What do Long Data Tell Us About the Inflation Hike Post COVID-19 Pandemic?

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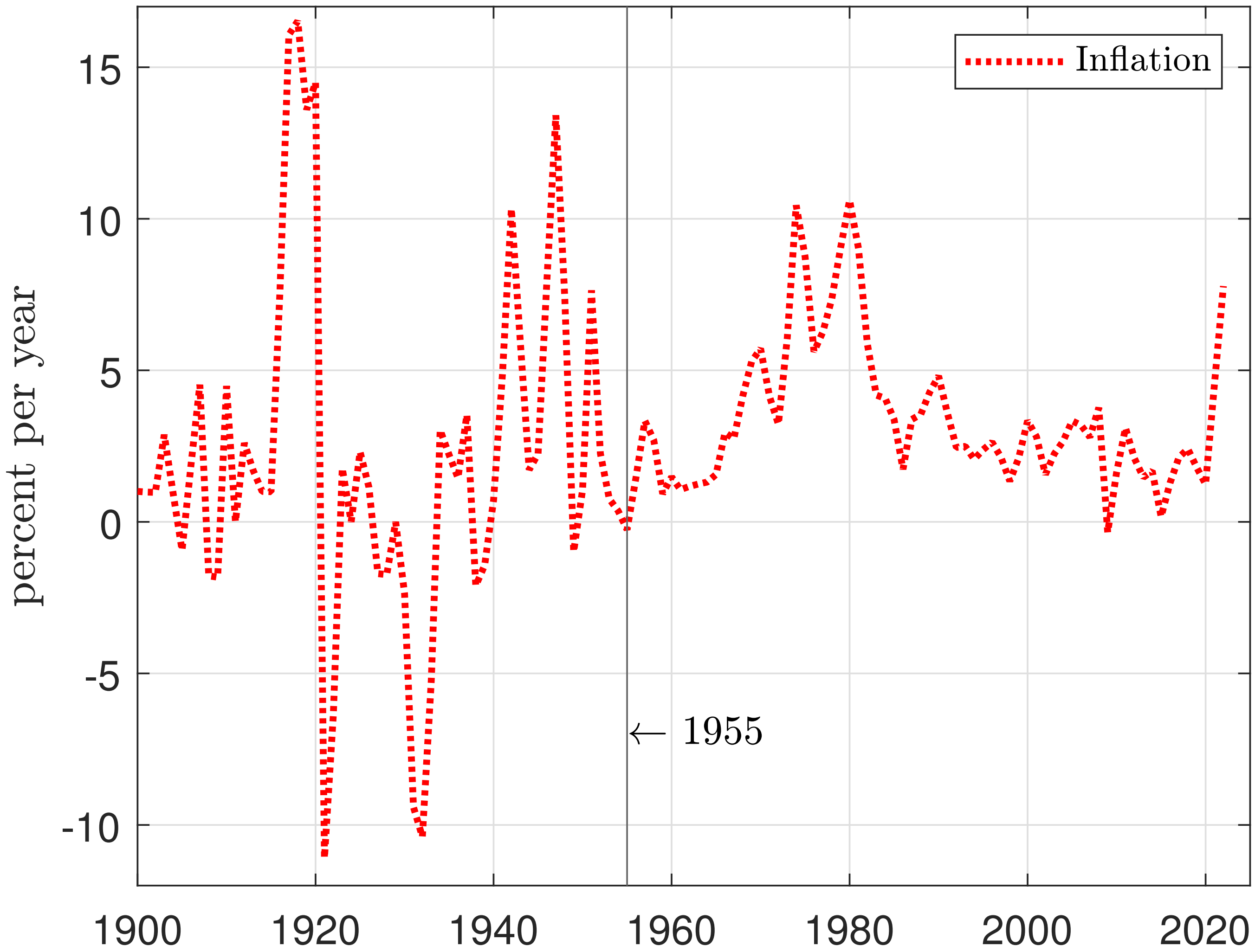
CPI Inflation, United States, 1900–2022



The Empirical Model*

π_t = inflation rate
i_t = nominal interest rate
y_t = log of real output per capita

X_t^m = permanent monetary shock
X_t^r = permanent natural rate shock
X_t = permanent productivity shock

Cyclical components of π_t, i_t, and y_t

$$\hat{\pi}_t \equiv \pi_t - X_t^m$$
$$\hat{i}_t \equiv i_t - X_t^m - X_t^r$$
$$\hat{y}_t \equiv y_t - X_t - \delta X_t^r$$

The focus of the present paper is the behavior of the **latent variable** $\boldsymbol{X_t^m}$ representing the permanent component of inflation.

