14.02 Exam 2

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1 Multiple Choice Questions (5 points each)

1. Under a fixed exchange rate system, monetary policy cannot be used to stimulate aggregate demand because

- a. Under fixed exchange rates, the domestic money market cannot be in equilibrium.

- b. Under fixed exchange rates, uncovered interest parity must hold at all times, which makes monetary policy ineffective.

- C. Under fixed exchange rates, the money supply has to respond to changes in the exchange rate to maintain the nominal interest rate constant.

- d. Under fixed exchange rates, the effect of changes in the nominal interest rate on investment and the trade balance exactly cancel out.

- e. Under fixed exchange rates, demand for domestic goods must be equal to domestic demand for goods, which are unaffected by the LM curve.

2. In an open economy, as income rises domestic demand for goods increases faster than demand for domestic goods because

- a. No, domestic demand for goods increases more slowly than demand for domestic goods.

- b. Government spending does not change as income rises.

- C. Part of the increase in domestic demand consists of increased demand for imported goods.

- d. Consumers always prefer to spend their additional income in the purchase of foreign goods.

- e. As domestic income increases, foreign income must fall, since the world trade balance must be zero.

3. The rate of growth of the nominal exchange rate can only differ from the growth rate of the real exchange rate if

- a. There is a flexible exchange rate system.

- B. Inflation in the domestic economy is different from inflation in the foreign economy.

- c. The future expected nominal exchange rate is different from the present exchange rate.

- d. The trade balance is not in equilibrium (equal to zero).

- e. The uncovered interest parity condition does not hold.

4. The fact that in open economies the current account must be equal to net savings implies that

- a. Countries cannot run budget deficits without also running current account deficits.

- b. Depreciations are ineffective in reducing trade deficits because they do not affect savings or investment.

- C. Countries with current account deficits must have positive net investment flows.

- d. The nominal interest rate must be equal to the foreign interest rate.

- e. Countries running systematic trade deficits will grow slower because investment is reduced.

5. A fiscal consolidation leads to a larger contraction of output under a fixed exchange rate than under a flexible exchange rate because

- A. Under fixed exchange rates the money supply has to fall to maintain the domestic nominal interest rate constant.

- b. Under fixed exchange rates the fiscal consolidation leads to a fall in investment income.

- c. Under fixed exchange rates the spending multiplier is smaller.

- d. Under fixed exchange rates the trade surplus is less responsive to changes in domestic spending.

- e. Uncovered interest rate parity does not have to hold under flexible exchange rates.

6. The Government spending multiplier is smaller in an open economy compared to a closed economy

- A. Always.

- b. Never.

- c. Only under flexible exchange rate regimes.

- d. Only under fixed exchange rate regimes.

- e. Only when the increase in government spending is used in the purchase of imported goods.

7. Depreciations intended to reduce the trade deficit will actually increase it when

- a. Investors expect the nominal exchange rate to appreciate in the future.

- B. The quantities of imports and exports respond with a delay to the change in the exchage rate.

- c. The Marshall-Lerner condition is satisfied.

- d. The fall in the nominal interest rate implied by uncovered interest rate parity induces an increase in domestic demand.

- e. Domestic inflation is larger than foreign inflation.

8. Under a fixed exchange rate regime, when investors expect a devaluation to occur (i.e., the price of the domestic currency expressed in units of the foreign currency goes down), the domestic nominal interest rate will

- a. Be higher than the foreign nominal exchange rate because the devaluation will lead to a reduction in the trade deficit.

- B. Be higher than the foreign nominal exchange rate because investors must be compensated for the potential fall in the value of their domestic assets.

- c. Be lower than the foreign nominal exchange rate because the price of bonds must be high to maintain investors' confidence in their domestic assets.

- d. Be lower than the foreign nominal exchange rate because a low interest rate will be a signal that the government is willing to maintain the fixed exchange rate regime.

- e. Remain constant because under fixed exchange rates the government cannot control the money supply.

9. A fiscal expansion can reduce consumption if

- a. The Ricardian Equivalence does not hold.

- b. The increased government spending is used in the purchase of imports only.

- c. The exchange rate is fixed.

- D. Households take into account all of their lifetime resources to decide their current **consumption**.

- e. The fiscal multiplier in the open economy is too small.

10. Stability in the Debt to GDP ratio can never be achieved if

- a. The interest rate is smaller than the growth rate of the economy, and the government runs a deficit every period.

- b. The interest rate is larger than the growth rate of the economy.

- C. The interest rate is larger than the growth rate of the economy, and the government runs a balanced budget.

- d. The initial debt to GDP ratio is larger than 1.

- e. The economy is under a fixed exchange rate regime.

