No Pain, No Gain: Multinational Banks in the Business Cycle

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Motivation

- Multinational banks’ market share growing in both advanced and developing countries
- Relatively little is established about macroeconomic impact
World Foreign Banks Assets (as a % of total assets)

Foreign Banks (as a % of total banks)

- Argentina
- Brazil
- Chile
- Colombia
- Honduras
- Mexico
- Paraguay
- Peru
- Uruguay

- Belgium
- Hungary
- Ireland
- Luxembourg
- Netherlands
- Poland
- Portugal
- Switzerland
- Turkey
- United Kingdom

Canada

- Bulgaria
- Estonia
- Georgia
- Croatia
- Cyprus
- Czech Republic
- Romania

Hong Kong SAR, China

- Australia
- New Zealand
Motivation
Micro Evidence

Empirical *micro-level* studies:
i) Multinational banks *deep pockets of liquidity*, exploit internal capital markets (Cetorelli and Goldberg, JIE 2012; De Haas and Van Horen, RFS 2013);

ii) Multinational banks *less experienced at allocating liquidity to local* businesses in host countries, especially small and informationally opaque firms (Diamond and Rajan, JME 2001; Giannetti and Ongena, Review of Finance, 2009)
Motivation

Macro Evidence

Trade-off echoed in ambiguous *macro-level* empirical findings.

Little consensus whether multinational banks are amplifiers (destabilizers) or buffers (stabilizers) of aggregate shocks.
Motivation

• The “Liquidity Origination” Advantage: Subsidiaries and branches of multinational banks in host countries get support from parents in home country (internal capital markets) → stabilizing force.

• The “Liquidity Allocation” Disadvantage: Multinational banks are less efficient than domestic banks at monitoring, assessing collateral of local firms. They allocate their more abundant liquidity only to selected firms/sectors → destabilizing force.
Model

Environment: players

- Two-country economy: home and foreign
- Representative households
  - Bankers and workers (perfect risk-sharing)
- Entrepreneurs (goods producers)
- Capital producers
Model

Environment: preferences

- Households’ preferences (GHH)

\[
\mathbb{E} \sum_{t=0}^{\infty} \beta^t \left( C_t - \frac{H_t^{1+\epsilon}}{1+\epsilon} \right)^{1-\gamma} - 1,
\]

\[
\mathbb{E} \sum_{t=0}^{\infty} \beta^t \left( C_t^* - \frac{H_t^{*,1+\epsilon}}{1+\epsilon} \right)^{1-\gamma} - 1
\]

- Entrepreneurs’ preferences

\[
\mathbb{E} \sum_{t=0}^{\infty} \beta_{e}^t \left( C_t^e \right)^{1-\gamma_e} - 1,
\]

\[
\mathbb{E} \sum_{t=0}^{\infty} \beta_{e}^t \left( C_t^{e,*} \right)^{1-\gamma_e} - 1
\]

Assume \( \beta_e < \beta \) to induce borrowing in equilibrium
Model
Environment: technology

- Production of consumption goods:
  \[ Y_t = A_t K_{t-1}^{\alpha} H_t^{1-\alpha}, \]

- Capital-good producers: use \( I_t \left[ 1 + f \left( \frac{l_t}{l_{t-1}} \right) \right] \) units of consumption goods to produce \( l_t \) units of capital goods.

- Capital accumulation:
  \[ K_t = (1 - \delta) K_{t-1} + I_t \]
Bankers

• Bankers in the home country operate two types of banks.
  • **Local banks**: takes deposits from home-country households and extend loans to home-country entrepreneurs.
  • **Global banks**: a parent operating in the home (domestic) country and an affiliate operating in the host (foreign) country.

• All the bankers in the foreign country operate local banks.
Global banks vs local banks

- **Internal Capital Markets:** Global banks can make transfers between the parent and the foreign affiliate subject to a cost.

- **Collateral Technology:** Global and local banks differ in their technology to liquidate collaterals pledged by entrepreneurs.
Foreign affiliates’ problem

\[ V_t^{g,*} \equiv \max_{\{X_{t+j}^{g,*}, D_{t+j}^{g,*}\}_{j \geq 0}} \mathbb{E}_t \sum_{j=0}^{\infty} (1 - \sigma) \sigma^j \Lambda_{t,t+j+1} N_{t+j+1}^{g,*} \]

s.t. \[ X_t^{g,*} = N_t^{g,*} + Z_t^{g,*} + D_t^{g,*} \]

\[ R_t^{D,*} D_t^{g,*} + \theta Z_t^{g,*} \leq \zeta \left[ (1 - \phi) R_t^{X,g,*} X_t^{g,*} + \phi R_t^{X,g} X_t^{g} \right] \]

