Problem Set 2 · Money and the financial sector

1. M0, M1, M2. Explain which of the following situations can occur and which cannot occur: (i) M0 rises and, at the same time, M1 drops; (ii) M0 falls and, at the same time, M2 rises.

2. Reserve ratio. Let M0 = 1,000, M1 = 4,000, and $r = 0.1$ (i) What change in the liquidity ratio l would neutralize the effect on M1 of a 10% fall in M0? Let M0 = 1,000, M1 = 4,000, and $l = 0.1$. (ii) What change in the reserve ratio r would neutralize the effect on M1 of a 10% increase in M0?

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

4. Money multiplier formula. The money multiplier is 2. Bank reserves are $R = 100$. Sight deposits are $D = 1{,}000$. Ascertain the currency held by people E.

5. M0, M1. (i) Explain two differences between M0 and M1. (ii) Can M0 be greater than M1? And smaller than M1? And equal to M1?

6. M0, M1. Let M1 = 4,000, $mm = 2$, and $r = 0.3$. (i) Find M0 and l. (ii) Find M1 if, given the results in (i), r dropped to zero. Explain the mechanism that produces the change in M1 (reason what happens to loans, expenditure, revenues, deposits, and M1 when r becomes 0).

7. M1. An individual accidentally finds 1 million € and deposits the amount on a bank. Explain how this decision is likely to affect M0 and M1.

8. 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.

9. 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 M1, the deposits, the reserve ratio, and the money multiplier. (ii) If the central bank makes a 1,000 € purchase of government bonds, find the monetary base and the money stock. (iii) Ignoring (ii), suppose that the aim is to increase the money stock by 10%. Which change in the reserve ratio would accomplish that goal?

10. Rate of return. (i) Compute the rate of return of a loan of 120 € when only 80 are repaid. (ii) What if 80 are loaned and 120 repaid? (iii) Find in each case the corresponding discount factor.

11. Present value. Calculate the present discounted value at period 1 of 100 €: (i) from period 2 when the interest rate is 5%; (ii) from period 3 when the interest rate is 5% at period 1 and at period 2; (iii) from period 3 when the interest rate is 5% at period 1 and 10% at period 2; (iv) from period 3 when the interest rate is 10% at period 1 and 5% at period 2; (v) from period 3 when the interest rate is 10% at both period 1 and 2.

12. Interest rate, discount factor. Is it possible for the discount factor to rise while the interest rate is also rising?

13. Interest rate, discount factor. 50 € from period 1 are worth 60 € in period 2. Find the corresponding interest rate and the discount factor.

14. Interest rate. (i) May the interest rate of an economy be persistently negative? What would that mean? (ii) And zero? (iii) Can people be considered more patient when $i = 0$ than when $i > 0$?

15. T-bills. (i) Compute the rate of return of a T-bill will face value $V = 210$ and price $P = 200$. (iii) Find the interest rate i under which the rate of return of the T-bill agrees with i. (iii) Find the face value of T-bills priced 200 if the interest rate is $i = 5\%$.

16. T-bills. Find the price (that prevents arbitrage) of a T-bill with face value 1200 if the real interest rate is 5% and the inflation rate is 15%. (ii) The nominal interest rate is 10% and the price of a T-bill is 200. Find the face value of the T-bill.

17. T-bills. The nominal interest rate is 10% and the T-bill price is 200. Find the face value of the T-bill.

18. Price and rate of return. Explain why the fall in the price of T-bills is accompanied by an increase of the rate of return of T-bills.

19. Money multiplier. Find the money multiplier if the liquidity ratio is 0.1, the monetary base is 550, and E (currency held by the public) is 100.

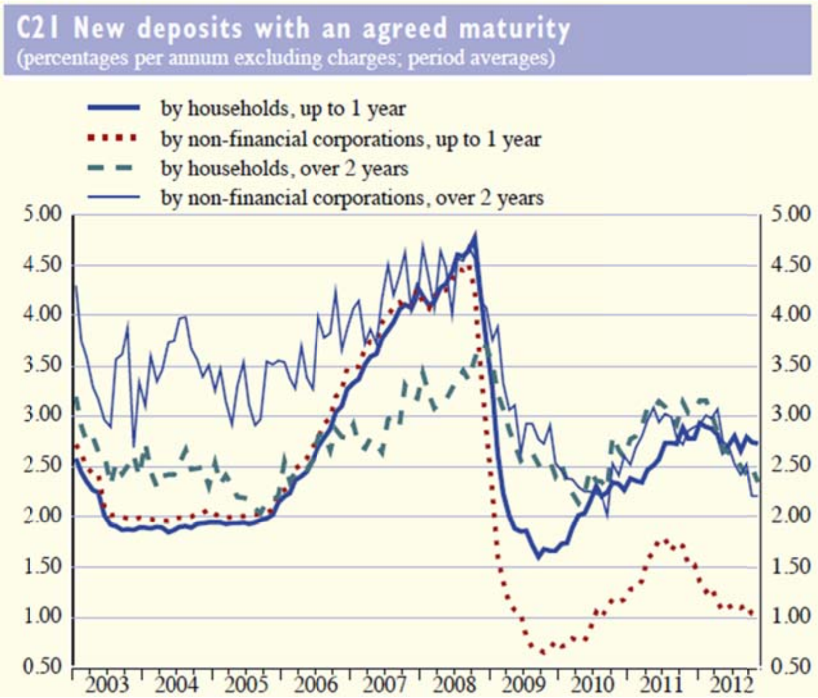
20. Cash and deposits. Determine the amount of cash (E) and the amount of deposits (D) corresponding to a money stock M1 equal to 900 when the liquidity ratio is 0.5.

