

Bank restructuring under asymmetric information: The role of NPL sales

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The views expressed in this paper are our own and do not necessarily coincide with those of Bank of Italy

Introduction

- Asset quality problems at the origin of banking crises
 - Bad assets raise solvency concerns & hamper lending capacity
 - Restructuring solutions typically involve
 - ▶ Removal of bad assets from banks' balance sheets
 - ▶ Some form of public support (including Deposit Insurance Funds, DIFs)
 - Some examples:
 - ▶ In resolution: Good bank & bad bank segregation solutions
 - ▶ Outside resolution: Troubled asset relief programs & Publicly sponsored AMCs
 - Classical solutions to financial distress (Myers, 1977)
 - ▶ Liability restructuring: debt haircut, debt-for-equity-swap
 - ▶ For banks with insured deposits this would amount to public recapitalizations
- ⇒ What is the role of legacy asset sales in bank restructuring?

Contribution

This paper ingredients:

1. Bank suffering canonical debt overhang problem (Myers, 1973)
2. Asymmetric information about quality of legacy loans

Mechanisms:

- Unfreezing new lending requires concessions from creditors
- Liability restructuring solutions create incentives to overstate NPL problem
- Loan sale requirements punish opportunistic behaviour

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Optimal interventions:

- Sufficiently large loan sale requirements
- Loan sale subsidies provided by DIF, increasing in loan sale amount
- Can be implemented with Loan loss protection scheme granted by DIF for free

Road map

1. Model
2. Debt overhang problem absent restructuring
3. Solving the problem:
 - ▶ Formal solution concept (*mechanism design*)
 - ▶ Pure liability restructuring solution do not always work
 - ▶ Solutions adding asset sale requirements do work
4. Implementation in the presence of insured deposits

Model setup (I)

- $t = 0, 1$, risk-neutral agents, zero discount rate
- Measure one of banks owned by bankers
- Legacy loans with payoffs at $t = 1$
 - ▶ good loans always pay A
 - ▶ bad loans pay A only with prob q , zero otherwise
 - ▶ θ is fraction of bad loans with cdf $F(\theta)$
 - ▶ Loans can be sold to competitive outside investors at $t = 0$
- Outstanding senior legacy debt promises B at $t=1$
- New lending opportunity requires unit funding & pays y at $t = 1$

Model setup (II)

Frictions:

- θ is private information of each bank's owners
- Junior funding of new lending (from bank owners, for simplicity)

Assumptions:

- **A1:** $y > 1$ (new lending NPV > 0)
- **A2:** $y > B$ (new lending makes senior debt safe)
- **A3:** $(1 - q)B > y - 1$ (debt overhang arises for high enough θ)

Authority

- Acts as mediator between bankers and legacy creditors
- Proposes menu of restructuring plans that solves debt overhang
- Voluntary participation: no party worse off
 - ▶ More coercive interventions would not change results qualitatively

Debt overhang problem absent restructuring

- Bankers maximize equity value net of new funding contributions
- New lending's NPV distribution:

$$\text{New lending NPV} = \Delta \text{Equity value} + \Delta \text{Legacy debt value}$$

- In absence of lending, legacy debt risky if $A(1 - \theta) < B$
- If new lending, legacy debt becomes riskless (since $y > B, A2$) \Rightarrow

$$\Delta \text{Legacy debt value} = \underbrace{(1 - q)}_{\text{Default prob. no lending}} \underbrace{(B - A(1 - \theta))}_{\text{LGD no lending}}$$

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Prop The bank finds optimal to issue new lending iff $\theta \leq \bar{\theta}$ where

$$y - 1 = (1 - q) (B - A(1 - \bar{\theta}))$$

- For $\theta > \bar{\theta}$ legacy creditors gain more than new lending's NPV

\Rightarrow Classical Myers' debt overhang problem

Restructuring plans and menus

Restructuring plans prescribing new lending: tuple $R = (z, B', \alpha, p)$

- $z \in [0, 1]$: legacy loans sale requirement
 - ▶ The bank chooses how many bad loans $x \leq z$ to sell
- $B' \leq B$: new promised repayment to legacy creditors
- $\alpha \in [0, 1]$: equity granted to legacy creditors
- p : competitive unit price of sold loans

Dealing with asymmetric information

1. Authority sets θ -contingent restructuring plan *menu*:

$$\mathcal{R} = (R(\theta) = (z(\theta), B'(\theta), \alpha(\theta), p(\theta)))_{\theta \in [0,1]}$$

2. Each bank θ optimally decides which type $\hat{\theta}(\theta)$ to report
- ⇒ Can focus on truth-telling menus: induce choice $\hat{\theta}(\theta) = \theta$ for all θ

Debt overhang solutions

Menu \mathcal{R} is a *solution* for distribution $F(\theta)$ if there exists compliance decisions $x(\theta) \leq \min \{\theta, z(\theta)\}$, satisfying:

