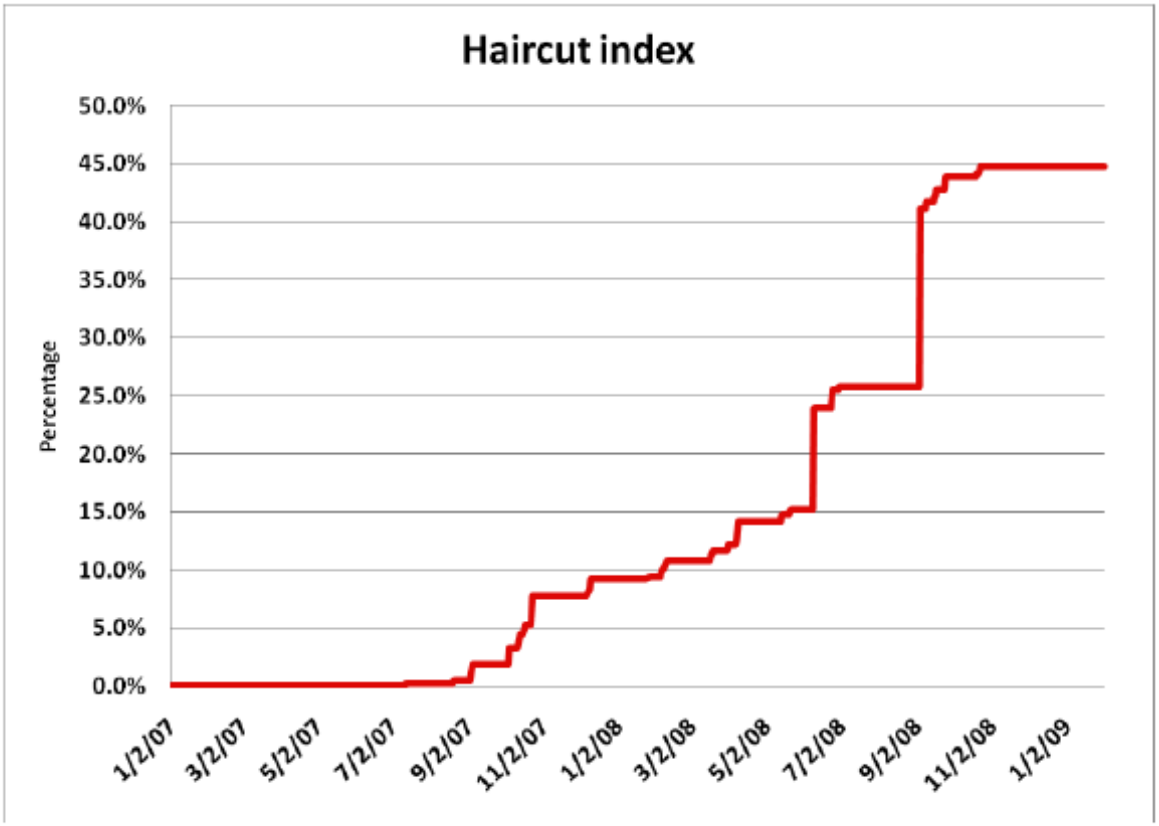
Wedndesday Lecture 1
Repo Runs

August 8, 2012

Gorton and Metrick, "The Run on Repo"



Haircuts

From Gorton and Metrick, Table II, Panel D

Assets	2007 Q1-2	2007 Q3-4	2008
A-AAA ABS-Auto/CC/SL	0.0%	0.9%	9.5%
AA-AAA ABS-RMBS/CMBS	0.0%	1.8%	17.1%
$<$ AA ABS-RMBS/CMBS	0.0%	3.7%	18.6%
Unpriced ABS/MBS/All subprime	0.0%	7.7%	68%
AA-AAA CDO	0.0%	8.3%	53.5%
Unpriced AA-AAA CDO/CLO	0.0%	10.5%	57.3%

Overview of Martin, Skeie, von Thadden

- General model applicable to MMMFs, hedge funds, ABCP conduits, SIVs and investment banks
- Many non-banks are involved in maturity transformation, using short term funding backed by long term assets (Gorton and Metrick)
- These structures share fragility of banks, e.g., Bear Sterns
- Sunspot equilibria in repo markets (Diamond and Dybvig, Qi)
- Fragility depends on microstructure of repo markets
  - tri-party repo features fixed haircuts and the "unwind"
  - DvP features "first come, first served" and variable haircuts (Gorton and Metrick)

