**Econ 522: Intermediate Macroeconomics, Fall 2017**
Chapter 6 Open Economy Practice Problems

1. **Define net capital outflow, and net exports. Explain how the two are related.**

2. **Define the nominal exchange rate and the real exchange rate.**

3. **Consider an economy described by the following equations:**

$$\begin{aligned} Y &= C + I + G + NX, \\ Y &= 5,000, \\ G &= 1,000, \\ T &= 1,000, \\ C &= 250 + 0.75(Y - T), \\ I &= 1,000 - 50r, \\ NX &= 500 - 500\epsilon, \\ r &= r^* = 5 \end{aligned}$$

   (a) **In this economy, solve for national saving, investment, the trade balance, and the equilibrium exchange rate.**

   Savings is determined in the same way as before. National savings is the sum of public and private savings. Public savings is the difference between taxes and government spending. Private savings is what's left over from income after consumers pay for taxes and consumption.

$$\text{Pub S} \;=\; T - G \;=\; 1,000 - 1,000 \;=\; 0$$

$$\text{Priv S} \;=\; Y - C - T \;=\; 5,000 - C - 1,000$$

   $C$ is given by the consumption function, which can be solved by plugging in $Y$ and $T$ (disposable income): $C = 250 + .075(5,000 - 1,000) = 3,250$. Using that number for $C$, you can find private saving.

$$\text{Priv S} \;=\; Y - C - T \;=\; 5,000 - 3,250 - 1,000 \;=\; 750$$

   Finally, $\text{Ntnl S} \;=\; \text{Priv S} + \text{Pub S} \;=\; 750 + 0 \;=\; 750$.

   Investment is slightly different now. Before, we set would set the $I$ equation equal to $S$, and solve for $r$. Then that $r$ plugged into the $I$ equation gave the amount of investment. (Which in a closed economy always ended up being equal to savings). Now the world real intrest rate will give the amount of investment. For this part of the problem it comes out the same, but it won't always.

$$I \;=\; 1,000 - 50r^* \;\Rightarrow\; I \;=\; 1,000 - 50(5) \;=\; 750$$

   The trade balance refers to net exports and net capital outflow, which are the same in equilibrium. It can be found as the difference between $S$ and $I$. Here it is 0.

The real exchange rate can be found using the $NX$ equation and plugging in the trade balance for $NX$:

$$0 \;=\; 500 - 500\epsilon \;\Rightarrow\; \epsilon \;=\; 1$$

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(b) **Imagine now that $G$ increases to 1,250. Solve for national saving, investment, the trade balance, and the equilibrium exchange rate. Explain what you find.**

The increase in $G$ will decrease public savings. Consumption and private saving do not change. National saving decreases by the same amount as public savings.

$$\begin{aligned} \text{Pub S} &= 1,000 - 1,250 = -250 \\ \text{Priv S} &= 750 \\ \text{Ntnl S} &= 750 - 250 \end{aligned}$$

A changes in savings in a small open economy will not change the world real interest rate. Because $r^*$ doesn't change, $I$ will not change either.

$$I \;=\; 1,000 - 50r^* \;\Rightarrow\; I \;=\; 1,000 - 50(5) \;=\; 750$$

You can solve for the trade balance using the difference in $S$ and $I$.

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

Finally, using the new trade balance value you can solve for the real exchange rate $\epsilon$.

$$\begin{aligned} -250 &= 500 - 500\epsilon \\ 500\epsilon &= 500 + 250 \\ 500\epsilon &= 750 \\ \epsilon &= 750/500 \\ \epsilon &= 1.5 \end{aligned}$$

So the increased government spending to a decrease in public saving, and in total national saving. The decrease in saving leads to a trade deficit (starting from balanced trade as was the case in part a). The trade deficit puts upward pressure on the real exchange rate.

