Name: _____Solutions____

Cosumnes River College
Principles of Macroeconomics
Problem Set 7
Due May 1, 2017

Spring 2017 Prof. Dowell

Instructions: Write the answers clearly and concisely on these sheets in the spaces provided. Do not attach extra sheets.

1. Answer briefly:
   a. What three roles does money play in the economy?
      1. *medium of exchange*
      2. *unit of account*
      3. *store of value*

   b. What is the difference between commodity money and fiat money?
      Commodity money has value in non-monetary uses or in use as something other than money. Gold is the classic example of commodity money. Fiat money, on the other hand, has value as money only because it is decreed as money by the government. Fiat money retains its value only so long as people are willing to accept it, although the government 'encourages' wide spread acceptance both by declaring the fiat money as legal tender and by requiring that taxes be paid in the fiat money..

2. The first Tennessee Bank has $1.5 million in total reserves and $4 million in checking account balances. What is the bank's reserve position if the required reserve ratio (r_D) is 20%? (*i.e.*, What is the level of required reserves and the level of excess reserves?)
   Required Reserves = Deposits x r_D = $4,000,000 x 0.2 = $800,000
   Total Reserves – Required Reserves = Excess Reserves
   $1,500,000 - $800,000 = $700,000
   Required Reserves = $800,000 and Excess Reserves = $700,000

3. Suppose the commercial banking system in the U.S currently has $300 billion in checking deposits and the required reserve ratio is 10%. Assume that there are no excess reserves.
   a. Calculate the required reserves held by the commercial banking system and the amount of funds loaned to the public. (Hint: Think about the banking system's balance sheet.)
      Required Reserves = $300 Billion x 0.10 = $30 Billion
      Loans are equal to deposits less reserves (because the banks have loaned out all deposits not held as required reserves) or $270 billion.

b. If an additional $50 billion is deposited into the commercial banking system, what will be the final level of checking deposits, the final level of required reserves and the final level of loans within the system continuing to assume that banks hold no excess reserves?
Deposits will increase by the change in reserves(the newly deposit $50 billion) times the multiplier which with $r_D = 0.10$ is 10.

Hence, total deposits will be equal to $300 billion plus $50 billion x 10 or $800 billion. Required reserves are now equal to $800 billion x .1 or $80 billion and loans are equal to $720 billion.

4. Use t-accounts to illustrate what happens to commercial banks' balance sheets when each of the following transactions occurs. (Don't worry about the Fed's balance sheet for this question.)

a. You withdraw $500 from your checking account at the Sacramento Country bank to buy overpriced Sacramento Kings tickets.

Sacramento Country Bank

Assets		Liabilities	
Reserves	*-$500*	*Deposits*	*-$500*

b. Sam finds a $100 bill on the sidewalk and deposits it into his checking account at the Sacramento Country Bank.

Sacramento Country Bank

Assets		Liabilities	
Reserves	*+$100*	*Deposits*	*+$100*

c. Mary Q. Contrary withdraws $1,000 in cash from her checking account at the Sacramento Country Bank, carries it to San Francisco and deposits it into her account at the San Francisco City Bank.

Sacramento Country Bank

Assets		Liabilities	
Reserves	*-$1,000*	*Deposits*	*-$1,000*

San Francisco City Bank

Assets		Liabilities	
Reserves	*+$1,000*	*Deposits*	*+$1,000*

d. Using the simplified money (or deposit) multiplier, what will be the effect of each of the above transactions on the money supply if the required reserve ratio is 12.5% and excess reserves are zero?

a. Given zero excess reserves, the bank now has a reserve deficiency of $437.50. (With the withdrawal of $500, total reserves fell by $500, but you no longer need the $62.50 that was held against the original deposit, so the total deficiency is $437.50.) The money supply must contract by the change in reserves ($437.50) times the money multiplier (1/0.125 = 8) or $3,500. Note here that while deposits will contract by $4,000, the money supply only contracts by $3,500. This is because the initial withdrawal, while it reduces deposits by $500, does not change the money supply. It just replaces deposits with currency, both of which are part of M1. If on the other hand, the Fed had reduced reserves by $500, the money supply would have been reduced by $4,000.

