

## Romer Chapter 10 Money Growth and Inflation

Money Market Equilibrium:

$$\frac{M}{P} = L(i, Y)$$

Definition of the real interest rate:

$$i = r + \pi^e$$

In a steady-state, all variables grow at constant rates (including some that grow at a rate of zero).

For this exercise, we assume that the real rate of interest and output are constant. We are considering the simple case where money is growing and the price level is growing.

In a steady state inflation will be constant (since the price level will be growing at a constant rate). Since inflation is steady, it is reasonable to assume that  $\pi^e = \pi$ .

We have already considered inflation in our *ABC* model. If the money increases once by 10%, our classical model implies that the price level will rise by 10% in equilibrium.

If the money supply is growing at 10% per year, then the price level will also grow by 10% per year in a steady state.

A subtle point arises when there is a *change* in the steady rate of inflation (as displayed in Figure 10.2, p. 500, in Romer).

When the steady rate of inflation is higher, the nominal rate of interest will be higher. But this implies that the real money supply must be lower. If the real money supply is lower, then the price level must have grown faster than the money supply (at some point) as we moved from one steady state to another. If we instantaneously go to the new steady state, this requires a jump in the price level. Explain Figure 10.2!

When expected inflation rises, this causes people to want to reduce money holdings. In terms of our model from *ABC*, a reduction in money demand shifts LM to the right and AD to the right, putting upward pressure on the price level. This is in addition to the direct proportional impacts of money growth on the price level. This is what causes the discontinuity in the bottom panel of Figure 10.2.

Some growth arithmetic:

If a variable  $y$  grows at a constant rate, we can depict this process by:

$$y = ae^{rt}$$

$$\frac{dy}{dt} = ae^{rt} r$$

$$\frac{\frac{dy}{dt}}{y} = \dot{y} = \frac{ae^{rt} r}{ae^{rt}} = r$$

Note also that if  $y = ae^{rt}$ , then

$$\ln y = \ln a + rt$$