2 Short Long Question: Debt (20 points)

Assume there is a closed economy which in year 0 has accumulated a real debt of $B_0 = 100$, its real GDP is $Y_0 = 100$, real government spending is $G_0 = 20$, and real taxes are $T_0 = 17$. Assume also that the nominal interest rate is 5%, and inflation is 3%.

(3 points) a. What is the real Primary Balance to GDP ratio in year 0?

A/ Primary Balance $= \frac{G_0 - T_0}{Y_0} = \frac{20-17}{100} = 0.03 = 3\%$

(3 points) b. Suppose that the government keeps running a real primary balance ratio equal to the one you found in point a, and that the economy grows at 6% every year. What will the real debt-to-GDP ratio be in year 1?

A/ $\frac{B_1}{Y_1} = (1 + r - g)\frac{B_0}{Y_0} + \frac{G_0 - T_0}{Y_0} = (1 + 0.05 - 0.03 - 0.06)\frac{100}{100} + 0.03 = 0.99$.

(3 points) c. Will the real debt ratio be increasing or decreasing over time?

A/ Decreasing.

(3 points) d. Compute the long-run value of the real debt-to-GDP ratio in this economy.

A/ $\left(\frac{B}{Y}\right)^* = (1 + r - g)\left(\frac{B}{Y}\right)^* + \frac{G_0 - T_0}{Y_0}$

$\Rightarrow \left(\frac{B}{Y}\right)^* = \frac{\frac{G_0 - T_0}{Y_0}}{g - r} = \frac{0.03}{0.04} = 0.75 = 75\%$.

Now Assume this economy is an open economy under a fixed exchange-rate regime, and that the foreign nominal interest rate is $i_0^* = 5\%$, and the nominal interest rate is $E_0 = 1$.

(4 points) e. If suddenly investors believe there will be a 10% devaluation of the nominal exchange rate because the real debt-to-GDP ratio is too high, will the domestic nominal interest rate fall or increase? By how much and why?

A/ By uncovered interes rate parity, the domestic nominal interest rate increases: $(1 + i_0) = (1 + i_0^*)\left(\frac{E_0}{E_1^e}\right)$.

The expected nominal exchange rate is $E_1 = (1 - 0.1)E_0 = 0.9E_0$.

$\Rightarrow (1 + i^0) = (1 + 0.05)\left(\frac{1}{0.9}\right) = 1.16$

$\Rightarrow i^0 = 0.16 = 16\%$.

The domestic nominal interest rate must increase so that investors are still indifferent between holding domestic and foreign assets.

(4 points) f. Under this new domestic nominal interest rate, what would be the real debt-to-GDP ratio in year 1? Should investors be even more worried now?

A/ $\frac{B_1}{Y_1} = (1 + r - g)\frac{B_0}{Y_0} + \frac{G_0 - T_0}{Y_0} = (1 + 0.16 - 0.03 - 0.06)\frac{100}{100} + 0.03 = 1.1$.

Real debt-to-GDP increases by 10%. Now the real debt-to-GDP ratio will be increasing over time, so investors will be even more worried!

3 Long Long Question: Open Economy IS (35 points)

Consider the following open economy:

$$C = c_0 + c_1 Y$$

$$I = c_2 Y$$

$$IM = mYe$$

$$X = \frac{m\tilde{Y}}{e}$$

where C, Y, $\tilde{Y}$, I,IM,X, and e denote aggregate consumption, domestic output, foreign output, investment, imports, exports, and the real exchange rate, respectively. Assume $c_0 > 0$, $0 \le c_1 \le 1$, $c_2 > 0$, $0 \le m \le 1$, $1 + m > c_1 + c_2 > m$. We will assume throughout the question that the real exchange rate e (the number of foreign goods needed to buy one domestic good) is exogenously given. Denote by G the amount of Government spending.

(3 points) a. Write an expression for net exports (NX) as a function of Y, $\tilde{Y}$, e and m. Does the Marshall-Lerner condition hold in this economy? Why or why not?

A/

$$NX\left(Y,\tilde{Y},e\right) = \frac{m\tilde{Y}}{e} - mY$$

Marshall-Lerner condition holds because NX is decreasing in e.

(5 points) b. Write an expression for the equilibrium level of output in the goods market as a function of e, G, $\tilde{Y}$ and parameters.

A/

$$Y = c_0 + c_1 Y + c_2 Y + G + m\tilde{Y}/e - mY$$

$$Y = \frac{1}{1 - c_1 - c_2 + m}\left[c_0 + G + m\tilde{Y}/e\right]$$

Suppose there is a drop in consumers' confidence, so that c_0 drops to $c_0' < c_0$. Let $\Delta c_0 = c_0' - c_0 < 0$ be the change in c_0. Let Y_0 and Y_1 denote output before and after the drop in c_0, respectively. Suppose that the Government has decided to bring output back to its original level, Y_0.

