Repos, Fire Sales, and Bankruptcy Policy

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January 2nd, 2014

The Federal Reserve Day-Ahead Conference on Financial Markets and Institutions

Federal Reserve Bank of Philadelphia

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1 The 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.
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 $\Rightarrow$ no externalities
- on net, externalities are beneficial
Fire Sale

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

<table>
<thead>
<tr>
<th>$t = 1$</th>
<th>$t = 2$</th>
<th>$t = 3$</th>
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<tbody>
<tr>
<td>L alive</td>
<td>L alive</td>
<td>L alive</td>
</tr>
<tr>
<td>B alive</td>
<td>$\Delta B$ die w.p. $\delta$</td>
<td>I alive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T alive</td>
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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
Date 2

- 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: $U^T = a^T + c^T$

- **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: $U^I = \bar{a} - a^I + f(c^I)$

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

$t = 1$

L and B trade

$L \rightarrow c_1 \rightarrow B$

$L \leftarrow a_1 \leftarrow B$

$t = 2$

If B alive:

$B \rightarrow c_2 \rightarrow L$

$L \leftarrow a_2 \leftarrow L$

$t = 3$

If B defaults:

L keeps $a_2$

$L: a_2$

$I: \overline{a}$

$c_3 = f(c^I)$

$T: \overline{c}$

$\theta$
Date 3 Matching (OTC)

- $M_{ij} = \text{probability agent } i \text{ is matched with agent } j$

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

- no borrower dies: I matched with T
  - $M_{IT} = \min(n_I, n_T)$

- $\delta \Delta$ borrowers die: I and L matched with T
  - $M_{IT}^d = \frac{\min(n_I + \theta \Delta M^{LB}, n_T)}{n_I + \theta \Delta M^{LB}} \leq M_{IT} \ (\text{congestion})$
Decision problems

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

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

- Recall: in default *congestion* externality

\[ M_d^{IT}(\theta) \leq M^{IT} \]

- Price of good \( a \) to investors

\[
\begin{align*}
p_a & = M^{IT} f'(c^I) + (1 - M^{IT}) \\
p_d^a & = M_d^{IT}(\theta)f'(c^I) + (1 - M_d^{IT}(\theta))
\end{align*}
\]

\[ \Rightarrow \quad p_d^a \leq p_a \]
Important effects

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

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

$\Rightarrow$ 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

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  - Optimal policy: $\theta = 1$
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**: $\Delta M^{LB} + n^I > n^T$

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

\[
\begin{align*}
\text{Insurance effect} & \quad \text{Investment effect} \\
(1 - \gamma) \cdot c_1(\theta) & \quad - (f(c^I) + \bar{a} - a_3^I) \\
\text{Size of repo loan} & \\
\end{align*}
\]

- 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 $\theta^* = \{\theta \in (0, 1) : \theta \Delta M^{LB} + n^I = n^T\}$
Conclusion

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