Repos, Fire Sales, and Bankruptcy Policy

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1The opinions are the authors' and do not necessarily reflect those of the Federal Reserve Board or its staff.
Question

Optimal bankruptcy policy for repos: exempt from automatic stay?

- A repo is a sale of securities coupled with an agreement to repurchase the securities at a specified price on a later date
- Automatic stay: creditors cannot collect debts due or seize/liquidate collateral in the event of bankruptcy
Answer

- Effects of exemption from automatic stay:
  1. Increases volume of trade in repo mkt
  2. May cause externalities on other mkts (fire sales)

- Our results: exemption optimal when
  - market for collateral assets is liquid ⇒ no externalities
  - on net, externalities are beneficial
Fire Sale

- *Literature*: associates fire sales with welfare loss due to financial market frictions

- *Empirically*: market for collateral assets is Over The Counter

- *Model*: fire sales arise when search friction gets worse
Why do we care

- Repo: large market ($5-10 trillions in 2008) for funding and securities lending
- Repo lenders of large defaulting borrowers may (have to) sell lots of collateral ⇒ fire sales
  - 1998: Long Term Capital Management
  - 2008: Term Securities Lending/Primary Dealer Credit Facility
  - Stein: *prices being below long-run fundamental values may involve externalities...securities financing transactions are a leading example of the kind of arrangement that can give rise to such externalities*
Model

- 2 goods: \( a \) (durable), \( c \) (perishable)
- 4 types of agents, physically separated, can commit

\[
\begin{align*}
\text{\( t = 1 \)} & \quad \text{\( t = 2 \)} & \quad \text{\( t = 3 \)} \\
\text{L alive} & \quad \text{L alive} & \quad \text{L alive} \\
\text{B alive} & \quad \Delta B \text{ die w.p. } \delta & \quad \text{I alive} \\
\text{I alive} & \quad \text{T alive}
\end{align*}
\]
Date 1 - Lenders and Borrowers

- **Lender**
  - produces $c$ at date 1
  - consumes $c$ after date 1
  - likes $c$ more than $a$
  - $U^L = -c_1 + u(c_2) + \gamma(a_2 + a_3) + c_3$ with $\gamma < 1$

- **Borrower**
  - likes $a$ at date 2
  - produces $c$ at date 2
  - can convert $c \rightarrow a$, 1 for 1
  - $U^B = a_2 - c_2$

- Mutually beneficial trade between L and B
w.p. $\delta$ a fraction $\Delta$ of borrowers die

- if $\delta > 0$ and borrower dies holding asset $a$, asset dies with him
  - e.g. asset loses value because of default costs
Date 3 - Traders and Investors

- **Trader**
  - endowment: $\bar{c}$ units of good $c$
  - Preferences: $U^T = a_T^3 + c_T^3$

- **Investor**
  - endowment: $\bar{a}$ units of good $a$
  - technology $f$ produces good $c$ using good $c$ as an input
  - $f$ is increasing and $f'(\bar{c}) > 1$
  - Preferences: $U^I = a - a_I^3 + f(c^I)$

$\delta = 0 \rightarrow$ boring; $\delta > 0 \rightarrow$ interesting (L may cause congestion)
Summary

$t = 1$

L and B trade

$L \rightarrow c_1 \rightarrow B$

$\downarrow$

$L \leftarrow a_1 \leftarrow B$

$t = 2$

If B alive:

$B \rightarrow c_2 \rightarrow L$

$\downarrow$

$B \leftarrow a_2 \leftarrow L$

$t = 3$

T: $\bar{c}$

$I: \bar{a}$

$c_3 = f(c^I)$

L: $a_2$

If B defaults:

L has $a_2$
Goal

Model

Results

Conclusion

Date 3 Matching (OTC)

$M^{ij} =$ probability agent $i$ is matched with agent $j$

- assume Leontief matching function and $M^{jj} = 0$

- no borrower dies: I matched with T

  $M^{IT} = \frac{\min(n^I, n^T)}{n^I}$

- $\delta \Delta$ borrowers die: I and L matched with T

  $M^{dIT} = \frac{\min(n^I + \theta \Delta M^{LB}, n^T)}{n^I + \theta \Delta M^{LB}} \leq M^{IT}$ \textit{(congestion)}
Decision problems

\[ U^L = \max_{c_1} \left\{ -c_1 + (1 - \delta \Delta) u(c_1) + \delta \Delta \theta \left[ M_{dLT}^{LT} c_1 + (1 - M_{dLT}^{LT}) \gamma c_1 \right] + \delta \Delta (1 - \theta) \gamma c_1 \right\} \]

\[ U^I = \bar{a} + \left[ (1 - \delta) M_{dIT}^{IT} + \delta M_{dIT}^{IT}(\theta) \right] (f(\bar{c}) - \bar{a}) \]
Fire sale

- Recall: in default *congestion* externality
  \[ M_{d}^{IT}(\theta) \leq M^{IT} \]

- Price of good \( a \) to investors
  \[
  p_{a} = M^{IT} f'(c^{I}) + (1 - M^{IT}) \\
  p_{a}^d = M_{d}^{IT}(\theta)f'(c^{I}) + (1 - M_{d}^{IT}(\theta))
  \]
  \[ \Rightarrow \quad p_{a}^d \leq p_{a} \]
Important effects

1. **Insurance effect**: $c_1$ is weakly increasing in $\theta$

2. **Investment effect**: $M_{dIT}(\theta)$ is weakly decreasing in $\theta$

⇒ **1** and **2**: trade off for policy ($\theta$)
Optimal bankruptcy policy

- If the date-3 mkt for $c$ is **liquid**: $\Delta M^{LB} + nI \leq n^T$
Optimal bankruptcy policy

▶ If the date-3 mkt for $c$ is **liquid**: $\Delta M^{LB} + nI \leq n^T$

▶ Optimal policy: $\theta = 1$
Optimal bankruptcy policy

- If the date-3 mkt for \( c \) is **liquid**: \( \Delta M^{LB} + nI \leq n^T \)
- Optimal policy: \( \theta = 1 \)

- If the date-3 mkt for \( c \) is **illiquid**: \( \Delta M^{LB} + nI > n^T \)
Optimal bankruptcy policy

- If the date-3 mkt for \( c \) is **liquid**: \( \Delta M^{LB} + n^I \leq n^T \)
  - Optimal policy: \( \theta = 1 \)

- If the date-3 mkt for \( c \) is **illiquid**: \( \Delta M^{LB} + n^I > n^T \)
  - Optimal policy depends on:
    
    \[
    (1 - \gamma) \cdot c_1(\theta) - (f(c^I) + \bar{a} - a_3^I)
    \]
    
    Size of repo loan

  - If \( n^I > n^T \) then either \( \theta = 0 \) or \( \theta = 1 \)
  - If \( n^I < n^T \) then either \( \theta = \theta^* \) or \( \theta = 1 \)

  where \( \theta^* = \{\theta \in (0, 1) : \theta \Delta M^{LB} + n^I = n^T\} \)
This paper:

- Simple comparison of costs and benefits of exemption
  - insurance vs investment effect (congestion externality)
  - size of repo loan at $t = 1$
- liquidity of mkt for collateral at $t = 3$
Exemption from automatic stay optimal if and only if

\begin{align*}
\text{a. market for collateral is liquid } & \Rightarrow \text{ no externalities occur} \\
\text{b. investment effect vs insurance effect small } & \Rightarrow \text{ externalities are beneficial}
\end{align*}