(4 points) c. Can the Government achieve its target with fiscal policy (i.e. changing G)? If so, state the exact amount by which G needs to change (i.e. find ΔG).

A/ Yes, G needs to be increased by $\Delta G = -\Delta c_0 > 0$.

(4 points) d. Assume the government controls e. Can it achieve its target via exchange rate policy (i.e., via a devaluation or a revaluation of the exchange rate)? Compute the new level of the real exchange rate e' that achieves the government's target, and state whether a devaluation or revaluation is required.

A/ Yes, via a real devaluation the Government can increase output. The new level of the real exchange rate

$e' < e$ is characterized by

$$\frac{1}{1 - c_1 - c_2 + m} \left[c_0' + G + \frac{x\tilde{Y}}{e'} \right] = Y_0 \tag{1}$$

Suppose instead that the Government wants to bring output back to its original level (Y_0), and *at the same time* keep net exports at the level after the drop in c_0 (which we denote by NX_1).

(4 points) e. Show that to achieve this goal the Government needs to use *both* fiscal and exchange rate policy.

<mark>A/</mark> Mathematically G' and e' should satisfy

$$\frac{1}{1 - c_1 - c_2 + m} \left[c_0' + G' + \frac{m\tilde{Y}}{e'} \right] = Y_0 \tag{2}$$

$$\frac{m\tilde{Y}}{e'} - mY_0 = NX_1 \tag{3}$$

The second equation implies that the exchange rate must change. But why do we also require fiscal policy? Because, in the absence of fiscal policy, the exchange rate that brings output back to Y_0 was characterized by eq. (1), which need not coincide with the exchange rate prescribed by eq. (2).

(4 points) f. In particular, show that the Government needs to combine a real devaluation ($e' < e$) with an increase in Government spending ($G' > G$)

<mark>A/</mark> Since $NX_1 > NX_0$, equation (3) directly implies that $e' < e$, in other words, a real devaluation is required. To see that $G' > G$, note that eq. (3) can be written as

$$\frac{m\tilde{Y}}{e'} = \frac{m\tilde{Y}}{e} + m\left(Y_0 - Y_1\right)$$

which into eq. (2) implies

$$\frac{1}{1 - c_1 - c_2 + m} \left[c_0' + G' + \frac{m\tilde{Y}}{e} + m\left(Y_0 - Y_1\right) \right] = Y_0$$

Using the original expression for output before the drop in c_0, (equation 1), we have

$$G' - G = c_0 - c_0' - m\left(Y_0 - Y_1\right)$$

$$= c_0 - c_0' - m\left(Y_0 - Y_1\right)$$

Noting that

$$Y_0 - Y_1 = \frac{1}{1 - c_1 - c_2 + m}\left[c_0 - c_0'\right]$$

we get

$$G' - G = \frac{1 - c_1 - c_2}{1 - c_1 - c_2 + m}$$

From now on, assume that the foreign country is characterized by

$$\tilde{C} = c_0 + c_1\tilde{Y}$$

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$$\tilde{I} = c_2 \tilde{Y}$$

where $\tilde{C}, \tilde{I}$ denote aggregate consumption, domestic output, foreign output, investment, imports, exports, and the real exchange rate, respectively.

(4 points) g. Write expressions for imports $(\widetilde{IM})$ and exports $(\tilde{X})$ of the foreign country.

A/ Since world trade must be balanced: $\widetilde{IM} = X = m\tilde{Y}/e$, and $\tilde{X} = IM = mYe$.

(4 points) h. Find home country output (Y) and foreign output $(\tilde{Y})$ as a function of parameters (c_0, c_1, c_2, m) and exogenous variables $(G, \tilde{G}, e)$.

A. First find foreign output as a function of home's output:

$$\tilde{Y} = \frac{1}{1 - c_1 - c_2 + m} \left[c_0 + \tilde{G} + mYe \right] \tag{4}$$

Then plug this back into the expression found in part 2, to get

$$Y = \frac{1}{1 - c_1 - c_2 + m - \frac{m^2}{1-c_1-c_2+m}} \left\{ c_0 + G + \frac{m/e}{1 - c_1 - c_2 + m} \left(c_0 + \tilde{G} \right) \right\} \tag{5}$$

(3 points) i. Can a real devaluation from the point of view of the home country, (ie a decrease in e) make both countries better off?

A/ No, a real devaluation leads to an increase in Y and a decrease in $\tilde{Y}$.

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