Information Sharing and Information Acquisition in Credit Markets

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Points of departure

- **Role of banks in information acquisition**
  - Banks acquire costly information and get competitive advantage
  - Hold up good borrowers and earn rents (Sharpe 1990, von Thadden 2004)

- **This paper**: looks at the impact of information sharing on information acquisition
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• **Why information sharing?**
  — Recently around 70 countries introduced *private bureaus and public registers* (IFC 2009)
    ▶ Sharing inside bank’s data with outside banks.
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• Why information sharing?
  — Recently around 70 countries introduced *private bureaus and public registers* (IFC 2009)
    - Sharing inside bank’s data with outside banks.
  — Information sharing may increase competitive pressure
Main Question

Will the inside bank acquire more or less information under information sharing with other banks?
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- Other Questions
  - How will the quality of credit decisions change?
  - How will banks’ information rents change?
  - How will borrower switching and interest rates change?
  - What are the welfare implications?
Hard and Soft Information

Not all information can be shared to outside banks: hard vs. soft information
Hard and Soft Information

- Not all information can be shared to outside banks: **hard vs. soft** information

- An important distinction: (Petersen 2004)
  - Hard information can be communicated: e.g., previous default by borrower
  - Soft information cannot be easily shared: e.g., opinions, honesty, judgement on relations with clients, suppliers, etc...
  - Only the first type is shared through credit bureaus.
Our MAIN QUESTION rephrased:

How does the bank’s acquisition of soft information change when hard information is shared with outside bank?
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  How does the bank’s acquisition of soft information change when hard information is shared with outside bank?

• Answer
  The bank will acquire more soft information (higher monitoring).
  — Soft information substitutes for lost source of hard information

• Confirm theoretically and empirically
Preliminary intuition

- Default may happen due to bad luck or bad quality
  - acquire soft information by monitoring to identify true bad quality
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• **Share hard information**: outside bank learns about default and success
  ⇒ defaulting borrowers get higher interest rate
Preliminary intuition

- Default may happen due to bad luck or bad quality
  - acquire soft information by monitoring to identify true bad quality

- Share hard information: outside bank learns about default and success
  - defaulting borrowers get higher interest rate

- Do not share hard information: outside bank faces only average quality
  - defaulting borrowers get average outside rate, and switch more
  - monitoring wasted under no sharing: *less soft information*
Results

- Marginal returns from soft information increase
  - Higher soft information acquisition.
  - Relationship banking
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  – More soft and hard information
  ⇒ Creditworthy borrowers get lower loan rates
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      - Better identify bad risks

⇒ Welfare increase
Recent work on hard information sharing:

- Hauswald and Marquez (2003)
- Gehrig and Stenbacka (2007)

This paper: Hard and soft information, complementarities
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Impact of increased competition

This paper: Impact of information sharing
Setup

- Two banks.
Setup

• Two banks.
• Two types of borrowers (continuum of size $N$):
  – High type: probability of success $p_H = p(>0)$. Proportion $\lambda$ in the population.
  – Low type: probability $p_L = 0$ of success. Proportion $1 - \lambda$. 
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  - During the first period, banks have the option to invest into a signal $\eta$.

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\begin{align*}
\text{Prob}(\eta = G|\text{type} = H) &= \text{Prob}(\eta = B|\text{type} = L) = \phi > \frac{1}{2} \\
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\end{align*}
\]

- $\phi$ - informativeness of the soft signal $G$ or $B$
- Signal is costly: $c(\phi) = c(\phi - 0.5)^2$
First period

- Banks choose whether or not to share hard information
- Banks announce interest rates and compete
- Borrowers choose one of the banks and invest \( I \)
- Banks invest in monitoring: inside bank observes signal
- Borrowers repay if they can: inside bank observes default/payment

- Banks acquire both hard and soft information
First period

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- Banks invest in monitoring: inside bank observes signal
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Second period

- Banks acquire both hard and soft information

- Perfect Bayesian Equilibrium under sharing/no sharing.
Bidding: Information Sharing

