Chapter 5: Open Economy (A Long Run Model for Small Open Economy)

Assumptions

Because it is a long run model, we can apply classical dichotomy. That is, we first determine real variables (such as net export and real exchange rate), then we determine nominal variables (such as nominal exchange rate).

Because the economy is open and small, the domestic real interest rate must be the same as world real interest rate (otherwise international arbitrage would make it so).

So unlike the big closed economy in which real interest rate adjusts to equilibrating saving and investment (so is endogenous), the small open economy takes the real interest rate as given (so is exogenous).

National Income Accounting for Open Economy

Let $Z^d$ denote the component of expenditure on domestic goods and service, $Z^f$ the component of expenditure on foreign goods and service,

By definition of GDP, we have

$$Y = C^d + I^d + G^d + X \quad (1)$$

where $X$ denotes export (the foreign expenditure on domestic goods and service)
Using the fact that $C^d = C - C^f, I^d = I - I^f, G^d = G - G^f$
we can rewrite (1) as

\[ Y = C + I + G + (X - IM) = C + I + G + NX \quad (2) \]

where $IM = C^f + I^f + G^f$ denote the import (domestic expenditure on foreign goods and service), and $NX = X - IM$ the net export (or trade balance)

**Net Export**

Identity (2) implies that

\[ NX = Y - (C+I+G) \quad (3) \]

So net export is the difference between total output ($Y$) and total spending ($C+I+G$)

If output exceeds the total spending, we export the difference, and $NX$ is positive (trade surplus). If output falls short of spending, we import the difference and $NX$ is negative (trade deficit).

Recall Figure 2-1, which shows that total output equals the total income. So another way to interpret (3) is, when $NX$ is negative we overspend and must borrow from abroad, and there is capital inflow.

When $NX$ is positive we spend only part of income, so we must lend to foreign countries, and there is capital outflow.
Thus by looking at a country’s net export, we can tell whether this country is debtor or creditor.

Quick check: can you find the recent data about US’ trade balance. What does that number tell you? How about China?

There is another way to look at NX. Rewrite (3) as

\[
NX = (Y - C - G) - I = S - I \quad (4)
\]

So NX is also the difference between national saving (S) and investment.

Discuss:
When economy is closed, NX = 0. This is so because real interest rate adjusts so that saving and investment are equal, see Figure 3-8

When economy is small and open, in general NX \(\neq 0\). This is because the small open economy takes the world real interest rate as given. In other words, the investment is fixed at the level of I(\(r^*\)), and in general I(\(r^*\)) \(\neq S\).

If we assume fixed factors of labor and capital, the total output is fixed at \(\bar{Y} = F(\bar{K}, \bar{L})\). However, the government can change the national saving by changing the tax and government expenditure.
Exercise: Show how a rise in G (fiscal expansion) affects NX.

Exercise: Show how a tax cut affects NX.

Exercise: show how a rise in world real interest rate affects NX

Exercise: show how an outward shift in investment curve affects NX
The bottom line is, in order to evaluate the impact of a policy on NX, we need to first look at its effect on saving and investment. Policies that decrease investment or increase saving tend to cause a trade surplus.

Critical thinking: Take into account that US dollar is reserve currency, is the severity of US foreign debt overestimated or underestimated?

**Exchange rate**

The nominal exchange rate is the rate at which one currency trades for another currency.

There are two equivalent ways to report (quote) nominal exchange rate:

The exchange rate of 120 yen per dollar is the same as the exchange rate of 0.00833 dollar per yen. One number is the inverse of the other.

This book expresses the exchange rate in units of foreign currency per dollar.

If the exchange rate goes up, dollar appreciates (strengthens)
If the exchange rate goes down, dollar depreciates (weakens)

The real exchange rate (terms of trade) is the relative price of the goods of two countries. That is, the real exchange rate tells us the rate at which we can trade the goods of one country for the goods of another.

Let $\varepsilon$ denote the real exchange rate, $e$ the nominal exchange rate, $P$ the domestic price and $P^*$ foreign price, then

$$\varepsilon = \frac{eP}{P^*} \quad (5)$$

If $\varepsilon = 2$, then we can trade one unit of domestic good for two units of foreign good. The term of trade improves when $\varepsilon$ rises.

If the real exchange rate is high, foreign goods are relatively (cheap expensive). So our net export will be (big small)

If the real exchange rate is low, foreign goods are relatively (cheap expensive). So our net export will be (big small)

To sum up, as real exchange rate rises, net export (rises falls) So the real exchange rate and net export have a (positive negative) relationship.

Mathematically we can write

$$NX = NX(\varepsilon), \quad \frac{dNX}{d\varepsilon} < 0 \quad (6),$$
See Figure 5-7

So after we determine NX, we can determine real exchange rate using (6) (or figure 5-7).

Alternatively, we can treat S-I as the supply of domestic currency, and the net export as the demand of domestic currency (why?). As domestic currency appreciates (in real term), domestic goods become more expensive, so the net export falls and the demand for domestic currency falls.

Exercise: show how a domestic fiscal expansion affects the real exchange rate

Discuss: how does a tariff on imported goods affect NX and real exchange rate. The theoretical answer is given in Figure 5-12. For a real example, read the handout.
Purchasing Power Parity (PPP)

A hypothesis in microeconomics called law of one price states that arbitrage would happen so that the same good would have the same common-currency prices in different countries, or equivalently, one US dollar should have same purchasing power in different countries.

The logic is that arbitrage will push the nominal exchange rate and price to adjust so that

$$\varepsilon \equiv 1 \quad (7)$$

(7) is called absolute purchasing power parity (the macroeconomic version of law of one price). (7) and (5) jointly imply that the nominal exchange rate is determined by prices in two countries:

$$e = \frac{p^*}{p} \quad (8)$$

In reality (7) may fail due to factors such as transaction cost and nontraded components. See case study on page 148.

We can reach a conclusion weaker than (7) by rewriting (5) as
By using the arithmetic trick on page 26, we can get

\[ e = \frac{\varepsilon P^*}{P} \quad (8) \]

\[ e\% = \varepsilon\% + P^\% - P\% = \pi^* - \pi \quad (9) \]

The last equality follows if we assume \( \varepsilon\% = 0 \).

Equation (9) is called relative purchasing power parity. It says that the percentage change in nominal exchange rate \( (e\%) \) is equal to the inflation differential \( (\pi^* - \pi) \).

Evidence for relative PPP can be seen in Figure 5-13.

Quick Check

If the inflation rate in Zimbabwe is higher than US, do you expect Zimbabwe currency to appreciate or depreciate against US dollar?

Discuss: how to do the long-term forecast for the Yen-Dollar exchange rate? Hint: forecast NX (and real exchange rate) first, then the inflation differential (and nominal exchange rate).
Discuss: we already know fiscal policy has impact on real exchange rate. Does monetary policy have impact on real exchange rate? How about nominal exchange rate? Is your answer consistent with classical dichotomy?

Discuss: why do we care about exchange rate? Suppose you are considering a long term investment in foreign country.

Discuss: this chapter is concerned with a long run model for exchange rate. How is exchange rate determined in short run?