- Banks report their type truthfully:

$$E(x(\theta), R(\theta), \theta) = \max_{\theta' \in [0,1], x \leq \min\{\theta, z(\theta')\}} E(x, R(\theta'), \theta)$$

- Bankers' value if new lending & restructuring \geq no-restructuring

$$E(x(\theta), R(\theta), \theta) \geq \bar{E}(\theta)$$

- Legacy creditors' value if new lending & restructuring \geq no-restructuring

$$\int B'(\theta) dF(\theta) + \int \alpha(\theta) (\mathbb{E}[A_s(x(\theta), R(\theta), \theta)] - B'(\theta)) dF(\theta) \geq \int \bar{D}(\theta) dF(\theta)$$

- Competitive pricing of sold loans given banks' compliance decisions:

$$p(\theta) = \frac{x(\theta)qA + (z(\theta) - x(\theta))A}{z(\theta)} \text{ if } z(\theta) > 0$$

Liability restructuring plans do not always work

- Focus on pure debt haircut restructuring plans: $B' \leq B$
- Bankers' participation constraint for bank $\theta > \bar{\theta}$

$$(1 - \theta)A + q\theta A + y - B'(\theta) - 1 \geq q(A - B)$$

has solution if and only if:

$$B'(\theta) \leq B - (1 - q)(\theta - \bar{\theta})A$$

- Necessary haircut $(1 - q)(\theta - \bar{\theta})A \uparrow$ when $\theta \uparrow$
- Bank θ may report $\theta' > \theta$ to get larger haircut
- Inducing truth-reporting \Rightarrow Bank rents

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Prop 2 There exists distributions $F(\theta)$ st that no pure debt haircut restructuring solution to debt overhang exists

- Intuition: Bank rents to induce truth-reporting exceed NPV new lending
- Also true for pure liability restructuring: debt haircut + debt-to-equity swap

A solution involving loan sales

Consider menu $\mathcal{R} = (R(\theta))_{\theta \in [0,1]}$ with

$$R(\theta) = (z(\theta) = \mathbf{1}_{\theta > \bar{\theta}}, B'(\theta) = B - (1 - q)A(\theta - \bar{\theta})^+, \alpha(\theta) = 0, p(\theta) = qA)$$

- Banks $\theta > \bar{\theta}$ required to sell as many loans as bad loans they have
- Minimum debt haircut acceptable for bank shareholders if new lending

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2. The competitive price sold loans is the fair price of bad loans $p = qA$
3. Reporting $\theta' > \theta$ implies selling $\theta' - \theta$ good loans at bad loan price
4. Loan sale losses offset debt haircut gains:

$$(\theta' - \theta)(A - qA) = B'(\theta) - B'(\theta')$$

⇒ No incentives to over-report!!

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Prop 3 The restructuring menu \mathcal{R} solves the debt overhang

\Rightarrow Rationale for bad loan sales prevalence in bank restructuring

Implementation in presence of deposit insurance

- Legacy debt B insured deposits that cannot be renegotiated or written down
- Deposit insurance fund (DIF) natural candidate to make concessions
- DIF transfers $T \geq 0$ to bank equivalent to haircuts $B - B'$ from creditors

Two possible implementations of solution \mathcal{R}

- Per legacy loan subsidy to loan sales:

$$\tau(\theta) \equiv \frac{T(\theta)}{\theta} = \frac{B - B'(\theta)}{\theta} = (1 - q) \left(1 - \frac{\bar{\theta}}{\theta}\right)^+ A$$

- ▶ Increasing in θ , but not inducing over-reporting
- Asset protection scheme offering a minimum guaranteed payoff per legacy loan to buyers:

$$\sigma(\theta) = \left(1 - \frac{\bar{\theta}}{\theta}\right)^+ A \leq A$$

- ▶ translated to competitive price of legacy loans is equivalent to $\tau(\theta)$

Conclusion

- Paper contributes to understand role of bad asset sales in bank restructuring
- We consider debt overhang of banks with deteriorated legacy loans
 - ▶ In Myers (1977) pure liability restructuring solutions always work
 - ▶ With asymmetric information about legacy loans, this is not the case
- ⇒ Loan sale requirements avoid excessive rent appropriation by bank owners
- With insured deposits:
 - ▶ Restructuring plans with loan sale requirements assisted with subsidies from DIF
 - ▶ Subsidies can be implemented through asset protection scheme to loan buyers
- Proposed scheme related to GACS but relevant differences
 - ▶ Asset protection scheme not granted at market terms
 - ▶ Issuer of the guarantee is DIF not the State
- Similar scheme with lower subsidies if authority can dilute bank shareholders
 - ▶ E.g., in practice, because bank is considered failing or likely to fail