Discussion of “Firm Heterogeneity, Capital Misallocation, and Optimal Monetary Policy” by González, Nuño, Thaler, Albrizio

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[a]The views expressed are my own and do not necessarily reflect those of the Board of Governors of the Federal Reserve System.

This paper

- **Starting point**: monetary expansion raises TFP. [Baqaee et al. 2021; Jordà et al. 2020...]
- Propose a specific mechanism in the context of a HANK model.
  - most productive firms are financially constrained
  - loose money enables productive firms to expand
- **Contribution 1**: validate mechanism in Spanish micro data.
  - in companion paper Albrizio, González and Khametshin (2021)
- **Contribution 2**: characterize <u>no-shortcut</u> Ramsey policy.
  - zero inflation is optimal in steady state
  - new time inconsistency problem $\implies$ gains from commitment
  - divine coincidence holds but requires more aggressive interest rate policy

Discussion

1. Inspecting the mechanism behind endogenous TFP
    - intuition
    - robustness
2. Optimal policy
    - why is full-blown Ramsey hard?
    - context for results
3. Conclusion

Inspecting the mechanism

Inspecting the mechanism

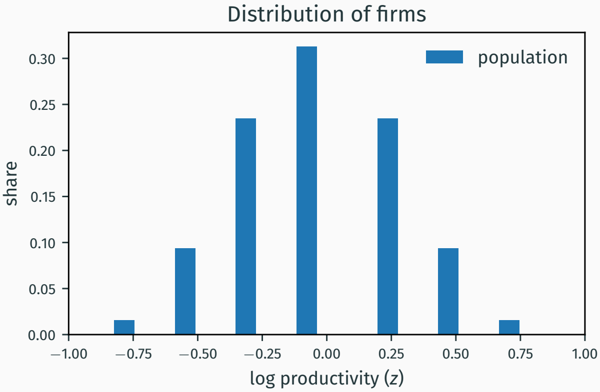
- Key object is the **marginal revenue product of capital** (MRPK).
- RANK benchmark: MRPK equals the rental rate of capital. $MRPK_t = r_t^K$
- This HANK: MRPK is heterogeneous across firms.

$$MRPK_t(z) = \underbrace{z}_{\text{firm-level productivity}} \cdot \underbrace{\varphi_t}_{\text{avg MRPK}} \tag{1}$$

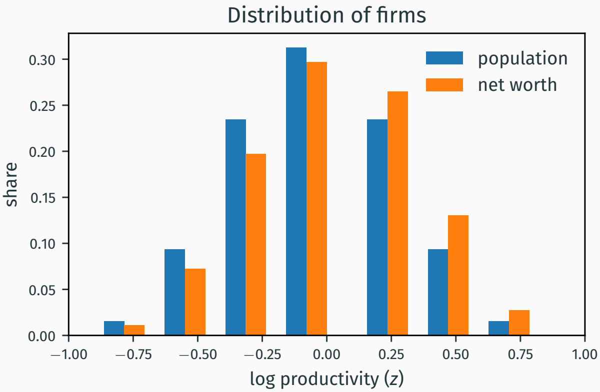
  - z follows exogenous Markov process
  - φ_t is determined in equilibrium exactly as in RANK

- How is market clearing r_t^K determined in this setup?

The market for capital and TFP



The market for capital and TFP



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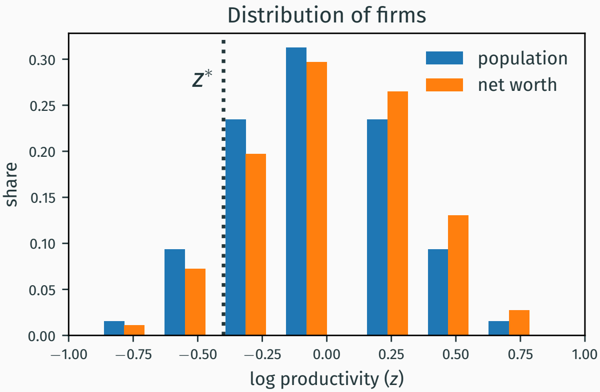
- r_t^K falls until enough firms start producing

The market for capital and TFP



- production capacity is constrained by net worth
- r_t^K falls until enough firms start producing
- $MRPK_t(z_t^*) = r_t^K$ holds only for the marginal firm
- **Aggregate TFP** = average z weighted by net worth shares

Evolution of net worth shares

- Discrete time law of motion:

$$Q_t a_{it} = \Big[\underbrace{\gamma\Big(MRPK_t(z_{it}) - r_t^K\Big)}_{\text{excess return on capital}} + \underbrace{r_t^K + (1-\delta)Q_t}_{\text{return on net worth}}\Big] a_{it-1} \tag{2}$$

  - γ is leverage constraint, Q_t is capital price, δ is depreciation

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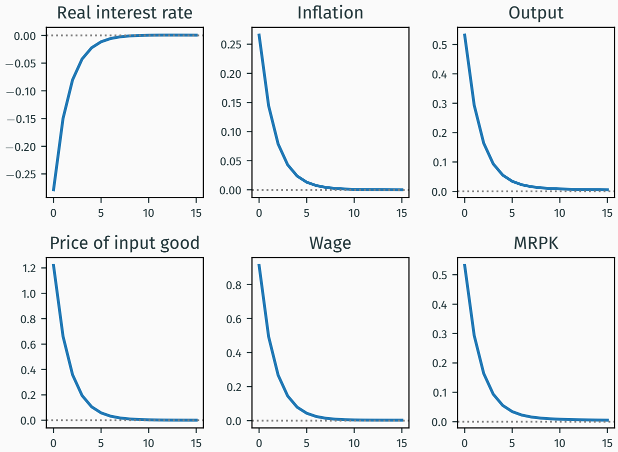
- Recall that marginal revenue product of capital is

$$MRPK_t(z_{it}) = \underbrace{z_{it}}_{\text{firm-level productivity}} \cdot \underbrace{\varphi_t}_{\text{avg MRPK}} \tag{3}$$

- **Insight**: Aggregate TFP is endogenous bc average MRPK is endogenous.

