Lecture 15 - Notes

François Geerolf
UCLA
Intermediate Macroeconomics, Econ 102

During this lecture, we finish up Chapter 18 and start to review Chapter 19.

1 Combining Exchange Rate and Fiscal Policies

In the previous lecture (available here), we saw that an increase in the trade deficit was not necessarily a bad sign – or at least, that it was often the feature of a booming economy, with high aggregate demand. Conversely, a reduction in the trade deficit, or almost equivalently a reduction in the current account deficit, is not always a good sign.[1] For example, the Focus Box in Blanchard (2017) shows that Spain, Portugal, and Greece, which were borrowing abroad from 1999 to 2008 (mostly from Germany), had current account deficits reaching 9% of GDP for Spain, 12% of GDP for Portugal, and 14% for Greece by 2009. This is illustrated on Figure 1.

All these countries were "able to reduce their borrowing" by 2013. However, as Figure 2 shows, this adjustment was done through what is called import compression, resulting from lower output: there was less aggregate demand, which led to unemployment, feeding back into lower aggregate demand. That is why, in particular, demand for foreign products declined. In this case, because these countries were part of the Euro area, an area with fixed exchange rates, they were not able to devalue their currency to regain competitiveness, and increase exports. All the adjustment in the external balance had to come about through the reduction in GDP, which would decrease imports.

More generally, in order to hit two targets, one needs two instruments. The only way to reduce a trade deficit if one cannot use the real exchange rate is indeed to force GDP to contract. (and therefore, unemployment to increase) Similarly, an increase in net exports, coming about from a depreciation of the real exchange rate (if the Marshall-Lerner condition is satisfied), will bring an improvement in the trade balance. Through the multiplier effect, there will be multiple rounds of additional spending. In order to decrease the trade deficit, one may also potentially want to decrease government spending at the same time, in order to avoid overheating the economy. Therefore, as Table 1 shows, a depreciation of the real exchange rate is only warranted if the economy initially has a trade deficit.

[1] Why can we use the terms "current account deficit" and "trade deficit" interchangeably, at least when we talk about their variations? (and this is often done in the popular press) Recall that the Current Account CA is given by the sum of Net Exports NX, net income NI and net transfers NT: $CA \equiv NX + NI + NT$. But since the change in NX dominate the change in the CA, because net income and net transfers are both small and do not move a lot, we are always tempted to use those two terms interchangeably when we talk about changes.