21. Discount factor. The discount factor is 0.6 and the price of a T-bill is 200. Given the relationship between the interest rate and the price of T-bills, find the face value of the T-bill. (ii) Calculate the present value of 200 if the interest rate is 2/3 (per one).

22. Money creation process. Explain how an increase in unemployment is likely to affect the money multiplier process.

23. 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 not 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.

24. Money creation process. Consider the chart below and, in particular, the period 2008-2009. Explain how the evolution of new deposits presumably affected the money multiplier.



25. Main concepts. Identify the main concepts of the second topic covered in the course (moeny and the financial side of the economy) and define them briefly and with precision

Source: ECB Monthly Bulletin, 01/2013 http://www.ecb.eu/pub/pdf/mobu/mb201301en.pdf (S43)

Multiple choice questions

1. Suppose financial assets A and B differ only in two properties. Which one of the following sentences is more likely to be true?
(a) If A is riskier than B, then B's rate of return should be higher than A's.
(b) If A is less liquid than B, then A should be riskier than B.
(c) If A's rate of return is higher than B's, then A should be more liquid than B.
(d) None of the above

2. What may leave the money multiplier unchanged?
(a) The liquidity ratio l falls and the reserve ratio r remains constant.
(b) The liquidity ratio l falls and the reserve ratio r rises.
(c) The liquidity ratio l and the reserve ratio r both fall.
(d) The liquidity ratio l and the reserve ratio r both duplicate.

3. Financial assets A and B differ only in two properties. Which of the following sentences is more likely to be true?
(a) If A is as liquid as B, then B should be more profitable than A.
(b) If A is riskier than B, then B's rate of return should be higher than A's.
(c) If A is more liquid than B, then B should be riskier than A.
(d) If A's rate of return is smaller than B's, then B should be less liquid than A.

4. Which sequence represents the money stock creation process?
(a) $\uparrow$ deposits $\Rightarrow$ $\downarrow$ loans $\Rightarrow$ $\uparrow$ reserves $\Rightarrow$ $\uparrow$ deposits
(b) $\uparrow$ deposits $\Rightarrow$ $\uparrow$ loans $\Rightarrow$ $\downarrow$ expenditures $\Rightarrow$ $\downarrow$ revenues $\Rightarrow$ $\uparrow$ deposits
(c) $\uparrow$ deposits $\Rightarrow$ $\uparrow$ liquidity ratio $\Rightarrow$ $\uparrow$ money multiplier $\Rightarrow$ $\uparrow$ deposits
(d) None of the above

5. What is not a monetary aggregate?
(a) M1
(b) The monetary base
(c) M2
(d) The money multiplier

6. At the issue date, the price of a T-bill to mature in one year and with face value 1,000 € is 400 €. By arbitrage, which must be interest rate for loans maturing in one year?
(a) There is no relationship between the price of the T-bill and the interest rate
(b) Exactly 40%
(c) Smaller than 40%
(d) Greater than 40%

7. M0 is defined as
(a) currency held by the people minus bank reserves.
(b) currency held by the people plus sight bank deposits.
(c) sight bank deposits minus bank reserves.
(d) currency held by the people plus bank reserves.

8. Using the discount factor, if the one year interest rate is 10%, the price at the issue date of T-bill with face value 1,000 € is
(a) $1000\cdot(1+0.1)$ (c) $\frac{1000}{1+10}$
(b) $\frac{1+10}{1000}$ (d) $\frac{1000}{1+0.1}$

9. Financial assets A and B differ only in two properties. Which one of the following sentences is more likely to be true?
(a) If A is more liquid than B, then B should be more profitable than A.
(b) If A is riskier than B, then B's rate of return should be higher than A's.
(c) If A is less liquid than B, then A should be riskier than B.
(d) If A's rate of return is higher than B's, then A should be more liquid than B.

10. Which of the following sentences is not true?
(a) The nominal interest rate tends to be inversely correlated with the price of financial assets.
(b) When the central bank executes an open market operation, the nominal interest rate tends to be inversely correlated with M1.
(c) The discount rate is inversely correlated with the nominal interest rate.
(d) None of the above

11. The discount factor associated with interest rate $i = 50\%$
(a) cannot be calculated.
(b) is also 50%.
(c) is smaller than 1.
(d) is greater than 1.

