Understanding Post-Covid Inflation Dynamics

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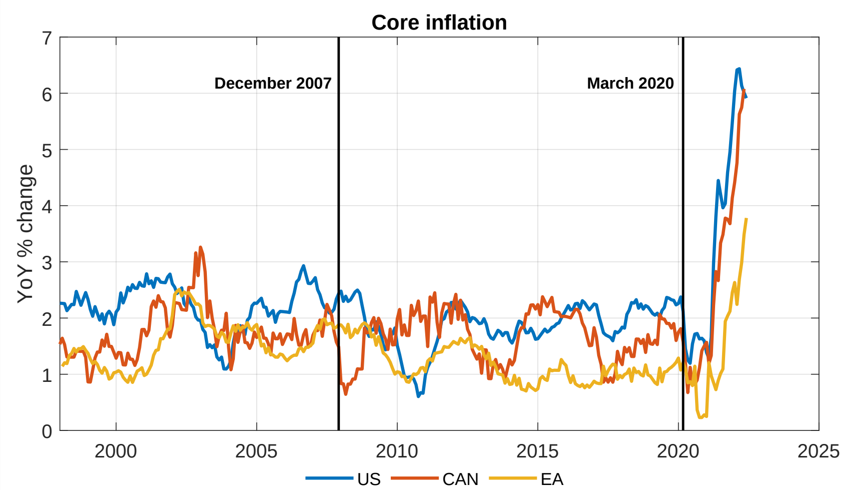
Inflation is increasing rapidly after COVID shock



Understanding inflation: from the Great Recession to COVID

- Challenge: reconcile the "missing deflation puzzle" of the Great Recession with the recent surge in inflation

- Study recent US inflation and output dynamics using the workhorse SW New Keynesian model
    - Key feature: Kimball (1995) state-dependent demand elasticity
    - State-dependent Phillips curve slope and propagation of shocks

Preview of results

- Our variant of the SW model explains the modest decline in inflation during the Great Recession and its recent post-COVID surge better than the original SW model
    - Nonlinear formulation especially helpful

- Phillips curve steeper during booms, flattened during recessions

- Cost-push shocks amplified in booms, muted in recessions

- Policy tradeoff to stabilize inflation becomes larger as baseline inflation increases

The workhorse macroeconomic model

- Nonlinear formulation of Smets–Wouters (2007) model
- Following Dotsey-King (2005), Levin-Lopez-Salido-Yun (2007)

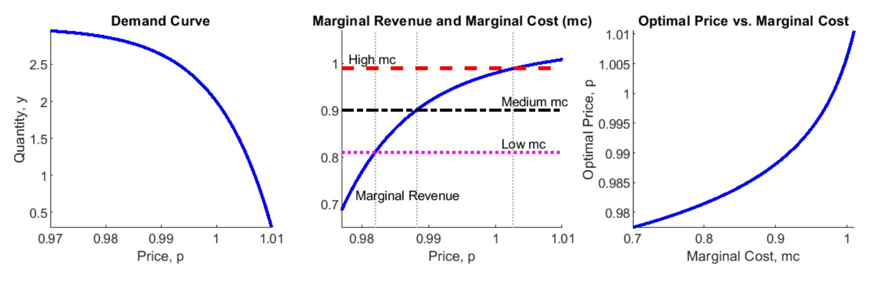
$$G_Y\left(\frac{Y_t(f)}{Y_t}\right) = \frac{\phi}{1-\psi}\left[\left(\frac{\phi-\psi}{\phi}\right)\frac{Y_t(f)}{Y_t} + \frac{\psi}{\phi}\right]^{\frac{1-\psi}{\phi-\psi}} + \left[1 - \frac{\phi}{1-\psi}\right]$$

- $\psi > 0$: Kimball (1995), $\psi = 0$: Dixit-Stiglitz case

▸ Details

Intuition: asymmetric price setting with quasi-kinked demand

- Strategic complementarities imply that firms face **quasi-kinked demand**
  - Demand elasticity is an increasing function of price
- Firms increase prices sharply when marginal costs increase but do not cut prices as much when marginal cost falls

