Credit Risk Transfer in Banking Markets with Hard and Soft Information

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1. Introduction

- In the years before the subprime crisis, many countries have seen an explosion in the use of instruments for credit risk transfer (CRT) by financial institutions.
- Back then, this development was welcomed by many observers:
  - Better risk-sharing and diversification (Allen/Gale 2005)
  - Relaxation of banks’ lending constraints (“free up economic capital,” see, e.g., Chiesa 2004)
    → Improved access to credit for firms and households
Introduction

- But: The subprime crisis has raised doubts about the benefits of credit risk transfer
- Problem: CRT may also improve the access to credit for firms and households that are not creditworthy ("subprime")
- Banks grant such loans only because their risks can be transferred to other parties
- See Dell’ Ariccia/Igan/Laeven (2007) for empirical evidence of such behavior in the current crisis
This Paper

- Model where the access to bank credit is endogenously restricted for risky, but profitable firms
- Restrictions depend on the degree of competition in the banking sector
- Credit risk transfer as a way to improve firms’ access to credit
- Distinction between two kinds of information on which bank loans are based:
  1. *Hard* information
  2. *Soft* information
Main results

• Credit risk transfer improves the access to credit by relaxing banks’ lending constraints

• Functioning of CRT depends on the type of information:
  • With *hard* information, CRT works smoothly
  • With *soft* information, CRT leads to a *moral hazard problem* at the originating banks
    → Banks grant loans to *unprofitable* firms

• Competition generally reinforces the positive effects of CRT
  • However, with *soft* information, high levels of competition are detrimental
2. Model Setup

- Economy with two types of agents: Entrepreneurs & banks (Insurers come in later)
- Continuum of entrepreneurs who are uniformly distributed on a Salop circle of length $L$
  - Can invest one unit of money in a project
  - No own funds, financing of projects through banks
  - Linear transportation costs $t$ per unit of distance
Entrepreneurs

- Three types of entrepreneurs: *good* (G), *medium* (M), or *bad* (B)
  - Projects yield a return $Y$ with probability $p_i$ and zero with probability $1 - p_i$, $i \in G, M, B$
  - Success probabilities depend on the qualities of the entrepreneurs: $1 = p_G > p_M > p_B > 0$
  - Good and medium projects have a positive NPV, bad projects have a negative NPV: $p_G Y > p_M Y > r > p_B Y$
    ($r =$ opportunity costs of funds)
  - Fractions of qualities: $q_G, q_M, q_B$
  - Within each quality group, projects are perfectly correlated
Banks

- Grant loans to entrepreneurs
- Refinance with deposits only
- Compete for loans à la Salop
- Want to keep their probability of default below some threshold (assumed to be zero)
- Can observe the entrepreneurs’ qualities at zero costs
Structure of the Loan Market

Bank 1

Bank $n$

Bank 2

Bad projects, share $q_B$

Medium projects, share $q_M$

Good projects, share $q_G$
**Time Structure**

- \( t = 0 \): Banks locate equidistantly on the loan market
- Banks announce loan rates
- Borrowers choose a bank and invest
- \( t = 1 \): Borrowers repay their loans if they are successful, otherwise they fail. If a loan to a failing borrower has been insured, the credit insurer repays the loan. Banks repay deposits.
3. No Credit Risk Transfer

- Here: Equilibrium with a fixed number $n$ of banks (discussion of market entry as an extension)
- $R_G, R_M, R_B =$ loan rates for good, medium, bad loans
- $l_G, l_M, l_B =$ bank-individual loan volumes for the respective loan quality
- Note: Without CRT, banks will never grant bad loans due to the negative NPV: $l_B = 0$
In order to avoid bankruptcy, banks must satisfy

$$R_G l_G - r (l_M + l_G) \geq 0$$  \hfill (1)

We focus on situations where condition (1) binds in equilibrium

- Bank lending to risky (*medium*) entrepreneurs is constrained by the profits from lending to risk-free (*good*) entrepreneurs
- Shadow price of condition (1) is strictly positive
Equilibrium