b. With the new deposit there now are excess reserves of $100 x (1 – 0.125) = $87.5. The money supply will expand by $87.5 x 8 = $700. The reasoning here is essentially the same as above. Remember that the initial deposit doesn't change the money supply. It is only the lending of the excess reserves that fuels <u>new</u> lending, deposit creation and growth of the money supply.

c. There is no change in the money supply because neither deposits nor reserves in the banking system as a whole are changing. We're just moving deposits and reserves around in the banking system.

e. Using the simplified money (or deposit) multiplier, what will be the effect of each of the above transactions on the money supply if the required reserve ratio is 15% and excess reserves are zero?

a. Given zero excess reserves, the bank now has a reserve deficiency of $425. (With the withdrawal of $500, total reserves fell by $500, but you no longer need the $75 that was held against the original deposit, so the total deficiency is $425.) The money supply must contract by the change in reserves ($425) times the money multiplier (1/0.15 = 6.667) or $2,833.33.

b. With the new deposit there now are excess reserves of $100 x (1 – 0.15) = $85. The money supply will expand by $85 x 6.667 = $566.67.

c. There is no change in the money supply because neither deposits nor reserves in the banking system as a whole are changing. We're just moving deposits and reserves around in the banking system.

5. Suppose there is $120 billion of cash, and that half of that is held in bank vaults as required reserves (that is, banks hold no excess reserves).

a. How large will the money supply be if the required reserve ratio is 10 percent?
In this case, since there <u>is currency</u>, M^S = Currency + Deposits = Currency + Reserves x $(1/r_D)$.
M^S = $60 billion + $60 billion x (1/0.10) = $60 billion + $600 billion = $660 billion
Note that we have currency or cash here. Only half of the currency is held in bank vaults as reserves. As before, we multiply reserves by the money or deposit multiplier. We then add the cash held outside banks to the total deposits to get the total money supply.

b. How large will the money supply be if the required reserve ratio is 12.5 percent?
M^S = $60 billion + $60 billion x (1/0.125) = $60 billion + $480 billion = $540 billion

c. How large will the money supply be if the required reserve ratio is 16.67 percent?
M^S = $60 billion + $60 billion x (1/0.1667) = $60 billion + $359.93 billion = $419.93 billion

6. List and explain the tools the Federal Reserve has to control the money supply.
The three tools are the required reserve ratio, the discount rate and open market operations. Changes in the required reserve ration result in changes in the money which in turn, given reserves changes the money supply. (Note that as a practical matter the reserve ratio is no longer used as a monetary policy tool.) The discount rate is the rate at which banks can borrow reserves from the Fed. A reduction in the discount rate, ceteris paribus, will cause banks to borrow more reserves, increase lending and increase the money supply. An increase in the discount rate will have just the opposite effect. Open market operations is the purchase and sale of short term securities by the Fed. It is through OMO's that the Fed controls the federal funds rate, the rate at which banks lend and borrow reserves amongst themselves. On open market purchase increases the price of the short term securities (and hence reduces the federal funds rate) and increases reserves in the banking system (and hence the money supply). An open market sale has just the opposite effect.

7. Suppose that the Fed purchases $8 million worth of government bonds from Bill Gates, who banks at The First Seattle Bank. Show the effects on the balance sheet (using t-accounts) of the Fed, The First Seattle Bank and Bill Gates. Does it make any difference if the Fed buys the bonds from an individual or from a bank?

