Monetary Policy With Supply Chain Constraints

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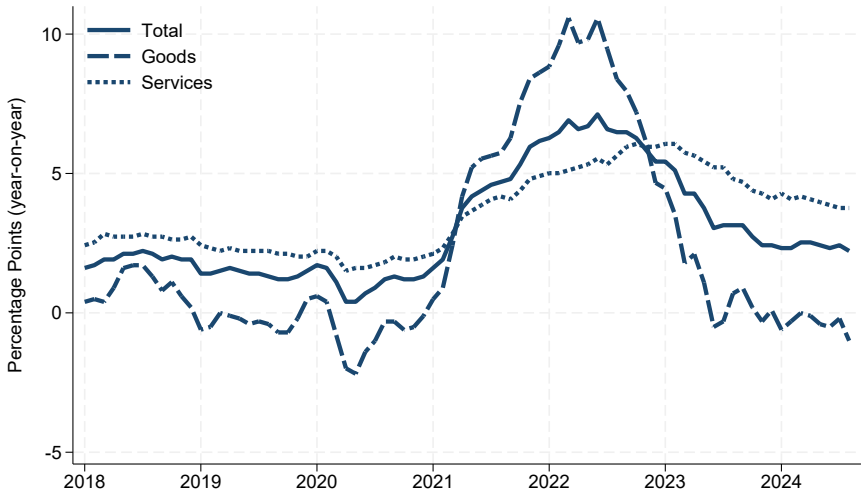
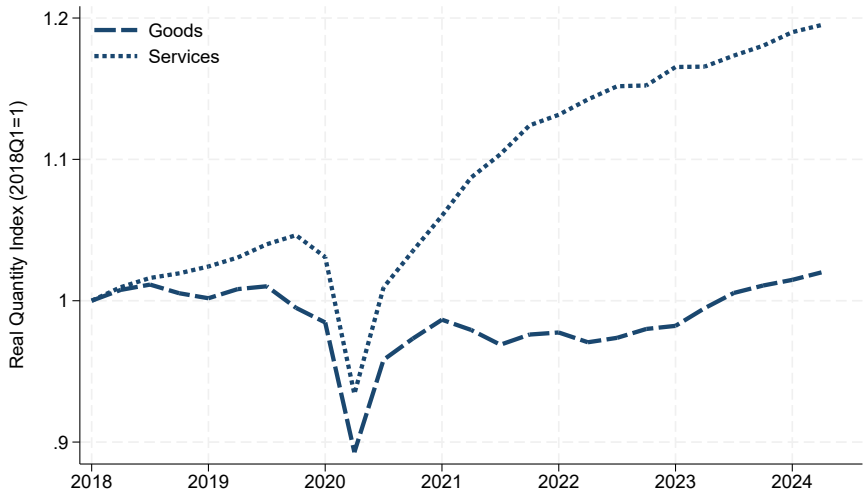
BCC Conference

What Happened?

(a) PCE Inflation



(b) Real Gross Output



Source: Bureau of Economic Analysis & authors' calculations.

Introducing Capacity Constraints

Multisector, New Keynesian, small open economy.

Firm ω sets $P_t(\omega)$ to solve:

$$\max_{\{P_t(\omega)\}} \mathbf{E}_0 \sum_{t=0}^{\infty} \frac{S_{0,t}}{P_t} \left[\left(P_t(\omega) - MC_t(\omega) \right) Y_t(\omega) - \Phi(P_{t-1}(\omega), P_t(\omega)) \right]$$

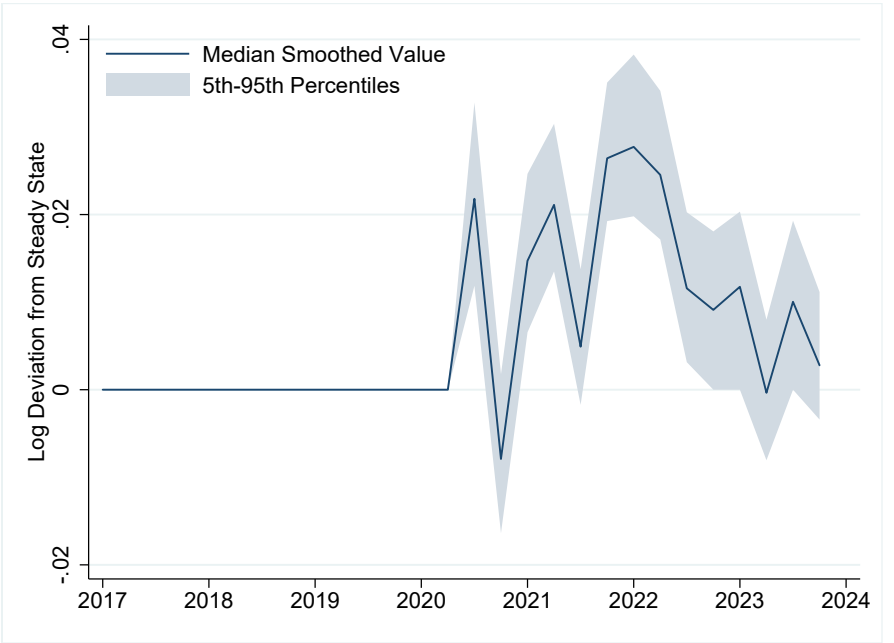
$$\text{s.t.} \quad Y_t(\omega) = \left(\frac{P_t(\omega)}{P_{Ht}} \right)^{-\varepsilon} Y_t$$