Figure 1: Euro Periphery Current Account Deficits Since 2000

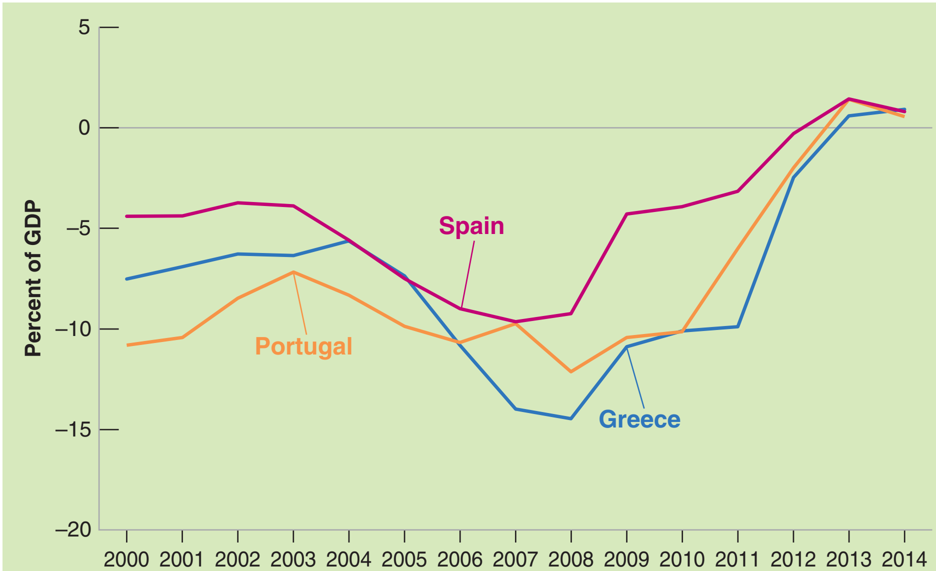


Figure 1 *Euro periphery Current Account Deficits since 2000*

Figure 2: Imports, Exports, and GDP in Greece Since 2000

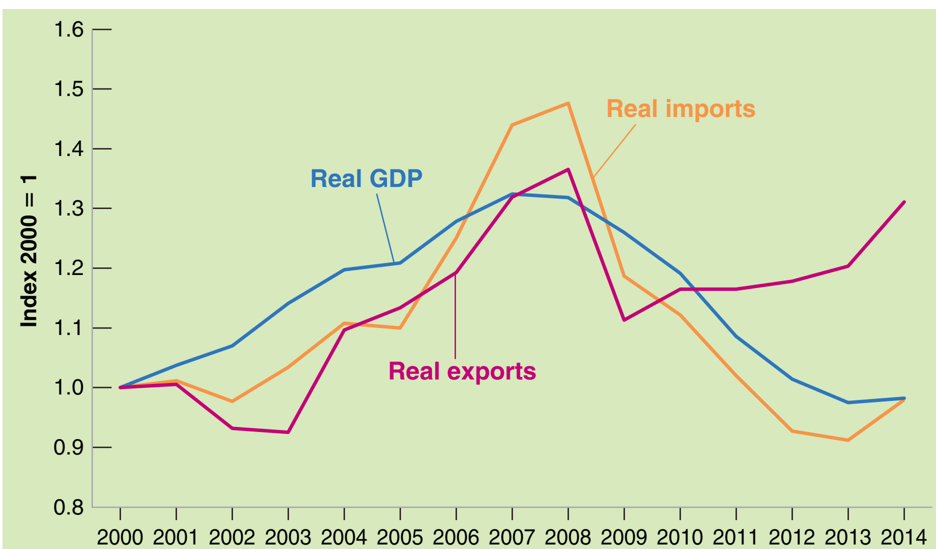


Figure 2 *Imports, Exports, and GDP in Greece since 2000*

In general, if one is trying to manage both net exports as well as the level of output, one will in general need to use both instruments: the exchange rate tool, as well as the fiscal tool. Table 1 shows more generally which policies should be implemented based on whether trade is in surplus or deficit, and whether the economy is booming or in a recession:

- Government spending needs to be changed if one has either a trade surplus and low output or a trade deficit and high output.
- The real exchange rate also clearly needs to be changed if one has either a trade deficit and low output, or a trade surplus and high output.

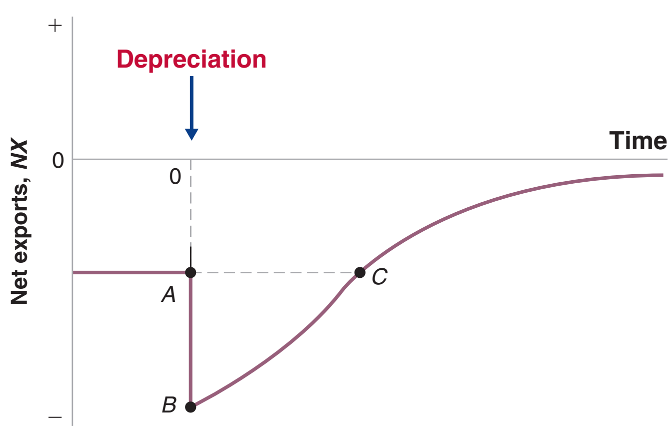
Table 1: Exchange Rate and Fiscal Policy Combinations

Initial Conditions	Trade Surplus	Trade Deficit
Low output	ϵ? G$\nearrow$	$\epsilon\searrow$ G?
High output	$\epsilon\nearrow$ G?	ϵ? G$\searrow$

2 The dynamics of net exports: the J-curve

In lecture 14, we saw that under the Marshall-Lerner condition, the trade balance would improve following a depreciation of the currency, despite the negative valuation effect on the trade balance. However, in practice, the negative valuation effect on net exports is immediate.[2] In contrast, the positive effects on export and import volumes (which require consumers to shift their purchases towards the cheaper goods) only come about gradually. Therefore, the dynamic of net exports after a devaluation traces a J-curve: an initial deterioration of net exports, followed by an improvement.