Bill Gates

Assets		Liabilities
Bonds	*-$8 mil.*	
Deposits (at 1st Seattle Bank)	*+$8 mil.*	

First Seattle Bank

Assets		Liabilities	
Reserves	*+$8 mil*	*Deposits*	*+$8 mil.*

Federal Reserve

Assets		Liabilities	
Bonds	*+$8 mil.*	*Reserve Deposits*	*+$8 mil.*

So long as Bill Gates deposits the money in a bank, there is no difference. For the banking system, the result is a new deposit and new reserves which leads to new lending. Assuming no excess reserves, banks will lend out all excess reserves and the money supply will ultimately increase by the amount of the new deposit plus the initial excess reserves times the money multiplier. If the Fed buys the bonds directly from banks, the money supply increases by the amount of the bond purchase times the money multiplier. Assuming a required reserve ratio of 10% and dropping zeros, we would in the two cases (buying from an individual and buying directly from banks) have respectively the following:

$$\Delta M^S = \$8 + \$7.2 \times 10 = \$8 + \$72 = \$80 \text{ and } \Delta M^S = \$8 \times 10 = \$80$$

8. Treasury bills have a fixed face value and pay interest by selling "at a discount." For example, if a one-year bill with a $1,000 face value sells today for $950, it will pay $1,000 - $950 = $50 in interest over its' one-year life. The interest rate on the bill is therefore $50/$930 = 0.0526 or 5.26%.

   a. Suppose the price of the Treasury bill falls to $940. What happens to the interest rate?
   If the price of the $1,000 Treasury bill falls to $940, it will earn $60 of interest over its' one year life span for an interest rate of $60/$940=0.0683 or 6.83%

   b. Suppose instead, the price of the Treasury bill rises to $960. What happens to the interest rate?
   If the price of the $1,000 Treasury bill rises to $960, it will earn $40 of interest over its' one year life span for an interest rate of $40/$960=0.0417 or 4.17%

   c. What is the general relationship between bond prices and interest rates?
   The general relationship is inverse. When bond prices rise interest rates fall and vice versa.

9. Suppose that you own a $1000 bond which earns 5% interest. Furthermore, assume that interest rates on newly issued bonds rise to 10%. Explain why no one would be willing to buy your bond for a $1000. In addition, calculate the price that you could reasonably expect to receive for your bond.
No one would be willing to buy the bond at $1000 because they can easily buy the newly issued ones and earn a higher interest rate. The only way that someone would be willing to buy your bond is if the price fell far enough to yield a rate of return equal to the newly issued bonds. Since my bond is earning $50 per year and new bonds are earning 10% my bond would have to fall far enough to provide this same yield. The bond price that would provide the same yield would be $500.

10. Suppose that you own a $1000 bond which earns 20% interest. Now assume that interest rates on newly issued bonds fall to 10%. How much could you reasonably expect to receive for your bond if you were to sell it?
Since I would be earning $200 a year in interest (20% x $1000) then I should be able to receive a price for my bond that will achieve this same yield. That is $200/price of the bond should equal the new interest rate of 10%. The bond price that would provide this same yield would be $2000.

11. Explain the transaction and speculation motives for holding money.

The transaction motive for holding money is the main reason why people hold money-to buy things. The speculation motive for holding money is as follows: when interest rates are lower than normal, people may expect them to increase in the future thus bringing about a decline in the value of bonds. People hold money speculating that the price of bonds will fall in the future and they can buy them cheaply. If interest rates are higher than normal, people will hold bonds expecting interest rates to return to normal, (i.e fall, and the price of bonds to rise).

12. Explain why both business investment and purchases of new homes decline when interest rates rise.

Interest is, loosely speaking, the cost of money. Since you borrow to invest, if the cost of money goes up, you borrow less and hence invest less. There are fewer projects with positive returns available at higher interest rates.

13. Explain what a $50 billion increase in the money supply ill do to real GDP given the following assumptions.
    a. Each $10 billion increase in the money supply reduces the rate of interest by 0.5 percentage points.

    This tells us that the interest rate changes by 5 x 0.5 or 2-½ percentage points.

    b. Each one percentage point decline in the interest rate stimulates $30 billion worth of new investment.

    If the interest rate falls by 2-½ percentage points (from part a), then investment rises by 2-½ x 30 or $75 billion.

    c. The expenditure multiplier (on investment) is 2.

    With a multiplier of 2, GDP rises by 2 x $75 billion or $150 billon.

d. The aggregate supply curve is so flat that prices do not rise noticeably when aggregate demand increases.

This just tells us that we don't need to worry about the multiplier being reduced by inflation. So, the net effect of the $50 billion increase in the money supply is an increase in GDP of $150 billion.