

22 Week 8 Financial Crisis Notes

1. “A key question: how the original loss of several hundred billion dollars in the mortgage market was sufficient to trigger such an extraordinary series of worldwide financial and economic consequences.” Answer: *A run, or panic, in the “shadow banking system” consisting of repo and other overnight financing, brokerage accounts, and derivatives counterparties.* The source of the losses didn’t really matter. It’s the fragility of the financial structures that held the losses. Compare to the dot-com bust. Anyway, that’s the main lesson I take away.
2. (Duffie p. 51) Background: how an old-fashioned *bank run* works.
 - (a) The keys: 1) Illiquid assets (mortgages), limited cash reserves, 2) liabilities (demand deposits) that promise a fixed value, 3) first-come first serve payment. 4) my redemption makes the institution worse off, raising your incentive to run. The last in line will not get full value, so if everyone else runs, you should run too. Bank deposits are a “systemic contract,” they leave an “externality”, a “multiple equilibrium.”
 - (b) Is this a problem? If the 5) liquidation of assets is socially inefficient, the run is undesirable. In models (Diamond and Dybvig), the bank must liquidate real projects, i.e. having built the basement stop building the house. This is bad, and a reason for policy intervention. If we’re just selling financial assets however, the case is much weaker. You have to argue that liquidation “depresses prices” and this price depression is socially inefficient, not just a transfer. A run per se is not a bad outcome.
 - (c) Runs are not a policy problem if it’s only a transfer. People forget this all the time. We need to abandon real projects, or your fire sale is my buying opportunity.
 - (d) *Bankruptcy per se is not a problem:* There is no crater. Debt becomes equity, keeps firm running if it makes sense to do so. You need some social (not just transfers) “costs” People forget this too!
 - (e) Runs are a problem if you get an overall financial crisis. (Not in Duffie, but in Gorton). It doesn’t matter if you’re all alone (MF Global.) When your bankruptcy makes people worry about the other bank (Gorton, E. Coli), leading to “systemic insolvency” (really illiquidity) then it’s potentially a problem. And only then.
 - (f) Our challenge: understand how each of *brokerage*, *derivatives*, and *overnight debt* have an incentive to “run,” and how those runs precipitate firm demise. Then, how to fix these features! See Duffie. For now, this is what *happened*.
3. *Bailouts/bankruptcy/equity sales/debt overhang*
 - (a) Why not just raise new equity? Duffie repeats the common story: the *debt overhang problem* gets in the way. Once a firm has taken a lot of losses, it’s clear that if broken up debt will only get, say, 60 cents on the dollar. Equity is still not worthless, as it’s an option on things getting better. Now, if you sell new equity, the first thing that happens is the value of bondholder claims get better. New equity holders don’t want to subsidize current bond holders. This is the story, anyway. It also has holes in it, and we see new equity coming in to firms after losses all the time. For this or other reasons, though, it’s often hard to sell new equity to a company right on the edge of bankruptcy, or find a suitor willing to come in.