INFORMATION SHARING

Informed Bank

No default

Default, Good

Default, Bad

Uninformed Bank

No default

Default
Bidding: Information Sharing

INFORMATION SHARING

INformed Bank

No default

Default, Good

Default, Bad

Uninformed Bank

No default

Default

• Mixed strategy (von Thadden 2004)
Figure: Interest rate strategies; information sharing
No information sharing

- Uninformed bank has no information

NO INFORMATION SHARING

Informed Bank

No default
Default, Good
Default, Bad

Uninformed Bank

ALL
No information sharing

- Two sources of profits
Figure: Interest rate bidding strategies; No information sharing
• Sharing profits: $\pi_{\text{share}} = I(1 - \lambda)(2\phi - 1) - c\phi^2$
  - Soft Info rents

• No sharing profits:
  $\pi_{\text{noshare}} = Ip(1 - \lambda) + I(1 - p)(1 - \lambda)(2\phi - 1) - c\phi^2$
  - Hard Info rents
  - switch
  - Soft info rents

Figure: sharing

Figure: no sharing
Optimal soft information

- $c(\varphi) = c(\varphi - 0.5)^2$

  - Optimal Level Sharing
    
    $\varphi_{share} = 0.5 + \frac{I}{c} (1 - \lambda)$

  - Optimal Level No Sharing
    
    $\varphi_{noshare} = 0.5 + \frac{I}{c} (1 - p)(1 - \lambda)$

Proposition: Marginal returns to monitoring are higher under information sharing. Banks invest more in monitoring. $\varphi_{share} > \varphi_{noshare}$ if $c$ is low enough.
Optimal soft information

- $c(\varphi) = c(\varphi - 0.5)^2$
  - Optimal Level **Sharing**
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- **Proposition** *Marginal returns to monitoring are higher under information sharing. Banks invest more in monitoring.*
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- $\pi_{share} > \pi_{noshare}$ if $c$ is low enough
Results

- More soft information under information sharing
Results

- More soft information under information sharing
  - higher marginal returns
  - substitution
  - Relationship banking
Data


- Covering 26 economies: changes in information sharing

- **More soft information**
  - In countries with established credit bureaus (hard information sharing)
  - Introduce three measures of soft information acquisition (borrower level)
**Soft information=Days.** Number of days used to approve a loan application

<table>
<thead>
<tr>
<th>OLS estimation results</th>
<th>Days needed until loan approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable</td>
<td>(1) base</td>
</tr>
<tr>
<td>hard information</td>
<td>3.523**</td>
</tr>
<tr>
<td></td>
<td>(1.489)</td>
</tr>
<tr>
<td>creditor rights</td>
<td>-6.405**</td>
</tr>
<tr>
<td></td>
<td>(2.886)</td>
</tr>
<tr>
<td>concentration</td>
<td>-0.215</td>
</tr>
<tr>
<td></td>
<td>(0.153)</td>
</tr>
<tr>
<td>bank reform index</td>
<td>-1.426</td>
</tr>
<tr>
<td></td>
<td>(5.685)</td>
</tr>
<tr>
<td>foreign bank share</td>
<td>0.381***</td>
</tr>
<tr>
<td></td>
<td>(0.142)</td>
</tr>
<tr>
<td>non performing loans</td>
<td>0.271*</td>
</tr>
<tr>
<td></td>
<td>(0.131)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.12</td>
</tr>
<tr>
<td>Number of obs.</td>
<td>2064</td>
</tr>
</tbody>
</table>

- Hard information= index of information sharing depth (0-5)
• **Soft information=React.** If you default, what will your bank do? Sue you(1), increase rate(2), do nothing (3)
- **Soft information = React.** If you default, what will your bank do? Sue you (1), increase rate (2), do nothing (3)
- Lenient reaction by bank means soft information plays a big role
- Substitution
• **Soft information=React.** If you default, what will your bank do? Sue you(1), increase rate(2), do nothing (3)

