Banking Globalization and International Business Cycles

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In the recent credit crisis, we observed
- Global downturns on the real and financial sides
- Deterioration in financial intermediaries’ (FIs) credit conditions

I construct a DSGE model which explains those observations.
- Credit-constrained FIs which engage in cross-border lending

Key to understanding the recent financial crisis

1. FIs’ globalization
2. FIs’ net worth shock
3. FIs’ credit constraints
Related Literature and Stylized Facts

![Graphs showing GDP, Cross-border lending, Investment, and Cross-border lending trends for different regions: US, Japan, Euro area, Iceland, Ireland, and Developing Countries.](image-url)
Theoretical Studies on Bilateral Correlations (1)

- Correlation (quantity) puzzle
  - Suppose a productivity shock. It is efficient to increase I and L in the more productive country and reduce I and L in the less productive country. → Negative bilateral correlation.
Theoretical Studies on Bilateral Correlations (2)

- Frictions in the financial markets resolve the puzzle.

- However,
  - No explicit role of FIs. No effect of banking globalization
  - Unexplained movements other than GDP
Empirical studies

- Declines of FIs' net worth generate a macroeconomic downturn.

- Common lender effect
  - Kaminsky and Reinhart (2000), and Van Rijckeghem and Weder (2003)
Theoretical Studies

- Macroeconomic model with FIs’ credit frictions

- Macroeconomic model with both FIs’ and entrepreneurial credit frictions
  - Holmstrom and Tirole (1997)
Contribution

- Develop a DSGE model with:
  - Credit-constrained FIs and chained credit contracts
  - Two countries: banking globalization and cross-border lending

- Explain business cycle synchronization
  - For real and financial variables
  - Effect of banking globalization
  - Effect of credit-constrained FIs
Model
Chained Credit Contracts (CCC, No banking globalization)

- **Firms**
- **Capital producers**
- **Investors**
- **Entrepreneur j in bank i**
- **Loan of QK-NF-NE**
- **Entrepreneurs’ balance sheet**
- **FIs’ balance sheet**

Graphical representation:

- Arrows indicating financial flows and relationships among firms, capital producers, investors, and entrepreneurs.
- Notations such as $QK$, $NE$, $NF$, $QK\cdot NF\cdot NE$, and $R^FQK$ to denote various financial contracts and balances.

Diagram description:

- **Firms** connected to **Entrepreneurs’ balance sheet** via an arrow labeled $I$.
- **Firms** also connected to **Capital producers** and **Investors**.
- **Capital producers** connected to **Entrepreneur j in bank i**.
- **Entrepreneur j in bank i** connected to **FIs’ balance sheet**.
- **Loan of QK-NF-NE** and **Loan of QK-NF-NE** indicated in the diagram.
- **Entrepreneurs’ balance sheet** and **FIs’ balance sheet** with subcategories $QK\cdot NF\cdot NE$, $QK\cdot NE$, $NF$, and $NE$.

(Ueda (BOJ) International CCC May 26, 2010)
Banking globalization parameters $\tau^E$ and $\tau^F$

- Exogenous (portfolio choice is not incorporated)
- They determine the allocation of finance between the home and foreign country.
Investors, FIs, and entrepreneurs make CCC.

- Costly state verification (CSV) both for FIs’ and entrepreneurial idiosyncratic productivity $\omega^F, \omega^E$
- FIs’ and entrepreneurial net worths matter.
- Monopolistic FIs optimize the content of CCC so as to satisfy investors’ and entrepreneurial participation constraints.
- FIs specify $\omega^F$ and $\omega^E$ so that FIs (entrepreneurs) default if $\omega^F < \omega^F$ ($\omega^E < \omega^E$), and FIs (entrepreneurs) repay debts of $\omega^F$ ($\omega^E$) otherwise.
Cost-of-funds (premiums) depend on four net worths.

\[ E_t \left\{ \frac{R_H^E \left( s^{t+1} \right)}{R} \right\} = F \left( \frac{N^F}{QK_H}, \frac{N^E}{QK_H}, \frac{N^{F*}}{Q^* K_H^*}, \frac{N^{E*}}{Q^* K_H^*} \right). \]
The U.S. data suggests:

- Net worth is biased to entrepreneurial sector so that we have \( \frac{N^F}{QK} = 0.1 \) and \( \frac{N^E}{QK} = 0.5 \).

- Credit market parameters are calibrated.

- Banking globalization \( \tau^F \) and \( \tau^E \) (exogenous)
  - Roughly, \( \frac{(\tau^E + \tau^F)}{2} \) is 0.15 for the US, 0.1 for Japan, and 0.35 for the Euro area.
Focus only on the credit market (not general equilibrium)
Based on the two-country model of Backus, Kehoe, and Kydland (1992), and its sticky price extension by Clarida, Gali, and Gertler (2002)

- Tradable two consumption goods
- Immobile labor and physical capital
- Calvo-type sticky prices
\[ C(s_t^t) \text{ in } H: \]

\[ C(s_t^t) = \left( (1 - \gamma)^{1/\eta} C_H(s_t^t)^{(\eta-1)/\eta} + \gamma^{1/\eta} C_F(s_t^t)^{(\eta-1)/\eta} \right)^{\eta/(\eta-1)}. \]

- \( \gamma \): inverse of the home bias
- \( \gamma \) is 0.15 for US and Japan.
Simulation
FIs’ Net Worth Shock in H (1)

- Business cycle synchronization
- No synchronization without banking globalization ($\tau = 0$)
- Common lender effect

![Graphs showing synchronization and investment](attach:graphs.png)

Ueda (BOJ) International CCC May 26, 2010
FIs’ Net Worth Shock in H (2)
FIs’ Net Worth Shock in H (3)

- No effect in BGG
Predicted GDP Bilateral Correlations

- Globalization in FIs’ lending ($\tau^E$) yields positive correlations.
What We Find

- Key to the recent financial crisis
  - FIs’ globalization
  - FIs’ credit constraint
  - FIs’ net worth shock

- As globalization intensifies, policy comes to have greater global impacts.
  - Besides the dollar swap program, a reduction in policy rates and capital injection policy.
Applications

- Foreign assets and global imbalances
- Various policies, such as pegged exchange rate policy, a currency swap program, capital injection policy, macroprudential policy
- Welfare changes when two countries with different financial technology are interconnected with different financial openness.
- More complex credit network