*The model is that of Schmitt-Grohé and Uribe (2022, 'The Macroeconomic Consequences of Natural Rate Shocks: An Empirical Investivation'), which in turn builds on Uribe (2022).

- The law of motion of the stationary endogenous variables

$$\begin{bmatrix} \widehat{y}_t \\ \widehat{\pi}_t \\ \widehat{i}_t \end{bmatrix} = B \begin{bmatrix} \widehat{y}_{t-1} \\ \widehat{\pi}_{t-1} \\ \widehat{i}_{t-1} \end{bmatrix} + C \begin{bmatrix} \Delta X_t^m \\ z_t^m \\ \Delta X_t \\ z_t \\ \Delta X_t^r \end{bmatrix},$$

where $z_t^m =$ a stationary monetary shock and $z_t =$ a stationary real shock

- The exogenous shocks follow univariate AR(1) processes,

$$\begin{bmatrix} \Delta X_{t+1}^m \\ z_{t+1}^m \\ \Delta X_{t+1} \\ z_{t+1} \\ \Delta X_{t+1}^r \end{bmatrix} = \rho \begin{bmatrix} \Delta X_t^m \\ z_t^m \\ \Delta X_t \\ z_t \\ \Delta X_t^r \end{bmatrix} + \Psi \begin{bmatrix} \epsilon_{t+1}^{X^m} \\ \epsilon_{t+1}^{z^m} \\ \epsilon_{t+1}^{X} \\ \epsilon_{t+1}^{z} \\ \epsilon_{t+1}^{X^r} \end{bmatrix},$$

with ρ and Ψ diagonal and ϵ_t^s, for $s = X^m, z^m, X, z, X^r$, i.i.d. $N(0,1)$.

Observation equations

Observables:

Δy_t = output growth

$\Delta \pi_t$ = change in consumer price inflation

Δi_t = change in the short-term nominal interest rate

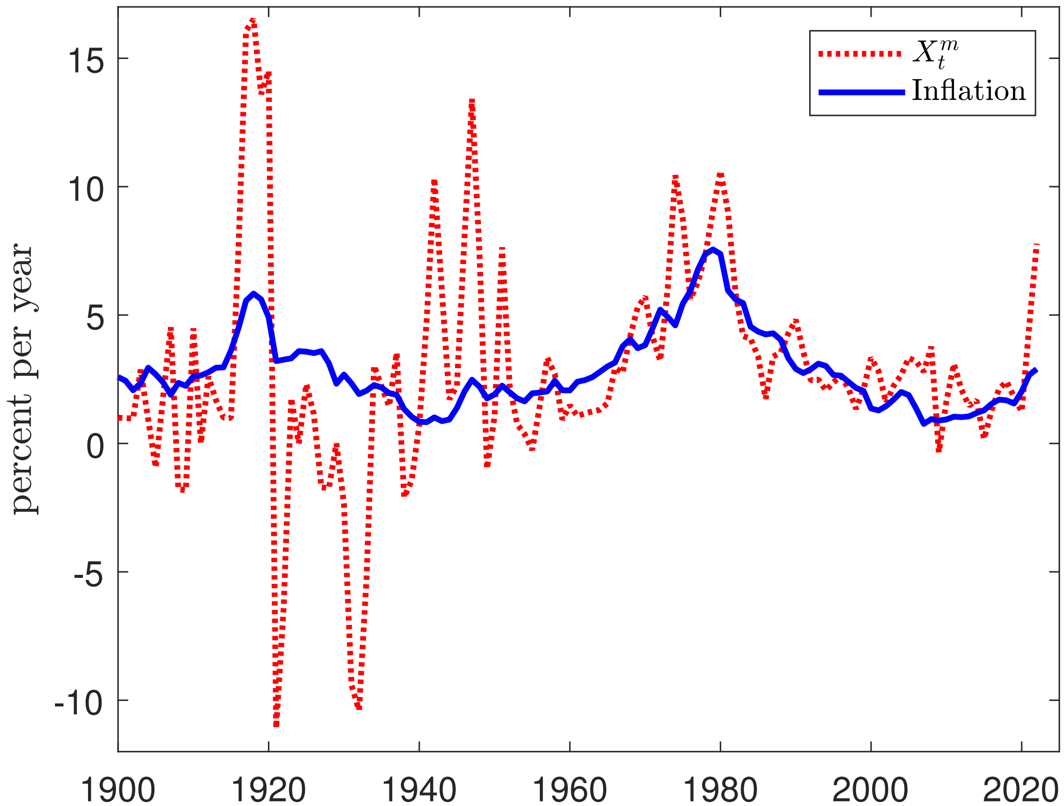
$$\Delta y_t = \widehat{y}_t - \widehat{y}_{t-1} + \Delta X_t + \delta \Delta X_t^r + \mu_t^y,$$

