

Principles of Economics and Management I

Ciências ULisboa · MMAEG · 2026/2027

Problem Set 10 · Money, Banking and Inflation

Session 10 · LN10

Exercise level: **[Easy]** routine / warm-up **[Medium]** typical test level **[Hard]** challenge (above test level, to consolidate mastery)

1. (2 points) **[Easy] The money multiplier.** The required reserve ratio is 10%, banks hold no excess reserves and the public holds no cash. An initial deposit of €1000 enters the system.
 - (a) (1 point) Compute the money multiplier and the total deposits created.
 - (b) (1 point) How much *new* money was created?
2. (2 points) **[Easy] Excess reserves.**
 - (a) (1 point) If banks hold 5% in excess reserves on top of the 10% required, what does the multiplier become?
 - (b) (1 point) Why did the effective multiplier fall so much after 2008?
3. (3 points) **[Medium] The quantity theory of money.** Consider $MV = PY$. The money supply grows 8% a year and real output 2%.
 - (a) (1 point) With V constant, what is the implied inflation rate?
 - (b) (1 point) And if V falls 3%?
 - (c) (1 point) What assumptions does the theory need in order to predict well? Does it hold in the short run?
4. (3 points) **[Medium] Fisher and bond prices.**
 - (a) (1 point) The nominal rate is 4.5% and inflation 3%. Compute the real rate (approximate and exact).
 - (b) (1 point) A zero coupon bond pays €1000 in 5 years. The market rate rises from 3% to 4.5%. What is the change in price?
 - (c) (1 point) Why does an inflation surprise hurt creditors and benefit debtors?
5. (5 points) **[Hard] The multiplier with currency in circulation.** Required reserves are 10% and the public keeps a currency to deposit ratio of $c = 0.20$.
 - (a) (2 points) Derive the monetary base multiplier, $m = \frac{1+c}{c+rr}$.
 - (b) (2 points) With a monetary base of 200 billion €, compute M , deposits and currency.
 - (c) (1 point) The ECB buys 10 billion € of bonds. What is the effect, and what can go wrong?
6. (5 points) **[Hard] Seigniorage, the inflation tax and independence.** A government finances a deficit of 20 billion € by printing money, starting from a monetary base of 200 billion €. Real output grows 1% and V is constant.
 - (a) (2 points) Compute the growth rate of the base and the implied inflation.
 - (b) (2 points) Define seigniorage and the inflation tax. Who pays them?
 - (c) (1 point) Why does the ECB have a price stability mandate and independence?