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Macroeconomics

Study Question: A Large Open Economy
(Answers on the subsequent pages)

Recall the example of a world with only two large economies, X and Z, that we first encountered in the notes file 5312-opensave:

The following equations describe country X:

full employment real national income, $Y^x = 8000$

$$C^x = 1000 + .8(Y^x - T^x) - 50r^w$$

$$I^x = 2000 - 20r^w$$

$$G^x = 1000$$

$$T^x = .25Y^x$$

And these equations describe country Z:

full employment real national income, $Y^z = 8000$

$$C^z = 1000 + .8(Y^z - T^z) - 50r^w$$

$$I^z = 3200 - 20r^w$$

$$G^z = 1000$$

$$T^z = .25Y^z$$

Recall that the world interest rate was 20 and that country Z had a current account deficit of 600. (Meaning: $NX = -600$, so country Z is importing 600 more of goods than it is exporting).

Now the government in country Z increases national savings by reducing G to 300.

Calculate the change in the world interest rate and the change in country Z's current account deficit.

Calculate equilibrium values for r^w , and a bunch of other stuff

To calculate r^w , let's set world savings equal to world investment:

$$S^x + S^z = I^x + I^z$$

$$S^x + S^z = (2000 - 20r^w) + (3200 - 20r^w)$$

$$S^x + S^z = 5200 - 40r^w$$

But wait! What are S^x and S^z ?

$$\begin{aligned} S^x &= (Y^x - C^x - G^x) \\ &= 8000 - [1000 + .8(8000 - .25(8000)) - 50r^w] - 1000 \\ &= 8000 - 1000 - 4800 + 50r^w - 1000 \\ S^x &= 1200 + 50r^w \end{aligned}$$

$$\begin{aligned} S^z &= (Y^z - C^z - G^z) \\ &= 8000 - [1000 + .8(8000 - .25(8000)) - 50r^w] - 300 \\ &= 8000 - 1000 - 4800 + 50r^w - 300 \\ S^z &= 1900 + 50r^w \end{aligned}$$

Now substitute these values into our world savings = world investment equation

$$(1200 + 50r^w) + (1900 + 50r^w) = 5200 - 40r^w$$

$$3100 + 100r^w = 5200 - 40r^w$$

$$140r^w = 2100$$

$$r^w = 15$$

So the NEW equilibrium world interest rate is 15 (down from the original 20 percent).

Now let's use the $r^w=15$ to calculate equilibrium values for C^x , S^x , I^x , NX^x , CA^x , and KA^x :

$$C^x = 1000 + .8(8000 - .25(8000)) - 50(15) = 5050$$

$$I^x = 2000 - 20(15) = 1700$$

$$NX^x = Y^x - C^x - I^x - G^x = 8000 - 5050 - 1700 - 1000 = 250$$

$$CA^x = NX^x \rightarrow CA^x = 250$$

$$KA^x = -CA^x \rightarrow KA^x = -250$$

This economy has a smaller current account surplus and a smaller capital account deficit than at the original 20 percent interest rate.

$$S^x = 1200 + 50r^w = 1200 + 50(15) = 1950$$

Check: $S^x = I^x + CA^x?$ $1950 = 1700 + 250$. Yes!

Next let's use the $r^w=15$ to calculate equilibrium values for C^z , S^z , I^z , NZ^z , CA^z , and KA^z :

$$C^z = 1000 + .8(8000 - .25(8000)) - 50(\mathbf{15}) = 5050$$

$$I^z = 3200 - 20(\mathbf{15}) = 2900$$

$$NZ^z = Y^z - C^z - I^z - G^z = 8000 - 5050 - 2900 - 300 = -250$$

$$CA^z = NZ^z \rightarrow CA^z = -250$$

$$KA^z = -CA^z \rightarrow KA^z = 250$$

Country Z has a smaller current account deficit and a smaller capital account surplus than at the original 20 percent interest rate.

$$S^z = 1900 + 50r^w = 1900 + 50(\mathbf{15}) = 2650$$

Check: $S^z = I^z + CA^z?$ $2650 = 2900 + (-250)$. Yes!

Analysis of the above algebraic example

Notice that an increase in national savings is an excellent long run method of reducing a current account deficit for country z. Country Z also increased investment (aiding long term economic growth). Notice also how investment rose in country X!