- \( N_{t+1}^{g,*} = R_t^{X,g,*} X_t^{g,*} - R_t^{D,*} D_t^{g,*} \) is bank net worth.
- Foreign affiliates take as given the transfers they receive \( Z_t^{g,*} \).
- \( \zeta \) is the overall tightness of the constraint. \( \phi \) is the consolidation parameter.
Parent banks’ problem

\[
\max_{\{Z_{t+j}, Z_{t+j}^*, X_{t+j}^g, D_{t+j}^g\}_{j \geq 0}} \mathbb{E}_t \sum_{j=0}^{\infty} (1 - \sigma) \sigma^j \Lambda_{t, t+j+1} N_{t+j+1}^g + V_{t}^{g,*},
\]

s.t.

\[
Z_t^g + Z_{t}^{g,*} = 0 \quad [\gamma_t^g] \\
X_t^g = N_t^g + Z_t^g - \frac{\psi}{2} (Z_t^g - \bar{Z}_t^g)^2 + D_t^g \quad [\lambda_t^g] \\
R_t^D D_t^g + \theta Z_t^g \leq \zeta \left[ (1 - \phi) R_t^{X,g} X_t^g + \phi R_t^{X,g,*} X_t^{g,*} \right] \quad [\mu_t^g]
\]
Local banks’ problem

\[ V_t^l \equiv \max \{ X_{t+j}^l, D_{t+j}^l \}_{j \geq 0} \quad \mathbb{E}_t \sum_{j=0}^{\infty} (1 - \sigma) \sigma^j \Lambda_{t,t+j+1} N_{t+j+1}^l, \]

\text{s.t.} \quad X_t^l = N_t^l + D_t^l, \quad \begin{bmatrix} \lambda_t^l \\ \mu_t^l \end{bmatrix}

\begin{align*}
R_t^D D_t^l & \leq \zeta R_t^{X^l} X_t^l, \quad \begin{bmatrix} \lambda_t^l \\ \mu_t^l \end{bmatrix}
\end{align*}
Entrepreneurs’ problem

- Entrepreneurs take collateralized loans from global banks and local banks that operate in their country.

- Liquidation technologies in the case of default
  - Local banks can liquidate a fraction \( \kappa^l \) of the collateral.
  - Global banks can liquidate a fraction \( \kappa^g > \kappa^l \) of the collateral, but they also incur a convex liquidation cost.
Entrepreneurs’ problem

\[
\max \{ H_{t+j}, C_{t+j}^e, K_{t+j}, X_{t+j}^g, X_{t+j}^l, f_{t+j} \} \}_{j \geq 0} \\
\mathbb{E}_t \sum_{j=0}^\infty \beta_j^e \frac{\left( C_{t+j}^e \right)^{1-\gamma_e} - 1}{1 - \gamma_e}
\]

s.t.
\[
C_t^e + Q_t K_t + R_{t-1} X_{t-1}^g + R_{t-1} X_{t-1}^l \\
= X^g_t + X^l_t + Y_t - W_t H_t + (1 - \delta) Q_t K_{t-1},
\]
\[
R_t X^g_t \leq \kappa^g \left[ (1 - f_t) Q_t K_t - \frac{\nu}{2QK} (1 - f_t)^2 Q_t^2 K_t^2 \right], \quad [\omega^g_t]
\]
\[
R_t X^l_t \leq \kappa^l (f_t Q_t K_t) \quad [\omega^l_t]
\]
## Calibration

<table>
<thead>
<tr>
<th>Preferences</th>
<th>Value</th>
<th>Target/Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household discount factor $\beta$</td>
<td>0.990</td>
<td></td>
</tr>
<tr>
<td>Household CRRA $\gamma$</td>
<td>2.000</td>
<td></td>
</tr>
<tr>
<td>Inverse Frisch elasticity $\epsilon$</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Entrepreneur discount factor $\beta_e$</td>
<td>0.980</td>
<td></td>
</tr>
<tr>
<td>Entrepreneur CRRA $\gamma_e$</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital share of output $\alpha$</td>
<td>0.330</td>
<td></td>
</tr>
<tr>
<td>Capital depreciation $\delta$</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>Investment adjustment cost $f''(1)$</td>
<td>1.000</td>
<td>Gertler et al. (2012)</td>
</tr>
</tbody>
</table>

