possible results of the Greek investment by values  $x$  and  $-y$  such that: (a) the expected return coincides with the expected return of a Spanish T-bill; and (b) the return of purchasing one Spanish T-bill and one Greek T-bill is negative under the conditions of (ii).

**20. Definitions.** Define briefly the following concepts: securitization; financial depth.

**21. M1.** What is the meaning of the expression “M1 is endogenous”?

**21. Reserve ratio.** Find the reserve ratio if the monetary base is 350, deposits amount to 1,000, and the liquidity ratio equals  $1/4$ .

**22. Money multiplier.** Explain the economic mechanism by means of which an increase in the liquidity ratio affects the money multiplier.

**23. Money creation models.** Explain one difference between the textbook model of money creation and the alternative model and one common characteristic.

**24. Eurozone.** Identify three eurozone members whose country name does not contain the letter “a”.

**25. Money multiplier process.** Name five variables involved in the money multiplier process.

**26. Instability of the financial sector.** Identify three reasons that could justify the belief that the financial sector of an economy is inherently unstable.

**27. Money creation process.** Consider Example 16.1. Calculate the values that, in Table 7, would correspond to round 6 and 7.

**28. Money creation process.** [A little bit hard] (i) Show that, in the textbook model of bank money creation with unknown values for  $r$  and  $l$ , the final increment  $\Delta D$  resulting for an increase  $\Delta M0$  in the monetary base is given by the formula

$$\Delta D = \frac{1}{r + l} \cdot \Delta M0 .$$

(ii) Determine the formula obtained from the previous one when  $\Delta M0$  is replaced by  $\Delta M0$ .