Nonlinearities in the Regional Phillips Curve with Labor Market Tightness

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Motivation

- The Phillips curve formalizes an intuitive idea
  - In tight labor markets, marginal costs increase and pass through price inflation
  - Aggregate supply curve of New Keynesian models
  - The slope of the Phillips curve is the elasticity of that supply curve
- Phillips curve estimation is challenging

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} - \kappa (u_t - u_t^*) + \vartheta_t$$

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  - Potentially state-dependent parameters

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- Phillips curve estimation is challenging
  - Main empirical challenges
- Emergent literature argues for the usefulness of cross-sectional Phillips curves

$$\pi_{jt} = \gamma_t - \psi(u_{jt} - u^*_{jt}) + \vartheta_{jt}$$

Gitti (2024)

Main object of interest: Non-linear regional Phillips curve (NRPC)

- Two main contributions
  - Argue that $\log\left(\frac{v}{u}\right)$ is a better measure of slack than $u \rightarrow$ Theory
  - Estimate changes in the slope of the NRPC in the cross-section pre vs. post Covid $\rightarrow$ Empirical
- Importance of the contribution
  - Most theories on the change of the slope of the Phillips curve are *external* to it
    - Examples: Globalization, market power
  - Here cyclical demand will generate changes in the supply elasticity
  - ... and map very cleanly to an estimating equation
  - Informative on the debate of the supply vs. demand shifters behind inflation surge of 2021

Discussion Roadmap

- Evaluation: Important, well-executed paper, in an exciting research agenda
- I will focus on two comments
  - Identification of the parameters of interest
  - Thoughts on orders of magnitude

NRPC

- Simplified framework: Many terms collapsed into ε_{it}

$$\pi_{it} = \beta \mathbb{E}_t \pi_{i,t+1} + \kappa_{it} \hat{\theta}_{it} + \varepsilon_{it} \tag{1}$$

$$\kappa_{it} = \begin{cases} \kappa & \text{if } \hat{\theta}_{it} \leq \hat{\theta}^* \\ \kappa(1+\lambda) & \text{otherwise.} \end{cases} \tag{2}$$

- Pedagogic assumptions:
  - $\hat{\theta}$ follows an AR(1) with coef. ρ
  - Same ρ regardless of slack vs. tight labor market
  - Perfect foresight. Only one shock in each region in period t

Two regions

- Two regions. Small and Large shocks

$$\pi_{it} = \frac{\kappa}{1 - \beta\rho}\hat{\theta}_S \tag{3}$$

$$\pi_{jt} = \frac{\kappa}{1 - \beta\rho}\left(1 + \lambda\left(1 - (\beta\rho)^{\tilde{T}}\right)\right)\hat{\theta}_L \tag{4}$$

- $\tilde{T}$ endogenous. Furthermost period with tight labor market given an initial shock $\hat{\theta}_L$
- Differential inflationary effect of a tight economy:

$$\frac{\partial \pi_{jt}}{\partial \theta_L} - \frac{\partial \pi_{it}}{\partial \theta_S} = \lambda\kappa\frac{1 - (\beta\rho)^{\tilde{T}}}{1 - \beta\rho} \tag{5}$$

Identification

$$\frac{\partial \pi_{jt}}{\partial \theta_L} - \frac{\partial \pi_{it}}{\partial \theta_S} = \lambda \kappa \frac{1 - (\beta \rho)^{\tilde{T}}}{1 - \beta \rho} \tag{6}$$

- Empirical object is the LHS. Coefficient of interest is λ
- Uninteracted estimates in the paper suggest $\kappa / (1 - \beta \rho)$ is small
- If $\tilde{T} \approx 1$, then $\left(1 - (\beta \rho)^{\tilde{T}}\right) \approx 0$
- If $\tilde{T} \to \infty$, then $\left(1 - (\beta \rho)^{\tilde{T}}\right) \approx 1$
- $\tilde{T}$ is a nuisance parameter. Need to take a stance on it before using the empirical moment to infer about λ.

