Discussion of "Fragile New Economy: The Rise of Intangible Capital and Financial Instability" by Ye LI (OSU)

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Brief Summary

- Introduces a continuous-time macro-finance model to jointly rationalize the FIVE facts during the boom periods of the U.S. economy

  1. intangible capital increasingly intensive in the economy
  2. greater corporate cash holding in the form of "bank" desposits/debts and money market positions
  3. declining short-term interest rates (model suggests it's due to firms' larger liquidity demands)
  4. boom of financial sector, i.e. larger share of financially inter-mediated assets relative to real economy
  5. higher prices of collateral assets

- Importantly, this model delivers endogenous accumulation of risk of financial instability along with economic expansion

  - Key Chanel of *Intermediated Liquidity Premium*

Model Overview

► Entrepreneurs (firm producers/borrowers/cash depositors)

    a. Infinite-horizon risk-neutral preference: $\mathbb{E} \int_{t=0}^{\infty} e^{-\rho t} \mathrm{d} c_t^E$

    b. linear production function of goods numeraire (CES technology considered in Appendix) using two types of capital

    - tangible capital (T) production $\alpha K_t^T \mathrm{d} t$ vs. more productive intangible capital (I), $(\alpha + \phi) K_t^I \mathrm{d} t$

    - (T): perfectly liquid/resalable at price q_t^T /pledgeable

    - (I): illiquid/entrepreneur-specific/non-pledgeable, i.e. organizational capital, brand, proprietary tech

    c. Poisson liquidity shocks total capital destroyed with intensity/rate λ

    - demand for extra liquidity services s.t. a borrowing constraint: $i_t^E \leq \kappa i_t^E (1 - \theta) q_t^T + m_t^E$

    - m_t^E: helps convert debt into investment goods input conditional on λ shocks

Model Overview (Cont.)

▶ financial intermediaries

  a. Main channel robust to firms'

    - equity holding of mutual fund shares (simple pass-through of returns to firms)

    - debt holding of cash deposits (banking sector)

  b. more interesting risk-looping effects if the *banking sector* is modeled

<table>
<tr><td colspan="2">Firm Balance Sheet</td></tr>
<tr><td>Assets</td><td>Liabilities</td></tr>
<tr><td>Deposits
m_t^E</td><td>Owned by
Entrepreneurs</td></tr>
<tr><td>Intangible
Capital</td><td></td></tr>
<tr><td>Tangible
Capital</td><td>Owned by banks
k_t^{TB}, and entre-
preneurs k_t^{TE}</td></tr>
</table>

<table>
<tr><td colspan="2">Bank Balance Sheet</td></tr>
<tr><td>Assets</td><td>Liabilities</td></tr>
<tr><td>Tangible
Capital
$k_t^{TB} = x_t^B n_t / q_t^T$</td><td>Deposits
$(x_t^B - 1)\, n_t^B$
Equity n_t^B</td></tr>
</table>

Bank asset-to-equity ratio ("leverage"): x_t^B

Aggregate bank equity: $N_t^B = \int_{i \in \mathbb{B}} n_{i,t}^B di$

Total output in dt: $\alpha K_t^T + (\alpha + \phi)\, K_t^I dt$

Notes: Li (2019)

  c. bank intermediation: gives the exact *financial-real* linkage

Inspecting the Key Mechanism

- "Liquidity Intermediation-based" financial-real linkage
  - capital accumulation (real side): $\mathrm{d}K_t =$

  $$\underbrace{-(\delta\mathrm{d}t - \sigma\mathrm{d}Z_t)K_t}_{\text{stoch. depreciation}} \underbrace{-\lambda\mathrm{d}tK_t}_{\text{liquidity shocks}} + \underbrace{[\kappa \cdot \frac{1}{1-\kappa(1-\theta)q_t^T}M_t^E]\lambda\mathrm{d}t}_{\text{Borrowed Investment}} + \underbrace{K_t\chi\mathrm{d}t}_{\text{reshuffle}}$$

  - Intermediated liquidity premium channel (financial side):

  $$M_t^E = (x_t^B - 1)N_t^B$$

  - N_t^B: bank's net worth / x_t^B: bank's asset-equity ratio
  - key: binding borrowing constraint s.t. $i_t^E = \kappa i_t^E(1-\theta)q_t^T + m_t^E$

Key Implications

- Goods times: more capitalized banks N_t^B ↑

1. demand for cash holding m_t^E ↑ ⇒ larger firm leverage and greater liquidity premium (borrowing constraint further relaxed) (Fact 2)

2. firm's required liquidity risk premium ↓ ⇒ interest rate r_t ↓ (Fact 3)

3. helps with cushioning liquidity shocks even if tangible asset are partly destroyed + lower bank funding cost drives up demand for tangible asset ⇒ collateral value of tangible q_t^T ↑ (Fact 5)

