

**PROBLEM SET 6**  
**14.02 Macroeconomics**  
**May 3, 2006**  
**Due May 10, 2006**

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

1. The United States finances its current account deficit by increasing its holdings of foreign assets.

Ans:

False. The United States finances its current account deficit by having foreigners increase their holdings of US assets.

2. The higher productivity and output of another country is a threat to the prosperity of the US.

Ans:

False. The direct effect of increased foreign income is greater demand for exports. This has an expansionary effect on the domestic economy. In general, statements regarding economic ‘competition’ between countries are questionable. Larger foreign economies provide a larger market for domestic goods. If higher productivity decreases production costs, cheaper foreign goods provide benefits to domestic consumers.

3. The national income identity implies that budget deficits cause trade deficits.

Ans:

False.

$$\begin{aligned} Y &= C + I + G + \left( X - \frac{IM}{\epsilon} \right) = (Y - T - S) + I + G + NX \\ \rightarrow NX &= (T - G) + S - I \end{aligned}$$

The national income identity says that an increase in the budget deficit must be reflected in an increase in either private saving, or a decrease in investment, or a deterioration of the trade balance. It does not say, however, a budget deficit will necessarily cause a trade deficit.

4. A small open economy can reduce its trade deficit through fiscal contraction at a smaller cost in output than a large economy can.

Ans:

True. A fiscal contraction reduces the domestic demand of goods, thus reduces the value of imports, and improves the trade balance, but at the cost of lower domestic demand of domestic goods and lower output. The more open the economy, the larger the effect on the trade balance and the smaller the adverse effect on output. The cost is inversely correlated with the openness of an economy, which is highly correlated with the size.

5. The domestic demand for goods and the demand for domestic goods are identical, if the trade deficit is equal to zero.

Ans:

True. In an open economy, the demand for domestic goods is equal to the domestic demand for goods ( $C + I + G$ ) minus the value of imports in terms of domestic goods ( $\frac{IM}{\epsilon}$ ), and plus exports ( $X$ ). Therefore, the two are identical if the trade balance is equal to zero (i.e.,  $X = \frac{IM}{\epsilon}$ ).

6. A real depreciation leads to an immediate deterioration of the trade balance.

Ans:

True. A real depreciation eventually leads to an improvement of the trade balance, if the Marshall-Lerner condition holds. However, right after the depreciation people and firms may not be able to immediately adjust their level of transactions to the new prices. Because imports will now be more expensive due to the weaker currency, the trade balance deteriorates. (That is,  $X$  and  $IM$  stay about the same, but  $\epsilon$  drops and so does  $NX = X - \frac{IM}{\epsilon}$ .) Over time, the level of transactions will adjust to the new exchange rate (moving  $X$  and  $IM$ ), and net exports will then rise. This is the J-curve – prices change immediately, but quantities adjust more slowly.

## II. Short Questions:

### 1. Interest Rates and Exchange Rates

Consider two bonds, one issued in euros in Germany, and one issued in dollars in the United States. Assume that both government securities are one-year bonds – paying the face value of the bond one year from now. The exchange rate,  $E$ , stands at 1 dollar = 0.79 euros.

The face values and prices on the two bonds are given by

|               |             | Face Value | Price      |
|---------------|-------------|------------|------------|
| United States | 1-year bond | \$10,000   | \$9,531.98 |
| Germany       | 1-year bond | €10,000    | €9,687.11  |

Note: The symbol € represents the euro.

- a. Compute the nominal interest rate on each of the bonds.

Ans:

The nominal return on the US bond is

$$\frac{10,000}{9,531.98} - 1 = 4.91\%.$$

The nominal return on the German bond is

$$\frac{10,000}{9,687.11} - 1 = 3.23\%.$$

- b. Compute the expected exchange rate next year consistent with uncovered interest parity.

Ans:

Uncovered interest parity implies that the dollar is expected to depreciate. Thus, the expected exchange rate is

$$\frac{E(1+i^*)}{(1+i)} = \frac{0.79 * 1.0323}{1.0491} = 0.78.$$

- c. If you expect the dollar to appreciate relative to the euro, which bond should you buy?

Ans:

If you expect the dollar to appreciate instead, purchase the US bond, since it pays a higher interest rate and you also gain by holding dollar-denominated assets.

