

14.02 Fall 2001
Problem Set 2
Posted September 19, 2001
Due September 26, 2001

I. True/False (explain)

1. If taxes are set proportional to income, $T = tY$, and $t > 0$, then the multiplier is larger.
2. The amount of bonds owned by households is a stock.
3. When nominal income increases, interest rates increase to reduce the demand for bonds.
4. When the Fed (US Central Bank) sells bonds in the open market, currency plus reserves go up and interest rates on bonds fall.

II. Short Questions

1. Multiple choice (explain). Suppose that the Argentinian economy consists of people that hold all of their wealth in the form of money or bonds. They can hold their money as currency or demand deposits. Assuming that all other variables remain unchanged, an increase in high-powered money (remember this is currency plus reserves) will have a greater effect on the money stock if
 - a. Argentinians don't trust banks and therefore don't put their money in the checking accounts.
 - b. Argentinians hold a low proportion of their money in currency.
 - c. The Argentinian authorities require banks to have a higher reserve ratio.
 - d. The Argentinian authorities allow people to also hold US dollar deposits.
 - e. Argentinian demand for money is very responsive to the interest rate.
2. Banks in Money Supply. Suppose that $R = 100$, $CU = 100$, and $D = 500$.
 - a. Draw the balance sheets (assets and liabilities) of the Central Bank and the commercial banks. What is the reserve ratio?
 - b. What is high-powered money?
 - c. What is the money supply?
 - d. Solve for the money multiplier.
 - e. What happens to the money multiplier as c (defined as CU/M) increases? For the Central Bank to achieve a given increase in money supply, will it have to buy more or less bonds for a $c = 0.2$?

III. Goods Market, continued... Consider a closed economy in which government expenditure and taxation are exogenously given. The economy is characterized by the following equations:

1. $C = c_0 + c_1 Y_D$, $Y_D = Y - T$, and $0 < c_1 < 1$
2. $I = d_0 + d_1 Y$, and $0 < d_1 < 1$
3. $G = G$
4. $Z = C + I + G$

$$5.Y = Z$$

- a. Explain the second equation, giving economic intuition.
- b. Solve for the equilibrium level of output. Show the geometric series of the reaction of output to an increase in autonomous spending. What happens if $c_1 + d_1 > 1$?
- c. Assume that $c_1 + d_1 < 1$ for the rest of the problem. Solve for the effect of an increase of \$1 billion of government spending on output. Compare the multiplier in this model to the multiplier when investment is exogenous (as in class). Explain the difference.
- d. Rewrite the equilibrium condition in terms of saving, investment and the budget deficit. Suppose the government increases spending by \$1 billion. Does this mean that saving also increases by \$1 billion? Why or why not?
- e. Solve for the equilibrium level of saving. [Hint: write saving in terms of income, consumption and taxes and eliminate consumption using equation 1. Then replace income by the equilibrium level computed in part b.] Using this expression, calculate the effect of an increase in government spending on saving.

V. Empirical Exercise.

We see a lot of news about interest rates and Central Bank actions. Here is your lucky chance to work with the data. Go to the Federal Reserve economic database located at www.stls.frb.org/fred and select interest rates. Download the series for the "3-Month Treasury Bill Rate - Secondary Market".

1. Graph the monthly interest rate on the y-axis against time on the x-axis for the period 1990-2001 (August is latest figure). Explain briefly what happened at the beginning of the 1990s, end-1998, and since November 2000. Does the news that the Fed is pursuing an expansionary monetary policy fit the data. (Note Excel or XESS in Athena should do the trick).

Now to investigate whether the relationship between money demand and interest rates holds, select "Monetary aggregates". Download the series "M1 -Money Stock". Also select "Gross Domestic Product (GDP) and its components" and download the series "Gross Domestic Product" under the heading 1 Decimal. Since GDP is only available quarterly, take quarterly averages for the interest rate series and for M1. (That is, take the average of January, February and March and label that as the figure for the first quarter etc.) Now construct the quarterly series $M/\$Y$.

2. Plot (scatter plot) changes in the interest rate against changes in $M/\$Y$. Does the relationship 'roughly' fit the theory?