

# Introduction to Macroeconomics · 2019-20

## Problem Set 1 · Multiple choice questions

- Which claim about the money multiplier process is not true?
  - More deposits give rise to more loans.
  - More loans give rise to more expenditure.
  - More expenditures give rise to more revenues.
  - More revenues give rise to fewer deposits.
- Which sequence represents the bank money creation process in the textbook model?
  - $\uparrow$  deposits  $\Rightarrow$   $\downarrow$  loans  $\Rightarrow$   $\uparrow$  reserves  $\Rightarrow$   $\uparrow$  deposits
  - $\uparrow$  deposits  $\Rightarrow$   $\uparrow$  loans  $\Rightarrow$   $\downarrow$  expenditures  $\Rightarrow$   $\downarrow$  revenues  $\Rightarrow$   $\uparrow$  deposits
  - $\uparrow$  deposits  $\Rightarrow$   $\uparrow$  liquidity ratio  $\Rightarrow$   $\uparrow$  money multiplier  $\Rightarrow$   $\uparrow$  deposits
  - None of the above
- What is not a monetary aggregate?
  - M1**
  - The monetary base
  - M2**
  - The money multiplier
- M0** is defined as
  - currency held by the public minus bank reserves.
  - currency held by the public plus sight bank deposits.
  - sight bank deposits minus bank reserves.
  - currency held by the public plus bank reserves.
- An individual has a constant liquidity ratio  $l$ . Specifically, he has €1,000 in cash and deposits worth €2,000. While wandering around the streets, he finds a €20 banknote and a €1 coin. According to  $l$  which part of the €21 is held in cash and which part is deposited in a bank?
  - Cannot be determined
  - €10.5 are held in cash and €10.5 are deposited in a bank.
  - €14 are held in cash and €7 are deposited in a bank.
  - €7 are held in cash and €14 are deposited in a bank.
- Identify the sentence that is not false.
  - The money multiplier may be negative.
  - M2** is always smaller than **M1**.
  - M0** is always greater than **M1**.
  - None of the above
- What may leave the money multiplier unchanged, where  $l$  is the liquidity ratio and  $r$  is the reserve ratio?
  - $l$  falls and  $r$  remains constant
  - $l$  falls and  $r$  rises
  - $l$  and  $r$  both fall
  - $l$  and  $r$  both duplicate
- Which event does not reduce the money multiplier?
  - An increase in the liquidity ratio
  - An increase in the reserve ratio
  - An increase in the liquidity ratio combined with a decrease in the reserve ratio
  - None of the above
- If the monetary base is 100, **M1** = 1,000 and the liquidity ratio is 0.1,
  - the money multiplier cannot be calculated.
  - the reserve ratio must be zero.
  - the money multiplier is 10.
  - None of the above
- The money multiplier may remain constant if, being  $l$  the liquidity ratio and  $r$  the reserve ratio,
  - both  $l$  and  $r$  fall.
  - both  $l$  and  $r$  rise.
  - $l$  declines and  $r$  does not change.
  - $l$  goes down and  $r$  goes up.
- The money multiplier has decreased. A possible explanation is that
  - the liquidity ratio  $l$  has decreased.
  - the reserve ratio  $r$  has decreased.
  - liquidity and reserve ratios have not changed.
  - the liquidity ratio  $l$  has increased and the reserve ratio  $r$  has decreased.
- What variable is not a monetary aggregate?
  - M0**
  - The money multiplier
  - M1**
  - All of the above
- If **M0** remains constant and the cash held by the public diminishes, then
  - bank reserves must have been increased.
  - M1** also remains constant if the money multiplier has fallen.
  - M1** is twice **M0**.
  - It is impossible for **M0** to remain constant.

