

Economics 153

Monetary Economics

Homework 1

Fall 2006

Consider a monetary economy in which the demand for real balances is given by:

$$\frac{M_t}{P_t} = \sqrt{\frac{Y}{2i_t}},$$

where M_t denotes nominal money balances in period t , P_t the price level, Y output, and i_t the nominal interest rate for assets held between periods t and $t + 1$. Assume that output, Y , and the real interest rate, r , are constant over time. Suppose that the monetary policy consists in pegging the price level. Specifically, the central bank pegs the price of one unit of consumption goods at one unit of currency, that is,

$$P_t = 1 \quad \text{for all } t.$$

Under this policy the money supply is endogenous because the central bank stands ready to exchange money for goods at the price $P_t = 1$.

1. Find the equilibrium inflation rate, $\pi_t = P_t/P_{t-1} - 1$.
2. Find the equilibrium nominal interest rate, i_t .
3. Find the equilibrium level of real balances, M_t/P_t .
4. Find the equilibrium level of money supply, M_t .
5. Find the equilibrium growth rate of the money supply, $\mu_{t+1} = M_{t+1}/M_t - 1$.

Now consider a change in monetary policy. Specifically, in period T it is announced that beginning from period $T + 1$, the price level peg is abandoned and instead the central bank will switch to a money growth rate peg at the rate $\tilde{\mu} > 0$, so that in period $T + 1$ we have $M_{T+1}/M_T = 1 + \tilde{\mu}$.

6. Find the equilibrium inflation rate that will prevail from period $T + 1$ on, that is find π_{T+j} for $j \geq 2$.
7. Find the equilibrium interest rate, i_t , for $t \geq T + 1$.
8. Find the equilibrium level of real balances for $t \geq T + 1$.
9. Use the equilibrium values of M_T/P_T , M_{T+1}/P_{T+1} , the fact that $M_{T+1}/M_T = 1 + \tilde{\mu}$, and the equilibrium condition $P_{T+1}/P_T = (1 + i_T)/(1 + r)$ to prove that already in period T , the nominal interest rate, i_T , jumps up to its new permanently higher level.

10. Discuss what happens to real balances in period T relative to the value that would have obtained in the absence of the announcement of the policy change.
11. Then discuss how this change in real balances can be brought about given that in period T the central bank continues to peg the price level.
12. What are the effects of the announced policy shift on the balance sheet of the central bank in period T .
13. Plot (by hand) the (qualitative) time path of (i) inflation, (ii) the nominal interest rate, (iii) real balances, (iv) the logarithm of the nominal price level, and (v) the logarithm of the nominal money supply. The plot should feature time on the horizontal axis and the respective variable on the vertical axis. Be sure to indicate at least 4 dates: 0 , $T - 1$, T , and $T + 1$.
14. Discuss briefly how the dynamics associated with the anticipated increase in the money growth rate developed in this problem set are different from those that would arise in the case in which up to period T the central bank, instead of fixing the price level, would follow a policy of a constant money supply.