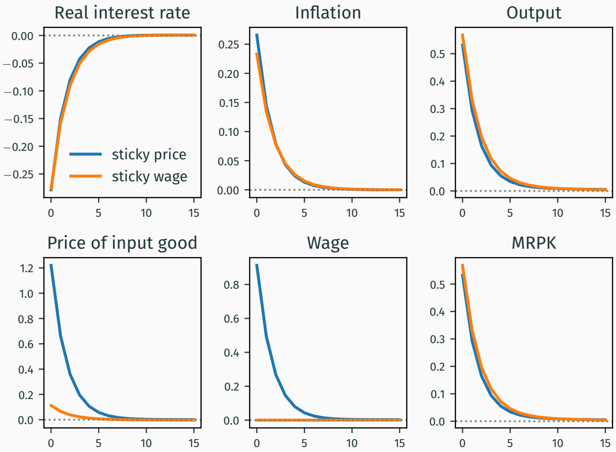
Monetary policy and MRPK



- Avg MRPK depends on product price and non-capital costs:

$$\varphi_t = \alpha \left(\frac{1-\alpha}{w_t}\right)^{\frac{1-\alpha}{\alpha}} m_t^{\frac{1}{\alpha}} \qquad (4)$$

Monetary policy and MRPK



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- TFP channel is **robust** feature of any model where monetary easing raises φ_t.

Optimal policy

Why is full-blown Ramsey policy so hard in HA models?

- The most powerful HA solution methods proceed in two steps.
    1. deterministic steady state *small nonlinear problem*
    2. perturbation around steady state *large linear problem*

- Think of this as the Archimedean principle of HA macro.

- Steady state and dynamics are **inseparable** in Ramsey problem.
    $\rightarrow$ large nonlinear problem

Social utopia and optima

- W is welfare function, θ is policy instrument, $\mathbf{X}$ is endogenous variables.
- **Utopian steady state** policy is the scalar θ^* that solves

$$\max_{\theta} W(\theta, \mathbf{X}) \quad \text{s.t. } \mathbf{H}(\theta, \mathbf{X}) = 0 \tag{5}$$

- **Optimal steady state** policy is the limit of $\{\theta_t^*\}$ that solves

$$\max_{\{\theta_t\}_{t\geq 0}} \sum_{t=0}^{\infty} \beta^t W_t(\theta_t, \mathbf{X}_t) \quad \text{s.t. } \mathbf{H}_t(\theta_t, \mathbf{X}_t) = 0 \quad \forall t \geq 0 \tag{6}$$

- **Optimal policy response** to shock $\{Z_t\}$ is the path $\{\theta_t^*\}$ that solves

$$\max_{\{\theta_t\}_{t\geq 0}} \sum_{t=0}^{\infty} \beta^t W_t(\theta_t, \mathbf{X}_t, Z_t) \quad \text{s.t. } \mathbf{H}_t(\mathbf{X}_t, \theta_t, Z_t) = 0 \quad \forall t \geq 0 \tag{7}$$

Optimal policies and how to find them

- This paper does optimal policy—not utopia—in HANK.
  - competitive equilibrium $\mathbf{H}_t(\mathbf{X}_t, \theta_t, Z_t) = 0$ depends on distribution of net worth shares

- How do they do it?
  - no tricks, very efficient implementation of (6) and (7)
  - continuous time is not black magic: linear interpolation $\approx$ time derivatives
  - curse of dimensionality[2]: time horizon $\times$ idiosyncratic state space

- **Optimal steady state** policy is zero inflation.

- **Optimal policy response** to a discount factor shock $\{Z_t\}_{t\geq 0}$ is full price stabilization.
  $\rightarrow$ divine coincidence

Context for heterogeneity and optimal policy

- Considerations for optimal policy. [Dávila and Schaab 2021]
    1. **aggregate efficiency**
    2. **risk sharing** (equalize marginal utility across periods and states)
    3. **redistribution** (equalize marginal utility across households)

- Addressing considerations 2. and 3. requires **heterogeneous households**.
    - divine coincidence fails generically in richer environments

Conclusion

Conclusion

- Exciting and ambitious paper!
    - brings rich micro data to support an intuitive **HA mechanism**
    - sophisticated template to compute full-blown **Ramsey policy**
- Optimal policy HANK $\approx$ RANK. Not to be taken out of context.
    - no redistributive or risk sharing considerations
    - **question:** have you looked at asymmetry between positive and negative shocks?
- Follow-up work could **refine quantitative predictions**.
    - TFP responds much more to monetary policy in models with markup heterogeneity and production networks. [Cienfuegos and Loria 2017; Baqaee et al. 2021]
    - is the capital misallocation channel important?
    - heterogeneous returns to scale, depreciation, financial constraints, and endogenous entry/exit could amplify the channel; exploit rich Spanish data to discipline them

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