

# Monetary Policy in Incomplete Market Models: Theory and Evidence

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# Policy and the business cycle: interactions



**Quantitative** importance of these interactions in reality?

# This paper

- Estimate structural (HANK) model
- **Non-parametric** approach to modeling monetary and fiscal policy
  - ▶ feed in empirical dynamics
- Counterfactuals shutting down monetary and/or fiscal policy
- Theoretical result: reverse-engineer government transfer scheme which renders the model isomorphic to a complete-markets counterpart
  - ▶ quantitatively decompose difference between incomplete and complete-markets model

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# Modeling policy

- Typical approach in (HA)NK literature: impose structure on government policy:

- ▶ include optimizing government or policy rule, e.g.:

$$i_t = \phi \pi_t$$

- Approach here: let the data speak on policy

- ▶ replace policy rule by Impulse Response Function (IRF), e.g.:

$$i_t = f(\varepsilon_t, \varepsilon_{t-1}, \varepsilon_{t-2}, \dots)$$

where  $\varepsilon_t$  are exogenous shocks (can include e.g. productivity shocks, monetary policy shocks, etc).

- ▶ estimate  $f$  in from the data and plug into model
- ▶ effectively renders policy variables exogenous (but allows for correlation with structural shocks, so arguably still endogenous in an economic sense)

# Why isn't this the standard approach?

## Indeterminacy.

- Equilibrium not unique in standard NK model with exogenous policy
  - ▶ “Taylor Principle”
- When replacing policy rule by IRF, government policy cannot react “off the equilibrium”
- This paper: resolve indeterminacy issue beforehand, exogenous policy then possible



# Resolving indeterminacy

Follow Hagedorn (2017), who shows that equilibrium is determinate under two conditions:

- 1 financial markets are incomplete
- 2 exogenous path of *nominal* government expenditures (conditional on shocks)

# Alternative assumptions

- Difficult to know the “right” way to resolve indeterminacy
  - ▶ no empirical evidence on policy actions off the equilibrium path
- In the spirit of this paper, re-estimate model alternative assumptions on policy
  - ▶ horse race between current assumption, policy rules and FTPL?

# Semi-parametric approach?

- Consider policy rule given by:

$$i_t = \phi \pi_t + f(\varepsilon_t, \varepsilon_{t-1}, \varepsilon_{t-2}, \dots)$$

- Guarantees determinacy iff  $\phi > 1$
- Need to find  $f$  such that interest rate response in the model coincides with the data
  - ▶ iterative procedure?

# Estimation

- Structural estimation: nice, but is it even even needed here?
- Currently, only price and wage stickiness parameters are estimated
  - ▶ parameter values could be obtained from micro studies or estimates of slope NKPC
  - ▶ current estimates point towards very strong nominal rigidity (avg. price duration of almost 3 years)

# Bigger picture

Policy interactions matter quantitatively. This raises a number of questions:

- What kind of behavior on the part of the policy makers (central bank and fiscal authority) can rationalize the empirical policy interactions?
- Are these interactions desirable? What are the welfare effects in the model?
  - ▶ Should fiscal policy be meddling in central bank's business and vice versa?
    - ★ What about Tinbergen's rule (one instrument per target)?
    - ★ Fiscal policy to distributional side effects of monetary policy?

Can start addressing these question with the new model framework.