Are There any Spillovers between Household and Firm Financing Frictions? A Dynamic General Equilibrium Analysis

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Motivation

- Examine possible feedback/spillovers between financing frictions in household and firm sector
- Do worse financial conditions for households contribute to worse financial conditions for firms?
  Financing frictions often suggested as a prime candidate for solving amplification and persistence puzzles
  - financial accelerator (Bernanke et al (1999), Kiyotaki and Moore (1997))
- 2 most important types of financing constraints:
  - firms and households
  - almost always examined separately
- Can combination of household and firm frictions increase amplification and persistence effects on output?
Motivation

- Great Depression: decline in total consumption of 6.2% in 1930 (Olney 1999)
  - "Consumption Collapse of 1930" often suggested as key cause in persistence of depression

- Mian and Sufi (2009):
  - sort US counties by household leverage growth in 2002-2006
  - 10% highest household leverage growth counties
  → 2.5% higher unemployment rate change relative to bottom 10% in 2005-2008.

- household and firm financial accelerators can reinforce each other (double financial accelerator)
  - are both financial accelerators?
  - common perception in business press, policy circles, some economists (mostly new-keynesians)
  - how does this work in a modern DSGE model?
What I do

- I use DSGE model where both firms and households financially constrained
  - first (to my knowledge) to study financing frictions feedback (unlike Iacoviello 2005).
  - allow for equilibrium default, interest rate spreads, time varying leverage
  - no need to assume collateral constraint always binds (closer in spirit to precautionnary saving model)
- As in Iacoviello (2005), but unlike Bernanke et al (1999):
  - allow for risk averse agents and nonlinearities in budget constraint
  - means I can apply Bernanke et al equilibrium default framework to households
- Conclusion: financing frictions alone do not generate double financial accelerator. You need other elements like nominal rigidities, intersectoral adjustment costs.
Model structure

- Key ingredients:
  - financially constrained households (borrowers)
  - financially constrained firms (entrepreneurs)
  - financially unconstrained households (savers)
  - collateral value volatility $\rightarrow$ housing and capital adjustment costs

- Use differences in impatience rates to generate borrowing/lending
Model, borrowers

- $\theta_{bo}$ impatient households borrow in equilibrium ($\beta_{bo} < \beta$)

- 1 period debt contracts:
  - repay $R_t l_{bo,t-1}$ or default and let lender seize collateral $\varepsilon_{bo,t} \tilde{A}_{bo,t}$.
  - cost of seizing collateral $\mu_{bo} \varepsilon_{bo,t} \tilde{A}_{bo,t}$.
  - $-\varepsilon_{bo,t}$ iid across borrowers and time

- $\varepsilon_{bo,t}$ uninsurable $\rightarrow$ default iff $\varepsilon_{bo,t} < \bar{\varepsilon}_{bo,t}$.

- Assume borrowers belong to large family as in Shi(1997) monetary search model
  - allows me to keep intuitive default rule while preserving tractable distribution of wealth

- large family pools borrowers’ resources
  - diversify $\varepsilon_{bo,t}$ after loan repayments.
  - bank cannot seize insurance (limited liability).
  - bank can diversify idiosyncratic risk across many borrowers
Model, borrowers

- Representative borrower solves

$$\max_{\{c_{bo,t}, h_{bo,t}, l_{bo,t}, n_{bo,t}, \bar{\varepsilon}_{bo,t}\}_{t=0}^\infty} E_0 \sum_{t=0}^\infty \beta^t_{bo} \left( c_{bo,t} \frac{\bar{\varepsilon}_{c,t} h_{bo,t} (1 - n_{bo,t})^{1-\xi_c - \xi_h}}{1-\sigma} \right)$$

subject to

- Budget constraints:

$$c_{bo,t} + q_t l_{bo,t}^h \leq n_{bo,t} w_t + H(\bar{\varepsilon}_{bo,t}) \tilde{A}_{bo,t} + l_{bo,t} (\lambda_{bo,t}) ,$$

- Lender break-even constraints:

$$G(\bar{\varepsilon}_{bo,t}) \tilde{A}_t \geq R_t l_{bo,t-1} (\psi_{bo,t}) ,$$

$$\tilde{A}_{bo,t} = q_t (1 - \delta_h) h_{bo,t-1} .$$
Model, borrowers

\[ u_{cbo,t} = \beta_{bo} R_{t+1} E_t u_{cbo,t+1} efp(\varepsilon_{bo,t+1}) \]
\[ \psi_{bo,t} = \lambda_{bo,t} efp(\bar{\varepsilon}_{bo,t}) . \]

- **External finance premium:**
  - \( efp(\bar{\varepsilon}_{bo,t+1}) > 1, \ efp'(\bar{\varepsilon}_{bo,t+1}) > 0. \)
  - higher financing frictions \( \rightarrow \) higher effective discount rate

- \( efp(\bar{\varepsilon}_{bo,t+1}) \) countercyclical on impact because loan predetermined
- remains countercyclical if borrowers’ consumption smoothing moderates changes in borrowing enough
Entrepreneur model of financing frictions similar to impatient households.