14. Which variable does not directly affect the money multiplier?
- the liquidity ratio  $l$ .
  - the reserve ratio  $r$ .
  - the rate of growth of  $M_0$ .
  - None of the above
15. What cannot be considered a financial asset?
- A bank deposit
  - A government bond
  - A loan
  - None of the above
16. The difference  $M_1 - M_0$
- is known as the amount of bank reserves,  $R$ .
  - is equal to the total volume of deposits,  $D$ .
  - does not exist or has no meaning.
  - None of the above
17. The liquidity ratio is 0.4. The reserve ratio is 0.3. Which change in the reserve ratio duplicates the money multiplier?
- 0.1
  - 0.1
  - Cannot be determined
  - None of the above
18. Sight deposits are  $D = 100$ . The bank reserves are  $R = 20$ . The money multiplier is 3. Then the cash  $E$  held by the public
- is smaller than 30.
  - is larger than 40.
  - makes the liquidity ratio smaller than 0.1.
  - cannot be determined.
19. The liquidity ratio is four times the reserve ratio. The money multiplier is 2. It is then false that
- $M_0 = 5 \cdot R$ , where  $R$  is the banks' reserves.
  - the amount  $R$  of the banks' reserves can be determined.
  - the liquidity ratio is  $2/3$ .
  - cash in the hands of the public is four times  $R$ .
20. Which option is not false?
- The money multiplier is not affected by changes in the reserve ratio.
  - That  $M_0$  is smaller than  $M_1$  is equivalent to deposits  $D$  being equal to reserves  $R$ .
  - The only financial institution involved in the  $M_1$  creation process is the central bank, which creates reserves and, simultaneously, makes loans to consumers and firms.
  - None of the above
21. Suppose that deposits are three times reserves and that cash in the hands of the public equals deposits. Then the money multiplier is
- smaller than 1.75.
  - larger than 2.5.
  - cannot be calculated.
  - None of the above
22. In which option either all the terms correspond to financial assets or no term designates a financial asset?
- T-bills,  $M_0$ , loans, liquidity ratio
  - Money multiplier,  $M_1$ , T-bills, €2 coins
  - Liquidity ratio, money multiplier, central bank
  - Reserve ratio, reserves, deposits, banknotes
23. According to the sequence of events describing the money ( $M_1$ ) creation process
- the sellers' revenues create the buyers' expenditures, deposits create reserves and deposits do not create loans.
  - the central bank raises the money multiplier, banks lower the liquidity ratio, buyers make loans to sellers and the central bank purchases T-bills.
  - loans create expenditure, expenditure creates revenue, revenue creates deposits, deposits create the liquidity ratio, the liquidity ratio creates the reserve ratio, the reserve ratio creates the money multiplier and the money multiplier creates  $M_1$ .
  - None of the above
24. Which option specifies exactly one monetary aggregate and at least two variables or concepts that are not monetary aggregates?
- $M_0$ , deposits, number of banks, reserve ratio,  $M_1$
  - Liquidity ratio, central bank, T-bills, money multiplier,  $M_0$
  - Money multiplier, reserve ratio, liquidity ratio
  - $M_2$ , banknotes, central bank money, loans,  $M_3$
25. Which sentence is not false?
- All the monetary aggregates are created by the central bank.
  - In the money multiplier model,  $M_1$  is not the product of the monetary base and the money multiplier.
  - The monetary base is the money stock minus the money multiplier.
  - None of the above sentences is true.

- 26.** The money multiplier remains constant if
- (a) the liquidity ratio duplicates and the reserve ratio diminishes by 50%.
  - (b) the reserve ratio duplicates and the liquidity ratio diminishes by 50%.
  - (c) the monetary base duplicates and the money stock diminishes by 50%.
  - (d) None of the above
- 27.** The only role of the central bank in the money creation process is to
- (a) accept deposits from households and firms.
  - (b) establish the liquidity ratio.
  - (c) make loans to firms, but only to those firms having profits.
  - (d) None of the above
- 28.** The money multiplier process is actually a process in which
- (a) the central bank continuously increases the amount of cash held by the public.
  - (b) the amount of bank deposits continuously decreases.
  - (c) the liquidity ratio converges to the reserve ratio.
  - (d) None of the above
- 29.** Financial assets are exclusively created by
- (a) the government.
  - (b) the central bank.
  - (c) the private sector (and, in that sector, mainly firms).
  - (d) None of the above

## Problem Set 1 · Exercises

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**E1. Money multiplier.** Cash in the hands of the public is half deposits. The reserve ratio is half the liquidity ratio. If possible, find the money multiplier.

**E2. 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**?

**E3. M1, reserve ratio.** The liquidity ratio doubles the reserve ratio. The money stock **M1** is twice the monetary base **M0**. Find the reserve ratio if there is enough information to calculate it; if not, explain what information is missing.

