Discussion of:

Rollover Risk and Market Freezes

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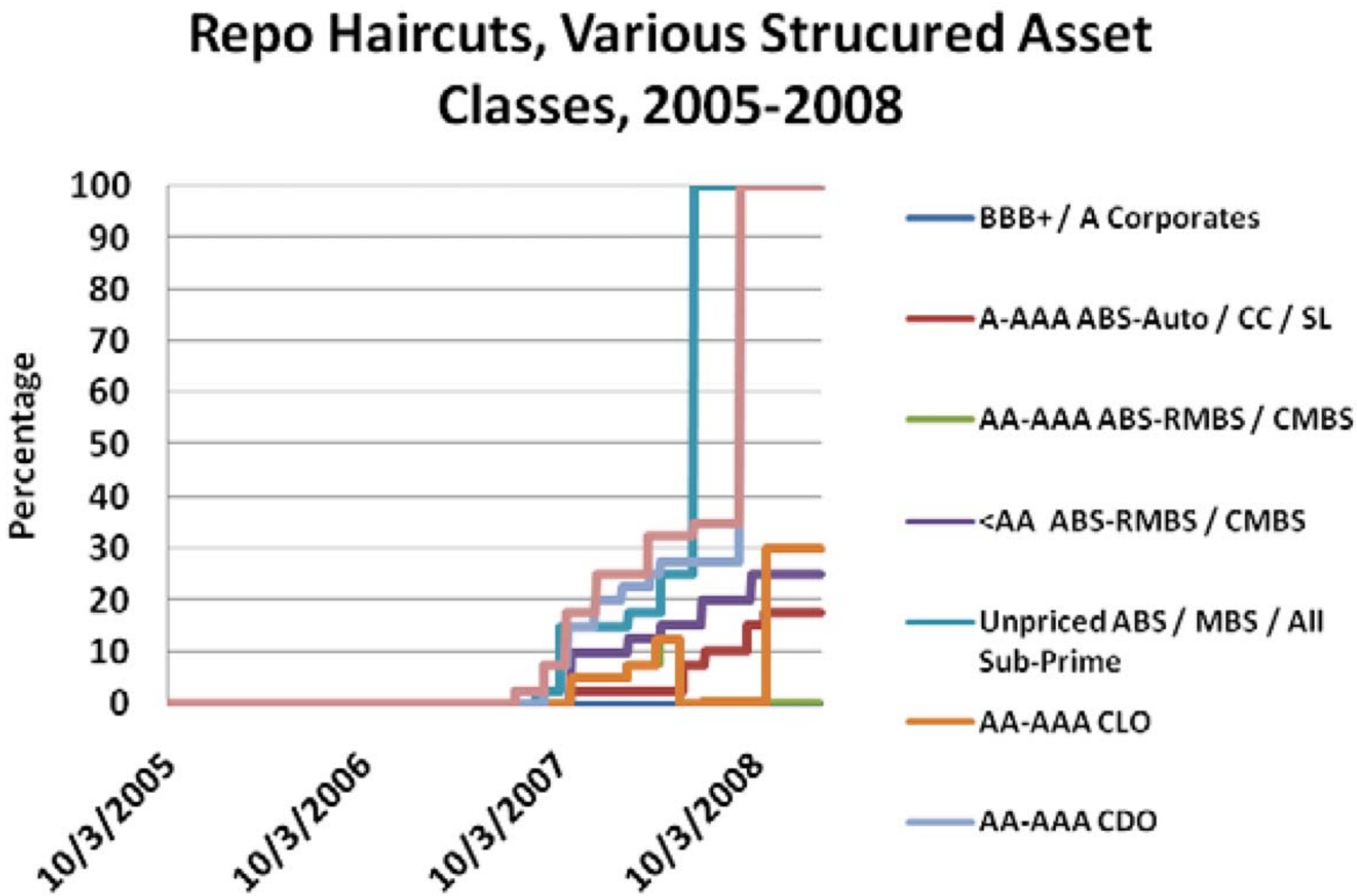
Repurchase agreements ("repos")

- The repo market is a large part of the financial system
  - total size of repo market $\sim$ \$12 trillion

    (Source: Gorton and Metrick, 2009)
  - compared to total assets in U.S. banking system $\sim$\$10 trillion
- Repo haircuts rose dramatically in 2007
  - higher haircuts $\Rightarrow$ less repo financing for a given portfolio
  - increase in haircuts is like an outflow of deposits (a "run")
  - leads to insolvency, other problems



Source: Gorton & Metrick, "The Run on Repo and the Panic of 2007-2008" (2009)

Why did haircuts rise so much?