- d. Assume you are a US investor. You exchange dollars for euros and purchase the German bond. One year from now it turns out the exchange rate,  $E$ , is actually 0.83 (1 dollar = 0.83 euros). What is your realized rate of return in dollars compared to the realized rate of return you would have made had you held the US bond?

Ans:

The dollar in fact appreciates, so the realized rate of return (in \$) on the German bond is

$$\begin{aligned} & \frac{E_t (1 + i_t^*)}{E_{t+1}} - 1 \\ &= \frac{0.79 * 1.0323}{0.83} - 1 = -1.74\% \end{aligned}$$

or approximately

$$\begin{aligned} & i_t^* - \frac{E_{t+1} - E_t}{E_t} \\ &= 3.23\% - \frac{0.04}{0.79} = 3.23\% - 5.06\% = -1.83\%. \end{aligned}$$

Investing in the US bond would have produced a 4.91% return.

- e. Is the difference in rates of return in (d) consistent with the uncovered interest parity condition? Why or why not?

Ans:

Yes, because the uncovered interest parity condition is about the equality of expected returns but not the equality of realized returns.

## 2. Balance of Payments

Consider a world with three equal-sized economies, A, B, and C, and three goods, clothes, cars, and computers. Assume that consumers in all three economies desire to spend an equal amount on all three goods.

Suppose the value of production of each good in the three economies is as follows (denominated in the same currency):

|           | A  | B  | C  |
|-----------|----|----|----|
| clothes   | 10 | 0  | 5  |
| cars      | 5  | 10 | 0  |
| computers | 0  | 5  | 10 |

- a. What is GDP in each economy? If the total value of production is consumed, how much will consumers in each economy spend on each of the goods?

Ans:

GDP is 15 in each economy, and consumers will spend 5 on each good.

- b. What will be the trade balance in each country? What will be the pattern of trade in this world (i.e., which good will each country export and to whom)?

Ans:

Each country must maintain a zero trade balance. A exports clothes to B, B exports cars to C, and C exports computers to A.

- c. Given your answer to part (b), will country A have a zero trade balance with country B? With country C? Will any country have a zero trade balance with any other country?

Ans:

No, no country will have a zero trade balance with any other country.

- d. The United States has a large trade deficit. It has a trade deficit with each of its major trading partners, but the deficit is much larger with some countries (e.g., China) than with others. Suppose the United States eliminates its overall trade deficit (with the world as a whole). Do you expect it to have a zero trade balance with every one of its trading partners? Does the especially large trade deficit with China necessarily indicate that China does not allow US goods to compete on an equal basis with Chinese goods?

Ans:

Eliminating the overall trade deficit does not necessarily imply that the United States would have bilateral balanced trade with any particular country, as is illustrated by the example above. Therefore, a large trade deficit with China could occur, whether or not US goods compete with Chinese goods on even ground.

### 3. Nominal and Real Exchange Rates

Download 'ps6sq3.xls' from the course website. The spreadsheet contains data on the following variables from 1980 to 2004:  $E$  refers to the nominal exchange rate between the US dollar and the Euro;  $P$ , the price level in the United States;  $P^*$ , the price level in the Euro area; and  $TB\_US$ , the US bilateral trade balance with the Euro area as a ratio of GDP.

NOTE: We define the nominal exchange rate as the price of a US dollar in terms of Euros.

- a. Derive the history of real exchange rates between the US dollar and the Euro from the data provided, and plot the evolution of both the nominal and the real exchange rates from 1980 to 2004. Label the figure descriptively and turn it in with your problem set.

Ans:

The real exchange rate,  $\epsilon = E \left( \frac{P}{P^*} \right)$ . See Figure I.

The nominal and the real exchange rates between the US dollar and the Euro moved hand in hand during the period from 1980 to 2004. Most of the fluctuation in  $\epsilon$  is attributable to the movement of  $E$ .

- b. Were US goods relatively cheaper or more expensive in 1985 (as opposed to 2000)? How about in 2004 (as opposed to 2000)?

Ans:

As is shown in Figure I, US goods were relatively more expensive in 1985 (as opposed to 2000) and were less expensive in 2004 (as opposed to 2000).

