Quiz 1 Solution Set
14.02 Macroeconomics
March 8, 2006

I. Answer each as True, False, or Uncertain, and explain your choice.

1. After Hurricane Katrina the Government spent $500 million rebuilding New Orleans and $100 million in transfers to displaced individuals. The direct effect of these policies was an increase in GDP of $600 million.

   Ans:

   False. The subsidies of $100 million cannot count towards G and are in fact government transfers (or part of T).

2. If a country produces all the oil that it consumes, an increase in the price of oil will lead to an equal increase in CPI and GDP inflation.

   Ans:

   Uncertain. An increase in the price of oil need not lead to an equal increase in CPI and GDP inflation in such an country. It depends on the relative weight of oil production in the country's GDP composition and that of oil consumption in a typical urban dweller's consumption basket.

3. If nominal GDP is higher than real GDP of a given year, the economy is undergoing inflation in that year.

   Ans:

   False. The value of real GDP depends on the choice of base year prices. So the fact that real GDP is higher or lower than nominal GDP tells us nothing about the actual price level in the economy. We can simply pick another base year to reverse the inequality. Also, inflation refers to the rate of change but not the level of price.

4. Fiscal policy is more effective in changing GDP if investment is more sensitive to a change in the interest rate.

   Ans:

   False. The more sensitive investment demand, the flatter the IS curve, the smaller the effect of a given shift in the IS on output.

5. The nominal demand for money only depends on the nominal interest rate and the quantity of final goods produced in the economy.

   Ans:

   False. It also depends on the price level.

6. John was fired from his job last year, and gave up looking for a job three weeks ago. He is now officially unemployed.

   Ans:

   True. To be classified as unemployed, a person has to be looking for a job in the past four weeks, and John gave up only three weeks ago.

II. Short Questions

1. The Goods Market

   Consider the IS model:

   Extend the consumption function to be:

   $$C = c_0 + c_1 (Y - T) + c_2 (Y^e - T^e),$$

   where C is annual consumption, Y is current annual income, Y^e is expected future annual income (think of it as the annual income that people expect to receive on average in the future), T is current annual taxes and T^e expected future annual taxes. Assume $c_1 + c_2 < 1$.

   a. Is this new specification an improvement upon the specification we used in class?

   Ans:

   The new specification offers a more realistic description of people's consumption behavior. Consumption decision depends not only on current disposable income but also on expectations about the future. The latter is missing in our previous discussion in lecture.

   b. Is the restriction on $c_1 + c_2$ reasonable? (Hint: Suppose your current and expected future annual income both go up by 1 unit. By how much will you increase consumption?)

   Ans:

   Yes. If income, both now and in the future, goes up by one unit, consumers should increase spending by no more than one unit.

   c. Assume $I = \bar{I}$, and G given. Write down the equilibrium condition.

   Ans:

   The goods market reaches an equilibrium when $Y = Z \Rightarrow$

   $$\begin{aligned} Y &= C + I + G \\ &= c_0 + c_1 (Y - T) + c_2 (Y^e - T^e) + \bar{I} + G \\ &= \frac{c_0 - c_1 T + c_2 (Y^e - T^e) + \bar{I} + G}{1 - c_1}. \end{aligned}$$

   d. Show, algebraically and graphically, the effects of an increase in Y^e on Y. Explain in words.

   Ans:

   Consumers feel wealthier today if their expected future income goes up. Thus, an increase of expected future income by ΔY^e leads to an immediate increase in consumption demand by $c_2 \Delta Y^e$. This shift in demand increases production and, in turn, current income. The increase in income leads to a further increase in consumption, which leads to a further increase in production, and so on. As a result, the full effect on output of ΔY^e is $\frac{c_2}{1-c_1}\Delta Y^e$, the initial shift in demand times the multiplier.

   Recall your answer in (c),

   $$Y = \frac{c_0 - c_1 T + c_2 (Y^e - T^e) + \bar{I} + G}{1 - c_1}$$

$\Rightarrow$

$$\frac{\Delta Y}{\Delta Y^e} = \frac{c_2}{1 - c_1}$$
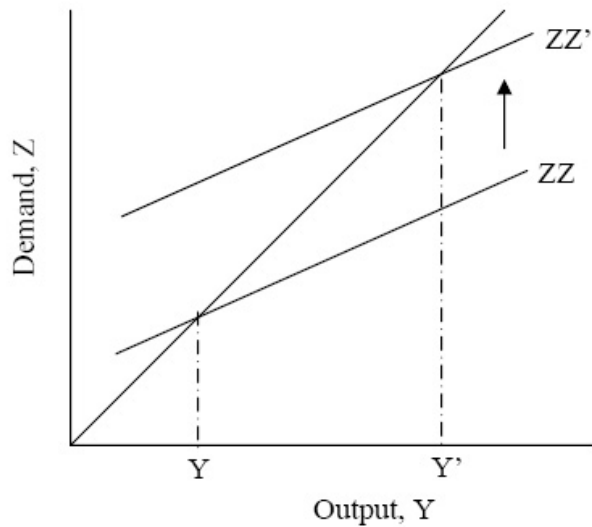
e. "Optimism is self fulfilling. If people are more optimistic about the future, then things will improve today." Do you agree? Why?

