Lectures on Monetary Policy, Inflation and the Business Cycle
Chapter 1 Exercises
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1. Interpreting Cross-Country Correlations

Suppose money demand is given by

$$m_t^i - p_t^i = y_t^i - \eta\, r_t^i$$

where m_t is the (log) money supply, p_t is the (log) price level, y_t is (log) output, and r_t is the nominal interest rate. Superscript i refers to the country.

    a) Show that in a steady state with a constant real interest rate

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

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

    b) Assume that steady state output growth is determined exclusively from non-monetary factors in all countries, and that steady state values are approximated accurately by long-run averages. Show that average output growth must be correlated with either average inflation or average money growth across countries.

    c) Determine the sign of those correlations if central banks follow an inflation targeting strategy (determining inflation objective π^i exogenously).

    d) Determine the sign of those correlations if central banks follow a monetary targeting strategy (specify a money growth target Δm^i exogenously).

    e) Relate your answers to the empirical evidence in McCandless and Weber (1995).

2. Interpreting Money-Output and Money-Interest Rate Correlations

    Consider the following stylized model of output and interest rate determination. Equilibrium in the goods market is represented by the condition:

$$y_t = d_t - \theta\, r_t$$

where y_t is (log) output, r_t is the interest rate, and d_t is an exogenous aggregate demand shock, with variance σ_d^2. In addition, equilibrium in the money market implies.

$$m_t = y_t - \eta\, r_t + v_t$$

where m_t denotes the (log) money supply, and v_t is an exogenous money demand shock with variance σ_v^2, and orthogonal to d_t. For simplicity we are implicitly assuming that prices are constant.

    a) Determine the equilibrium level of output as a function of m, d, and v.

    b) Suppose that m_t follows an exogenous process with variance σ_m^2. Determine the implied correlations between (i) money and output and (ii) money and the interest rate.

c) Suppose that the monetary authority pegs the interest rate at a constant level ($r_t = 0$ for all t), with the money supply being entirely endogenous). Determine the implied correlation between money and output, and discuss the factors affecting its size.

d) Suppose that the monetary authority adjusts the money supply in order to stabilize output (say, $y_t = 0$ all t) Determine the implied correlation between money and the interest rate, and discuss the factors affecting its size.

e) Discuss the difficulties in testing for the presence of a liquidity effect and/or money non neutralities in light of the previous results.

3. Comovements vs. Structural Relationships

Equilibrium in the goods market takes the form

$$y_t = -\alpha \, r_t + \varepsilon_t^d$$

where ε_t^d is an i.i.d. demand shock and r_t is the monetary policy instrument (e.g., the interest rate). Parameter $\alpha \geq 0$ measures the effectiveness of monetary policy.

The interest rate is determined according to the policy rule:

$$r_t = \beta \, y_t + \varepsilon_t^m$$

where ε_t^m is an i.i.d. monetary policy shock. Parameter $\beta \geq 0$ measures the degree of activism in trying to stabilize output fluctiuations.

Discuss the difficulties in trying to learn about α and β using the information contained in the time series for $\{r_t\}$ and $\{y_t\}$ only, and possible ways of overcoming that problem.