

Name:
Section:
T.A. Name

180.101 ELEMENTS OF MACROECONOMICS

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Problem Set #5

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Answer Key

INSTRUCTIONS: Above, write your name, section number and T. A. name. Answer each question in the space provided, or on the back of the same sheet.

1. Suppose the Fed purchases \$5 billion worth of government bonds from Bill Gates, who banks at the Bank of America in San Francisco. Show the effects on the balance sheets of the Fed, the Bank of America, and Gates. Does it make any difference if the Fed buys bonds from a bank or an individual?

BILL GATES

Assets

Deposit at +5
Bank of America

Bonds -5

Liabilities

no change

BANK OF AMERICA

Assets

Reserves +5

Liabilities

Deposits +5

FEDERAL RESERVE

Assets

Bonds +5

Liabilities

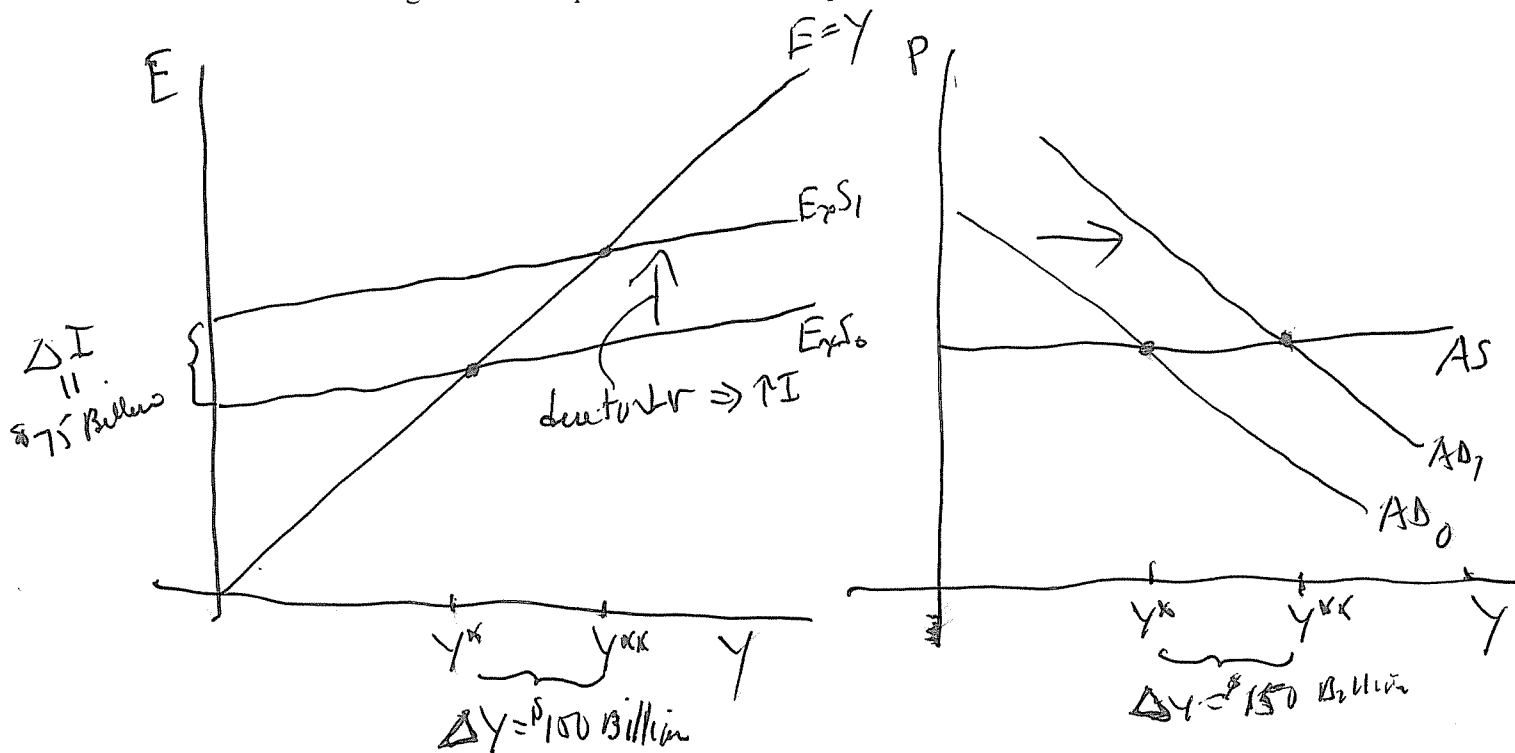
Bank Reserves +5

In the long run, it makes no difference whether the Fed buys bonds from a bank or an individual. Initially in this case, Bank of America's new reserves are offset by new deposits, so that not all of the new reserves are excess, whereas if the Fed had bought the bonds from Bank of America directly there would have been no change in deposits, and all the new reserves would have been excess. In the long run, however, the new reserves of \$5 billion will support the same increase in deposits. When the Fed buys bonds from Bill Gates, deposits increase by \$5 billion, and depending on the required reserve ratio the increase in reserves will create more deposits through the deposit expansion process. When BOA sells the bond, deposits do not increase initially, but reserves increase by \$5 billion, and, since deposits did not increase immediately, all the increase in reserves is excess reserves. But, BOA will eventually lend out the \$5 billion in excess reserves, and this will result in an increase in deposits through the deposit expansion process. Since in both cases there is an injection of reserves of \$5 billion into the banking system, in the long-run there will be no difference in the ultimate increase in deposits under the two assumptions.

2. Explain and show using appropriate diagrams what a \$5 billion increase in bank reserves will do to real GDP under the following set of assumptions:

