1. (2 points) Explain the effect of permanent fiscal expansion on output under a fixed exchange rate. Compare that with the effect of the same policy under floating in Chapter 16. Are they the same? Why?

ANSWER: (1 point) Yes, the effects are in the same direction. However, the effect on output is larger under fixed exchange rate policy.

With floating exchange rate, permanent fiscal expansion expands output and makes exchange rate appreciate as the resulting increase in money demand pushes up the interest rate. In Figure 1, the initial equilibrium is Point 1. The fiscal expansion with floating exchange rate will shift the DD curve to the right and bring the economy to Point 2.

(1 point) With fixed exchange rate, the central bank has to intervene in foreign exchange market by buying foreign assets to remove appreciation pressure on its national currency. This foreign exchange market intervention will increase foreign exchange reserves and as a result money supply. In other words, the foreign exchange market intervention shifts the AA curve to the right and increase output even further. The equilibrium with fixed exchange rate is Point 3.

2. (2 points) Explain the effect of permanent monetary contraction on output under a fixed exchange rate. Compare that with the effect of the same policy under floating in Chapter 16. Are they the same? Why?

ANSWER: (1 point) No, they are different. The policy reduces output with flexible exchange rate but does nothing with output with fixed exchange rate.

With flexible rate, the permanent monetary contraction increases interest rate and makes the national currency appreciate. That in turn raises the relative price of home goods to foreign goods or creates real exchange rate appreciation. This corresponds to a shift in the AA curve to the left in Figure 2. The equilibrium moves from Point 1 to Point 2.
With fixed exchange rate, the central bank is supposed to intervene in foreign exchange market to remove the appreciation pressure. As in Question 1, the central bank has to buy foreign assets to keep exchange rate fixed. Such an intervention causes money supply to increase and it shifts the AA curve back to the right. Eventually the economy arrives at the equilibrium Point 3 where no further interventions are required. It is clear from this exercise that fixed exchange rate policy renders monetary policy ineffective, because Point 3 is identical to Point 1.

3. (2 points) What causes a currency crisis? Write down a time path of inflation and interest rate before and after a currency crisis, as predicted by the model of a currency crisis discussed in class.

**ANSWER:** (1 point) A currency crisis is conventionally believed to occur as a result of a central bank’s inconsistent and inflationary policy. Specifically, the cause is the combination of two conflicting policies. One is to maintain fixed exchange rate, and the other is a persistent expansion of domestic credits. Figure 3 illustrates the timing of currency crisis. Crisis occurs when “shadow floating exchange rate” coincides with the official par rate. “Shadow floating exchange rate” is the exchange rate that would prevail in equilibrium when foreign exchange rate is zero. It is upward sloping because it is positively correlated with inflation, which keeps increasing as the domestic credit expansion continues. The central bank will continue to lose foreign reserves as it has to sell foreign assets to remove the depreciation pressure in the foreign exchange market. Speculative attacks will occur at time T and the speculators will acquire all the remaining foreign assets.

(1 point) The time paths of inflation and interest rate are in Figures 4 and 5. The inflation rate is the same as the rate of money supply growth, which is 0 before the crisis and the same as the rate of domestic credit expansion after the crisis. For the interest rate, it is fixed at the foreign interest rate before the crisis. After the crisis, interest rate will be higher due to the inflation. The reason is that, the expected depreciation after the central bank floats its exchange rate will be the same as the rate of inflation. According to the Uncovered Interest Parity, the domestic interest rate will be higher than the foreign interest rate by the inflation rate. The movements in the interest rate can also be understood by the Fisher effect.

4. (2 points) In Figure 3 in the class note on Argentina’s currency crisis, peso interest rate rises dramatically shortly before and after the crisis. The interest rate hike before a crisis contradicts the prediction based on the model discussed in class. Can you think of reasons why actual interest rate behaves differently from the theory? How is it related to capital flight?

**ANSWER:** (1 point) There are two main reasons for the interest rate hikes before the crisis. First, with free capital mobility, when people anticipate a currency crisis, the expected depreciation is no more zero. That will increase the expected return
on foreign currency deposits. To keep the currency fixed at the official rate, the domestic interest rate has to rise to make up for that. Second, many central banks impose short-term capital controls (i.e. prohibit outflows of foreign assets) and raises short-term interest rate to defend their national currency.

(1 point) The interest rate hike before a crisis, with or without capital controls, is meant to prevent or slow down capital flights, or outflows of foreign assets. In practice, central banks can hardly achieve this goal without capital controls.

5. (2 points) The U.S. foreign exchange intervention is sometimes done by an Exchange Stabilization Fund or ESF (a branch of the Treasury Department) that manages a portfolio of U.S. government and foreign currency bonds. An ESF intervention to support the yen, for example, would take the form of a portfolio shift out of dollar and into yen assets. Show that ESF intervention are automatically sterilized and thus do not alter money supplies. How do ESF operations affect the foreign exchange risk premium?

ANSWER: (1 point) The balance sheet of the ESF is demonstrated by Figure 6. The asset side contains the dollar assets (domestic credit) and the foreign currency bonds (foreign assets). The liability side indicates the stock of money supply, and it has to be the same as the total stock of assets.

When the ESF intervenes to support the yen, the ESF will sell dollar assets in exchange for yen assets. So the fall of the dollar assets will be offsetted 100 percent by the increase in the yen bonds. The ESF intervention then has no effects on the total stock of assets and money supply. This is precisely the mechanic of a sterilized intervention.

(1 point) When the ESF sells dollar assets in exchange for foreign currency bonds, the stock of dollar assets or U.S. government bonds hold by the private sector increases. Therefore the risk premium on dollar assets increase. In contrast, the risk premium will fall when the ESF buys dollar assets.
Figure 1: Fiscal Expansion

Figure 2: Money Expansion
Figure 3: Currency Crisis

\[ \tilde{e} = \log \tilde{E} \]

\[ \text{Ln } E \text{ (shadow floating exchange rate)} \]

\[ T = \text{time at crisis} \]

Figure 4: Inflation and currency crisis

Note: \( \mu \) is the rate of domestic credit expansion
Figure 5: Interest rate and currency crisis
R*: foreign interest rate

Figure 6: ESF Balance Sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
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<tbody>
<tr>
<td>US gov’t bonds</td>
<td>Ms</td>
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<tr>
<td>Foreign currency bonds</td>
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