$$\text{and} \quad Y_t(\omega) \leq \bar{Y}_t$$

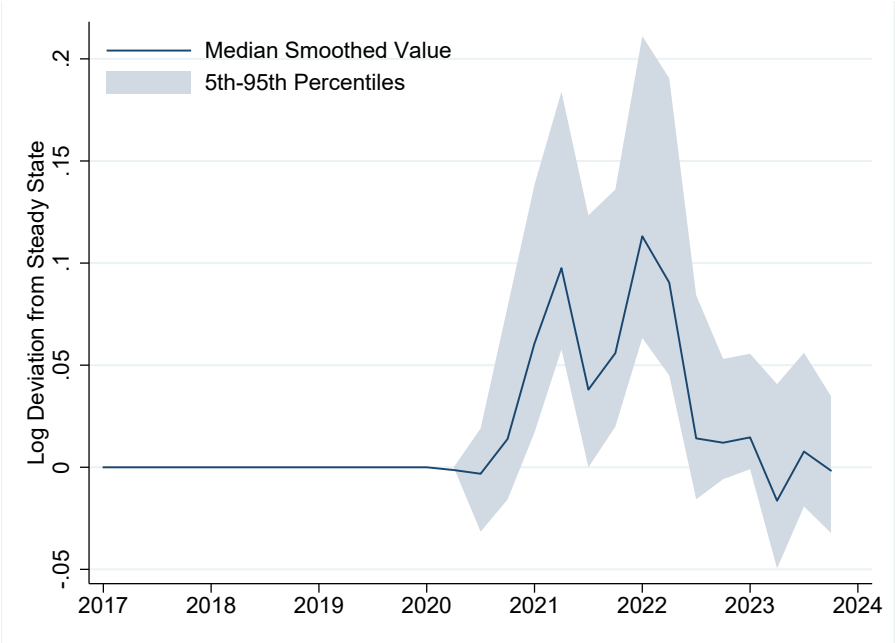
$$\pi_{Ht}(s) = \frac{\varepsilon - 1}{\phi(s)} \left[\widehat{rmc}_t(s) - \widehat{rp}_{Ht}(s) \right] + \frac{\varepsilon}{\phi(s)} \hat{\tilde{\mu}}_t(s) + \beta \mathbb{E}_t \left[\pi_{Ht+1}(s) \right]$$

