PS 4
Due Wednesday October 26, 2005
Chapter 5
Problems and Applications
2; 3; 4; 5; 7; 8

2. a. National saving is the amount of output that is not purchased for current consumption by households or the government. We know output and government spending, and the consumption function allows us to solve for consumption. Hence, national saving is given by:

$$\begin{aligned} S &= Y - C - G \\ &= 5{,}000 - (250 + 0.75(5{,}000 - 1{,}000)) - 1{,}000 \\ &= 750. \end{aligned}$$

Investment depends negatively on the interest rate, which equals the world rate r^* of 5. Thus,

$$\begin{aligned} I &= 1{,}000 - 50 \times 5 \\ &= 750. \end{aligned}$$

Net exports equals the difference between saving and investment. Thus,

$$\begin{aligned} NX &= S - I \\ &= 750 - 750 \\ &= 0. \end{aligned}$$

Having solved for net exports, we can now find the exchange rate that clears the foreign-exchange market:

$$\begin{aligned} NX &= 500 - 500 \times \varepsilon \\ 0 &= 500 - 500 \times \varepsilon \\ \varepsilon &= 1. \end{aligned}$$

b. Doing the same analysis with the new value of government spending we find:

$$\begin{aligned} S &= Y - C - G \\ &= 5{,}000 - (250 + 0.75(5{,}000 - 1{,}000)) - 1{,}250 \\ &= 500 \end{aligned}$$

$$\begin{aligned} I &= 1{,}000 - 50 \times 5 \\ &= 750 \end{aligned}$$

$$\begin{aligned} NX &= S - I \\ &= 500 - 750 \\ &= -250 \end{aligned}$$

$$NX = 500 - 500 \times \varepsilon$$

$$-250 = 500 - 500 \times \varepsilon$$

$$\varepsilon = 1.5.$$

The increase in government spending reduces national saving, but with an unchanged world real interest rate, investment remains the same. Therefore, domestic investment now exceeds domestic saving, so some of this investment must be financed by borrowing from abroad. This capital inflow is accomplished by reducing net exports, which requires that the currency appreciate.

c. Repeating the same steps with the new interest rate,

$$S = Y - C - G$$
$$= 5{,}000 - (250 + 0.75(5{,}000 - 1{,}000)) - 1{,}000$$
$$= 750$$

$$I = 1{,}000 - 50 \times 10$$
$$= 500$$

$$NX = S - I$$
$$= 750 - 500$$
$$= 250$$

$$NX = 500 - 500 \times \varepsilon$$

$$250 = 500 - 500 \times \varepsilon$$

$$\varepsilon = 0.5.$$

Saving is unchanged from part (a), but the higher world interest rate lowers investment. This capital outflow is accomplished by running a trade surplus, which requires that the currency depreciate.

a. When Leverett's exports become less popular, its domestic saving $Y - C - G$ does not change. This is because we assume that Y is determined by the amount of capital and labor, consumption depends only on disposable income, and government spending is a fixed exogenous variable. Investment also does not change, since investment depends on the interest rate, and Leverett is a small open economy that takes the world interest rate as given. Because neither saving nor investment changes, net exports, which equal $S - I$, do not change either. This is shown in Figure 5–6 as the unmoving $S - I$ curve.

The decreased popularity of Leverett's exports leads to a shift inward of the net exports curve, as shown in Figure 5–6. At the new equilibrium, net exports are unchanged but the currency has depreciated.