$$\Delta \pi_t = \widehat{\pi}_t - \widehat{\pi}_{t-1} + \Delta X_t^m + \mu_t^\pi,$$

$$\Delta i_t = \widehat{i}_t - \widehat{i}_{t-1} + \Delta X_t^m + \Delta X_t^r + \mu_t^i,$$

where μ_t^s, for $s = y, \pi, i$, are normally distributed mean-zero i.i.d. measurement errors

Inflation and Its Permanent Component: 1900 to 2022 Sample

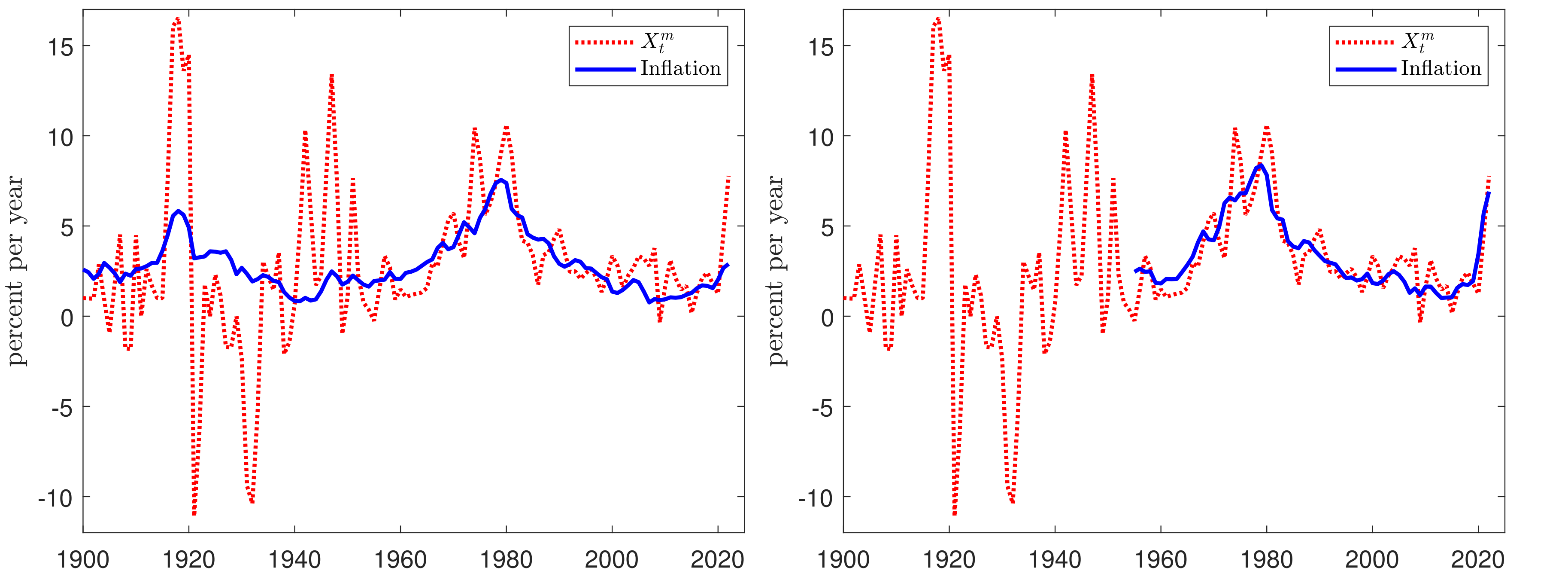


Notes. X_t^m is computed by two-sided smoothing using the Kalman filter at the posterior mean of the vector of estimated parameters and is normalized by adding a constant to match the sample mean of inflation.