- (b) A sale is really a “recapitalization”. The FDIC/Fed hope that the merged company has enough extra value to then pay off bondholders and escape debt overhang. Plus the government chips in.
 - (c) Bankruptcy is just a recapitalization, avoiding debt overhang. Current equity loses everything, old debt turns in to new equity worth less than the face value of that debt, and the firm can issue equity again and get going. Debt holders don’t like this of course, they’d rather be bailed out. The newspapers and policy wonks always think banks can only be recapitalized from taxpayer money.
 - (d) This motivates some policy proposals. Forms of convertible debt that would allow a debt/equity conversion without bankruptcy, for example. However, it is the right of bondholders to seize assets that makes bonds worthwhile, so it’s not a panacea.
 - (e) Motivated at least by this story, the Fed provided credit guarantees, i.e. a subsidy and bailout to the deal. Thus, bondholders made money at the expense of taxpayers, and then new equity came in
4. While we’re at it “financial crises are always and everywhere a result of short-term debt.” (Diamond)
- (a) Consider the example of a project, coming due in 10 years, financed by 10 year zero vs. financed by rolling over debt. If you finance with 10 year bonds, bad news just lowers bond prices. If you roll over debt, bad news means you’re insolvent.
 - (b) Government (Greece) crises are all at the moment of roll over.
 - (c) “Illiquidity” vs. “insolvency” (meaning, here, the present value is really less than zero and it won’t be paid at maturity) is not so easy to tell
 - (d) Runs as “multiple equilibrium.” Even with no news, if you run, I should run.
 - (e) When Bear and Lehman failed *they were financing portfolios of MBS by rolling overnight debt at 30:1 leverage!!*
 - (f) Leading to my question – why is short term funding so vital? Can we not run a financial system with equity and long term debt?
5. Duffie p. 51, “Standard policy tools”
- (a) Deposit insurance – removes the incentive to run.
 - (b) “Regulatory supervision.” Deals with moral hazard of deposit insurance, tries to keep banks from losing money in the first place.
 - (c) “Risk based capital.” With subsidized (deposit insurance) debt, the forces that made banks issue equity in the first place are gone – depositors don’t care if there is no equity holder. So we have to force banks to issue equity
 - (d) “Regulatory resolution mechanism” this means FDIC.
 - (e) Lender of Last Resort.
 - (f) Don’t get the impression that this is all working so great!

22.1 Duffie failure mechanics

This is a brilliant paper for outlining why short term repo, derivatives, and brokerage accounts are “run-prone” and hence “systemically dangerous” contracts. It’s also useful as investors need to understand the operation and risks of these markets. Another big picture: *it’s all about cash in the end.*

- Definitions of words / how stuff works. Rules for today: We’ll stop and define everything and not pretend everyone knows all this gobbledygook.
 1. Bank Run
 2. Debt overhang
 3. Repurchase agreement (repo)
 4. OTC derivatives. Don’t confuse notional with exposure. Master agreement, and netting of collateral.
 5. Credit Default Swaps
 6. ‘Off Balance Sheet Financing’ “Special Purpose Entity”
 7. Repurchase agreement
 8. “Re-Hypothecation”
 9. Keep adding to this list.....
- p. 51 Traditional **bank run**.
- p. 51 “Standard policy tools”
- p. 52 Alpha bank = Bear Stearns / Lehman story. Fundamentally, bankruptcy comes when you run out of cash, so he’s following how events drain cash. (And we have to think why won’t/can’t the company get more cash)
 1. Lose money.
 2. Obvious answer: raise new equity capital? a) “Debt overhang” b) “uninformed” story. Note: Efforts to sell the firm = new capital.
 3. Bailing out hedge funds/clients (more later)!
 4. Prime Brokerage clients leave, which makes cash situation worse (Why? How? Later)
 5. Derivatives counterparties leave, stop providing cash collateral.
 6. Short term creditors don’t roll over debt. (Why not? It’s collateralized? Coming soon)
 7. No more daylight overdrafts. Default. .
- What dealer banks do
 1. p. 54-55
 2. p. 55 “proprietary trading which can be aided in part by the ability to observe flows..” (That’s close to “front running”) Bear and Lehman were brought down by speculative losses. As I see it, merging speculative trading with systemically-dangerous liabilities (brokerage, derivatives, short term debt) is a key problem. We don’t let banks fund trips to Las Vegas with demand deposits. “Volker rule”