Capacity Multipliers

(a) Multiplier on Domestic Constraint



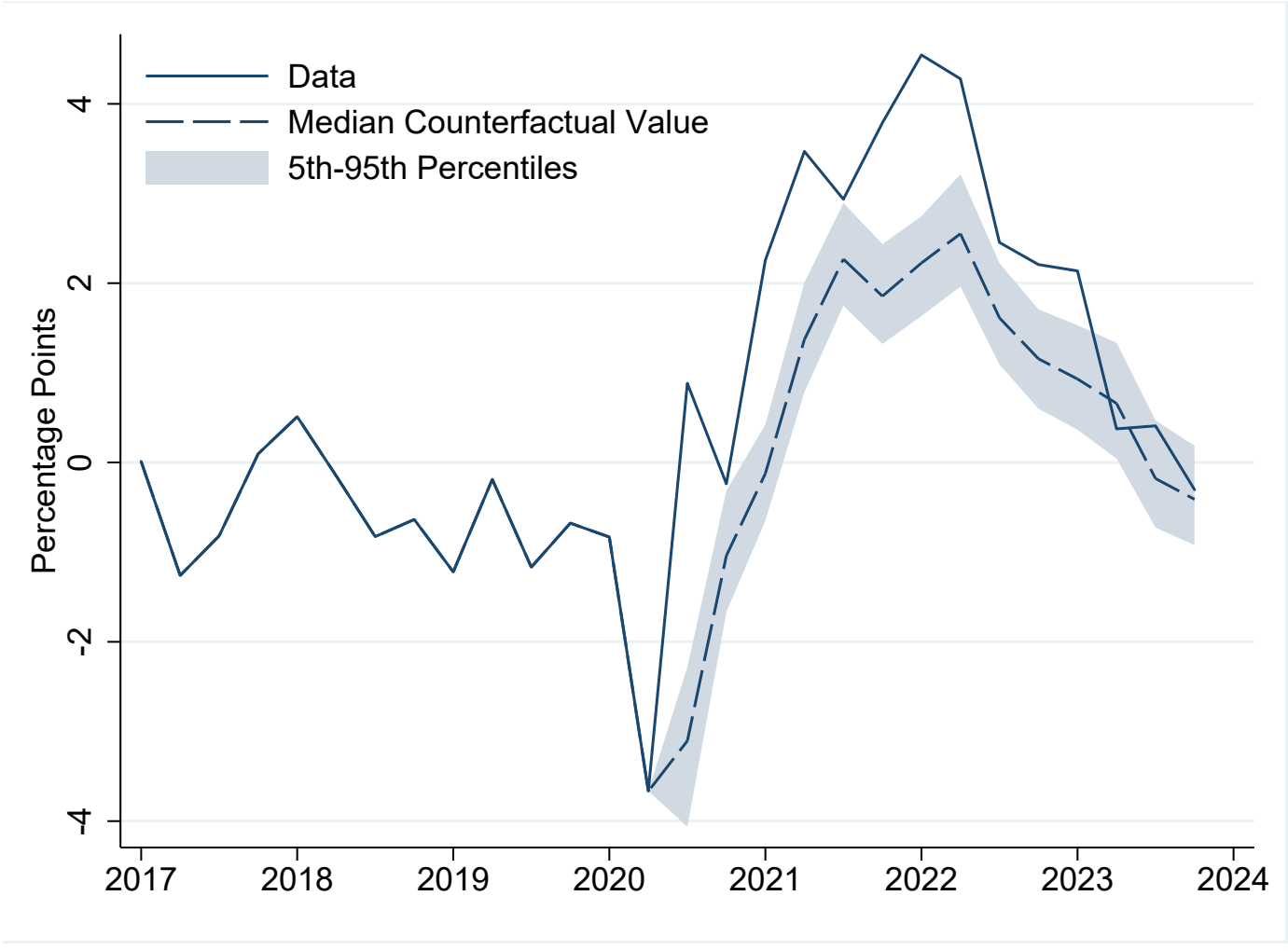
(b) Multiplier on Foreign Constraint



We plot reduced-form markup shocks in the domestic and import price Phillips Curves: $\left(\frac{\varepsilon}{\phi(s)}\frac{P_0}{P_{H0}(s)}\right)\hat{\tilde{\mu}}_t(s)$ and $\left(\frac{\varepsilon}{\phi(s)}\frac{P_0}{P_{uF0}(s)}\right)\hat{\tilde{\mu}}^*_{ut}(s)$.