Ans:

Ans: Yes. If people are more optimistic, then demand and output will go up today.

2. The "liquidity trap."

Consider an economy where money demand is given by

$$M^d = a\frac{\$Y}{i}$$

a. What happens to the demand for money as the interest rate goes to zero? Is it a reasonable assumption?

Ans:

The demand for money becomes infinite as the interest rate goes to zero. As the opportunity cost of holding money becomes trivial, individuals would rather hold a large amount of money to facilitate transactions.

b. "All the central bank can do by increasing the money supply is to decrease the interest rate down to zero, but no further." Do you agree or disagree?

Ans:

The interest rate cannot be negative, because individuals will not be willing to hold any bonds if the rate is below zero.

c. Look at the figure below, which plots the interest rate and the rate of money growth in Japan. Discuss the following proposition: "Monetary policy has been used to decrease the interest rate to zero in Japan. If this is not sufficient to increase demand and output, there is nothing more monetary policy can do"

3

Japan

Ans:
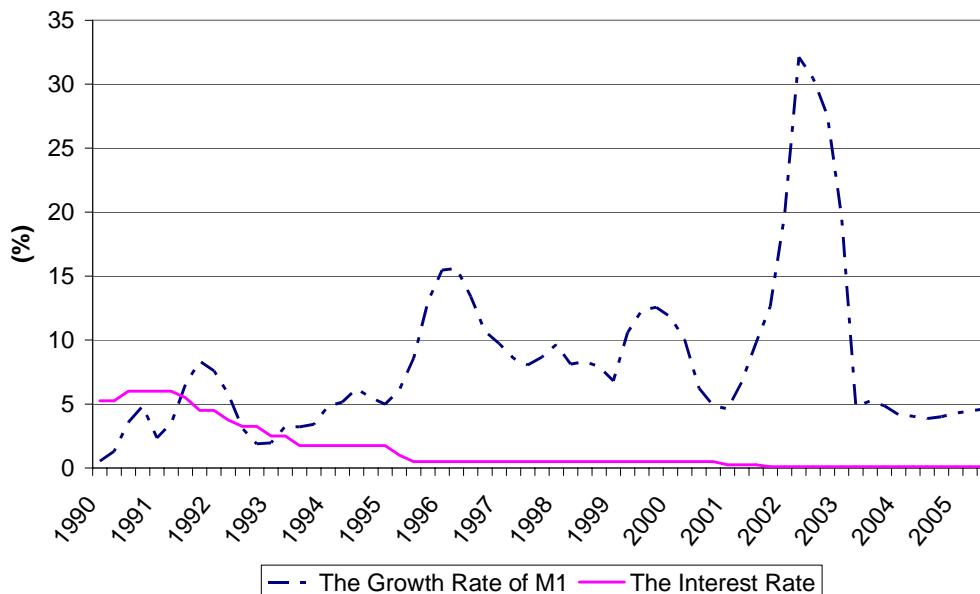
The interest rate stays close to zero even though the money supply continues to expand. In other words, monetary expansion hardly moves the interest rate and is thus ineffective in increasing investment demand and output.

III. Long Question

Consider the following economy:

$$
\begin{aligned}
C &= c_0 + c_1 (Y - T) \\
I &= b_0 + b_1 Y - b_2 i \\
\frac{M^d}{P} &= Y(d_0 - d_1 i)
\end{aligned}
$$

c_0, c_1, b_0, b_1, b_2, d_0, d_1 are positive constants, and $c_1 + b_1 < 1$. The price level is given. So are G and T.

The central bank chooses the money stock M so as to achieve a given interest rate i_0 (in other words, the money stock is endogenous).

a. Determine equilibrium Y, C and I. Determine in turn the level of the money stock, M.