### Bankers

| % bank asset as collateral $\zeta$                                        | 0.880 | Leverage=8.33                   |
| Weight of foreign assets in constraint $\phi$                             | 0.400 |                                |
| Adjustment cost to transfers $\psi$                                       | 0.100 |                                |
| Weight on transfers in the constraint $\theta$                            | 0.600 |                                |
| % assets liquidated by local banks $\kappa^l$                             | 0.600 | Loan-to-Value 60%              |
| % assets liquidated by global banks $\kappa^g$                             | 0.650 |                                |
| Cost of global bank liquidation $\nu$                                     | 0.308 | $\bar{X}^G / \bar{X}^L = 1/3$ |
| % assets brought by new bankers $\zeta$                                   | 1.358 | $e^{-0.04}$                    |
| Probability of surviving bankers $\sigma$                                | 0.969 | Gertler et al. (2012)          |
Results
IRF to a 5% negative shock to the foreign local bank net worth
Benchmark: No Transfers

Figure: The "Liquidity Channel"
Benchmark: Fixed Collateral Allocation

Figure: "The Collateral Channel"
Short-Run vs Long-Run Effects

<table>
<thead>
<tr>
<th></th>
<th>8 Q</th>
<th>16 Q</th>
<th>28 Q</th>
<th>first quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment</strong></td>
<td>-1.817</td>
<td>-2.500</td>
<td>-3.003</td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>-0.085</td>
<td>-0.269</td>
<td>-0.561</td>
<td></td>
</tr>
<tr>
<td><strong>No transfer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>-2.140</td>
<td>-2.596</td>
<td>-2.937</td>
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<tr>
<td>Output</td>
<td>-0.106</td>
<td>-0.306</td>
<td>-0.589</td>
<td>18</td>
</tr>
<tr>
<td><strong>Fix f</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
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<td>-1.938</td>
<td>-1.836</td>
<td>5</td>
</tr>
<tr>
<td>Output</td>
<td>-0.094</td>
<td>-0.252</td>
<td>-0.433</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: the first three columns show the cumulative percentage change. The last column shows the first quarter in which the difference between the full model and the benchmark flips sign.
TFP Shock in Host Country

Figure: IRFs to a 1% negative shock to TFP in the foreign/host country.
Structural Features

Cost of Transfers in Internal Capital Markets

- $I_t$
- $Y_t$
- Total loans
- Transfer to host
- $Q_t$

Graphs showing various economic indicators over time.
Structural Features
Consolidation of banks' balance sheets

$I_t$

$Y_t$

Total loans

Transfer to host

$f_t$

$Q_t$

-0.3
-0.2
-0.1
0
%

-0.1
-0.01
-0.02
-0.03
-0.04
0
%

-0.1
-0.03
-0.02
-0.01
0
%

-0.016
-0.014
-0.012
-0.01
-0.008
-0.006
0
%

-0.15
-0.1
-0.05
0
%
Structural Features
Role of Transfers in the Collateral Constraint
Cyclical policies

- Policies that adjust the loan-to-value ratio of the host-country’s firms borrowing from multinational banks:

\[ \tilde{\kappa}_t^g = \chi \tilde{Y}_t \]

Figure: Countercyclical policy \((\chi = -5)\). IRF to a negative 5% local bank net worth shock in the host country
Cyclical policies

- Policies that adjust the loan-to-value ratios of the host-country’s firms borrowing from both multinational and local banks:

\[ \tilde{\kappa}_t^g = \chi \tilde{Y}_t, \quad \text{and} \quad \tilde{\kappa}_t^l = \chi \tilde{Y}_t \]

**Figure:** Countercyclical policy ($\chi = -1.25$). IRF to a negative 5% local bank net worth shock in the host country
In Conclusion...

i) *The “Liquidity Origination” Advantage:* multinational banks can swiftly transfer liquidity across borders, initially dampening shocks → in immediate aftermath of shocks → stabilizer for financial shocks / amplifier for TFP shocks

ii) *The “Liquidity Allocation” Disadvantage:* collateral reallocation in credit market triggers drop in average liquidation efficiency → over medium run → amplifier of financial shocks / stabilizer of TFP shocks
Robustness
Curvature of liquidation technology

- The liquidation technology of the multinational bank in the foreign country is assumed to have less curvature: $\nu = 0.129$.
- $\kappa^g$ is calibrated to 0.62 to so that local loans are three times as large as foreign loans.
Robustness
Curvature of liquidation technology

Shut down the internal capital market of multinational banks.

Shut down the collateral reallocation between local and multinational banks.
Robustness

Assume that banks transfer half net worth loss to the household and half to entrepreneurs.

Shut down the internal capital market of multinational banks.

Shut down the collateral reallocation between local and multinational banks.