

Dynamic Macro Group

Part II: Phillips Curve and the Lucas Critique

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The second part is based on MT2 lecture slides and it is related on ‘**The Phillips Curve and the Lucas Critique**’. The purpose of this exercise is to explore how different assumptions about expectation formation can influence the response of an endogenous variable, specifically unemployment. Suppose the Phillips Curve is represented by:

$$\pi_t = \pi_t^e - \alpha(u_t - u_n) \quad (1)$$

where π_t and u_t are the inflation and unemployment rates in period t , respectively. Moreover, π_t^e denotes expected inflation, u_n is the natural rate of unemployment and α is a parameter. Now assume that monetary policy can set inflation according to the following rule:

$$\pi_t = \mu + \pi_{t-1} + \epsilon_t \quad (2)$$

where μ is a policy parameter and $\mathbb{E}_t[\epsilon_{t+1}] = 0$. You can parameterize the above model by setting, $\alpha = 1.5$, $u_n = 0.05$ and normalize the initial value of inflation $\pi_{-1} = 0$.

1. Change in Monetary Policy:

Assume that the monetary policymaker changes the rule in Equation (2) from $\mu = 0$ to $\mu' = 0.005$ in the 10th period. Compute and plot the dynamic path of inflation and unemployment for the first 20 periods under:

- Constant expectations, i.e., $\pi_t^e = \pi$.
- Static expectations, i.e., $\pi_t^e = \pi_{t-1}$.
- Rational expectations, i.e., $\pi_t^e = \mathbb{E}_t[\pi_t]$.
- Explain the effect on unemployment rate u_t ?

2. Simulation:

Generate 1,000 random values for ϵ_t from a normal distribution with mean and variance equal to 0 and 0.01, respectively (use the matlab built-in function ‘*randn*’). Use the first 100 periods as burn-in (i.e., drop them). Using the remaining 900 values, compute and plot:

- Inflation, π_t .
- Unemployment, u_t .

3. Data:

Using data from a country of your choice, analyze whether a Phillips Curve relationship exists in that country. Investigate whether the slope of the Phillips Curve changes across different time periods or subperiods.

References

- Challe E. (2019). Macroeconomic Fluctuations and Policies. **MIT Press**.
- Lucas Robert E. (1976). Econometric policy evaluation: A critique. **Carnegie-Rochester Conference Series on Public Policy**, volume 1, pages 19-46.