Discussion of “Firm Risk and Leverage-Based Business Cycles” by Sanjay Chugh

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Summary

- This is a very interesting paper on the role of “risk shocks” in explaining business cycle fluctuations.
- “Risk shocks”: time variation in the cross-sectional distribution of firm level productivity.

1. **Empirical part:**
   - measure ”risk shocks” based on US micro data.
   - measure cyclical fluctuations in the leverage cycle.

2. **Theoretical part:** analyze a DSGE financial-accelerator model.

- Argues that risk shocks explain a large share of financial fluctuations and a small share of real fluctuations.
  - for the benchmark model, risk shocks are procyclical.
Risk shock: overall effect

- The quantitative effect:
  1. Magnitude of the shocks.
  2. Propagation mechanism.

- Paper addresses both aspects.
- I will focus on the propagation mechanism.
Literature on risk shocks


- Stochastic volatility interacted with:
  1. non-convex adjustment costs (real options): increase in uncertainty can lead to recessions through "wait and see" (Bloom (2009), Bloom, Floetotto and Jaimovich (2009), Bachmann and Bayer (2009)).
  2. financial frictions:
     - Arrelano, Bai and Kehoe (2010): high volatility increases the risk of costly liquidation $\rightarrow$ firms reduce scale.
     - Christiano, Motto and Rostagno (2009), Dorofeeenko, Lee and Salyer (2008) are financial accelerator models: high volatility leads to recessions.
Empirical part of the paper 1: size of risk shocks

- Consider the following production function:

\[ y_{i,t} = \theta_t \omega_{i,t} f(k_{i,t}, n_{i,t}) \]

- Aimed at getting a measure of time variation in the volatility of \( \omega_{i,t} \).
- There is a growing empirical work on measuring this time variation:
  - measures and conclusions differ.
- Here find (relatively) larger time-variation than the existing micro-data based literature: why is this approach better?
Empirical part of the paper 2: leverage ratios

- Leverage ratio, defined as book value of debt/book value of equity.
- Contribution: construct cyclical properties.
  - much larger cyclical volatilities during “Great moderation”
  - leverage is moderately countercyclical.
- Stylized fact from corporate finance lit.: firms issue equity over debt in booms (Korajcyzk and Levy 2003, Dittmar and Dittmar 2008).
- How easily can we test models against these findings?
  - countercyclicality of leverage seems to require a theory of firm’s choice over capital structure (e.g. Levy and Hennessy (JME, 2007)).
  - difficult here: model allows only for issuing debt as external financing.
  - in the model: leverage ratio = value of debt/value of accumulated net worth (internal funds).
Theoretical model

- DSGE financial accelerator model with time-varying idiosyncratic productivity risk.
- Based on Carlstrom and Fuerst (ET, 1998): “output model”.
  - firm (entrepreneur) produces consumption goods.
  - uses capital and labor.
  - needs external financing.
- Different from other financial accelerator models with time-varying risk shocks:
Risk shocks and investment: role of financial frictions

- With CSV, financial accelerator models result in a one period standard debt contract:
  - pay an interest to the bank if above a liquidation threshold $\bar{\omega}_t$.
  - default, turn over the assets and be monitored by the bank if below $\bar{\omega}_t$.

- In a standard debt contract, the lender faces only the downside risk.
- An increase in volatility of outcomes leads to a decrease in expected payoffs for lender
  - it shifts the loan supply curve upwards.
  - equilibrium: higher premium and less loans (investment).

- This mechanism is present in existing DSGE models:
  - makes risk shocks countercyclical.
  - procyclical leverage ratios.
  - depending whether friction on demand or supply of capital, it leads to a procyclical (countercyclical) price of capital.
Theoretical model: key differences from literature

1. The production function of the firm that needs external financing:
   - Here:
     \[ y_{i,t} = \theta_t \omega_{i,t} k_{i,t}^{\alpha} n_{i,t}^{1-\alpha} \]
     \[ y_{i,t} = \omega_{i,t} k_{i,t} \]
   - in all models \( \omega_{i,t} \) is private information (Costly State Verification).

2. Friction in the supply vs. demand for capital.
   - here financial friction is on the input demand side (both labor and capital).
   - what is the role of adding labor?
Risk shocks and investment: “Hartman-Abel” effect

- Here the “output model” assumption makes a big difference.
- Take for example competitive factor prices and the prod.fct:
  \[ y = Ak^\alpha n^\nu, \quad \alpha + \nu < 1 \]

- “Hartman-Abel” effect: an increase in the volatility of technology leads to an increase in demand for inputs \( \rightarrow \) risk shocks procyclical.

  \[ k^* = \phi_1 A^{1-\alpha-\nu}; \quad n^* = \phi_2 A^{1-\alpha-\nu} \]

  ▶ optimal input choices are convex in technology.

- can be eliminated with a re-normalization of \( A \rightarrow A^{1-\alpha-\nu} \).
- Here, production function is constant returns to scale \((\alpha + \nu = 1)\).
  ▶ agency costs show up as an endogenous markup \( p_t > 1 \) paid by firm.
  ▶ it effectively makes the resulting prod. fct look like DRS.
- Effect is absent in CF (AER, 1997) or BGG (linear prod.fcts.)
Effect of higher risk: role of financial frictions

Standard debt contract: higher risk shifts supply

- Supply (low risk)
- Supply (high risk)
- Demand (low risk)
Effect of higher risk: role of Abel effect

'Abel effect' shifts demand

Supply (low risk)
Supply (high risk)
Demand (low risk)
Demand (high risk)
Conclusion

- paper studies risk shocks and financial frictions in a DSGE model.
- the consumption good producer is subject to the financial friction.
- propagation mechanism: effect of higher risk is a combination of two general forces:
  - financial frictions: produces recessions.
  - Hartman-Abel effect: produces booms.
- Suggestion on the model: shut down (temporarily) the Hartman-Abel channel.
  - would help to better understand the contribution of adding labor demand to the financial friction.