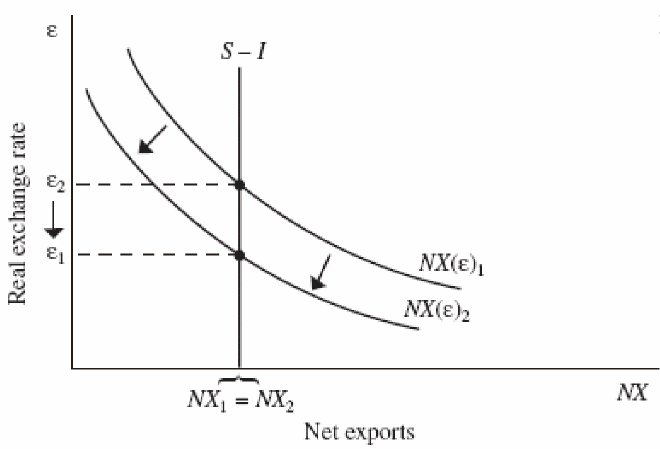

Figure 5–6

Even though Leverett's exports are less popular, its trade balance has remained the same. The reason for this is that the depreciated currency provides a stimulus to net exports, which overcomes the unpopularity of its exports by making them cheaper.

b. Leverett's currency now buys less foreign currency, so traveling abroad is more expensive. This is an example of the fact that imports (including foreign travel) have become more expensive—as required to keep net exports unchanged in the face of decreased demand for exports.

c. If the government reduces taxes, then disposable income and consumption rise. Hence, saving falls so that net exports also fall. This fall in net exports puts upward pressure on the exchange rate that offsets the decreased world demand. Investment and the interest rate would be unaffected by this policy since Leverett takes the world interest rate as given.

4. The increase in government spending decreases government saving and, thus, decreases national saving; this shifts the saving schedule to the left, as in Figure 5–7. Given the world interest rate r^*, the decrease in domestic saving causes the trade balance to fall.

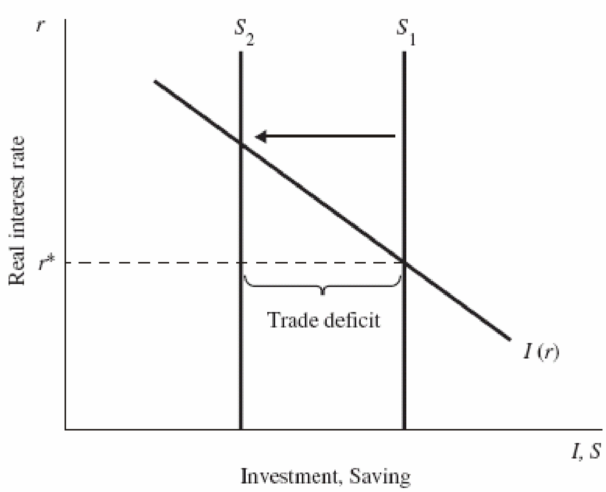

Figure 5–7

Figure 5–8 shows the impact of this increase in government purchases on the real exchange rate. The decrease in national saving causes the $(S - I)$ schedule to shift to the left, lowering the supply of dollars to be invested abroad. The lower supply of dollars causes the equilibrium real exchange rate to rise. As a result, domestic goods become more expensive relative to foreign goods, which causes exports to fall and imports to rise. In other words, as we determined in Figure 5–7, the trade balance falls.

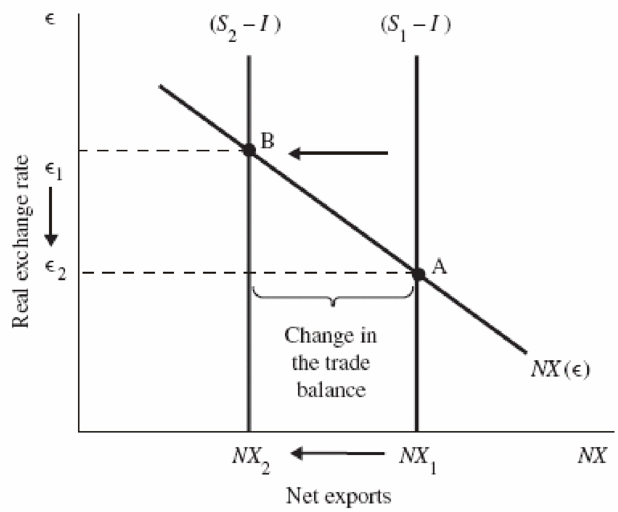

Figure 5–8

The answer to this question does depend on whether this is a local war or a world war. A world war causes many governments to increase expenditures; this increases the world interest rate r^*. The effect on a country's external accounts depends on the size of the change in the world interest rate relative to the size of the decrease in saving. For example, an increase in the world interest rate could cause a country to have a trade deficit, as in Figure 5–9, or a trade surplus, as in Figure 5–10.

