Discussion: Aggregate Bank Capital and Credit Dynamics

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Aim of this Research

Central banks need a new type of quantitative model for guiding their financial stability decision. The aim of this paper is to propose such a model.

Similar aim to Brunnermeier and Sannikov and He and Krishnamurthy
Implications

The paper does a nice job of deriving and explaining a differential equation for the (common) book to market value as a function of aggregate bank capital and a resulting stochastic evolution for aggregate bank capital.

- Stationary density
- Transition dynamics
Stationary densities and transitions

Bank capital evolution:

\[ dE_t = \mu(E_t)dt + \sigma(E_t)dZ_t \]

- volatility induced stationarity - move away from high volatility states
- spectral expansions of the transitions - follows Wong(1964)

Handbook chapter: methods summarized in Ait Sahalia, Hansen and Scheinkman
Impulse Response Functions

Bank capital evolution:

\[ dE_t = \mu(E_t)dt + \sigma(E_t)dZ_t \]

Paper criticizes the following "small noise" expansion:

- Find the steady state \( \bar{E} \)
- Use

\[ dF_t = \mu'(\bar{E})F_t dt + \sigma(\bar{E})dZ_t \]

- Compute impulse response for the approximate linear system.

In macroeconomics this approach and higher order refinements applied to large dimensional economic models.
Impulse Response Functions II

\[ dE_t = \mu(E_t)dt + \sigma(E_t)dZ_t \]

Malliavin derivative - use small increment instead of small noise

- Solve

\[ dF_t = \mu'(E_t)F_t dt + \sigma'(E_t)F_t dZ_t \]

with initial condition \( F_0 = \sigma(E_0) \)

- Nonlinear (random) impulse response is

\[ \mathcal{D}_0 E_t = F_t \]

- Compute interesting conditional expectations.

Quantitative Policy Support

How do we use the model or refinements of it as a guide for policy?

- Low capital requirements are “destabilizing” in contrast to high ones. What does this mean operationally?
- Potential welfare gains for making capital constraints state dependent. How do we implement this?
- What is the real world counterpart to a bank in this model?