- Increased uncertainty about value of assets?
  - larger haircut needed to secure lender
  - generally not considered quantitatively plausible
- Increased liquidation cost for assets?
  - if lenders are stuck with collateral, may all try to sell at once
  - may or may not be quantitatively plausible
- This paper offers an alternative answer:
  - frequent rollovers and repeated default

The Model

- Three periods $t = 1,\ 2,\ 3$

- At each date, state is either $\left\{ \begin{array}{l} L \text{ (low)} \\ H \text{ (high)} \end{array} \right\}$

  - transition matrix: $\left[\begin{array}{cc} p & (1-p) \\ (1-q) & q \end{array} \right]$ with $p, q > \frac{1}{2}$

- Asset pays off at $t = 3$: $\left\{ \begin{array}{c} V_L \\ V_H \end{array} \right\}$ if state is $\left\{ \begin{array}{c} L \\ H \end{array} \right\}$ with $V_H > V_L$

Q: How much can be borrowed against this asset at $t = 1, 2$?

Contracts

- Consider date 2
  - want to promise V_H in good state and V_L in bad state
  - but only simple debt contracts are allowed

- A debt contract with default generates state-contingent payoffs
  - Allen & Gale (1998)
  - but default is costly: lender gets fraction $\lambda < 1$ of collateral value

- Under some conditions, the best contract sets face value equal to V_H
  - default occurs in state L, lender receives λV_L

- Value of this debt at $t = 2$:

$$
\begin{aligned}
B_2(H) &= qV_H + (1-q)\,\lambda V_L \\
&= \underbrace{qV_H + (1-q)\,V_L} - \underbrace{(1-q)\,(1-\lambda)\,V_L}
\end{aligned}
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- Similarly:

$$B_2(L) = \underbrace{(1-p)V_H + pV_L}_{\text{expected payoff}} - \underbrace{p(1-\lambda)V_L}_{\text{expected default costs}}$$

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- Note: $B_2(H) > B_2(L)$ $\left(\text{because } p, q > \frac{1}{2}\right)$

- Also: $B_2(s) < E[V]$ *unless* $V_L = 0$

- Now consider $t = 1$
  - best contract sets face value $= B_2(H)$
  - default in L at $t = 2$, lender receives $\lambda B_2(L)$

- Value of $t = 1$ debt:

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B_1(H) &= qB_2(H) + (1-q)\lambda B_2(L) \\
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$\underbrace{\text{expected payoff at } t = 2}$

$=$ expected payoff at $t = 3$
minus expected default cost at $t = 3$

In general

- Conjecture:

$$B_n(s) = \text{expected final payout } \textbf{minus} \text{ expected total default costs}$$

- In other words:

$$\text{haircut} = \text{expected total default costs over life of asset}$$

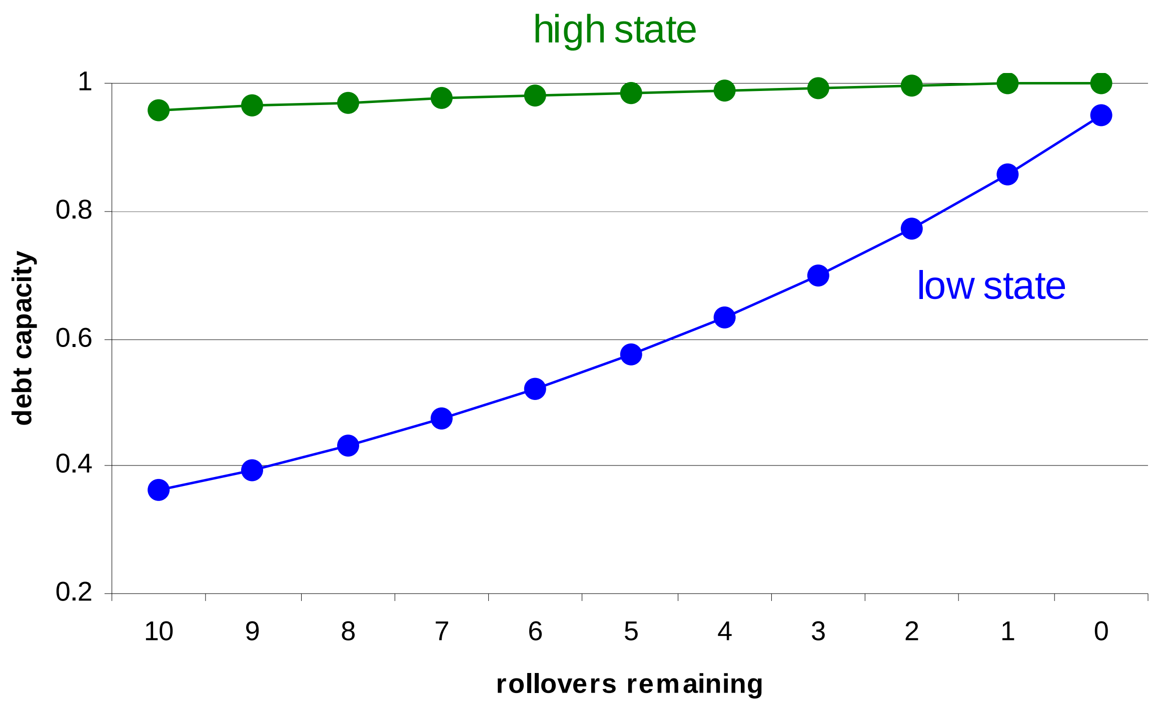
- Or, very roughly:

$$\approx (\text{cost of default}) \cdot (\text{prob of default per period}) \cdot (\text{no. of periods})$$