Results

- Unlike in the Diamond-Dybvig or Allen-Gale models, banks can survive runs because (a) they have capital and (b) they can lower investment
- Ultimately, the cause of failure is a coordination failure (panic)
- The tri-party repo market is less stable because of the unwind
- Flexible haircuts in the bilateral repo market can be a source of robustness

Primitives I

- *Time*: There is an infinite sequence of dates indexed $t = 0, 1, ...$
- *Assets*: There are two assets, a liquid asset ('cash') and an illiquid asset
- *Returns*: One unit of the safe asset yields one unit of the good at the next date; I units invested in the illiquid asset produces $F(I) = R \min\{I, \bar{I}\}$ units of the good two periods later
- *Agents*: There is a continuum of ex ante identical investors (e.g., *MMMF*) and a finite number of dealers (e.g., *investment banks*)

Primitives II

- *Overlapping generations*: A new generation of investors is born at each date and lives for three periods
- *Endowments*: A new investor has one unit of the good when born and wants to consume in the future
- *Liquidity shocks*: At each date 1, a fraction α of the middle-aged investors become impatient and want to consume immediately; the complementary fraction $1 - \alpha$ want to delay consumption
- *Information*: There is no aggregate uncertainty but investors' types are private information

Steady-state equilibrium

- The repo contract: (r, Q, k)
- Properties of steady state without runs:
  - returns are independent of maturity;
  - all dealers offer the same return, which satisfies

$$(1-\alpha)\,\beta^2 r^2 + \alpha\beta r = 1$$

  - dealers do not hold cash, investment is maximal $I = \bar{I}$ and all dealers make positive profits;
  - borrowing satisfies

$$b_i \leq \frac{(1+\beta)\,\beta^2 R\bar{I}}{1-\alpha+\beta}$$

  and collateral satisfies

$$\frac{1}{\beta R} \leq k_i \leq \frac{(1+\beta)\,\beta\bar{I}}{(1-\alpha+\beta)\,b_i}$$

Surviving runs

- If there is a run, a dealer has two sources of liquidity: profits and funds for reinvestment
- He can pay off the investors iff

$$R\bar{I} - \left(r + (1-\alpha)\, r^2\right) b_i \geq 0$$

- Substituting for r we get the *liquidity constraint*

$$\beta^2 R\bar{I} \geq (1 - \alpha + \beta)\, b_i \geq 0$$

- The liquidity constraint is tighter if
  - borrowing is higher
  - investment capacity is lower
  - productivity R is lower

Repo runs in the tri-party market

- Collateral cannot be varied in the short run
- The clearing bank "unwinds" the previous evenings repos, sends cash to investors and takes possession of the collateral
- The payoffs from a run are given as follows:

	other investors	
	roll over	run
roll over	$\hat{r}_i$	$\gamma R k_i$
run	r	r

The collateral constraint

- Investors will roll over their repos if and only if

$$r \leq \gamma R k_i$$

Call this the *collateral constraint*

Theorem

In the tri-party repo market, a run on a dealer can occur and bankrupt the dealer if and only if the liquidity constraint and the collateral constraint

$$\beta^2 R\bar{l} \geq \frac{1-\alpha+\beta}{\gamma(1+\beta)} b_i$$

are both violated.

Likelihood of runs

- The collateral constraint is more likely to be violated
  - the lower is γ
  - the higher is borrowing b_i
  - the lower is the dealer's investment capacity $\bar{I}$
  - the lower is the dealer's productivity

Bilateral repos

- Bilateral repos are for longer terms than tri-party repos
- There is greater opportunity to adjust the amount of collateral to prevent a run
- The maximum value of collateral per unit borrowed is

$$\bar{k} = \frac{\bar{l}}{\left(r + (1-\alpha)\, r^2\right) b_i - R\bar{l}}$$

- First come, first served constraint

$$\varphi = \frac{R\bar{l}}{\left(r + (1-\alpha)\, r^2\right) b_i}$$

Likelihood of runs

- The payoffs from a run are

	other investors	
	roll over	run
roll over	$\hat{r}_i$	$\gamma R k_i$
run	r	$\varphi r + (1-\varphi)\gamma R k_i$

- In the bilateral repo markets, a run on a dealer i can occur and bankrupt the dealer if and only if the dealer's collateral constraint

$$\beta^2 R\bar{l} \geq \frac{1-\alpha+\beta}{1+\gamma\beta} b_i$$

is violated.

Conclusion

- Institutions matter
- Haircuts can help markets clear (Geanakoplos)
- Was the financial crisis "only" a sunspot?