$$\pi_{2022} - \pi_{2019} = 6.0\%; \qquad X_{2022}^m - X_{2019}^m = 1.3\%$$

Inflation and Its Permanent Component: 1900–2022 vs 1955–2022

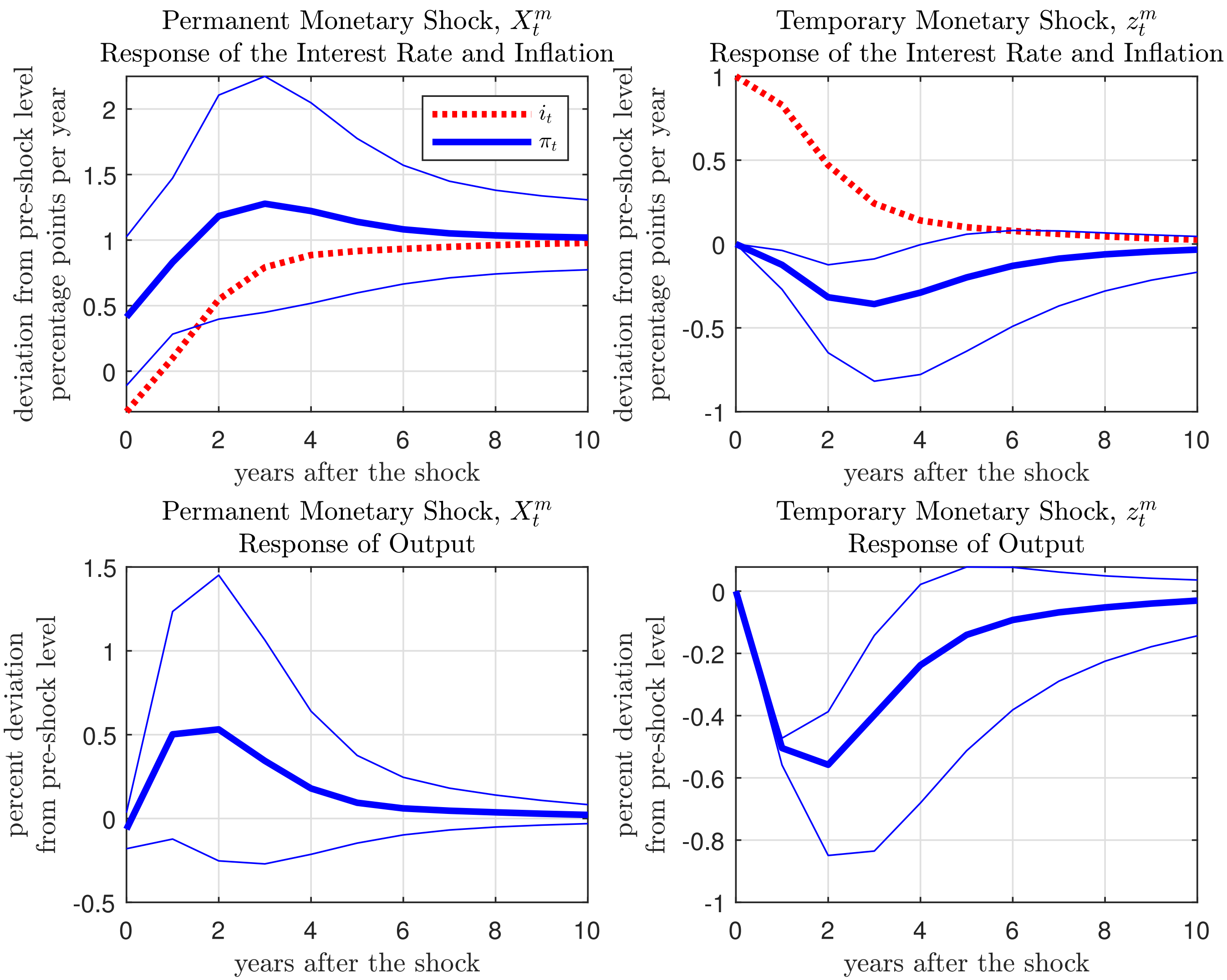
Sample: 1900 to 2022 Sample: 1955 to 2022



$X^m_{2022} - X^m_{2019} = 1.3\%$ $X^m_{2022} - X^m_{2019} = 5.0\%$

- Between 2019 and 2022 the permanent component of inflation experienced an increase of **1.3%** when model is estimated on 1900-2022 data but of **5.0%** when model is estimated on 1955-2022 data.