**E4. Cash.** The money multiplier is 2. Bank reserves are  $R = 100$ . Sight deposits are  $D = 1,000$ . Find the currency **E** held by the public.

**E5. Monetary aggregates.** The monetary base is €37,000; bank reserves, €12,000; and the liquidity ratio,  $1/10$ . (i) Calculate the currency held by the public, **M1**, deposits, the reserve ratio and the money multiplier. (ii) Which change in the reserve ratio would increase **M1** by 10%? (iii) In (i), what is the effect on **M1** of a €2,000 increase in **M0**?

**E6. Money multiplier.** Calculate the money multiplier, the reserve ratio, the liquidity ratio, **M1**, the monetary base, and deposits if the amount of cash in the hands of the public doubles the reserves and deposits are twice the cash in the hands of the public.

**E7. Reserve ratio.** (i) Let  $M0 = 1,000$ ,  $M1 = 4,000$  and  $r = 0.1$ . What change in the liquidity ratio  $l$  would neutralize the effect on **M1** of a 10% fall in **M0**? (ii) Let  $M0 = 1,000$ ,  $M1 = 4,000$  and  $l = 0.1$ . What change in the reserve ratio  $r$  would offset the effect on **M0** of a 10% increase in **M0**?

**E8. Money multiplier.** Using derivatives, find the effect on the money multiplier of a rise in  $r$  and a fall in  $l$ .

**E9. M0, M1.** Let  $M1 = 4,000$ ,  $mm = 2$  and  $r = 0.3$ . (i) Find  $M0$  and  $l$ . (ii) Calculate **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).

**E10. M0, M1, M2.** (i) Can **M0** rise and, at the same time, **M1** drop? (ii) Can **M0** fall and, at the same time, **M2** rise?

**E11. 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.

**E12. Cash and deposits.** Determine the amount of cash **E** and deposits **D** if the money stock **M1** equals 900 and the liquidity ratio is  $1/2$ .

**E13. 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.

**E14. Money creation process.** (i) Explain how an increase in unemployment is likely to affect the money multiplier process. (ii) 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?

**E15. M0.** Calculate the monetary base if the money multiplier is  $3/2$ , reserve and liquidity ratios coincide and the currency the public holds is 150.

**E16. Currency and liquidity ratio.** If  $M1 = 1,000$ ,  $M0 = 500$ , reserve ratio equals  $3/8$  and deposits  $D = 800$ , find the liquidity ratio  $l$  and the currency **E** held by the public.

**E17. Reserve ratio.** With  $M1 = 1,200$  and  $M0 = 300$ , find the reserve ratio if the reserve ratio is half the liquidity ratio.

**E18. M0.** Find **M0** if  $M1 = 1,200$ , the reserve ratio is  $1/10$  and the currency held by the public is 200.

**E19. Deposits and M0.** In the textbook model of money creation find the formula that expresses **D** in terms of **M0** (and the rest of parameters).

**E20. Money multiplier process.** Name five variables involved in the money multiplier process.

**E21. Money multiplier.** Explain how the fact that currency has an expiry date (coins and banknotes newly issued are legal tender for just six months) is likely to affect the money multiplier.

**E22. Liquidity and reserve ratios.** (i) The money multiplier is 2. Deposits equal four times reserves. If possible, find the liquidity ratio. (ii) The money multiplier is 2, the monetary base is 1,000 and deposits amount to 1,500. If possible, find the reserve ratio; if it is not possible, explain why.

**E23. Money creation.** Explain how the money creation process and the money multiplier are likely to be affected by: (i) the voluntary rise by banks of their reserve ratio; (ii) the generalized use of mobile phones by consumers to make payments.

**E24. M1.** The monetary base is 200. The liquidity ratio is equal to the reserve ratio. Deposits are 400. If possible, find **M1** and the money multiplier; if not possible, explain why.

**E25. Reserve ratio.** Find the reserve ratio if the monetary base is 350, deposits amount to 1,000, and the liquidity ratio equals 1/4.

**E26. Money multiplier.** Explain the economic mechanism by means of which an increase in the liquidity ratio affects the money multiplier.

