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

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The views expressed are my own and do not necessarily reflect those of the Board of Governors of the Federal Reserve System.
• **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 no-shortcut Ramsey policy.
  • zero inflation is optimal in steady state
  • new time inconsistency problem $\Rightarrow$ 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. \( MRPK_t = r^K_t \)

• This HANK: MRPK is heterogeneous across firms.

\[
MRPK_t(z) = \underbrace{z}_{\text{firm-level productivity}} \cdot \underbrace{\varphi_t}_{\text{avg MRPK}}
\]  

• \( z \) follows exogenous Markov process

• \( \varphi_t \) is determined in equilibrium exactly as in RANK

• How is market clearing \( r^K_t \) determined in this setup?
The market for capital and TFP

Distribution of firms

- Production capacity is constrained by net worth.
- \( r_K \) falls until enough firms start producing.
- \( MRP_K(t)(z^*) = r_K \) holds only for the marginal firm.

Aggregate TFP = average \( z \) weighted by net worth shares.
The market for capital and TFP

• Production capacity is constrained by net worth

• \( r^K_t \) falls until enough firms start producing
The market for capital and TFP

- production capacity is constrained by net worth
- \( r^K_t \) falls until enough firms start producing
- \( MRPK_t(z^*_t) = r^K_t \) 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:

\[ Q_t a_{it} = \left[ \gamma \left( MRPK_t(z_{it}) - r^K_t \right) + r^K_t + (1 - \delta)Q_t \right] a_{it-1} \]

- \( \gamma \) is leverage constraint, \( Q_t \) is capital price, \( \delta \) is depreciation

Recall that marginal revenue product of capital is

\[ MRPK_t(z_{it}) = z_{it} \cdot \phi_t \]

Aggregate TFP is endogenous because average MRPK is endogenous.
Evolution of net worth shares

• Discrete time law of motion:

\[ Q_t a_{it} = \gamma \left( MRPK_t(z_{it}) - r^K_t \right) + r^K_t + (1 - \delta)Q_t \bigg|_{a_{it-1}} \]

• \( \gamma \) is leverage constraint, \( Q_t \) is capital price, \( \delta \) is depreciation

• Recall that marginal revenue product of capital is

\[ MRPK_t(z_{it}) = \frac{z_{it}}{\text{firm-level productivity}} \cdot \frac{\varphi_t}{\text{avg MRPK}} \]

• **Insight**: Aggregate TFP is endogenous bc average MRPK is endogenous.
Monetary policy and MRPK

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

\[
\varphi_t = \alpha \left( \frac{1 - \alpha}{w_t} \right)^{\frac{1-\alpha}{\alpha}} m_t^{\frac{1}{\alpha}} \tag{4}
\]
Avg MRPK depends on product price and non-capital costs:

\[ \varphi_t = \alpha \left( \frac{1 - \alpha}{w_t} \right)^{\frac{1 - \alpha}{\alpha}} m_t^{\frac{1}{\alpha}} \]  

TFP channel is robust feature of any model where monetary easing raises \( \varphi_t \).
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
  2. perturbation around steady state

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

- Steady state and dynamics are **inseparable** in Ramsey problem.
  → large nonlinear problem
Social utopia and optima

• $W$ is welfare function, $\theta$ is policy instrument, $X$ is endogenous variables.

• **Utopian steady state** policy is the **scalar** $\theta^*$ that solves

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

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

$$\max_{\{\theta_t\}_{t \geq 0}} \sum_{t=0}^{\infty} \beta^t W_t(\theta_t, X_t) \quad \text{s.t.} \quad H_t(\theta_t, X_t) = 0 \quad \forall t \geq 0$$

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

$$\max_{\{\theta_t\}_{t \geq 0}} \sum_{t=0}^{\infty} \beta^t W_t(\theta_t, X_t, Z_t) \quad \text{s.t.} \quad H_t(X_t, \theta_t, Z_t) = 0 \quad \forall t \geq 0$$
Optimal policies and how to find them

• This paper does optimal policy—not utopia—in HANK.
  • competitive equilibrium $H_t(X_t, \theta_t, Z_t) = 0$ 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 $\{Z_t\}_{t\geq0}$ 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 $\text{HANK} \approx \text{RANK}$. 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; Baqae 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