Ans:

The goods market equilibrium (IS) implies

$$
\begin{aligned}
Y &= c_0 + c_1 (Y - T) + b_0 + b_1 Y - b_2 i + G \\
&= c_0 + c_1 (Y - T) + b_0 + b_1 Y - b_2 i_0 + G \\
&= \frac{c_0 + b_0 - c_1 T + G - b_2 i_0}{1 - c_1 - b_1}
\end{aligned}
$$

$$\Rightarrow$$

$$C = c_0 + c_1 \frac{c_0 + b_0 - (1 - b_1) T + G - b_2 i_0}{1 - c_1 - b_1}$$

$$I = b_0 + b_1 \frac{c_0 + b_0 - c_1 T + G - b_2 i_0}{1 - c_1 - b_1} - b_2 i_0$$

The money market equilibrium (LM) requires

$$
\begin{aligned}
M &= M^s = M^d = PY(d_0 - d_1 i) \\
&= P\frac{c_0 + b_0 - c_1 T + G - b_2 i_0}{1 - c_1 - b_1}(d_0 - d_1 i)
\end{aligned}
$$

b. Suppose the government wants to increase output by ΔY. It wants to do so by increasing government spending G. Derive the required change in G, ΔG. Derive the change in the government deficit. (In this and the next questions, continue to assume that the central bank maintains the interest rate equal to i_0.)

Ans:

The government wants to increase its spending in order to increase output by ΔY, while expanding M^s so as to keep $i = i_0$. Taxes remain unchanged. Recall your answer in (a),

$$Y = \frac{c_0 + b_0 - c_1 T + G - b_2 i_0}{1 - c_1 - b_1}.$$

$$\Rightarrow$$

$$\Delta Y = \frac{\Delta G}{1 - c_1 - b_1}$$

The government has to increase its spending by $\Delta G = (1 - c_1 - b_1) \Delta Y$. The budget deficit is $G - T = (1 - c_1 - b_1) \Delta Y$.

c. Suppose again the government wants to increase output by ΔY. It now wants to do so by decreasing taxes T. Derive the required change in T, ΔT. Derive the change in the government deficit. Explain the different implications of this policy from the previous one for the budget deficit.

Ans:

The government wants to reduce taxes in order to increase Y by ΔY, while expanding M^s so as to keep $i = i_0$. Government spending remain unchanged. Recall your answer in (a),

$$Y = \frac{c_0 + b_0 - c_1 T + G - b_2 i_0}{1 - c_1 - b_1}.$$

$$\Rightarrow$$

$$\Delta Y = -\frac{c_1 \Delta T}{1 - c_1 - b_1}$$

The government has to cut taxes by $\Delta T = \frac{(1 - c_1 - b_1)}{c_1} \Delta Y$. The budget deficit is $G - T = \frac{(1 - c_1 - b_1)}{c_1} \Delta Y$.

The reduction in taxes needed to achieve full employment is larger than the required increase in government spending. Therefore, the budget deficit in (c) is

greater than in (b). The reason is that the marginal propensity to consume is less than 1. Lower taxes increase individuals' disposable income. They spend only some of that additional income, while saving the rest. An increase in government spending on the other hand, is entirely translated into an increase in spending. We do not know (without further information) which policy is better. While cutting taxes creates a larger deficit, low taxes may be desirable for other reasons.

d. Suppose again the government wants to increase output by ΔY. It now wants to do without changing the budget balance, i.e. while maintaining $\Delta G = \Delta T$. Derive the required change in spending (and in taxes). Compare ΔG in this case to ΔG in question (b). Explain the difference in words.

Ans:

Again, recall your answer in (a),

$$Y = \frac{c_0 + b_0 - c_1 T + G - b_2 i_0}{1 - c_1 - b_1}.$$

With a balanced budget $G = T$,

$$Y = \frac{c_0 + b_0 + (1 - c_1)G - b_2 i_0}{1 - c_1 - b_1}.$$

$\Rightarrow$

$$\Delta G = \Delta T = \frac{1 - c_1 - b_1}{1 - c_1}\Delta Y$$

We have to simultaneously increase taxes and spending by $\frac{1-c_1-b_1}{1-c_1}\Delta Y$. Note that keeping a balanced budget requires a larger increase in spending than if we were allowed to create a deficit as in (b). The larger G is required in order to compensate for the negative effect of higher taxes on consumption.

e. Suppose again the government wants to increase output by ΔY. It now wants to do so without increasing consumption. Derive the combination of changes in taxes ΔT, and changes in spending, ΔG, which leads to an increase in output with no change in consumption. What happens to investment?

Ans:

Consumption stays unchanged, therefore,

$$\Delta T = \Delta Y.$$

Investment increases due to an increase in output,

$$\Delta I = b_1 \Delta Y.$$

Finally, required change in government spending,

$$\Delta G = \Delta Y - \Delta I = (1 - b_1)\Delta Y.$$