# Credit Risk Transfer in Banking Markets with Hard and Soft Information

Hendrik Hakenes

University of Hannover and MPI Bonn

Isabel Schnabel

University of Mainz, CEPR, and MPI Bonn

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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
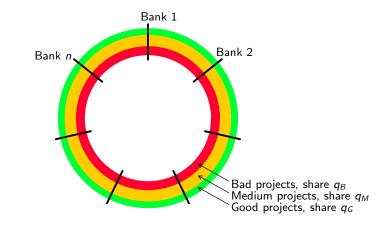    - Linear transportation costs $t$ per unit of distance

# 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)
  - Reasons: Regulation (Pennacchi JF 1988), bankruptcy costs (Wagner/Marsh 2004), risk aversion (Morrison JBus 2005)
- Can observe the entrepreneurs' qualities at zero costs

# Structure of the Loan Market



Bank 1

Bank 2

Bank $n$

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: $l_B = 0$

# No Credit Risk Transfer

- In order to avoid bankruptcy, banks must satisfy

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

- 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
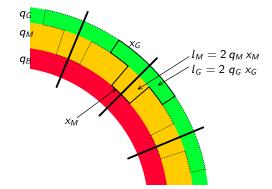    - Shadow price of condition (1) is strictly positive

## Equilibrium

- The volume of *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 $\Rightarrow$ Medium market shares do not "touch" $\Rightarrow$ Volume of *medium* loans is determined by monopolistic price setting:

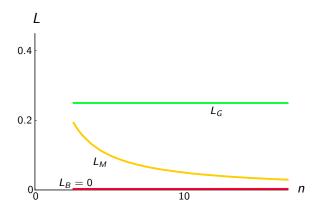$$l_M = 2 \, p_M \, q_M \, \frac{Y - R_M}{t}$$

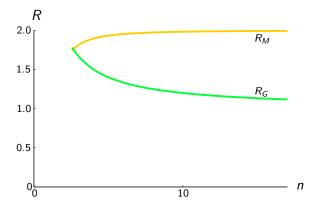# Market Penetration

### Proposition (Effect of Competition)

*Higher competition (higher n)*

- *leaves the aggregate amount of good loans unaffected*
- *lowers the aggregate amount of medium loans*
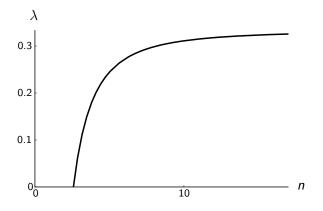- *increases the shadow price of condition (1)*

# 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
  $\rightarrow$ Shadow price $\lambda$ drops to zero

Proposition (Credit Risk Transfer with Hard Information)

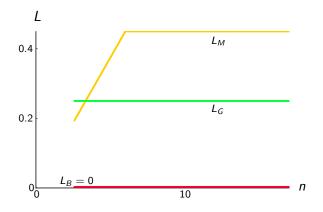*With hard information, the introduction of credit risk transfer*

- *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*

# Equilibrium

- In equilibrium, banks insure a *fraction* $\kappa$ of their medium loans, *all* bad loans, and *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 *soft* rather than *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):

$$R_G\, l_G + \bar{p}\, R\, (l_B + \kappa\, l_M) - (l_G + l_M + l_B)\, r \geq 0 \qquad (1')$$

### 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*
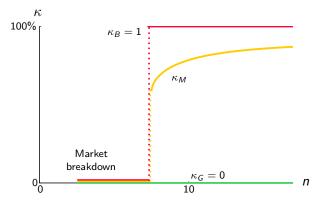- *increases banks' expected profits, but less than with hard information*

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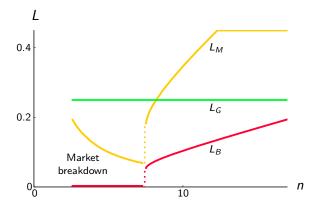
- *increases the fraction of medium loans that is insured*
- *leaves the aggregate amount of good loans unaffected*
- *increases the aggregate amount of medium loans (until the market is saturated)*
- *always increases the aggregate amount of bad loans*

*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
  $\Rightarrow$ Entry of new banks
- Effects of market entry are parallel to those of increasing $n$:
  - *Hard* information: Loan volume $L_M$ increases $\rightarrow$ Market entry reinforces the short-run effects of CRT
  - *Soft* information, *medium* competition: Loan volumes $L_M$ and $L_B$ increase $\rightarrow$ Market entry reinforces the short-run effects of CRT
  - *Soft* information, *high* competition: $L_M$ remains constant, only $L_B$ increases $\rightarrow$ 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
    $\rightarrow$ 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