- The volume of \textit{good} loans is determined by competition à la Salop:

\[
l_G = L q_G \left( \frac{1}{n} - \frac{R_G - R'_G}{t} \right)
\]

- (1) binds ⇒ Medium market shares do not “touch” ⇒ Volume of \textit{medium} loans is determined by monopolistic price setting:

\[
l_M = 2 p_M q_M \frac{Y - R_M}{t}
\]
Market Penetration

\[ G = 2 \quad G \times G \]

\[ M = 2 \quad M \times M \]

\[ l_M = 2 \quad q_M \times x_M \]

\[ l_G = 2 \quad q_G \times x_G \]
Proposition (Effect of Competition)

Higher competition (higher $n$)

- leaves the aggregate amount of good loans unaffected
- lowers the aggregate amount of medium loans
- increases the shadow price of condition (1)
Loan Volumes $L_G$, $L_M$, and $L_B$
Loan Rates $R_G$ and $R_M$
Shadow Price $\lambda$ of Condition (1)
4. Credit Risk Transfer

- Condition (1): Banks want to avoid bankruptcy ex ante
  ⇒ Banks have an incentive to engage in CRT
- Banks may transfer risk to a continuum of insurers
  - Risk neutral
  - Competitive
- Insurers cannot observe a bank’s volume of credit risk transfer
- Functioning of the CRT market depends on the type of screening information:
  1. Hard information
  2. Soft information
4.1. Hard Information

- With *hard* screening information, banks can insure their medium loans, swapping risky payments against their expected values.
- Effect of CRT: Condition (1) is no longer binding → Shadow price $\lambda$ drops to zero.
Proposition (Credit Risk Transfer with Hard Information)

With *hard* information, the introduction of credit risk transfer

- leaves the aggregate amount of good loans unaffected
- increases the aggregate amount of medium loans
- reduces the shadow price of condition (1) to zero
- increases banks’ expected profits
Proposition (Effect of Competition)

In the presence of credit risk transfer with hard information, higher competition (higher $n$)

- leaves the aggregate amount of good loans unaffected
- increases the aggregate amount of medium loans (until the market is saturated)
Loan Volumes $L_G$, $L_M$, and $L_B$
4.2. Soft Information

- With *soft* screening information, it becomes more difficult for banks to insure their loan portfolios.
- Asymmetric information about loan qualities gives rise to a *moral hazard problem*:
  - In their lending decisions, banks anticipate whether they will be able to resell credit risks.
  - Banks may grant *bad* loans only to transfer them to the insurers.
  - This is anticipated by the insurers who demand a *lemons premium*.
In equilibrium, banks insure a fraction \( \kappa \) of their medium loans, \( \textbf{all} \) bad loans, and \( \textbf{no} \) good loans

- Condition (1) is still binding

Given the lemons premium on the CRT, the improvement in the access to credit for medium entrepreneurs will be smaller if information is \textit{soft} rather than \textit{hard}

- If the information problem becomes too severe, the market for CRT breaks down
Analysis

- Expectations of insurers: Quality of loans underlying the credit risk transfer is medium with probability $\alpha$.
- Expected probability of success: $\bar{p} \equiv \alpha p_M + (1 - \alpha) p_B$
- Banks can swap any risky loan for a safe repayment $\bar{p} R \Rightarrow R_M = R_B \equiv R$
- Medium loans as share of transferred loans:

$$\alpha = \frac{\kappa l_M}{\kappa l_M + l_B}$$

- Modified version of condition (1):

$$R_G l_G + \bar{p} R (l_B + \kappa l_M) - (l_G + l_M + l_B) r \geq 0 \quad (1')$$
Proposition (Credit Risk Transfer with Soft Information)

*With soft information, if the market for credit risk transfer does not break down, its introduction*