- Each \$1 billion increase in bank reserves reduces the rate of interest by 0.5 percentage point.
- Each 1 percentage point decline in interest rates stimulates \$30 billion worth of new investment.
- The multiplier for investment is 2.
- The aggregate supply curve is so flat that prices do not rise noticeably when demand increases.

If each \$1 billion increase in bank reserves reduces the rate of interest by 0.5 percentage point (from assumption a), a \$5 billion increase in bank reserves will reduce the interest rate by 2.5 percentage points. If each 1 percentage point decline in interest rates stimulates \$30 billion worth of new investment (from assumption b), the decline in interest rates of 2.5 percentage points will increase investment by \$75 billion. If the multiplier for investment is 2 (from assumption c) the increase in investment will increase aggregate demand by \$150 billion. If the aggregate supply curve is horizontal (from assumption d) the increase in real GDP would equal \$150 billion. See the graphs below for the diagrammatic representation of this process:



3. Consider an economy in which government purchases and taxes are zero, the consumption function is

$$C = 300 + 0.75 Y$$

and investment spending (I) depends on the rate of interest (r) in the following way:

$$I = 1000 - 100r$$

Find the equilibrium GDP if the Fed makes the rate of interest (a) 2 percent ($r=0.02$), (b) 5 percent, and (c) 10 percent. Provide an economic explanation of any differences that arise in the equilibrium GDP at different interest rates. Draw a diagram that illustrates the results.

Since government purchases and taxes are zero we have $Y=C+I$. We therefore have $Y=300+0.75Y+1000-100r$. Collecting all the Y terms on the left hand side of the equation we get: $0.25Y=1300-100r$. This implies

$$Y=4(1300-100r)=5200-400r$$

Given this equation we can calculate equilibrium GDP for different values of r.

- a) if $r=0.02$ we have $Y = 5200 - 400 \times 0.02 = 5192$
- b) if $r=0.05$ we have $Y = 5200 - 400 \times 0.05 = 5180$
- c) if $r=0.10$ we have $Y = 5200 - 400 \times 0.10 = 5160$

Economic explanation: The higher is the interest rate, the lower is the level of investment spending, the lower is the level of aggregate planned expenditure, and therefore the lower is the equilibrium level of real output and income.