**E27. Reserve ratio.** Cash in the hands of the public is 100. Deposits amount to 600. With both deposits and the cash in the hands of the public remaining constant, the money multiplier has jumped from 2 to 4. If possible, find the change in the reserve ratio.

**E28. Money creation.** Initially, banks lend 100% of all the funds they could legally lend. How is the money creation process likely to be affected by the banks' decision of reducing the proportion of funds lent to 50%?

**E29. Money creation process.** (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  $\Delta M1$ .

**E30. Money creation process.** Imagine that the central bank declares all banknotes no longer valid and that only coins can be used to make cash payments. How is this measure likely to affect the money creation process and the value of the money multiplier?

**E31. Money multiplier process.** Explain how the money multiplier process would be affected in each case: (i) consumers only take a fraction (say 50%) of all the loans banks offer; (ii) the number of banks is reduced.

**E32. Money creation process.** Explain how each of the next events is likely to be affected the money multiplier process: (i) a half of the banking system goes bankrupt; (ii) firms and households decide to borrow from banks only 50% of what banks offer to lend; (iii) people double their liquidity ratio (from 0.2 to 0.4) and, at the same time, the reserve ratio is reduced from 0.4 to 0.3.

**E33. Money multiplier.** If possible, find the money multiplier if deposits  $D$  double the bank reserves  $R$ , cash  $E$  is one-fourth of  $M1$  and  $M0$  is twice  $E$ . If it is not possible, explain why not.

**E34. M0 and M1.** Indicate something that **M0** and **M1** have in common and something that differentiates them.

**E35. Money multiplier model.** If possible, calculate the reserve ratio and cash in the hands of the public if the money multiplier is 4 and the sum of cash in the hands of the public and deposits is four times reserves.

**E36. Money and financial assets.** Explain whether the following claims are true or false.

- (i) Every financial asset is a monetary aggregate.
- (ii) Every financial asset is a form of money created by the central bank.
- (iii) Banks participate in the **M1** creation model providing loans, accepting deposits and retaining part of those deposits as reserves.
- (iv) The money creation process is a series of events in which deposits are created, which in turn are used to make loans, which eventually lead to the creation of more deposits.
- (v) No rise in the reserve ratio can offset the effect on the money multiplier of a fall in the liquidity ratio.
- (vi) The difference between financial assets and monetary aggregates is that financial assets are created by firms and households, whereas each component of every monetary aggregate is created by central banks.
- (vii) Excepting reserves, all components in **M0** and **M1** are forms of money that private banks create.

**E37. Money multiplier.** Calculate the money multiplier, the reserve ratio, the liquidity ratio, **M1** and the monetary base if deposits are 400, cash 200 and reserves 100.

**E38. Money multiplier.** Find the money multiplier, the reserve ratio, the liquidity ratio, **M1**, the monetary base, deposits, cash and reserves if the money multiplier is ten times the liquidity ratio and reserves double cash.

**E39. Money.** Explain if there is any relationship between central bank money and bank money.

**E40. Financial assets.** What is a financial asset?

**E41. Financial assets and monetary aggregates.**

Explain whether the following claims are true.

(i) All the monetary aggregates are financial assets created by the government or the central bank.

(ii) All financial assets are monetary aggregates and all monetary aggregates are financial assets.

**E42. Money creation.** In the money creation model, is there any relationship between **M1** and the liquidity ratio? If so, describe it.

**E43. M0 and M1.** Does a rise in **M1** cause a rise in **M0** or does a rise in **M0** cause a rise in **M1**? Explain your answer.

**E44. Money multiplier process.** Explain how the money multiplier process would be affected if the younger people only accepted bank loans that take the form of a deposit and not the form of cash.

**E45. Money multiplier.** Find, if possible, the money multiplier if **M1** is four times reserves and cash in the hands of the public is equal to reserves. Find also the liquidity ratio (if not possible, explain why).

**E46. Money multiplier.** If the liquidity ratio increases by 100% and the reserve ratio is reduced by 50%, does the money multiplier rise or fall?

**E47. Money multiplier model.** The money multiplier is  $3/2$ . The reserve ratio plus one equal three times the liquidity ratio. Cash in the hands of the public is 100. If possible, find the money stock, reserves, the monetary base, the reserve ratio, deposits and the liquidity ratio. If not, explain why not.