• Lenient reaction by bank means soft information plays a big role

• Substitution

• Does your firm have a **Checking account** (yes/no)
**Soft information**=$\text{React}$. *If you default, what will your bank do?*  
*sue you*(1), *increase rate*(2), *do nothing* (3)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Reaction by bank to default</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) base</td>
</tr>
<tr>
<td>hard information</td>
<td>0.102*** (0.039)</td>
</tr>
<tr>
<td>creditor rights</td>
<td>-0.056 (0.067)</td>
</tr>
<tr>
<td>bank reform index</td>
<td>-0.692*** (0.175)</td>
</tr>
<tr>
<td>foreign bank share</td>
<td>0.013*** (0.003)</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.04</td>
</tr>
<tr>
<td>Number of obs.</td>
<td>1937</td>
</tr>
</tbody>
</table>
 Switching

- Sign of soft information (good or bad)
  - Good signal borrowers switch less than bad signal borrowers
  - Good signal borrowers receive lower interest rates than bad signal borrowers
Switching

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- Soft signal (1): Bad(good) = ”Problems (No problems) with non-financial factors”

- Soft signal (2): ”Bad(good) management quality”
Switching from the main bank

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>(1) Base</th>
<th>(2) Small</th>
<th>(4) Base</th>
<th>(5) Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>soft signal (1)</td>
<td>-0.239* (0.123)</td>
<td>-0.274** (0.132)</td>
<td>-0.249** (0.123)</td>
<td>-0.289** (0.133)</td>
</tr>
<tr>
<td>soft signal (2)</td>
<td>-0.011 (0.025)</td>
<td>-0.013 (0.028)</td>
<td>-0.008 (0.026)</td>
<td>-0.009 (0.028)</td>
</tr>
<tr>
<td>hard information</td>
<td>-0.010*** (0.002)</td>
<td>-0.010*** (0.002)</td>
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<td>-0.010*** (0.002)</td>
</tr>
<tr>
<td>bank reform index</td>
<td>0.256** (0.119)</td>
<td>0.258** (0.130)</td>
<td>0.242** (0.119)</td>
<td>0.240* (0.131)</td>
</tr>
<tr>
<td>foreign bank share</td>
<td>-0.010*** (0.002)</td>
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<td>-0.010*** (0.002)</td>
<td>-0.010*** (0.002)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of obs.</td>
<td>3531</td>
<td>2984</td>
<td>3490</td>
<td>2945</td>
</tr>
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### How problematic is Cost of capital

#### Probit estimation results

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>(1) All</th>
<th>(2) Small</th>
<th>(3) All</th>
<th>(4) Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>soft signal (1)</td>
<td>2.771***</td>
<td>(0.102)</td>
<td>2.818***</td>
<td>(0.110)</td>
</tr>
<tr>
<td>soft signal (2)</td>
<td>-0.107***</td>
<td>(0.020)</td>
<td>-0.104***</td>
<td>(0.022)</td>
</tr>
<tr>
<td>hard information</td>
<td>-0.096***</td>
<td>(0.030)</td>
<td>-0.087***</td>
<td>(0.032)</td>
</tr>
<tr>
<td>creditor rights</td>
<td>-0.107***</td>
<td>(0.020)</td>
<td>-0.106***</td>
<td>(0.022)</td>
</tr>
<tr>
<td>bank reform index</td>
<td>0.679***</td>
<td>(0.092)</td>
<td>0.642***</td>
<td>(0.099)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.11</td>
<td>0.11</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Number of obs.</td>
<td>3643</td>
<td>3102</td>
<td>3601</td>
<td>3062</td>
</tr>
</tbody>
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Note: **p < 0.1, *p < 0.05, ***p < 0.01
Discussions and Policy implications

- Sharing (hard) information may increase the total investment in information acquisition.
- Caveat: quality of hard information.
Discussions and Policy implications

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- Caveat: quality of hard information.
- Structure of the banking system:
  - Large banks: hard information; small banks: soft information (Stein 2000, Berger, Miller, Petersen, Rajan and Stein 2002)
  - Sharing hard information may increase the gap.
- Will relationship banking survive competition?
  - Yes! The focus on it will increase (Boot and Thakor 2000).
- Borrower interest rates and switching.
  - Overall inconclusive.
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Summary

• Higher investment in soft information when hard information is shared.

• This is because the marginal benefit from investing in soft information is higher when hard information is shared.

• More accurate credit decisions, higher welfare