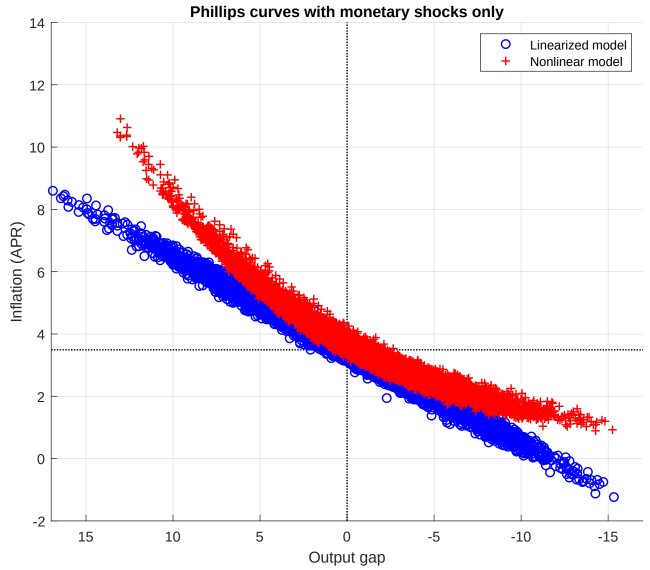


Parameterization and Solution

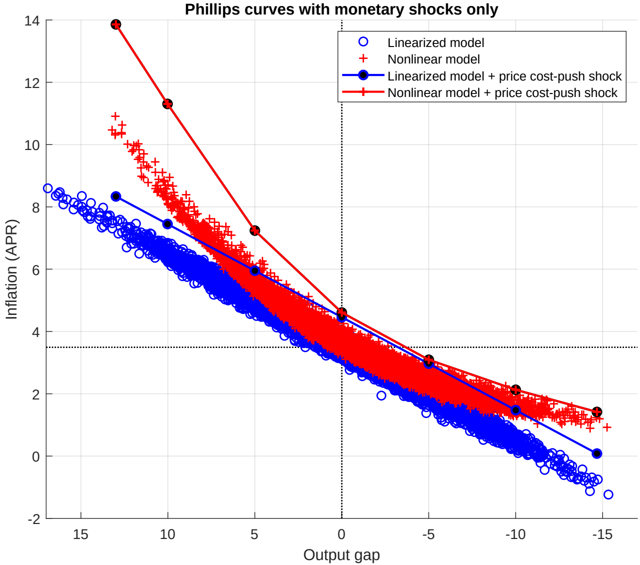
- We follow Harding, Lindé & Trabandt (JME, 2022) to parameterize model
  - Estimate linearized model on pre GFC data
  - Impose tighter prior for steady state markup, Calvo price parameter set in line with micro evidence
  - Estimate price Kimball parameter

- Solution and filtering also follows HLT
  - Solve model with extended path method in Dynare (Fair–Taylor)
  - Stochastic simulation under certainty equivalence teases out difference between linear and nonlinear solutions

Phillips curves in linearized and nonlinear model



Effect of a cost-push shock on Phillips curves



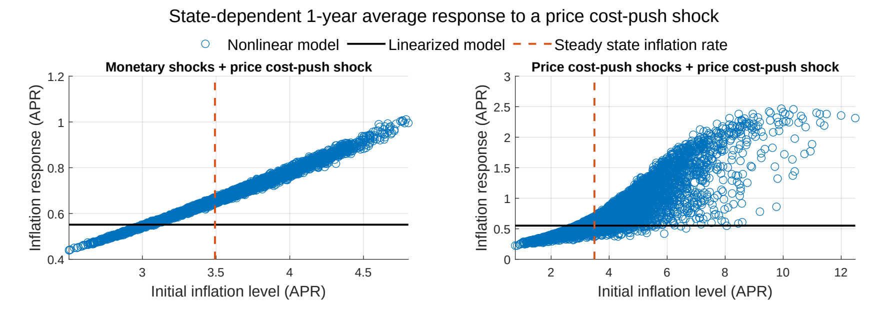
What are the implications for shock propagation?