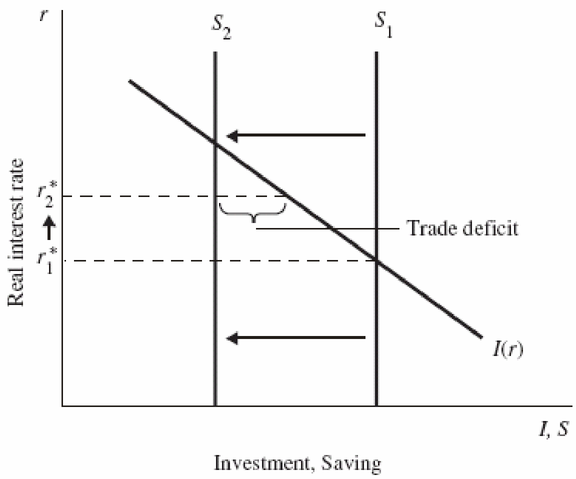

Figure 5–9

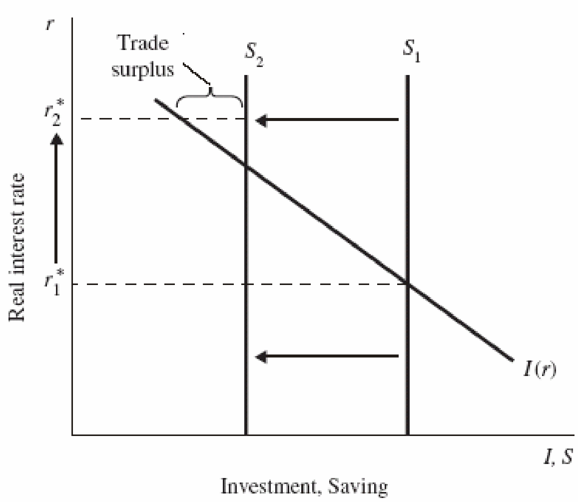

Figure 5–10

5. Clinton's policy would not affect net exports because it does not affect national saving (because it would not affect Y, C, or G) or investment. It would, however, shift the NX curve by decreasing U.S. demand for Japanese auto imports. This shift of the curve, shown in Figure 5–11, would raise the exchange rate. Although net exports would not change, the volume of both imports and exports would fall by the same amount.

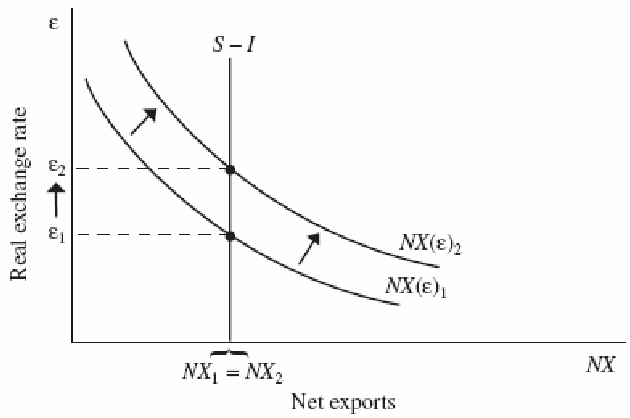

Figure 5–11

There are also important compositional effects of this policy. On the production side, the higher exchange rate increases imports and puts pressure on the sales of American companies with the exception of American luxury car production, which is shielded by the tariff. Also American exporters will be hurt by the higher exchange rate, which makes their goods more expensive to foreign countries. Consumers of Japanese luxury cars will be hurt by the tariffs while all other consumers will benefit from the appreciated dollar, which allows them to purchase goods more cheaply. In sum, the policy would shift demand to American luxury car producers at the expense of the rest of American production and also shift consumption from Japanese luxury cars to all other imports.

