

Problem 1

It is the year 2000 and Estonia is still outside the euro. This question compares the effects of unexpected temporary and permanent shocks to the Estonian money supply. In this question, define the exchange rate as Estonian kroon per euro.

- (a) Using the framework developed in class (the FOREX and money markets), illustrate the short-run and the long-run effects of a temporary increase in the Estonian money supply. Be sure to label the axes, curves, initial equilibrium point A, short-run equilibrium point B, and long-run equilibrium point C.

Solution. The short-run chain of logic is as follows.

- i. increase in money supply \rightarrow MS curve shifts to the right
- ii. MS curve shifts to the right \rightarrow intersects MD at a lower nominal interest rate
- iii. FR curve, given by

$$FR = i_F + \frac{E_{H/F}^e - E_{H/F}}{E_{H/F}},$$

unchanged because expected exchange rate is unaffected by *temporary* change in money supply

- iv. nominal interest rate falls \rightarrow DR line intersects FR line at higher exchange rate

The conclusion is that the kroon depreciates in the short run.

What about the long-run? Since the increase in the money supply is only temporary, we now just go in reverse: decrease the money supply by the same amount and we end up back at the original point with neither appreciation nor depreciation.

- (b) Using the framework developed in class (the FOREX and money markets), illustrate the short-run and the long-run effects of a permanent increase in the Estonian money supply. Be sure to label the axes, curves, initial equilibrium point A, short-run equilibrium point B, and long-run equilibrium point C.

Solution. The short-run logic is as follows.

- i. increase in money supply \rightarrow MS curve shifts to the right
- ii. MS curve shifts to the right \rightarrow intersects MD at a lower nominal interest rate
- iii. FR curve, given by

$$FR = i_F + \frac{E_{H/F}^e - E_{H/F}}{E_{H/F}},$$

shifts up: permanent change in home money supply implies permanent, long-run depreciation of home currency, so there is a *permanent* rise in $E_{H/F}^e$

- iv. nominal interest rate falls \rightarrow DR intersects new FR line at higher exchange rate

The conclusion is that the kroon depreciates in the short run even more than in the case of the temporary shock.

Now for the long-run chain of logic.

- i. Over time, P increases because of the permanent increase in M
- ii. Real money supply M/P falls back to its original level as P increases, nominal interest rate goes back to its original level
- iii. But $E_{H/F}^e$ is permanently higher, so FR is still at its new, elevated level
- iv. Therefore $E_{H/F}$ has increased in the long-run

We therefore have a permanent depreciation in the kroon when the money supply increase is permanent, although the long-run depreciation is less than that of the short-run depreciation.