- Simulate model with shocks evaluated at estimated standard deviations
  - Do this shock by shock, then for all shocks combined
- Feed a 1 σ_p price cost-push shock at each period during the simulations
- Compute the average 1 year effect of the shock across different states

State-dependent effects of cost-push shocks on inflation

- Cost-push shocks amplified when initial inflation is high, irrespective of which shock drives underlying model dynamics
  - Similar results for output gap responses

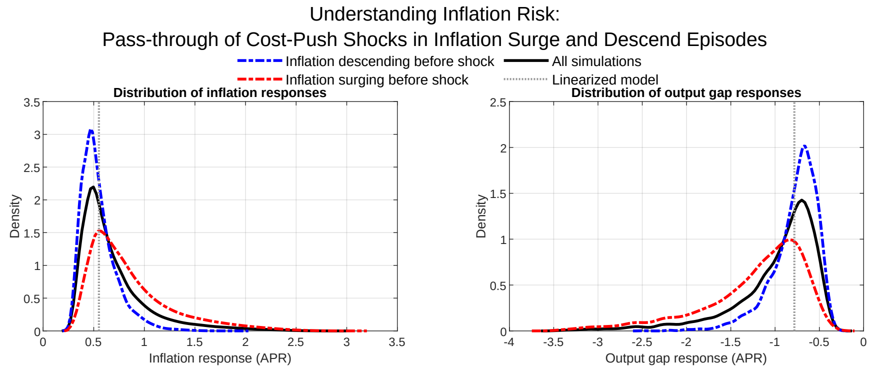
- Cost-push shocks are main driver of inflation in the model
  - Produce substantial inflation risk



▸ More ▸ GDP effects

What explains the increased inflation risk?

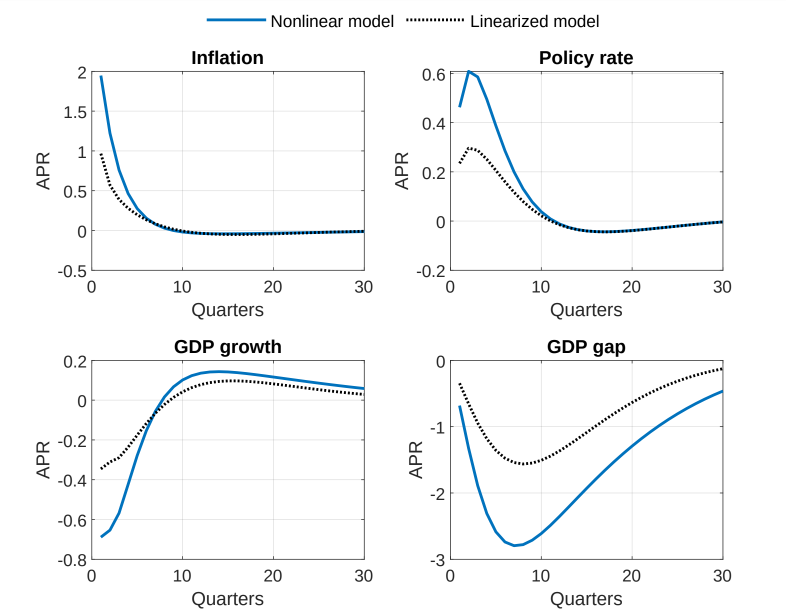
- Whether inflation is surging or descending is key
- Inflation risk substantially higher when inflation is surging



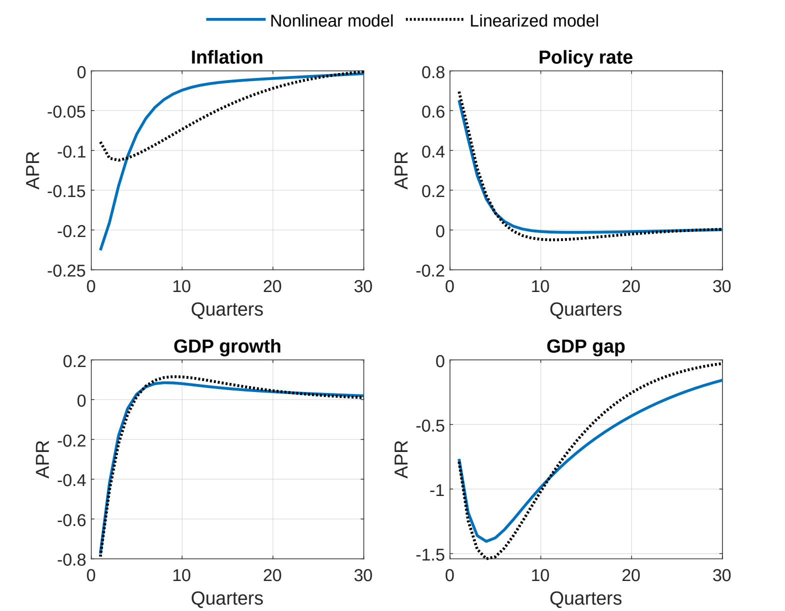
Monetary policy trade-offs during the post-Covid period