4. more productive intangible capital & $\mathrm{d}K_t > 0$ ⇒ increasing demand for financing intangible through liquidity channel for reduced interest rate ⇒ more intangible-intensive (Fact 1)

5. most of the capital growth will be financed via intermediation, relative size of financial sector: $\eta_t = \frac{N_t^B}{K_t^I + K_t^T}$ ↑ (Fact 4)

Comments

▶ A very interesting paper with super rich implications both on asset-pricing (finance) AND business cycle dynamics (macro):

- risk-looping: demand for intangibles $\uparrow \Rightarrow$ demand for cash deposits $\uparrow \Rightarrow$ leverage and liquidity premium $\uparrow \Rightarrow$ bank funding cost/interest rate $\downarrow \Rightarrow$ bank demand for tangible $\uparrow \Rightarrow$ tangible price $\uparrow \Rightarrow$ leverage and liquidity premium $\uparrow$ ...

- asymmetric boom-bust cycles: slow-moving boom + sharp system disruption (debt disruption, asset price collapse, real capital shrinkage)

- ...

▶ From a macro-perspective, an innovative financial-real linkage that creatively nests in some way of:

- $i_t^E \leq q_t^K N_t^E$ [(a) Kiyotaki Moore (1997) and Bernanke, Gertler and Gilchrist (1996) "firm balance sheet channel"]

- $Q_t S_t = \phi_t N_t$ [(b) Gertler and Karadi (2011) "bank side friction"]

Something More I: Intangibles Spillover?

- R&D Spillover (measure based on cross-citation patent applications), Colino(2016): strong evidence of dynamic spillovers from past innovations, equally important as self-R&D investment.

TABLE 7: Dynamic spillovers on R&D and citation-weighted patenting

	Citation-weighted patents			R&D activity	
			Neg. Bin.		
	(1)	(2)	(3)	(4)	(5)
Own R&D stock	-0.034	-0.040	0.006		
	(0.092)	(0.088)	(0.041)		
Dynamic spill.	0.519***	0.420***	0.344***	0.037***	0.024**
	(0.084)	(0.080)	(0.035)	(0.012)	(0.010)
R&D/Sales$_{t-1}$					0.538***
					(0.047)
Patents$_{t-1}$		0.122**	0.141***		
Observations	3289	3289	3289	2872	2863
Firm and year FE	✓	✓	✓	✓	✓

Notes: Colino(2016)

Something More II: Dynamics of Tangibles or Rate of Secularization?

▶ Better map to the data: share of financially securitized asset for resalibility relative to intangible asset (good will, patents, firm-specific tech applications)

Mortgage Debt Outstanding:
($ mil)

Something More III: Mian-Sufi Evidence on Credit Boom-Bust Cycles

- this paper: large corp cash holding also means greater leveraged position of firms

- Mian-Sufi Papers (whatever top5 pubs): household credit channel, household debt matters the most $\Rightarrow$ boom and bust cycles / "horse-race": corporate leverage shows up as the weak "cause"

HOUSEHOLD DEBT AND BUSINESS CYCLES WORLDWIDE 1765
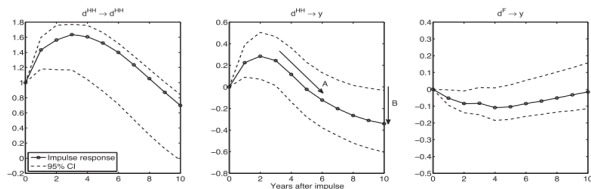

FIGURE I

Impulse Responses from a Recursive VAR in Real GDP, Nonfinancial Firm Debt, and Household Debt

Notes: Mian and Sufi (2017, QJE)

Additional Comments (Alert: very Macro)

- ▶ "corporate cash-liquidity channel" vs. firm/bank balance sheet channel, household leverage channel etc. (quantitatively important? empirically identifiable?)

- ▶ More empirical work needed: explore firm-level data for more dimensions: R&D intensive firms more productive? Firm leverages/performances differences conditional on whether corp cash in form of holding bank debts? how about holding gov debts?

- ▶ Role for U.S. monetary policy? too relaxed of a Taylor-type practice vs. firms excessive demand bidding down interest rate during pre-crisis periods? sensitivity to gov debt holding (more shifted by MP) vs. bank debts?

Additional Comments (Alert: very Macro, Cont.)

- Role for counter-cyclical macro-prudential policy? tax over-borrowing and saving during goods times against sudden disruption? (potential for this "leaning against the wind" type of policy?)

- possibly improved calibration exercise? is it really about tangible capital liquidity shocks?

- banking sector: how about modeling the deposit multiplier effect?

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- ▶ banking sector: how about modeling the deposit multiplier effect?

- ▶ a great, very interesting, and inspiring paper!

Thank You Very Much