Unlike in the closed economy case, in the small open economy case the change in saving does not change the real interest rate. The investment level does not change because it is now determined by the world real interest rate. The funds used to finance investment in excess of saving are received from abroad. The increased borrowing from abroad results in a trade deficit, putting upward pressure on the real exchange rate.

(c) **Now imagine that the world interest rate rises from 5 to 10 percent, and that $G$ has returned to its original level of 1,000. Solve for national saving, investment, the trade balance, and the equilibrium exchange rate. Explain what you find.**

Back to the original level of $G$, savings will be the same as in part (a). $S = 750$. The new world interest rate will change the level of investment.

$$I = 1,000 - 50r^* \Rightarrow I = 1,000 - 50(10) = 500$$

The change in investment will change the trade balance, which will in turn lead to a change in the real exchange rate.

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

$$\begin{aligned} 250 &= 500 - 500\epsilon \\ 500\epsilon &= 500 - 250 \\ 500\epsilon &= 250 \\ \epsilon &= 250/500 \\ \epsilon &= 0.5 \end{aligned}$$

So the increased real interest rate leads to a decrease in investment. The decrease in investment leads to a trade surplus (starting from balanced trade as was the case in part a). The trade surplus puts downward pressure on the real exchange rate.

Unlike in the closed economy case, in the small open economy case savings can be greater than investment. The real interest rate does not adjust. The extra savings are sent abroad. The increase in making loans abroad results in a trade surplus, putting downward pressure on the real exchange rate.

4. **Use the small open economy model to predict what would happen to the trade balance, real exchange rate, and the nominal exchange rate in response to each of the following events.** *Don't worry about the nominal exchange rate. We have not covered that part.*

   (a) **Declining consumer confidence about the future induces consumers to spend less and save more.**

   This will increase private savings and national savings (shifting the supply curve right in the LF market). Domestic investment and the world real interest rate stay the same. The increased savings increases the supply of funds to be loaned abroad. Net capital outflow ($S - I$) shifts right in the foreign exchange market graph (it increases). This decreases the real exchange rate, which in turn increases net exports.

   (b) **Tax reform increases firm incentives to build new factories.**

   This will increase investment (shifting the demand curve right in the LF market). Domestic saving and the world real interest rate stay the same. The increased investment will be financed by borrowing from abroad. Net capital outflow ($S - I$) shifts left in the foreign exchange market graph (it decreases). This increases the real exchange rate, which in turn decreases net exports.

   (c) **A cool new product produced abroad increases preferences for imports over domestic goods.**

   This change in consumer preferences won't change savings or investment. It will shift the $NX$ curve to the left (an increase). The trade balance will not end up changing (because net capital outflow does not change), but will result in downward pressure on the real exchange rate. The level of net exports stays the same and the real exchange rate decreases.

5. **Imagine a small open economy that specializes in production and export of pagers. What happens if a sudden change in worldwide tastes makes pagers less popular. In particular,**

   (a) **What happens to the country's saving, investment, net exports, the interest rate, and the exchange rate? Hint: think of the decline in demand for exports from the country as shifting the country's NX (FX demand) curve. Only one of the listed variables will end up changing. And it will be the one determined by FX supply and demand equilibrium.**

   Neither saving nor investment change. The change in demand for the country's exports will shift its NX curve to the left. This will decrease the real exchange rate. The interest rate and equilibrium level of net exports does not change.

   (b) **How will this change in the exchange rate impact residents of the country who like to travel abroad? Will doing so become more or less expensive?**

   Traveling abroad will become more expensive, because the currency will now buy less in terms of foreign goods.

   (c) **If the country's government wanted to adjust taxes to maintain the exchange rate at its previous level, what should it try to do? And what would be the overall effects on saving, investment, net exports, and the interest rate?**

   It would need to decrease taxes. Decreasing taxes should increase disposable income and consumption. Savings will decrease (public savings decreases by more than private saving increases). This will shift the net capital outflow curve ($S - I$) to the left. Net exports will decrease and the real exchange rate will increase. Investment and the real interest rate do not change.