- What is the policy trade-off at the current juncture?
- Compute IRFs to cost-push and monetary shocks in nonlinear and linearized model conditional on 2021Q4 filtered state
- Compute the cost of full inflation stabilization in response to a cost-push shock for different levels of initial inflation

IRFs to a 1 σ_p price cost-push shock in 2021Q4

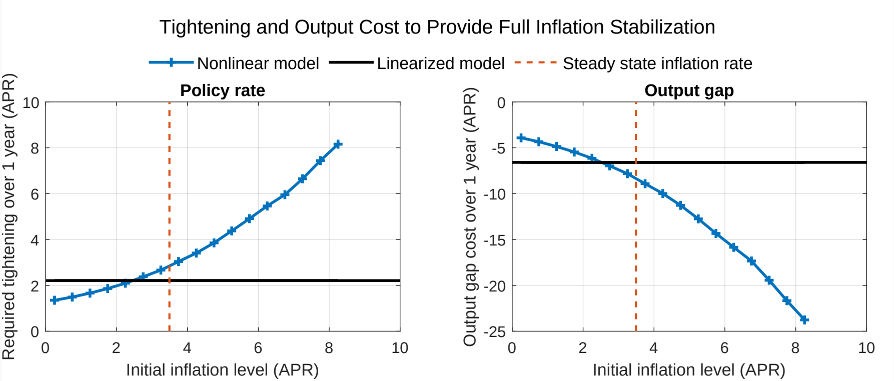


IRFs to a 1 σ_r monetary shock in 2021Q4

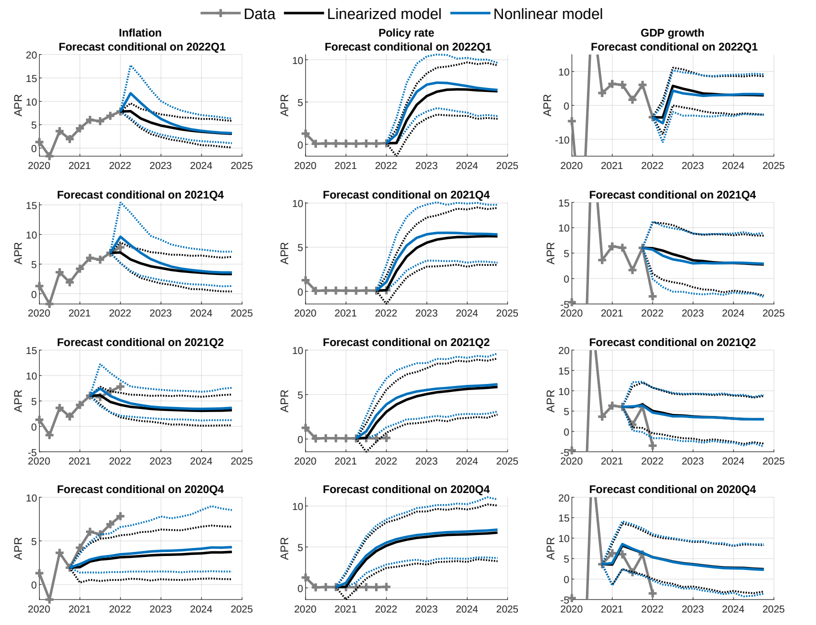


Inflation stabilization cost in response to a 1 σ_p cost-push shock

- Compute the policy contraction that would be necessary to undo the effects of a cost-push shock over 1 year
  - Monetary policy trade-off increasingly larger as inflation increases



Conditional forecast distributions during the post-Covid period



Key takeaways

- Our model explains the modest decline in inflation during the Great Recession and its recent post-COVID surge better than the standard workhorse macro model
- Nonlinear Phillips curve and state-dependent propagation of cost-push shocks key to understand post-Covid inflation dynamics
- Inflation risk is much higher when inflation is already elevated, implying large policy tradeoffs if cost-push shocks truly exogenous