Figure 3: The J-Curve



[2] An example might help. Imagine you are Argentina and you import oil whose price is quoted in dollars. If 1 dollar = 20 pesos initially, and the barrel of oil is at \$70, then the price of a barrel of oil is 1400 pesos. If you devalue the peso, say at 1 dollar = 25 pesos, then oil will be more expensive in pesos: the price of that barrel of oil is now 1750 pesos. This means that the value of your imports will increase instantaneously following a devaluation, which will worsen the trade balance. That's the negative valuation effect.

3 Current Accounts in the open economy

The Keynesian analysis in the first lectures relied heavily on the fact that investment equals saving: the paradox of thrift (note here), the effects of deficit reduction (note here), etc. What happens to this identity in an open economy? The answer is that if CA is the current account, that is the sum of net exports, net income and net transfers:

$$CA \equiv NX + NI + NT$$

then the current account is simply the difference between total saving and investment:

$$\boxed{CA = S + (T - G) - I}$$

Note that if the economy is closed, then $NX = NI = NT = 0$ and therefore $CA = 0$. This implies that investment equals total saving:

$$I = S + (T - G)$$

How do we arrive at the above relationship? Starting from the definition of demand in the open economy:

$$Y = C + I + G \underbrace{- \frac{IM}{\epsilon} + X}_{NX}$$

This implies:

$$Y - T - C = I + (G - T) + NX$$

However, the left-hand side is not exactly saving, because the income of domestic residents in the open economy is not given by Y but by $Y + NI + NT$:

$$(Y + NI + NT - T) - C = I + (G - T) + (NX + NI + NT)$$

Finally, using the above definition:

$$S = I + (G - T) + CA$$

4 The change in Net Exports through the lens of $CA = S + (T - G) - I$

We are coming back to the impact of 1) an increase in government spending 2) an increase in foreign demand 3) a decrease in taxes on the current account.

$$C = c_0 + c_1 (Y - T)$$
$$I = b_0 + b_1 Y$$
$$IM = \epsilon m_1 Y$$
$$X = \frac{x_1 Y^*}{\epsilon}$$

In the model of lecture 14, aggregate demand is given by:

$$\begin{aligned} Z &= C + I + G - \frac{IM}{\epsilon} + X \\ &= c_0 + c_1 (Y - T) + b_0 + b_1 Y + G - m_1 Y + \frac{x_1 Y^*}{\epsilon} \\ Z &= \left(c_0 - c_1 T + b_0 + G + \frac{x_1 Y^*}{\epsilon} \right) + (c_1 + b_1 - m_1) Y \end{aligned}$$

Therefore, using that demand equals output in equilibriuym ($Y = Z$), we arrive at the result in lecture 14:

$$Y = \frac{1}{1 - (c_1 + b_1 - m_1)} \left(c_0 - c_1 T + b_0 + G + \frac{x_1 Y^*}{\epsilon} \right).$$