Counterfactual: Slack Capacity Constraints

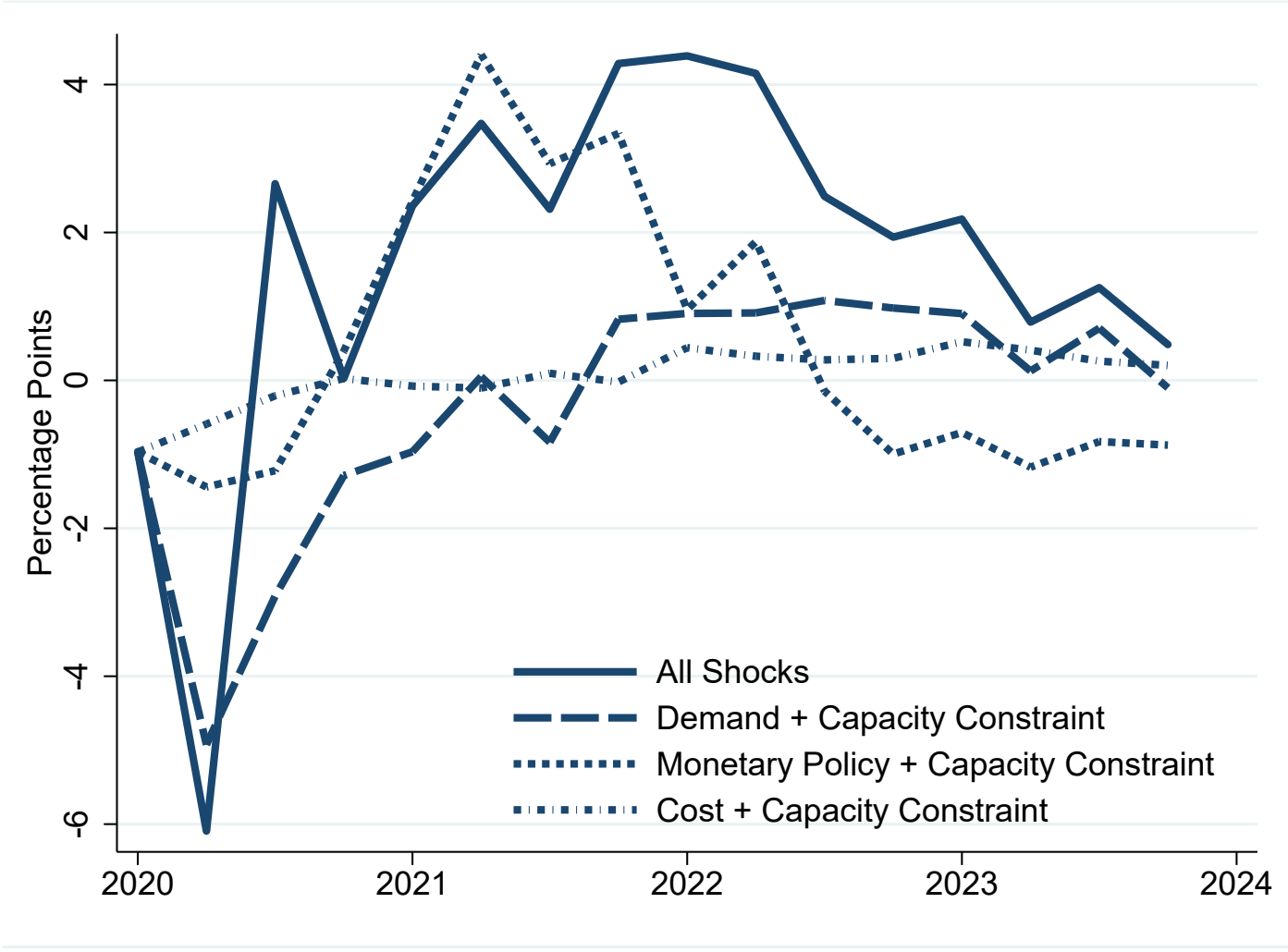
Aggregate Consumer Price Inflation



Note: Simulated values include measurement error, for comparability to data.