- leaves the aggregate amount of good loans unaffected
- *increases* the aggregate amount of medium loans, but *less* than with hard information
- *increases* the aggregate amount of bad loans
- *reduces* the shadow price of the no-failure constraint, but not to zero
- *increases* banks’ expected profits, but *less* than with hard information
Proposition (Effect of Competition)

In the presence of credit risk transfer with soft information, if the market does not break down, higher competition (higher $n$)

- increases the fraction of medium loans that is insured
- leaves the aggregate amount of good loans unaffected
- increases the aggregate amount of medium loans (until the market is saturated)
- always increases the aggregate amount of bad loans

For low levels of competition, the market for credit risk transfer breaks down.
Fraction of Insured Loans $\kappa_G$, $\kappa_M$, and $\kappa_B$
Loan Volumes $L_G$, $L_M$, and $L_B$
5.1. Market Entry

- Introduction of CRT increases banks’ expected profits
  ⇒ Entry of new banks
- Effects of market entry are parallel to those of increasing $n$:
  - *Hard* information: Loan volume $L_M$ increases → Market entry reinforces the short-run effects of CRT
  - *Soft* information, *medium* competition: Loan volumes $L_M$ and $L_B$ increase → Market entry reinforces the short-run effects of CRT
  - *Soft* information, *high* competition: $L_M$ remains constant, only $L_B$ increases → Market entry reinforces only the detrimental effects of CRT
5.2. Hard and Soft Banks

- Empirical evidence (e.g., Berger et al., JFE 2002) suggests that large banks tend to grant loans based on *hard* information (e.g., to large rated companies), whereas small banks tend to grant loans based on *soft* information (e.g., to unrated SMEs).
- This is consistent with our model if . . .
  - hard and soft loan markets are segmented (consistent with empirical evidence, e.g., Berger JFSR 2006)
  - fixed entry costs are lower in the soft loan market → very plausible
Hard and Soft Banks

- If *soft* banks have lower fixed entry costs, our model with market entry implies that they . . .
  - are **smaller** than hard banks
  - earn **smaller** margins in the good loan segment
  - penetrate the market for medium loans to a **smaller** extent
  - have a **larger** shadow price of condition (1)
- This implies that the need for credit risk transfer is higher for *soft* than for *hard* banks
- At the same time, CRT is less effective in improving the access to credit in the *soft* loan market due to informational frictions
6. Conclusion

- Loan markets may suffer from an undersupply of risky, but profitable loans.
- This undersupply is most severe when banking markets are highly competitive.
- Credit risk transfer generally improves the access to credit by relaxing banks’ lending constraints.
- Functioning of CRT markets depends on whether loans are based on hard or soft information.
Conclusion

• When loans are based on *hard* information, the transfer of credit risk from *medium* loans works smoothly and there is no incentive to grant *bad* loans.

• With CRT, banks’ lending constraints are fully relaxed: Banks can now grant an optimal (profit-maximizing) amount of loans in the medium loan segment.

• Higher competition (market entry) reinforces the positive effects of CRT.
Conclusion

When loans are based on soft information, the CRT market suffers from a moral hazard problem:

- The market for CRT either breaks down or . . .
- CRT is subject to a lemons premium because it induces banks to grant bad loans that are transferred to the insurers

Access to credit improves for medium entrepreneurs, but banks’ lending constraints are not fully relaxed

Non-monotonic relationship between competition and access to credit

For high levels of competition, an increase in $n$ increases only the aggregate volume of bad loans
Conclusion

- Credit risk transfer ...
  - *raises* welfare because it improves the access to credit for risky, but profitable entrepreneurs
  - *lowers* welfare because it improves the access to credit for unprofitable entrepreneurs
- In our model setup, the overall welfare effect of CRT is *positive* even with *soft* information
- However, an increase in competition may *lower* welfare if information is soft and medium loan markets are saturated
- Therefore, credit risk transfer based on soft information and highly competitive banking markets are a dangerous combination