

Problem Set I
(due on Wed, May 13th)

Exercise I: Cross Country Correlations of Money Growth, Output Growth and Inflation

Suppose that money demand, in any country $i = 1, \dots, I$, is given by

$$m_t^i - p_t^i = y_t^i - \eta_t^i,$$

where m_t is the log money supply, p_t is the log price level, y_t is log output and i_t is the nominal interest rate.

1. Show that in a steady state with a constant real interest rate and constant inflation

$$\Delta m^i = \pi^i + \Delta y^i,$$

where $\pi_t^i = p_t^i - p_{t-1}^i$ and variables without t subscript denote steady state values.

2. Assume that steady state output growth is determined exclusively by non-monetary factors and that steady state values are well approximated by long-run averages. Show that average output growth must be correlated with either average inflation or average money growth.
3. Determine the sign of those correlations assuming that central banks follow an inflation targeting strategy, where the inflation target π is determined exogenously.
4. Determine the sign of those correlations assuming that central banks follow a monetary targeting strategy (i.e. $\Delta m^i = \gamma$), where the monetary target γ is determined exogenously.
5. Relate your answers to the empirical evidence in McCandless and Weber (1995) and Barro (1996).

Exercise II: Consumer Preferences and Money (Super)Neutrality

Consider the simple classical economy analyzed in class and assume that the representative household period utility is given by:

$$u(C_t, \frac{M_t}{P_t}, 1 - N_t) = \left[C_t \frac{M_t}{P_t} \right]^{1-\sigma} L_t^\sigma$$

1. **An economy without capital:** Assume that output is produced using a simple technology $Y_t = N_t$. Also assume that the monetary authority keeps a constant money growth γ_m .
 - (a) Derive the optimality conditions of the household's problem.
 - (b) Derive the economy's steady state equilibrium under the assumption of perfect competition.

(c) Discuss the effects on inflation and output of a permanent change in the rate of money growth γ_m , and relate it to the existing evidence.

2. **An economy with capital** Assume now that output is produced using the technology $Y_t = K_{t-1}^\alpha N_t^{1-\alpha}$. Also assume that the capital stock K_t depreciates at a rate $0 < \delta < 1$. How would your answer to the previous questions change?