- Market freezes occurs when one of these increases

An example

- Set: $p = q = 0.99; \quad \lambda = 0.9, \quad V_H = 1, \quad V_L = 0.95$



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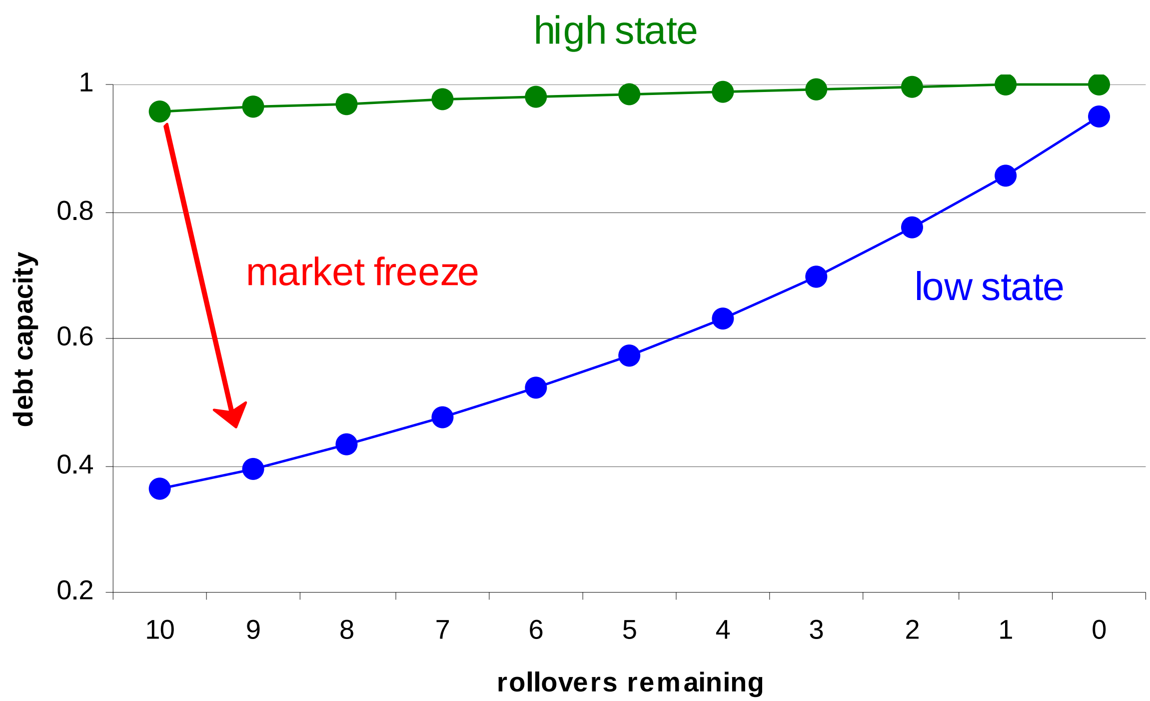

- Mild bad news leads to dramatic rise in haircut
  - reason: default is now likely to occur in every period

Special cases

- In the "optimistic" information structure:
  - L is an absorbing state $\Rightarrow$ default can only occur once
  - $V_L = 0$ (when default occurs, asset is worthless)
  - default cost $= (1 - \lambda) \cdot 0 = 0$

  $\Rightarrow$ debt capacity $=$ expected payoff

- In the "pessimistic" information structure:
  - H is an absorbing sate
  - default can occur many times (like example above)
  - result: debt capacity is low

Comments:

(1) How can we evaluate competing theories?

- One alternative explanation: sharp decrease in λ
  - if large borrower defaults, fire sale and sharp losses for lenders

- Here: λ is constant, but *frequency* of default increases sharply

- Which theory better explains the events of 2007-8?
  - what data should we look at to evaluate them?
  - perhaps: relationship between haircut and time to maturity?

(2) What policy implications does the model offer?

- Ex ante: want state-contingent payoffs without costly default
  - what are the frictions that prevent this?
  - can policymakers do anything to mitigate these frictions?

- Ex post: what government/central bank policies would be effective in dealing with a market freeze?
  - lending? If so, to whom?
  - large-scale asset purchases?

Conclusion

- Paper addresses an interesting and important question
  - why did haircuts on secured loans rise so much?
- Offers a model that can generate a market "freeze"
  - key feature: frequent rollovers and costly default
  - freeze occurs when repeated default becomes likely
- Would like to understand better:
  - evidence in favor of this mechanism
  - what policy implications the model offers