Repos, Fire Sales, and Bankruptcy Policy

Gaetano Antinolfi, Francesca Carapella*, Charles Kahn, Antoine Martin, David Mills, Ed Nosal

*Federal Reserve Board[1]

January 2nd, 2014

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

Federal Reserve Bank of Philadelphia

[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

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 $\Rightarrow$ no externalities
  - on net, externalities are beneficial

Fire Sale

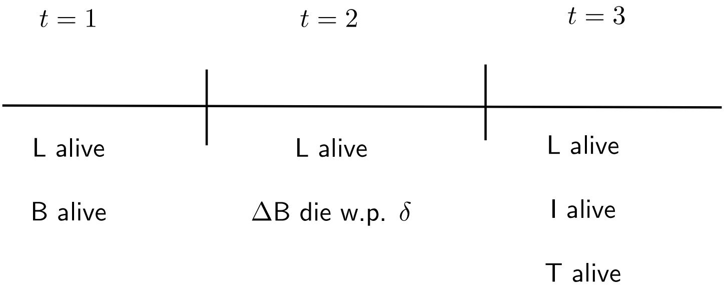
- *Literature*: associates fire sales with welfare loss due to financial mkt frictions
- *Empirically*: market for collateral assets is Over The Counter
- *Model*: fire sales arise when search friction gets worse

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 $\Rightarrow$ 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



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 $c \to a$, 1 for 1
  - $U^B = a_2 - c_2$
- Mutually beneficial trade between L and B

Date 2

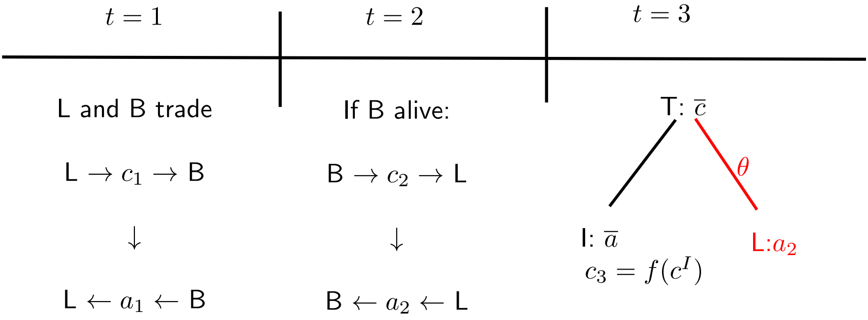
- w.p. δ a fraction Δ of borrowers die
- if $\delta > 0$ and borrower dies holding asset a, asset dies with him
  - e.g. asset loses value because of default costs

Date 3 - Traders and Investors

- Trader
  - endowment: $\overline{c}$ units of good c
  - Preferences: $U^T = a_3^T + c_3^T$
- Investor
  - endowment: $\overline{a}$ units of good a
  - technology f produces good c using good c as an input
  - f is increasing and $f'(\overline{c}) > 1$
  - Preferences: $U^I = \overline{a} - a_3^I + f(c^I)$

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

Summary



If B defaults:
L keeps a_2

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
  - $M_d^{IT} = \frac{\min(n^I + \theta\Delta M^{LB}, n^T)}{n^I + \theta\Delta M^{LB}} \leq M^{IT}$ (congestion)

Decision problems

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

$$U^I = \overline{a} + \left[(1-\delta)\, M^{IT} + \delta M_d^{IT}(\theta)\right] \left(f\,(\overline{c}) - \overline{a}\right)$$

Fire sale

- Recall: in default *congestion* externality

$$M_d^{IT}(\theta) \leq M^{IT}$$

- Price of good a to investors

$$\begin{aligned} p_a &= M^{IT} f'(c^I) + (1 - M^{IT}) \\ p_a^d &= M_d^{IT}(\theta) f'(c^I) + (1 - M_d^{IT}(\theta)) \end{aligned}$$

$$\Rightarrow \qquad p_a^d \leq p_a$$

Important effects

1. **Insurance effect**: c_1 is weakly increasing in θ
2. **Investment effect**: $M_d^{IT}(\theta)$ is weakly decreasing in θ

$\Rightarrow$ 1 and 2: trade off for policy (θ)

Optimal bankruptcy policy

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

Optimal bankruptcy policy

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

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 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

$$\overbrace{(1-\gamma) \quad \cdot \quad \underbrace{c_1(\theta)}_{\text{Size of repo loan}}}^{\text{Insurance effect}} - \overbrace{(f(c^I) + \overline{a} - a_3^I)}^{\text{Investment effect}}$$

- 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 $t = 3$

Conclusion

Exemption from automatic stay optimal if and only if

$a.$ market for collateral is liquid $\Rightarrow$ no externalities occur

$b.$ investment effect vs insurance effect small $\Big\}$ $\Rightarrow$ externalities are beneficial