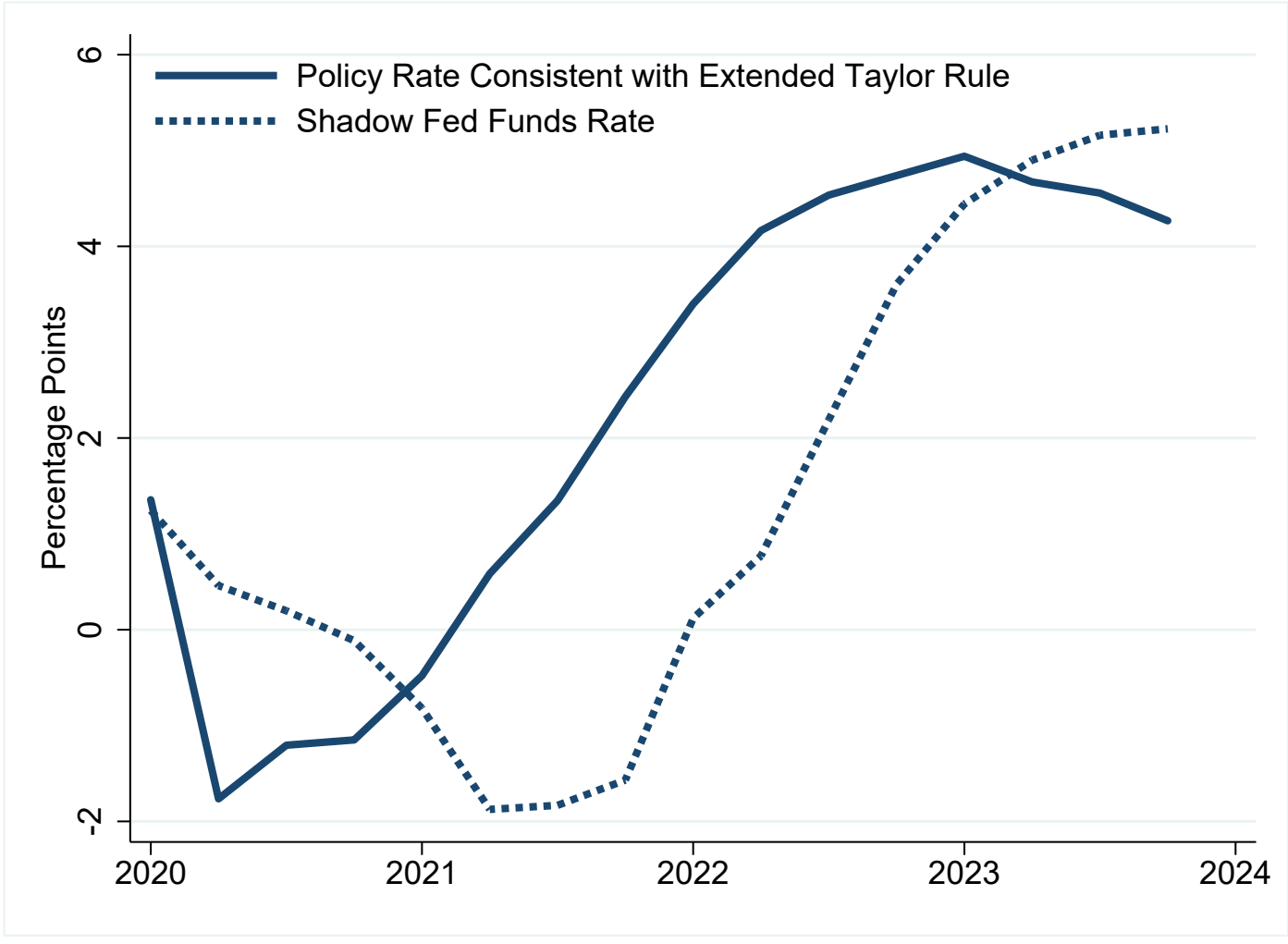
Decomposition Consumer Price Inflation

Individual Shocks + Tight Capacity



Tight capacity amplifies the impact of monetary policy shocks in 2021-2022.

Why does monetary policy matter so much?



What should the Fed have done?

Binding capacity constraints alter the Phillips curve

$$\pi_t = \Gamma_u(y_t - y_t^n) + \beta E_t \pi_{t+1}$$

$$\pi_t = \widehat{\pi}_t^n + \Gamma(y_t - y_t^n) + \beta E_t \pi_{t+1} \quad (2)$$

with $\Gamma > \Gamma_u$ and

$\widehat{\pi}_t^n = \frac{\bar{s}}{(1-\bar{s})}(\frac{1}{\vartheta}(y_t^n - \overline{y}_t(1)) - rp_{t-1}(1))$

The Fed's Problem

$$Min_{\{i_t\}} E_t \sum_{t=0}^{\infty} \beta^t \left(\frac{\pi_t^2}{2} + \frac{\kappa}{2}(y_t - y_t^e)^2\right)$$

Suppose that capacity constraints only bind for one period (t):

$$Min_{i_t} \frac{(\widehat{\pi}_t^n + \frac{\Gamma}{\rho}(r_t^n - i_t))^2}{2} + \frac{\kappa}{2}\left(\frac{1}{\rho}(r_t^n - i_t)\right)^2$$

Optimal policy:

$$i_t = r_t^n + \frac{\rho\Gamma\widehat{\pi}_t^n}{\Gamma^2 + \kappa} > r_t^n$$

Intuition: when constraints bind, the Fed wants to increase the nominal interest rate above the real rate inducing a negative output gap to reduce inflation at time t.

What was the Fed thinking?

- The Fed did not realize that capacity constraints were binding,
- or assigned a low likelihood to the event that constraints were going to bind for a protracted period of time
- Alternatively, the Fed might know constraints were binding but did not realize the impact that has on inflation dynamics.
- Either way, there are two take away for the Fed
  1. Incorporate in models the impact of binding constraints on price dynamics
  2. Monitor closely whether capacity constraints are binding. Note that there are many forms of constraints, and monitoring a subset is not good enough.