4.1 Increase in government spending

The increase in government spending $\Delta G > 0$ leads to an increase in output $\Delta Y > 0$ given by:

$$\Delta Y = \frac{\Delta G}{1 - (c_1 + b_1 - m_1)}$$

Let us now look at the impact on the current account assuming again that $NI = NT = 0$. The current account balance is given by:

$$CA = S + (T - G) - I$$

Therefore the change in the Current Account CA is the change in private saving, plus the change in public saving, minus the change in investment:

$$\Delta CA = \Delta S + \Delta (T - G) - \Delta I$$

Private saving is given by:

$$\begin{aligned} S &= Y - T - C \\ S &= -c_0 + (1 - c_1)(Y - T) \end{aligned}$$

Thus, private saving increases, a positive contribution to the Current Account:

$$\Delta S = (1 - c_1) \Delta Y > 0$$

Public saving decreases because of government spending, a negative contribution to the Current Account:

$$\Delta (T - G) = -\Delta G < 0$$

Investment increases, which is also a negative contribution to the Current Account:

$$\Delta I = b_1 \Delta Y > 0.$$

In total, the total of these contributions is negative as:

$$\begin{aligned}
\Delta CA &= (1-c_1)\,\Delta Y - \Delta G - b_1 \Delta Y \\
&= (1-c_1-b_1)\,\Delta Y - \Delta G \\
&= \frac{1-c_1-b_1}{1-(c_1+b_1-m_1)}\Delta G - \Delta G \\
\Delta CA &= -\frac{m_1}{1-(c_1+b_1-m_1)}\Delta G < 0
\end{aligned}$$

This could have been obtained directly from the change in imports:

$$\Delta\left(X - \frac{IM}{\epsilon}\right) = -\Delta\left(\frac{IM}{\epsilon}\right) = -m_1 \Delta Y = -\frac{m_1}{1-(c_1+b_1-m_1)}\Delta G.$$

4.2 Increases in foreign demand

The increase in foreign demand $\Delta Y^* > 0$ leads to an increase in output given by:

$$\Delta Y = \frac{1}{\epsilon}\frac{x_1}{1-(c_1+b_1-m_1)}\Delta Y^* > 0$$

Therefore the change in the Current Account CA is again the change in private saving, plus the change in public saving (equal to $\Delta\,(T-G) = 0$), minus the change in investment:

$$\begin{aligned}
\Delta CA &= \Delta S + \Delta\,(T-G) - \Delta I \\
&= (1-c_1)\,\Delta Y - b_1 \Delta Y \\
&= (1-c_1-b_1)\,\Delta Y \\
\Delta CA &= \frac{1}{\epsilon}\frac{x_1\,(1-c_1-b_1)}{1-(c_1+b_1-m_1)}\Delta Y^* > 0
\end{aligned}$$

There is an increase in private saving, and a lower increase in investment. Again, this could have been obtaned directly from the change in exports and imports:

$$\begin{aligned}
\Delta\left(X - \frac{IM}{\epsilon}\right) &= \frac{x_1}{\epsilon}\Delta Y^* - m_1 \Delta Y \\
&= \frac{x_1}{\epsilon}\Delta Y^* - \frac{1}{\epsilon}\frac{m_1 x_1}{1-(c_1+b_1-m_1)}\Delta Y^* \\
\Delta\left(X - \frac{IM}{\epsilon}\right) &= \frac{1-(c_1+b_1)}{1-(c_1+b_1-m_1)}\frac{x_1}{\epsilon}\Delta Y^* > 0
\end{aligned}$$

4.3 Decrease in taxes (or increase in transfers)

The decrease in taxes $\Delta T < 0$ leads to an increase in output $\Delta Y > 0$ given by:

$$\Delta Y = -\frac{c_1}{1-(c_1+b_1-m_1)}\Delta T > 0$$

Therefore the change in the Current Account CA is again the change in private saving, plus the change in public saving, minus the change in investment:

$$\begin{aligned}
\Delta CA &= \Delta S + \Delta\left(T - G\right) - \Delta I \\
&= \left(1 - c_1\right)\left(\Delta Y - \Delta T\right) + \Delta T - \Delta I \\
&= \left(1 - c_1 - b_1\right)\Delta Y + c_1 \Delta T \\
&= -\frac{1 - c_1 - b_1}{1 - (c_1 + b_1 - m_1)} c_1 \Delta T + c_1 \Delta T \\
&= \left(1 - \frac{1 - c_1 - b_1}{1 - (c_1 + b_1 - m_1)}\right) c_1 \Delta T \\
\Delta CA &= \frac{m_1}{1 - (c_1 + b_1 - m_1)} c_1 \Delta T < 0
\end{aligned}$$