12. The concept of discount factor is directly related to
(a) real GDP per capita.
(b) the reserve ratio or the liquidity ratio.
(c) the monetary aggregate M3.
(d) None of the above

13. What cannot be considered a financial asset?
(a) A bank deposit
(b) A government bond
(c) A loan
(d) None of the above

14. If the monetary base is 100, M1 is 1,000 and the liquidity ratio is 0.1,
(a) the money multiplier cannot be computed.
(b) the reserve ratio must be zero.
(c) the money multiplier is 10.
(d) None of the above

15. If M0 remains constant and the cash held by people diminishes, then
(a) bank reserves must have been increased.
(b) M1 also remains constant if the money multiplier has fallen.
(c) M1 is twice M0.
(d) It is impossible for M0 to remain constant.

16. Which sentence is high unlikely?
(a) A highly liquid financial asset with a high rate of return will be very risky
(b) An almost riskless financial asset with a high rate of return will be highly illiquid
(c) A highly liquid financial asset with a high rate of return will be almost riskless
(d) None of the above

17. Which event does not reduce the money multiplier?
(a) An increase in the liquidity ratio
(b) An increase in the reserve ratio
(c) An increase in the liquidity ratio combined with a decrease in the reserve ratio
(d) None of the above

18. Identify the sentence that is not false.
(a) The money multiplier may be negative.
(b) M2 is always smaller than M1.
(c) M0 is always greater than M1.
(d) None of the above

19. It is to be expected from a financial asset that, other things being equal,
(a) the higher its liquidity, the smaller its risk.
(b) the smaller its rate of return, the higher its liquidity.
(c) the higher its risk, the smaller its rate of return.
(d) None of the above

20. Which of the following concepts represents currency?
(a) The nominal interest rate
(b) The bank deposits
(c) The liquidity ratio
(d) None of the above

21. The discount factor is directly related to
(a) the CPI inflation rate.
(b) the money multiplier.
(c) the nominal interest rate.
(d) None of the above

22. The money multiplier directly relates
(a) the nominal interest rate to the reserve ratio.
(b) M1 to M0.
(c) the currency E held by the public to the face value of T-bills.
(d) the open market operations to the bank reserves.

23. If the nominal interest rate falls, then, necessarily,
(a) the associated discount factor also falls.
(b) the price of financial assets also falls.
(c) the real interest rate rises.
(d) None of the above

24. The money multiplier process is a process involving
(a) real GDP, the inflation rate, and unemployment rate.
(b) the nominal interest rate, the inflation rate, and the real interest rate.
(c) neither (a), nor (b), nor (d).
(d) loans, deposits, expenditures, and revenues.

25. Which of the following countries is not a member of the eurozone (officially known as "euro area")?
(a) Estonia
(b) Malta
(c) Slovenia
(d) None of the above

26. Which claim about the money multiplier process is not true?
(a) More deposits give rise to more loans.
(b) More loans give rise to more expenditure.
(c) More expenditures give rise to more revenues.
(d) More revenues give rise to fewer deposits.

27. The nominal interest rate on a one-year loan is 5%. Assuming arbitrage, find the likely initial price of a T-bill with the same time to maturity as the loan and with face value equal to 100.
(a) There is not enough information to determine the answer.
(b) The price is the present discounted value of 5%.
(c) The price is 100 (1 + 0.05) = 105.
(d) None of the above

28. Which variables are linked by the money multiplier?
(a) The monetary base and the nominal interest rate
(b) The money stock and the bank reserves
(c) The liquidity ratio and the volume of sight deposits
(d) None of the above

29. Which one is a monetary policy instrument of central banks?
(a) The money multiplier
(b) The reserve ratio
(c) The GDP deflator
(d) The inflation rate

30. The money multiplier (as presented in class) relates
(a) the nominal interest rate to the discount factor.
(b) the interest rate to the inflation rate.
(c) the unemployment rate to the monetary base.
(d) the money stock M1 to the monetary base M0.

31. What is not true about an expansionary open market operation?
(a) It is executed by the central bank.
(b) In the loan market model, it is represented by a shift of the supply of loans function to the right.
(c) It tends to cause an increase in the price of financial assets.
(d) It causes an increase in the interest rate.

32. The money multiplier may remain constant if
(a) both the liquidity ratio l and the reserve ratio r fall.
(b) both the liquidity ratio l and the reserve ratio r rise.
(c) the liquidity ratio l declines and the reserve ratio r does not change.
(d) the liquidity ratio l declines and the reserve ratio r rises.

33. The money multiplier has decreased. A possible explanation is that
(a) the liquidity ratio l has decreased.
(b) the reserve ratio r has decreased.
(c) both the liquidity ratio and the reserve ratio have remained constant.
(d) the liquidity ratio l has increased and the reserve ratio r has decreased.

34. Which variable does not directly affect the money multiplier?
(a) the liquidity ratio l.
(b) the reserve ratio r.
(c) the rate of growth of M0.
(d) None of the above

35. Which of the following concepts is a better measure of the amount of money in an economy?
(a) The amount of coins and bank notes
(b) The foreign currency
(c) The money stock
(d) All of the above

36. What variable is not a monetary aggregate?
(a) M0
(b) The money multiplier
(c) M1
(d) All of the above