7. The easiest way to tell if your friend is right or wrong is to consider an example. Suppose that ten years ago, a cup of American coffee cost \$1, while a cup of Italian espresso cost 1,000 lira. Since \$1 bought 1,000 lira ten years ago, it cost the same amount of money to buy a cup of coffee in both countries. Since total U.S. inflation has been 25 percent, the American cup of coffee now costs \$1.25. Total Italian inflation has been 100 percent, so the Italian cup of espresso now costs 2,000 lira. This year, \$1 buys 1,500 lira, so that the cup of espresso costs 2,000 lira/[1,500 lira/dollar] = \$1.33. This means that it is now more expensive to purchase espresso in Italy than coffee in the United States.

Thus, your friend is simply wrong to conclude that it is cheaper to travel in Italy. Even though the dollar buys more lira than it used to, the relatively rapid inflation in Italy means that lira buy fewer goods than they used to—it is more expensive now for an American to travel there.

8. a. The Fisher equation says that

$$i = r + \pi^e$$

where

i = the nominal interest rate
r = the real interest rate (same in both countries)
π^e = the expected inflation rate.

Plugging in the values given in the question for the nominal interest rates for each country, we find:

$$12 = r + \pi^e_{\text{Can}*}$$

$$8 = r + \pi^e_{\text{US}*}$$

This implies that

€€€€€€€€€€€€€€$\pi^e_{\text{Can}} - \pi^e_{\text{US}} = 4.$

Because we know that the real interest rate r is the same in both countries, we conclude that expected inflation in Canada is four percentage points higher than in the United States.

b. As in the text, we can express the nominal exchange rate as

$$e = \varepsilon \times (P_{\text{Can}}/P_{\text{US}}),$$

where

ε = the real exchange rate
P_{Can} = the price level in Canada
P_{US} = the price level in the United States.

The change in the nominal exchange rate can be written as:

$$\% \text{ change in } e = \% \text{ change in } \varepsilon + (\pi_{\text{Can}} - \pi_{\text{US}}).$$

We know that if purchasing-power parity holds, than a dollar must have the same purchasing power in every country. This implies that the percent change in the real exchange rate ε is zero because purchasing-power parity implies that the real exchange rate is fixed. Thus, changes in the nominal exchange rate result from differences in the inflaction rates in the United States and Canada. In equation form this says

$$\% \text{ change in } e = (\pi_{\text{Can}} - \pi_{\text{US}}).$$

Because economic agents know that purchasing-power parity holds, they expect this relationship to hold. In other words, the expected change in the nominal exchange rate equals the expected inflation rate in Canada minus the expected inflation rate in the United States. That is,

$$\text{Expected } \% \text{ change in } e = \pi^e_{\text{Can}} - \pi^e_{\text{US}*}$$

In part (a), we found that the difference in expected inflation rates is 4 percent. Therefore, the expected change in the nominal exchange rate e is 4 percent.

c. The problem with your friend's scheme is that it does not take into account the change in the nominal exchange rate e between the U.S. and Canadian dollars. Given that the real interest rate is fixed and identical in the United States and Canada, and given purchasing-power parity, we know that the difference in nominal interest rates accounts for the expected change in the nominal exchange rate between U.S. and Canadian dollars. In this example, the Canadian nominal interest rate is 12 percent, while the U.S. nominal interest rate is 8 percent. We conclude from this that the expected change in the nominal exchange rate is 4 percent. Therefore,

$$e \text{ this year} = 1 \text{ C\$/US\$}.$$
$$e \text{ next year} = 1.04 \text{ C\$/US\$}.$$

Assume that your friend borrows 1 U.S. dollar from an American bank at 8 percent, exchanges it for 1 Canadian dollar, and puts it in a Canadian Bank. At the end of the year your friend will have $1.12 in Canadian dollars. But to repay the American bank, the Canadian dollars must be converted back into U.S. dollars. The $1.12 (Canadian) becomes $1.08 (American), which is the amount owed to the U.S. bank. So in the end, your friend breaks even. In fact, after paying for transaction costs, your friend loses money.