

First challenge solutions  
Eco 403, spring 2012

**Question 1 (12 points)**

- a. The opportunity cost of holding money decreases. Since the interest bearing account is less attractive and the cost of withdraws is unchanged, households make less withdraws.
- b. A decrease in withdraws implies households must withdraw enough money for many day's purchases. Money held for future purchases sits in wallets and checking accounts for longer before being spent. Therefore on average, households hold more money or money demand increases.
- c. Since dollars are held in wallets and checking for longer before being spent, each dollar is spent less times, which decreases velocity.

**Question 2 (16 points)**

- a. Banks remove money from the economy to add to reserves. Less money is circulating, so checking deposits, savings deposits and currency held by the public fall. M2 therefore falls.
- b. Tbills are not in M2. The money supply is unchanged.
- c. Moving money from checking to savings deposits means banks have more money to loan, since savings deposits do not require reserves. The increase in loans is eventually redeposited back into the banking system as savings and checking accounts, increasing M2.
- d. The bank is borrowing printed money, which ends up in the economy. Hence M2 increases.
- e. The bank is moving money from vault cash to deposits at the FED. Both count as reserves, so neither is in M2. Therefore M2 is unchanged.
- f. Money is transferred from one element of M2 (checking) to another (currency held by the public). However, less deposits means banks have less money to lend, which means deposits fall again, and so on. So M2 falls.
- g. Credit cards are not money, but the right to spend someone else's money. No new money is created and M2 is unchanged.
- h. Repos at commercial banks give check writing privileges similar to a savings account. Therefore, a new savings account is created and M2 rises.

### Question 3 (12 points)

- a. Goods (coffins) are traded for other goods (labor services), which is barter. Coffins are not commodity money, since coffins are not a medium of exchange (they are not generally accepted as payment).
- b. Barter means that inflation is very high. Only if money is a very poor store of value will consumers ignore the benefits of using money as a medium of exchange.
- c. High inflation means money is losing value quickly and so money demand is low (Cagan model).
- d. Low money demand and high inflation means high velocity. Households desire to spend money quickly, before it loses value.
- e. No. The BT model assumes you must make purchases with cash. So the Cagan model is more realistic for high inflation countries.

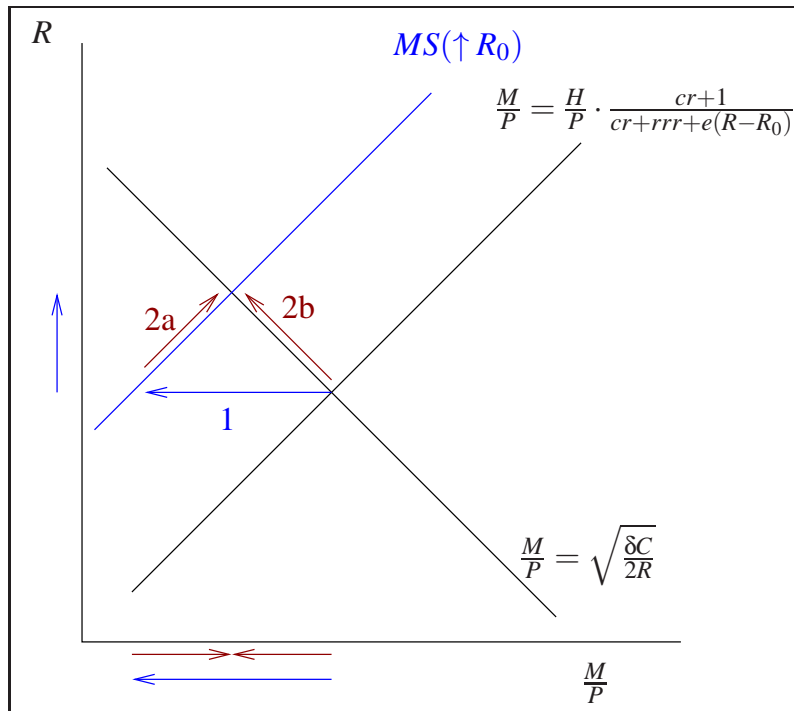
### Question 4 (8 points)

- a. Banks feared the stigma associated with borrowing at the discount rate. Since borrowing from the FED is a last resort, only banks that are facing a bank run or solvency problem will borrow from the FED. Therefore, the banks feared that if they borrowed from the FED, traders would assume the bank was in trouble.
- b. The discount rate is higher than almost all other funding sources for the bank, especially borrowing from another bank.