Again, this could have been obtained directly from the change in imports:

$$\Delta\left(X - \frac{IM}{\epsilon}\right) = -\Delta\left(\frac{IM}{\epsilon}\right) = -m_1 \Delta Y = \frac{m_1 c_1}{1 - (c_1 + b_1 - m_1)} \Delta T.$$

5 Output, the Interest Rate and the Exchange Rate (Chapter 19)

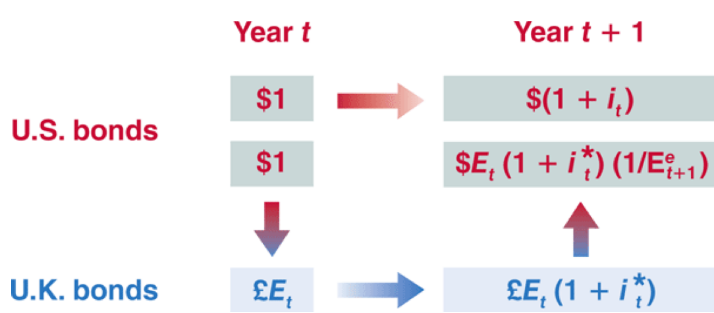
Assume that prices are fixed in the short run, so that the real exchange rate is driven by the nominal exchange rate ($\epsilon = EP/P^*$). The equilibrium in the goods market is given by:

$$Y = C\left(Y - T\right) + I(Y, i) + G + NX(Y, Y^*, E)$$

where the Marshall-Lerner condition holds, so that net exports NX increase with a depreciation. We saw previously that the interest parity condition works through the mechanics of Figure 4:

$$\boxed{1 + i_t = \left(1 + i_t^*\right)\frac{E_t}{E_{t+1}^e}}.$$

Figure 4: Mechanics of Uncovered Interest Parity

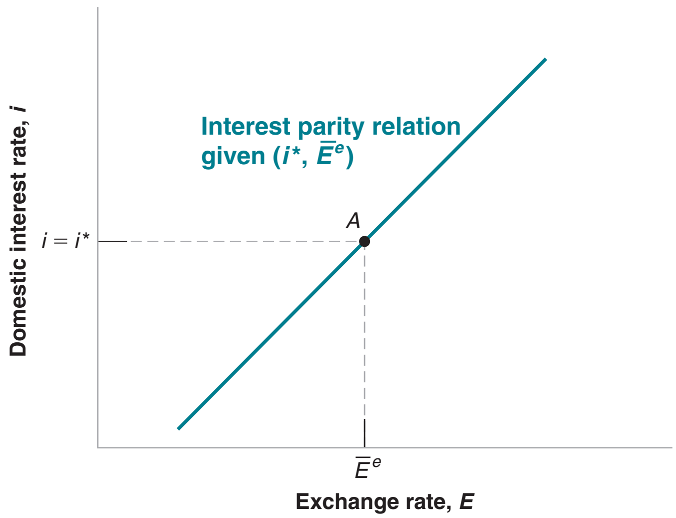


Taking the expected future exchange rate as given:

$$E = \frac{1 + i}{1 + i^*}\bar{E}^e$$

Note that according to this equation, if expectations are set, then the central bank, by altering i, can target any value for the domestic currency – and in particular, appreciate the currency as much as it wants. This interest parity relation given $(i^*, \bar{E}^e)$ is pictured in Figure 5.

Figure 5: Interest Rate Parity Relation



Therefore, the (IS) curve declines as a function of the interest rate, because of the effect on investment, and the appreciation of the real exchange rate, which reduces net exports:

$$Y = C\left(Y - T\right) + I(Y, i) + G + NX\left(Y, Y^*, \frac{1+i}{1+i^*}\bar{E}^e\right)$$

References

Blanchard, Olivier J., *Macroeconomics*, Pearson Education, 2017.