Newcomers Bootcamp
Session 1

9/18/2018

Phillips Curve

- Central piece of monetary (policy) models
- Link between real variables (eg. output) and nominal variables (eg. price inflation) in the medium to long run
- Key equation in determining monetary policy trade-offs (medium run versus long run)

Long-Run Plan

- Start with the Phillips curve and build other equations around (closed economy, open economy, trends)
- Understand why we do things the way we do, use that understanding in communication (forecast write-ups, missions, etc.)
- Hands-on simulations, a bit of theory, a lot of data

Basic Form of Phillips Curve

Lag

Measure of real economic cycle

$$\pi_t = \beta_1 \pi_{t-1} + \beta_2 \mathrm{E}_t\left[\pi_{t+1}\right] + \beta_3 \hat{y}_t + \epsilon_{\pi,t}$$

Period-on-period rate of change in price level

Expectations one period ahead

Shocks: Unexplained movements

$$\beta_1 + \beta_2 = 1$$

Homogeneity, aka monetary neutrality constraint

A Few of the Questions You Should Be Able to Answer

1. Why period-on-period (eg. quarter-on-quarter) and not year-on-year? Do we seasonally adjust?

2. What properties does the lag affect? What properties does the lead affect?

3. First lag only? Some more lags? What about leads?

4. Why do we impose the homogeneity?

5. What shape do the shocks take?

A Few of the Questions You Should Be Able to Answer

6. What measure of real economic cycle do we plug in?

7. Where does the Phillips curve form come from? Can we “derive” it?

8. Why is the Phillips curve a linear equation? Or is it?

9. How do Phillips curves differ in countries with different monetary policies (regime, target, etc.)?

Today's Session

- Dynamics: backward-looking, forward-looking
- Steady-state (long-run): homogeneity, stationarity
- Introduction to stabilization: inflation target

Backward-Looking Dynamics

$$\pi_t = \beta_1 \, \pi_{t-1} + \beta_3 \, \hat{y}_t + \epsilon_{\pi,t}$$

$$\begin{aligned} \pi_t = & \left[\beta_3 \, \hat{y}_t + \epsilon_{\pi,t}\right] \\ & + \beta_1 \left[\beta_3 \, \hat{y}_{t-1} + \epsilon_{\pi,t-1}\right] \\ & + \cdots + \\ & + {\beta_1}^K \left[\beta_3 \, \hat{y}_{t-K} + \epsilon_{\pi,t-K}\right] + {\beta_1}^{K+1} \pi_{t-K-1} \end{aligned}$$

Initial condition

Backward-Looking Dynamics

- The lag creates a link between today's inflation and past shocks or other events
- Aka persistence (do not confuse with inertia)
- Why should past events affect today's inflation outcomes? → Theoretical "derivation"

Forward-Looking Dynamics

$$\pi_t = \beta_2 \,\mathrm{E}_t\left[\pi_{t+1}\right] + \beta_3 \,\hat{y}_t + \epsilon_{\pi,t}$$

$$\begin{aligned}\pi_t = &\left[\beta_3 \,\hat{y}_t + \epsilon_{\pi,t}\right] \\ &+ \beta_2 \,\mathrm{E}_t\left[\beta_3 \,\hat{y}_{t+1} + \epsilon_{\pi,t+1}\right] \\ &+ \cdots + \\ &+ \beta_2{}^K \,\mathrm{E}_t\left[\beta_3 \,\hat{y}_{t+K} + \epsilon_{\pi,t+K}\right] + \beta_1{}^{K+1} \,\mathrm{E}_t\left[\pi_{t-K-1}\right]\end{aligned}$$

Terminal condition

Forward-Looking Dynamics

- The expectations term creates a link between today's inflation and future expected (not actual!) shocks or other events
- Why should expectations of future events affect today's inflation outcomes? → Theoretical "derivation"

Steady State (Long Run) in Backward-Looking Phillips Curve

$$\pi_t = \beta_1 \, \pi_{t-1} + \beta_3 \, \hat{y}_t + \epsilon_{\pi,t}$$

$$\hat{y}_t = 0, \quad \epsilon_{\pi,t} = 0$$

$\beta_1 \in [0, 1]$	$\beta_1 = 1$	$\beta_1 > 1$
Stationary, converging to ___	Unit root (Blanchard-Kahn stable)	Explosive

Long Accepted Monetary Paradigm

- If inflation is in check, (almost) no connection exists between the rate inflation and real economic activity in the long run (real-nominal dichotomy, monetary neutrality)

- Any rate of stable inflation can be consistent with given economic capacity (episodes of wild hyperinflation or deflations aside)

Implication for Model Design

- Homogeneous Phillips curve $\beta_1 + \beta_2 = 1$
- Phillips curve says absolutely nothing about the rate of inflation in the long run — this needs to be determined by the other equations

Dynamics in Homogeneous Phillips Cure

$$\pi_t = \beta_1\,\pi_{t-1} + (1 - \beta_1)\,\mathrm{E}_t\left[\pi_{t+1}\right] + \beta_3\,\hat{y}_t + \epsilon_{\pi,t}$$