Capital and output subject to common idiosyncratic shocks $\varepsilon_{e,t}$ as in Zha (2001).

Representative entrepreneur problem:

$$\max_{\{c_{e,t}, k_{e,t+1}, u_{e,t}, n_{e,t}, \bar{\varepsilon}_{e,t}, l_{e,t}\}} E_0 \sum_{t=0}^{\infty} \beta^t \ln c_{e,t}$$

subject to

$$c_{e,t} + q_{k} k_{t+1} \leq \bar{A}_{e,t} + H(\bar{\varepsilon}_{e,t}) \bar{A}_{e,t} + l_{e,t}$$

and

$$G(\bar{\varepsilon}_{e,t}) \bar{A}_{e,t} \geq R_t l_{e,t-1} + w_t n_{e,t}$$

$$\bar{A}_{e,t} = (1 - \delta_{e,t}) q_{t} k_{e,t} + y_{e,t}$$

$$y_{e,t} = z_{e,t} (u_{e,t} k_{e,t})^\alpha n_{e,t}^{1-\alpha} \theta, 0 < \theta < 1$$

$$\lambda_{e,t} = \beta^e R_{t+1} E_t \lambda_{e,t+1} efp_{e,t+1}.$$
More patient savers fund financially constrained households and entrepreneurs
- standard Real Business Cycle with housing representative agent

Financially unconstrained corporate sector that produces final output using capital and labour

Capital and housing production subject to convex adjustment costs

all owned by savers
Results

Negative Feedback between financing frictions in baseline RBC model

- Examine positive TFP shock (same analysis in reverse for recessions)

- Borrowers:
  - boom increases wages and house prices → increase borrowing
  - increase in $h_{bo,t}$ and consumption smoothing → lower leverage ($\frac{R_{t}l_{bo,t-1}}{A_{bo,t}} \downarrow$) and external finance premium
  - better borrowing conditions → higher $c_{bo,t}$ and lower $n_{bo,t}$ (stronger income effect on labour supply)

- Savers
  - higher demand for loans by borrowers raises risk free interest rate
  - save more relative to frictionless benchmark
  - lower $c_{s,t}$ → higher marginal value of working → higher $n_{s,t}$.

- Overall effect on aggregate labour supply?
Results

Negative Feedback between financing frictions in baseline RBC model

- Aggregate labour supply $N^s_t$ satisfies
  \[ 1 - N^s_t = \frac{\xi_n}{\xi_c w_t} C_{t \text{holds}}. \]

- $C_{t \text{holds}}$ more procyclical with credit constraints $\iff$ $N^s_t$ less procyclical $\implies$ Lower household financing frictions raise wages for firms in boom

- What about benchmark risk free interest rate?
  1) Fall in betterborrowing conditions $\implies$ higher borrower consumption and loan demand $\implies$ higher interest rate
  2) higher wages due to lower aggregate labour supply over several periods $\implies$ lower investment $\implies$ lower $q_t$ and higher $\frac{q_{t+1}^k}{q_t^k}$

- Basic capital demand without financing frictions:
  \[ R_{t+1} = \frac{(1-\delta_u)q_{t+1}^k + MPK_{u,t+1}}{q_k^t} \]

- higher $\frac{q_{t+1}^k}{q_t^k} \implies$ higher $R_{t+1}$
Results

Negative Feedback between financing frictions in baseline RBC model

- Combination of higher wages and higher interest rates increases cost of external financing for firms

  $\implies$ No positive feedback effect between strength of financing frictions
  - (small) negative feedback: reduces output response by 2-2.5% relative to model with only firm financing frictions

- Double household/firm financial accelerator story doesn’t work in Real Business Cycle model if you just add financing constraints
Results

Negative Feedback between financing frictions in baseline RBC model
Conclusion
Factors that could change negative spillovers result

- Uninsured $\varepsilon_{i,t}$
  - saver and borrower labour supplies move in opposite directions in response to change in household financing constraints.
  - aggregation of opposing borrower/saver effects less straightforward. This could reverse results.
  - may be feasible using explicit aggregation techniques (Den Haan et al 2009)

- Limits to factor mobility across sectors
  - but we already have these through adjustment costs
  - what if we don’t allow firms to switch between consumption and capital goods in short run?

Separate financing frictions for consumption and investment sector firms may reverse current results
- effects in more realistic multisector model (different production factor intensities, land...)?

Sticky wages and prices
- Sticky wages limit income effects on $N$
- sticky prices $P$

Quantitative significance controversial (see Pissarides (2009), Klenow et al (2008))