Discussion of “Financial Intermediation and Credit Policy in Business Cycle Analysis”

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1 Objective

- a workhorse model to incorporate banks in general equilibrium models

- incorporate two crucial features:
  - transformation of deposits into risky loans
  - cash-in-the-market pricing with segmented markets

- the first feature captured by a standard agency problem between the bank and its lenders
• the second feature captured by two types of segmentation:
  – consumers cannot directly buy assets
  – bank A cannot buy assets that are bank’s B specialty
  – but bank B can borrow from bank A: role for interbank market

• core amplification mechanism similar to Kiyotaki-Moore: feedback between asset prices and balance sheets

• various government policies analyzed
2 Intermediation with a representative agent

- Household is both shareholder and depositor
  ...but of different banks

- Banks are robots that work in the household best interest
  ...but can only get equity injections occasionally
- Household with preferences

\[ E \sum \beta^t U (C_t) \]

receives labor income \( W_t \)

- shareholder: has many bankers out there, receives flow \( N^r_t \) from retiring bankers, gives fresh funds \( N^y_t \) to young bankers

- depositor: lends \( A_t \) to banks, receives \( R_{t+1} A_t \) tomorrow

\[ C_t + N^y_t + A_t = W_t + N^r_t + R_t A_{t-1}. \]
2.1 Shareholder model

\[ C_t + N_t^y + A_t = W_t + N_t^r + R_t A_{t-1}. \]

- Crucial constraint on young bankers
  \[ N_t^y \leq \xi N_t^r \]

- Flow from retiring bankers
  \[ N_t^r = \sum_{j=1}^{\infty} (1 - \sigma)^{j-1} \sigma P_{t,t-j} N_{t-j}^y \]
  where \( P_{t,t-j} \) are rates of return which depend on portfolio strategy of the bankers (to be determined)
• Optimality conditions

\[ U'(C_t) = \lambda_t \]

\[ \lambda_t + \mu_t = E_t \sum_{j=1}^{\infty} (1 - \sigma)^{j-1} \sigma P_{t+j,t} \beta^j (\lambda_{t+j} + \xi \mu_{t+j}) \]

• To write portfolio problem recursively define

\[ \Lambda_{t+j|t} = \beta^j \frac{\lambda_{t+j} + \xi \mu_{t+j}}{\lambda_t + \xi \mu_t} \]
2.2 Portfolio problem

- The consumers wants each banker to maximize

\[ E_t \sum_{j=1}^{\infty} (1 - \sigma)^j \sigma \Lambda_{t+j|t} P_{t+j,t} \]

(both young and continuing bankers)

- Dynamics of banker net worth

\[
\begin{align*}
  n_t &= \tilde{R}_t s_{t-1} - R_t d_t \\
  n_t &= s_t - d_t
\end{align*}
\]
• Recursive problem

\[ V_t(n_t) = \max_{s_t, d_t} V_t(s_t, d_t) \]

s.t. \[ s_t = n_t + d_t \]

\[ s_t \leq \ell_t n_t \]

where \( \ell_t > 1 \) leverage ratio

\[ V_t(s_t, d_t) = E_t \Lambda_{t+1|t}[\sigma (\tilde{R}_{t+1}s_t - R_{t+1}d_t) + \]

\[ (1 - \sigma) V_{t+1}(\tilde{R}_{t+1}s_t - R_{t+1}d_t)] \]
• $V_t$ and $V_t$ are linear

• Endogenous borrowing constraint: market sets the largest $\ell_t$ such that
  \[ V_t(s, d) \geq \theta s \iff s \leq \ell_t n \]

• Microfoundation: banker can steal fraction $\theta$ of assets and give them to consumer right away

• Then leverage ratio is
  \[
  \ell_t = \frac{V_{d,t}}{V_{d,t} - V_{s,t} + \theta} \quad \text{if } V_{d,t} - V_{s,t} + \theta > 0 \\
  \ell_t = \infty \quad \text{otherwise}
  \]
• Result: if $V_{s,t} > V_{d,t}$ and $V_{s,t} - V_{d,t} < \theta$ the leverage constraint is binding

• In steady state sufficient conditions are

$$\beta \tilde{R} > 1$$
$$\beta \tilde{R} - 1 < \theta$$
3 Steady state(s) and not

- In steady state

\[ V_s = \beta \tilde{R} V_d \]

and \( V_d \) satisfies

\[ V_d = \sigma + (1 - \sigma) \frac{\theta}{\theta - (\beta \tilde{R} - 1)} V_d \]

(Need to check

\[ (1 - \sigma) \frac{\theta}{\theta - (\beta \tilde{R} - 1)} V_d < 1 \] (*)
• Suppose $\tilde{R}$ given (AK model) and satisfies conditions above

• **Result**: either there is no steady state or there are two

• **Result**: if there are two ss and both satisfy (*), then there is a continuum of equilibria!

• Changing assumption about stealing can eliminate multiplicity. E.g. after stealing banker remains in business with fraction $\theta$ of assets.