Figure I. Real and Nominal Exchange Rates between the US dollar and the Euro from 1980 to 2004

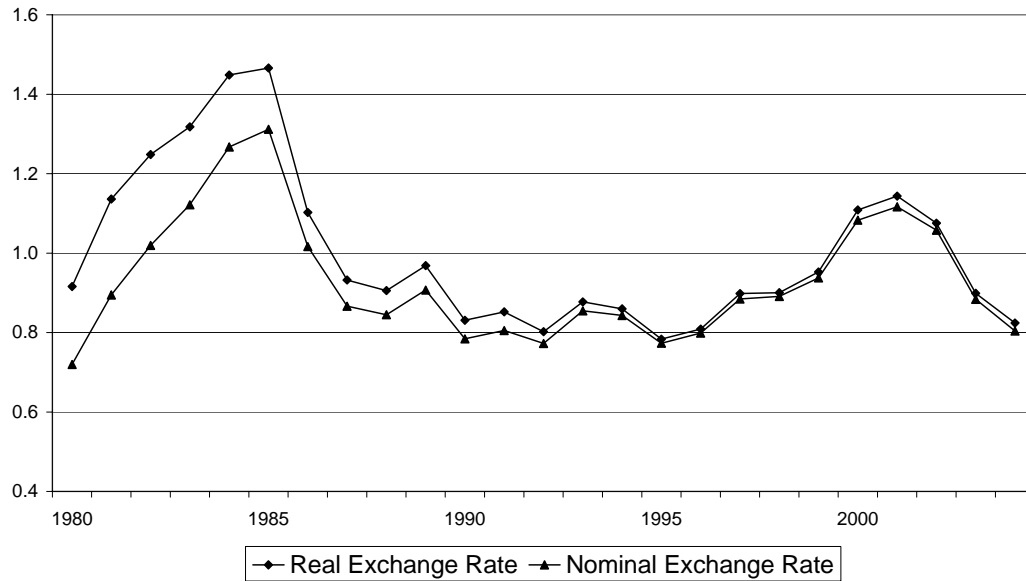


Figure 1:

#### 4. Eliminating a Trade Deficit

Consider an economy with a trade deficit ( $NX < 0$ ) and output equal to its natural level ( $Y = Y_n$ ). Assume the Marshall-Lerner condition holds.

- a. Discuss: “What is needed to reduce the trade deficit is a reduction in the budget deficit. There is no need for an exchange rate depreciation.”

Ans:

Uncertain. A fiscal contraction (i.e., decreasing  $G$  or increasing  $T$ , or in effect reducing the budget deficit ( $G - T$ )) reduces the domestic demand of goods, and thus decreases imports but leaves exports unaffected, so the trade balance improves with no need for an exchange rate depreciation. This improvement however comes with a decrease in output below  $Y_n$ , i.e., with a recession, which is not desirable.

- b. Discuss: “What is needed to reduce the trade deficit is an exchange rate depreciation. There is no need to reduce the budget deficit.”

Ans:

Uncertain. An exchange rate depreciation makes domestic goods less expensive compared to foreign goods. As a result, exports increase, and imports decrease. Given that the Marshall-Lerner condition holds in practice, the trade balance improves with no need to reduce the budget deficit. This adjustment however comes with an increase in demand, and an increase in output above  $Y_n$ , which is not desirable.

- c. Show the best combination of fiscal policy and exchange rate adjustment needed to reduce the trade deficit while maintaining output at the natural

level.

Ans:

Both a fiscal contraction and an exchange rate depreciation can reduce the trade balance. The former shifts in the IS curve and decreases output, while the latter shifts out the IS curve and increases output. Therefore, a right combination of the two can improve the trade balance while maintaining output at the natural level.

- d. Should the US want to reduce its trade deficit? If the rest of the world is willing/eager to lend to the US, why should the US worry?

Ans:

The current US trade deficit is about \$600 billion per year. Such a large trade deficit is sustainable, only if the rest of the world is not only eager to lend to the US now but also willing to continue to lend in the future. Even if financial investors were willing to continue to lend, it is not clear that it would be a wise policy for the US to accumulate such a large debt vis-à-vis the rest of the world. Hence, the US should reduce its trade deficit.

- e. If you were Secretary of the Treasury of the Bush administration, and you wanted to reduce the trade deficit, what program would you offer?

Ans:

Given the status quo, to reduce the US trade deficit requires the combination of a dollar depreciation and a fiscal contraction in the US.