Discussion of
"A Macroeconomic Model with a Financial Sector"
by Brunnermeier and Sannikov

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Summary

- Paper studies model with borrowing constrained banks/firms, also considers externalities and securitization

Contribution:

- technical: model is in continuous time, where authors get more tractable solutions to contracting problem between productive agents (banks & firms) and unproductive agents (households)
- go beyond log-linearization, study global dynamics
- find that after some bad shocks, in region of the state space close to the borrowing constraint, risk becomes important: firms become more prudent, invest less, price of capital drops even further, system becomes volatile & unstable
Banking sector is not special.

⇒ Model of the recent crisis?

Assumptions made for tractability:
  - source of fluctuations
  - behavioral assumptions on firms/banks
  - preferences and technology

⇒ Balance between tractability and quantitative work?

Model does not allow for contracts contingent on the aggregate state, restricts risk sharing between firms/banks and households.

⇒ Makes constraints in the model more important?
  How to map to firm/bank financing in the data?
Banking sector is not special

- Two layers of moral hazard as in Holmstrom & Tirole:
  \[ m_t = \text{banks’ monitoring effort} \]
  Firms need to hold a fraction \( \alpha^E \geq b(m_t) \) of internal funds to obtain loans from banks
  Banks need to hold a fraction \( \alpha^I \geq c(m_t) \) of internal funds to obtain loans from households

- Holmstrom & Tirole: net worth of banks and firms matter **separately**
- Assumption here: \( b(m_t) + c(m_t) \) is constant in \( m_t \)
- Fraction \( \alpha = \alpha^E + \alpha^I = b(m_t) + c(m_t) \) matters, only **combined** net worth of productive agents matters,
- Is this a good model for recent crisis? Banks’ net worth was affected, they were bailed out.
Source of fluctuations in model versus data

**In model: TFP, capital move**

- production function
  \[ y_t = a k_t \]

- driving force of output fluctuations: capital destruction shocks \( dZ_t \)
  \[ dk_t = \left( \phi \left( \frac{l_t}{k_t} \right) - \delta \right) k_t dt + \sigma k_t dZ_t \]

- alternatively, \( y_t = a_t k_t \), TFP shocks have permanent effect on \( a_t \) and adjustment costs
  \[ \phi \left( \frac{l_t}{y_t} \right) \]

- extension with labor: households supply fixed amount of labor \( \bar{L} \).

**In data (last 30 years): hours move, not TFP, capital**
Behavioral assumptions

- **Key assumption**: productive agents are *impatient*. Firms/banks discount future at higher rate $\rho > r$ than households.

- **Implication of the assumption**: impatient agents want to consume today, borrow from more patient households.

- **Comparison to data**: Retained earnings are important source of financing. Especially *before* the crisis, empirical corporate finance literature documents a puzzling large amount of cash hoarding (e.g., "Why do firms have so much cash?")
Balance between tractability and quantitative work?

- Assumptions that make the model easier to solve
  e.g., TFP/capital moves, impatient firms/banks,
  linear preferences, linear technology
  also make the model less suited for quantitative work
- Single state variable

\[ \eta_t = \frac{\text{net worth of firms + banks}}{\text{capital}} \]

Endogenous variables are functions of \( \eta_t \),
which solve differential equations
e.g., price of capital \( p(\eta_t) \), value functions \( f(\eta_t) \times \) net worth
- Still, solutions are not closed form, done \textit{computationally}
- Benefits from assumptions? Provide more justifications?
Comparison with Bernanke, Gertler & Gilchrist

- Brunnermeier & Sannikov:
  start from assumptions that make model with frictions easier to solve (including away from steady state),
  obtain model that seems less attractive for quantitative work

- Bernanke, Gertler & Gilchrist:
  start from standard New Keynesian business cycle model
  add frictions
  study whether frictions matter quantitatively

- Does BGG generate similar dynamics away from steady state?
  Are there important quantitative differences?
  Is the deviation from log-linearized dynamics quantitatively important?
  What features of the model are important to generate interesting dynamics?
Contracts

- Contracts between productive agents (banks/firms) and unproductive agents (households) do not allow productive agents to hedge any aggregate risk.

- Benchmark model (only aggregate shocks): productive agents cannot issue state-contingent debt or outside equity, can only issue non-contingent debt (= more risky, once issued, may go bankrupt), issue less when close to the constraint.

- Extension of the model for securitization (with idiosyncratic shocks): productive agents can issue state-contingent debt but only to other productive agents, not to households.

- Limitation on contracts allowed restricts risk sharing between producing and unproductive agents, makes constraints more important.

- Comparison to data: more risk sharing through outside equity etc.
Concluding comments

- For application to recent crisis, need banking sector that is special
- Interesting dynamics, are they quantitatively important?
- Right balance between not-much-tractability (use computer anyway) and quantitative work?
- Missing mechanism for fluctuations: hours
- In the data, firms hoard cash—are they impatient?
- In the data, firms issue equity directly to households—not allowed here