Discussion of
"Understanding Post-COVID Inflation Dynamics"
Harding, Lindé and Trabandt

Pablo Cuba-Borda
Federal Reserve Board

Federal Reserve Bank of Cleveland and the European Central Bank
Inflation: Drivers and Dynamics Conference

September 29-30, 2022

Disclaimer: The views expressed in this article are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of anyone else associated with the Federal Reserve System.
Understanding inflation dynamics remains first order

post-GFC (2008-2019) and COVID (2020)
- subdued inflation
- missing deflation at ZLB

post-COVID (2021-?)
- Rapid change of dynamics
- Confluence of supply and demand factors
Very timely paper:

Main question: What explains post-COVID inflation dynamics?

Possible answers:

1. Large exogenous demand factors
2. Large exogenous supply factors
3. Change in slope of Phillips curve

My discussion:

1. Brief review and assessment of the mechanism
2. Quantitative results and possible extensions
Mechanism in the paper (1)

- Canonical NK model with CES preferences:
  \[
  \frac{p_i}{P} = \frac{\epsilon}{\epsilon - 1} \times \zeta^\epsilon \times mc
  \]

  \(mc\) = marginal cost, \(\zeta^\epsilon\) = cost-push shock, \(\epsilon\) = demand elasticity

- First-order approximation eliminates interaction between \(mc\) and \(\zeta^\epsilon\)

- Pricing under Kimball (1995):

  \[
  \frac{p_i}{P} = \frac{\eta(p_i, P)}{\eta(p_i, P) - 1} \times \zeta^\epsilon \times mc
  \]

  \[
  \eta(p_i, P) = -\frac{\partial q(p_i, P)}{\partial p_i} \frac{p_i}{q_i}
  \]
Mechanism in the paper (2)

\[ \frac{p_i}{P} = \frac{\eta(p_i, P)}{\eta(p_i, P) - 1} \times \zeta^\epsilon \times mc \]

Theory of inflation = theory of endogenous variable markups: \( \frac{\partial \eta(p_i, P)}{\partial p_i} > 0 \)

- Low price firms have low demand elasticity → high markups
  - High markups reduce incentives to adjust prices: reduce exposure deflation risk
  - Low markups greater incentive to adjust prices: increase upside risk to inflation
Assessment of the mechanism

- Nonlinearity of supply side is a natural starting point, but competing theories:

1. Nonlinear optimal pricing *(this paper)*
   - Non-CES demand: state-dependent elasticity plays central role
   - How much did firms adjust desired markups during and post-COVID?

2. Capacity constraints (Boehm and Pandalai-Nayar, 2022)
   - CES demand + capacity constraint: endogenous increase in markups
   - Could this mechanism explain aggregate inflation post-COVID?

Open question: What evidence do we have on the underlying mechanism?
Quantitative model

- Embed nonlinear pricing in New Keynesian model (Smets and Wouters, 2007)
- Nonlinear solution needed for:
  1. Interaction of cost-push-shocks and state-dependent markups
- Bayesian full information estimation of linear and nonlinear versions

Main results

1. Cost-push shocks have different transmission in linear and nonlinear model
2. Nonlinear model features conditional heteroskedasticity in inflation
3. Post-COVID period presents stronger trade-off for monetary policy
Result 1: Transmission of cost-push shocks

- When does nonlinearity to kick in?
  - For high inflation need output gap > 5%
  - For muted inflation need output gap < −10%

Suggestion 1: Clarify if states and shocks that trigger the mechanism are plausible.
Result 2: Conditional heteroskedasticity and inflation risk

Suggestion 2: Show if nonlinear model can detect upside and downside risk using predictive distribution.

Result 3: Monetary policy trade-off

- Condition on 2021:Q4 states:
  - Explore the effects of cost-push shock: inflation ↑, output gap ↓
  - How costly is inflation stabilization following a cost-push shock?

Trade-off: Lowering inflation requires lowering output

Suggestion 3:

- Clarify why is it important to analyze 2021:Q4?
- If state-dependence is main contributor to post-COVID inflation, could think about policy trade-offs at different moments in time, not only in 2021:Q4.
Additional room for analysis in nonlinear model

**Suggestion 4:** Nonlinear model well suited to offer structural decomposition or real-time assessment of inflation risks.

Example with Growth-at-Risk:

![Graph showing 1-year-ahead average GDP growth](image)

Cascaldi-Garcia, Caldara, Cuba-Borda and Loria (2020)
Final thoughts

- Very timely and carefully explained paper
- Unifying mechanism to account for inflation dynamics pre- and post-COVID.
- Nonlinear modeling plays crucial role for quantitative results
- Could use the model to further explore additional features of inflation
  - Structural decomposition of downside and upside risk
  - Monetary policy trade-off in real time
- Great paper! Raises the bar for modelling inflation dynamics in NK setting.