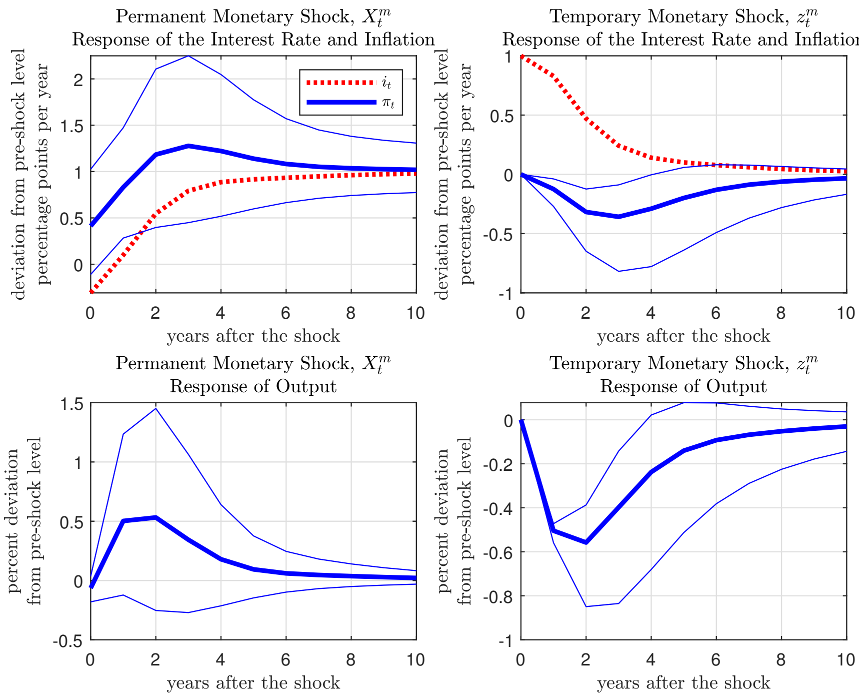
Impulse Response to Monetary Shocks: 1900 to 2022 Sample



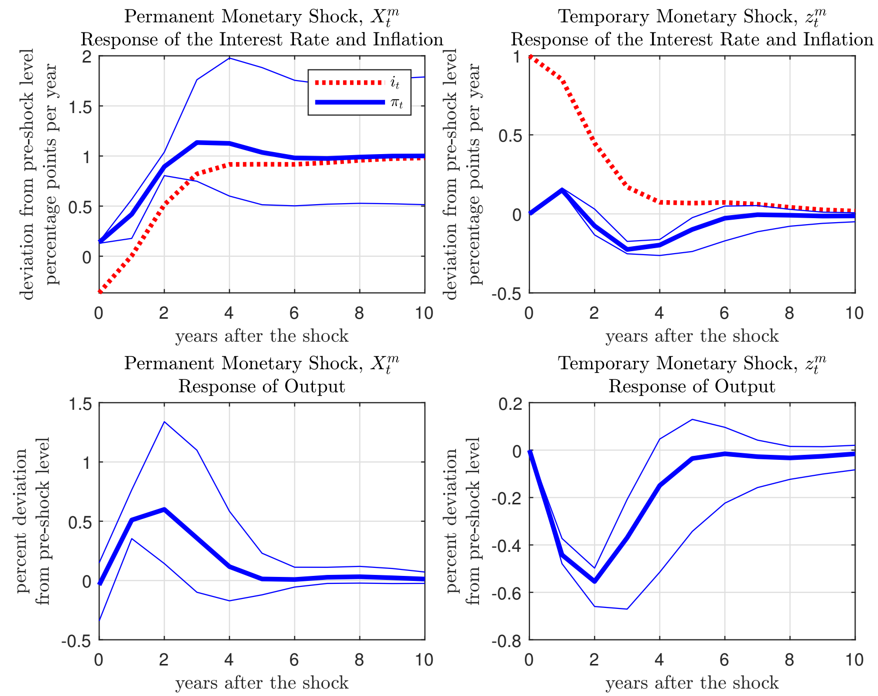
Notes. Posterior mean of impulse responses with 95-percent asymmetric Sims-Zha error bands.

Impulse Response to Monetary Shocks

Sample: 1900 to 2022



Sample: 1955 to 2022



- Impulse responses to monetary shocks (transitory or permanent) are little affected by sample.

Conclusion

• Seen from the perspective of a model estimated on postwar data the post-COVID-19 inflation spur is interpreted to be associated with a large increase in the permanent component of inflation.

• For the sample that includes the sudden, large, and short-lived swings in inflation observed in the first half of the 20th century, the same model attributes only a minor fraction of the post-COVID-19 inflation to an increase in its permanent component.

• The monetary transmission mechanism is estimated to be stable across the two sample periods.