

Second Challenge: Solutions
Eco 403, Spring 2012

Question 1 (10 points)

If inflation is below expectations, some firms misperceive and raise prices too much. These firms see a decrease in demand, which they misperceive as relative. The firms then reduce production and employment, causing unemployment to go up.

Question 2 (12 points)

- Progressive: The inflation tax is not a good tax on this dimension since it regressive. Poor households conduct a higher fraction of transactions in cash and therefore pay a larger inflation tax.
- Efficiency: The inflation tax causes households to make too many withdraws from the interest bearing account. This means that households are paying the cost of withdraws and the government has less revenues since households are holding less cash. Thus we have a welfare loss. However, the welfare loss is relatively small compared to other taxes, so the inflation tax is a relatively good tax on this dimension.
- Efficiency of collection: Taxes paid are in general greater than taxes collected, since checking accounts lose value but the government cannot gain seniorage revenues from checking accounts. The inflation tax is a bad tax on this dimension.

If little inflation results, the inflation tax is a good tax because according to (2) households will make few extra withdraws and so the tax will be relatively efficient.

Question 3 (8 points)

- We have:

$$\Delta M = k(R) \Delta H, \tag{1}$$

$$\$180 - \$100 = 2\Delta H \rightarrow \Delta H = 40. \tag{2}$$

Therefore:

$$\text{seniorage} = \frac{\Delta H}{P_t} = \frac{40}{20} = 2. \tag{3}$$

- We have:

$$\text{taxes paid} = m_{t+1}\pi_t = \frac{\$180}{\$30/\text{good}} \cdot \frac{30 - 20}{20} = 3. \tag{4}$$

The FED increased high powered money by 80% (50 to 90). But inflation was only 50%, so the tax raised a lot of revenue relative to the inflation it generated. The money multiplier is 2, however, so some “collection” costs were incurred.

Longer Questions

Question 4 (28 points)

- a. An increase in the required reserve ratio means banks must hold more reserves and do less lending. Less lending means less deposits, which in turn decreases the money supply. Money supply shifts left to point 1 on the money market. Money supply is less than money demand, so the price or interest rate rises. On the IS-LM graph, a higher interest rate is required to keep the money market in equilibrium at the same level of expenditures. So the LM curve shifts up. Higher interest rates means less spending on new houses and businesses, and therefore less total spending. Aggregate demand or total spending is less at the same price level, so AD has shifted left.

Aggregate demand is less than aggregate supply so the price level falls. This means that fixed nominal wages buy more goods, and so firms are reluctant to hire at the high wages. Production or aggregate supply decreases ('2a' on the graph).

Lower prices means the existing money supply buys more goods. Real money supply is greater than money demand, causing a decrease in interest rates, an increase in investment spending, and an increase in total spending/aggregate demand ('2b' on the graph and the red shifts).

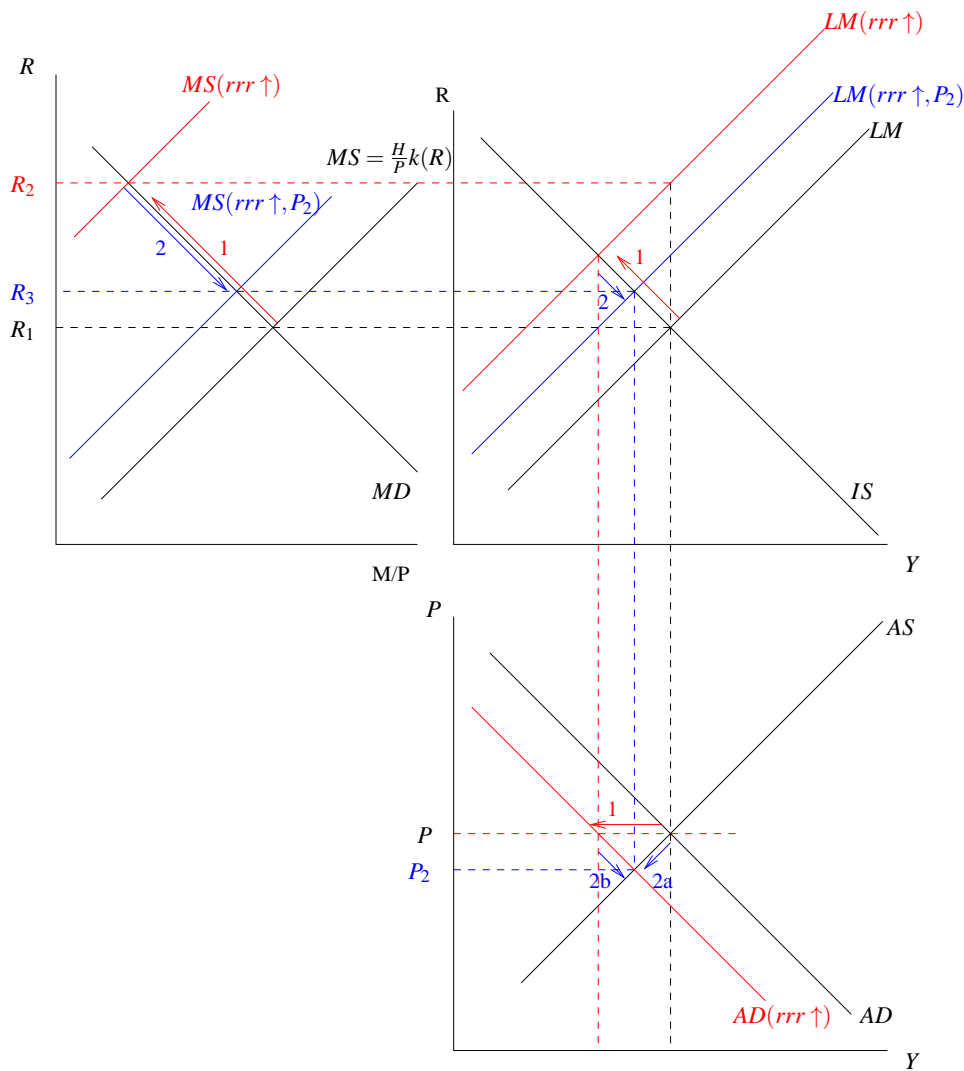


Figure 1: Increase in the required reserve ratio.