APPENDIX

Kimball aggregator

- Competitive firms aggregate intermediate goods $Y_t(f)$ into final goods Y_t using technology $\int_0^1 G(Y_t(f)/Y_t)df = 1$
- Kimball aggregator:

$$G_Y\left(\frac{Y_t\,(f)}{Y_t}\right) = \frac{\phi}{1-\psi}\left[\left(\frac{\phi-\psi}{\phi}\right)\frac{Y_t\,(f)}{Y_t} + \frac{\psi}{\phi}\right]^{\frac{1-\psi}{\phi-\psi}} + \left[1 - \frac{\phi}{1-\psi}\right]$$

with $\psi = (\phi - 1)\varepsilon$

- $\varepsilon > 0$ governs demand curvature; $\varepsilon = 0$ is Dixit-Stiglitz case

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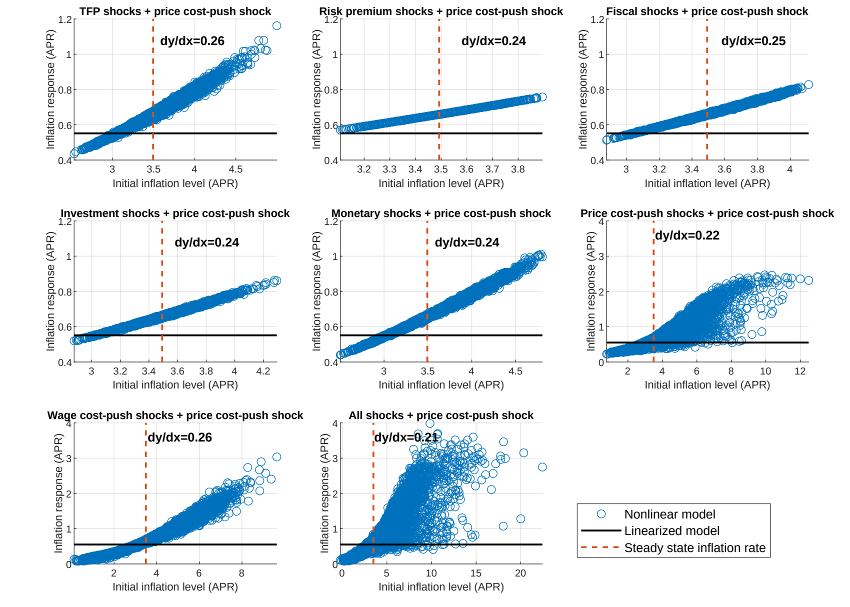
State-dependent effects of cost-push shocks on inflation



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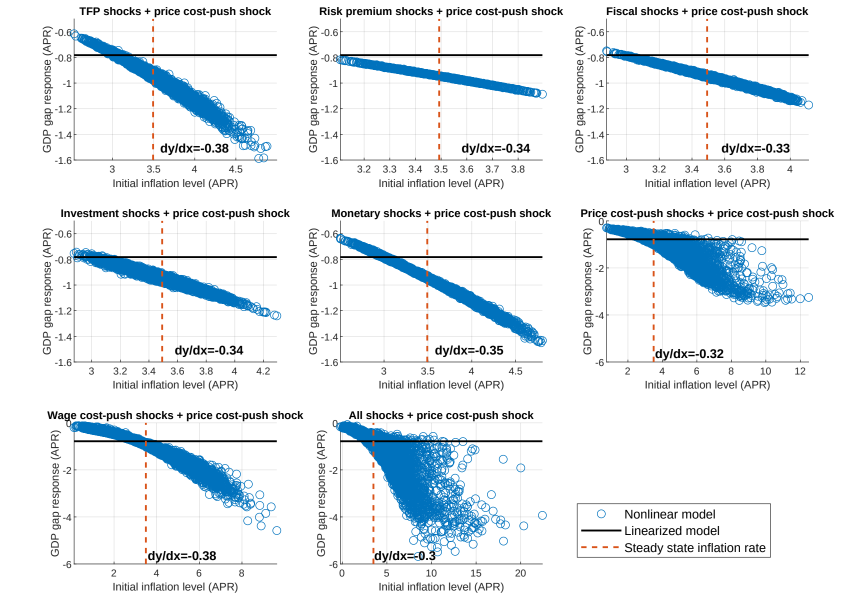
State-dependent effects of cost-push shocks on GDP gap



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