Identification

- Issue is compounded if we relax equal dynamics of θ in slack and tight markets
- Now assume:
  - In slack markets: AR(1) with coef. ρ
  - In tight markets: AR(1) with coef: ω
- In reality the dynamics of θ may be far from an AR(1)

Identification

$$\frac{\partial \pi_{jt}}{\partial \theta_L} - \frac{\partial \pi_{it}}{\partial \theta_S} = \lambda \kappa \frac{1 - (\beta\omega)^{\tilde{T}}}{1 - \beta\rho} + \kappa\beta \frac{\omega - \rho}{(1 - \beta\omega)(1 - \beta\rho)} \tag{7}$$

- First term very similar than before, but now a function of ω
- New term that needs to be cleaned. Sign and magnitudes are unclear
- Empirical moment may be large even if $\lambda = 0$
- ...or may introduce downward bias in λ

My suggestion: Test the AR(1) with equal parameter assumption in the data. If dynamics are richer, embrace them.

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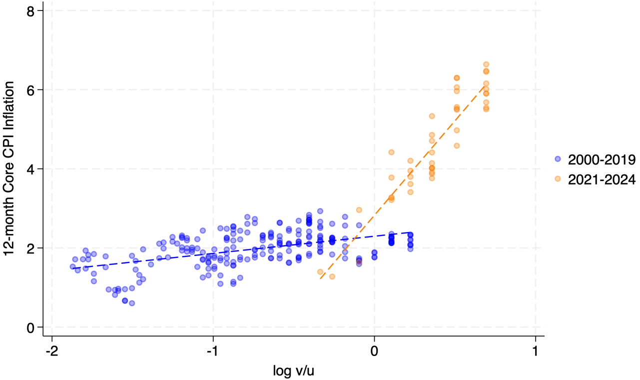
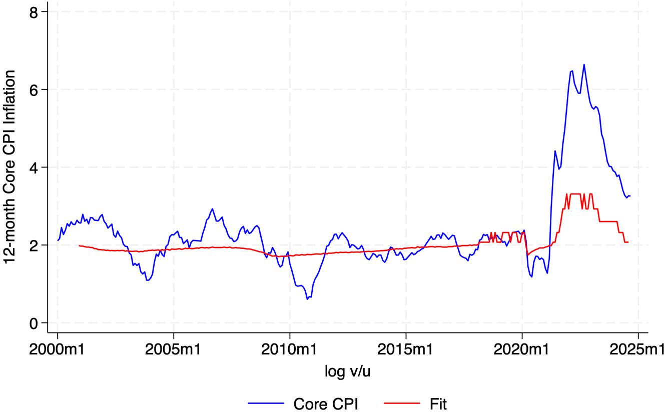


Magnitudes

$$\pi_{t-12,t} = 2\% + 0.16\log(\theta_t) + 1.79\log(\theta_t)\mathbb{1}_{\theta_t>1} - 0.15\mathbb{1}_{\theta_t>1}$$



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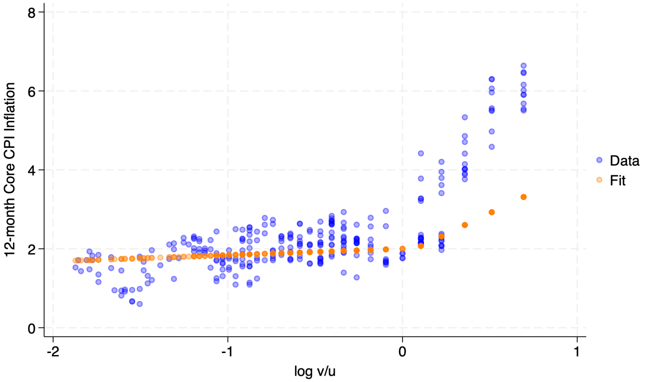

Magnitudes

- At face value the estimates can explain $\approx$ 30% of the inflation surge
- The paper could do more to address implicit assumptions of this figure
  - I am plugging the cross-sectional estimates in the aggregate data
    - The persistence of local θ may be very different than the persistence of national θ
    - My figure assumes they are the same
    - We know the volatility is very different
  - I am also assuming κ and λ at the regional level map directly into the aggregate