b. Overall, we have:

- Interest rates are higher due to higher reserves and therefore lower money supply.
- Money supply/demand falls as reserves rise.
- Withdrawals rise as the higher interest rates means households keep wealth in interest bearing accounts longer.
- Excess reserves fall since banks have an incentive to loan out excess reserves at the higher rate. Also, higher required reserves decreases the part that is excess.
- Investment spending falls as higher rates means it is more expensive to buy on credit.
- Output falls as the investment spending component of output falls.

- Real wages rise since existing wages buy more goods.
- Hours worked fall as firms are reluctant to pay higher real wages.
- Prices fall with the decrease in aggregate demand.

- c. Yes, the increase in interest rates means less investment spending, including housing.
- d. Probably small. Since US banks are holding large excess reserves, an increase in the amount of reserves which are required is unlikely to affect banks. They have more than enough reserves to satisfy an increase in the required reserve ratio.

Question 5 (18 points)

- a. The slope of money demand would become steeper. A decrease in interest rates is *less* likely to cause households to withdraw from the interest bearing account, because confidence is high. Therefore, money demand is less sensitive to interest rates.
- b. As seen in the graph below, monetary policy is effective:

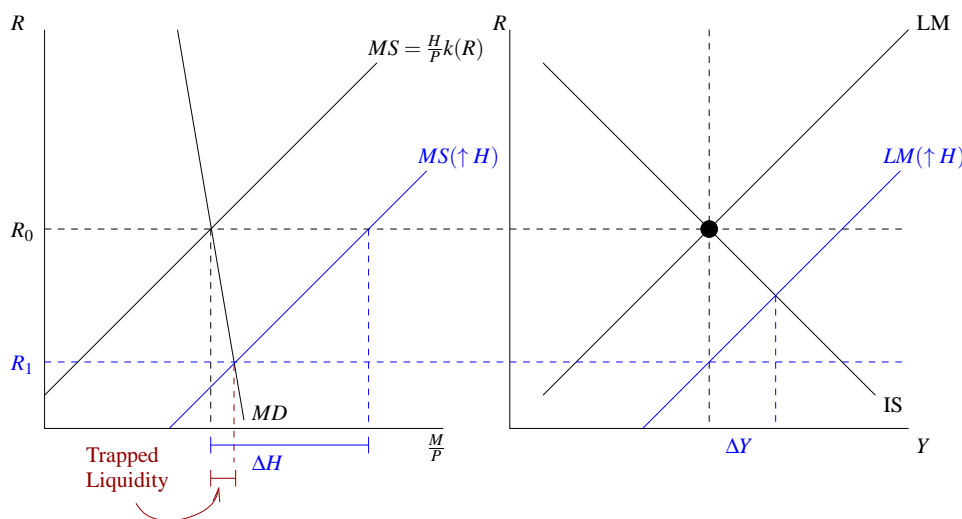


Figure 2: Steep money demand means monetary policy is effective.

- c. A small problem. Confidence in the interest bearing account is high so little liquidity is trapped in people's wallets.

Question 6 (24 points)

- a. We have unemployment equal to the natural rate in period 0 since inflation equals expectations. In the first period, we have:

$$u = NR - k \cdot a (\pi - \pi^e) = 5 - 3 \cdot (2 - 3) = 8. \quad (5)$$

Inflation expectations are higher than inflation so some firms raise prices too much and see a decrease in demand, which they misperceive as relative, leading to higher unemployment. In period 2, we are in the long run. The key is to remember that expectations equal inflation in the long run. People are not fooled permanently. (One can also see this by recognizing we must be on the long run Phillips curve in the long run). In summary:

period	inflation	expectations	u
0	2	2	5
1	2	3	8
2	2	2	5

b. We have:

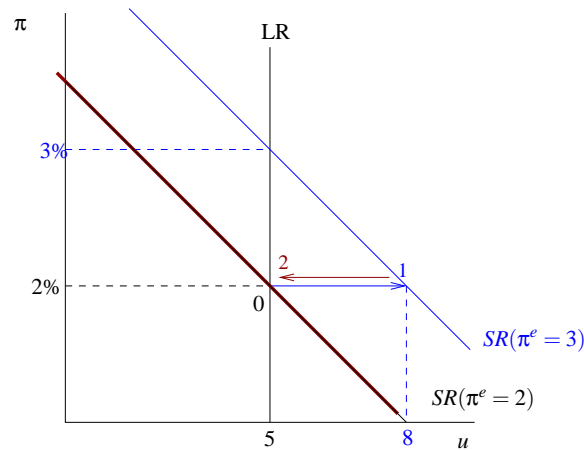


Figure 3: Money Supply is increasing in the interest rate.

- c. No, unemployment rose. The FED was hit with two problems. First a liquidity trap prevented most dollars from being spent, and then misperceptions caused some firms to raise prices too much, leading to a decrease in demand.
- d. A small decrease. The Keynesian Phillips curve is downward sloping, but monetary policy has little effect on unemployment in a liquidity trap according to the Keynesian model.