### Longer Questions

### Question 5 (34 points)

We have:



- An increase in the reserve rate means holding excess reserves are more attractive, so banks decrease loans and increase excess reserves. Less lending means less money is eventually spent and re-deposited by retailers back into banks, decreasing checking deposits. The decrease in deposits further decreases the money supply (shift '1' on the graph).
- Money demand is greater than money supply so the price of money or interest rate rises.
- An increase in the interest rate means for banks that lending is more attractive, so banks will decrease excess reserves and increase lending. More lending means more deposits and so the money supply rises. The interest rate is on the y-axis, so we move along the curve ('2a' on the graph). Note that money supply increases only part way back to the original level. Thus the effects in '1' are stronger than '2a'.
- An increase in the interest rate means that for households the opportunity cost of holding money increases. Households therefore make more withdrawals from the interest bearing account, gaining a little valuable interest. More withdrawals means on average dollars remain in checking/wallets for only a short period of time before being spent. Thus average money balances or money demand falls. Since dollars remain in checking/wallets for less time before being spent, each dollar is spent more times per month, which is an increase in velocity.

So overall (remember, step 1 outweighs 2a) we have:

- a.
  - The interest rate rises.
  - Money supply falls.
  - The number of withdraws rises.
  - Excess reserves rise.
  - Checking deposits fall.
  - Lending falls.
  - Velocity rises.
- b.
  - Banks have more reserves in case depositors demand their money. So a bank run is less likely.
  - Banks are encouraged not to lend, but instead to hold excess reserves.
  - Interest rates rise, as shown above. Many policies cause interest rates to rise without reducing lending so much, however. So the FED policy makes sense only if the FED is still very concerned about the solvency of the banking system.

### Question 6 (18 points)

a. We have:

$$k_{M2}(R) = \frac{cr + 1 + sr}{cr + rrr + e(R - R_0)}. \quad (1)$$

Plugging in gives:

$$k_{M2}(R) = \frac{\frac{1}{4} + 1 + 1}{\frac{1}{4} + 0 + \frac{1}{5} - \left(\frac{1}{5} - \frac{1}{8}\right)} = 6. \quad (2)$$

Thus:

$$M2 = k_{M2} \cdot H, \quad (3)$$

$$M2 = 6 \cdot 9 \rightarrow M2 = 54. \quad (4)$$

b. We have:

$$M2 = (cr + 1 + sr) D, \quad (5)$$

$$54 = \frac{9}{4}D \rightarrow D = 24. \quad (6)$$

$$cr = \frac{C}{D}, \quad (7)$$

$$\frac{1}{4} = \frac{C}{24} \rightarrow C = 6. \quad (8)$$

$$H = C + TR, \quad (9)$$

$$9 = 6 + TR \rightarrow TR = 3. \quad (10)$$

c. Clearly since  $rrr = 0$ , the FED does not require any reserves. So required reserves are zero and all reserves are excess. Mathematically,

$$rrr = \frac{RR}{D}, \quad (11)$$

$$0 = \frac{RR}{24}, \quad (12)$$

$$RR = 0. \quad (13)$$

$$TR = RR + ER, \quad (14)$$

$$3 = 0 + ER \rightarrow ER = 3. \quad (15)$$

In many countries, little or no reserves are required, but of course that does not mean banks will not hold reserves.

d. Money paid to the FED exits the economy.

$$\Delta M2 = k_{M2}\Delta H, \quad (16)$$

$$\Delta M2 = 6 \cdot -0.5 \rightarrow \Delta M2 = -3. \tag{17}$$

M2 falls.