3. p. 55 bottom/ p. 56 top. Repos. Understand how they work here
 4. 56 bottom. OTC derivatives. Don't confuse notional with exposure
 5. p. 57 top. Note we can't all lose money on derivatives! You have to appeal to frictions. Which are real.
 6. p. 57 "Master Swap Agreement" allows netting across types (CDS with interest rate swaps). (This is a big disadvantage of exchange-traded)
 7. p. 57, bottom "the range of acceptable collateral was narrowed." This is Gorton's haircuts, coming later.
 8. p. 58 Credit Default Swaps. You pay (say) \$5 for a year, and then if a bond defaults the counterparty buys it from you at face value (or cash settlement). You get collateral based on the price of the bond. AIG failed because it had to post more collateral, based on its own credit downgrade. Many back-to-back CDS – the dealer will lay off risk, and people don't sell CDS, they just write another one, e.g. sell a new CDS back to the bank. ("compression trades" get rid of this)
 9. p. 58 "Prime broker services"
 10. p. 59 "asset management divisions" and "internal hedge funds" "voluntary support" as we saw with Bear stearns. This is very interesting. It helps explain internal hedge funds at all (where is "the principles coinvest" if they are on a bank salary!)
 11. p. 59 'Off Balance Sheet Financing' "Special Purpose Entity" On the bottom of p. 59, how these structures were basically set up to avoid capital requirements. Top of p. 60 how the credit risk is still there.
- Failure mechanisms (p. 60) For each security
 1. Why do investors run?
 2. When they run, why does this make the bank worse off, hence inducing additional runs? Counterexample: My car is in the shop when the dealer goes under. I calmly go get it Monday morning. Why are brokerage accounts not like this?
 - So, for the list of securities...
 1. p. 61. Repos (overnight).
 - (a) Repo means huge leverage for these banks, over 30, and much of that with overnight debt!
 - (b) Why do they run? It sounds simple, "they default, you get the collateral." A: They may have to sell collateral fast. Also there may be some legal hassles. (It turns out UK bankruptcy did not recognize repo). Why not just lend to someone else? (Again, a general picture. People *have* thought about the run danger of these contracts, and tried to do something about it. The idea of repo is you have collateral, so you don't have a reason to run. Alas, it's not so simple.
 - (c) p. 61 With no repos, no Fed or other lender, must sell assets. "Fire sale" (At least bid/ask). Then you mark down existing assets "death spiral." (Q: where are those fundamental investors?)

- (d) p. 61 Rising haircuts makes it much worse. If you had been putting in \$2, borrowing \$98 at repo to fund \$100, then haircuts go up to 10%, now you need \$8 extra from other sources – not collateralized! (More with Gorton). This is like the “money multiplier” – if the Fed demanded a huge increase in required reserves, but did not increase the money supply, the volume of *aggregate* lending would have to go down, sharply - or a huge deflation, overnight.
 - (e) p. 62-63. Hey, people had thought of this! Other sources of last-minute cash.
 - (f) 31 Intraday overdraft, discount window, TALF, other ways used to mitigate the liquidity problems.
2. 63. Prime brokerage
- (a) The car puzzle. Why should you care if your broker goes under? A: You should care a lot!
 - (b) UK cash is “equivalent to uninsured deposits” i.e. is a pure unsecured loan to the bank. A promise.
 - (c) Bottom: The single pool
 - (d) 64 “Re-Hypothecation” In the UK your securities are commingled. In the US less so, but they can still use your securities as collateral for their own borrowing to finance their own activities. For example, you buy \$200 equities, borrow \$100 margin from the dealer. The dealer can repo \$140 of your assets (to get the \$100 cash to lend you) so with 2% haircut, has \$38 extra cash “a significant source of financing for prime broker” *So when you pull out, this causes the prime broker to lose financing for his own positions.* Another crucial part of a “run,” that when you pull out the bank is worse off.
 “Failure to run, as Lehman’s London-based clients learned, could leave a client unable to claim ownership of assets that had not been segregated in the client’s account and had been re-hypothecated to third parties.” It turns out even though they’re your stocks, it’s hard to get them out of the brokerage in bankruptcy.
 - (e) 64. In the US there is also a problem if you *don’t* run. If you bought on margin and the dealer can’t repo any more, it can’t use your securities to borrow even the \$100 from someone else. The customer still wants loan, but dealer can’t get the money.
 - (f) 65 In the future, “Hedge funds may place more assets with custodian banks rather than traditional prime brokers.” Why do people put up with all this? Banks (Lehman) gave them very nice incentives to move prime brokerage to London where they could make more money. Prime brokers give you better terms than custodians. Everyone wants risk until it’s too late. But the big point: all of this can be fixed!
3. 65 Derivatives counterparties.
- (a) Some mechanisms for lowering exposure, which get cash out of the dealer. Borrow from the dealer, ask new derivatives contracts in which they pay you (ask to write an option), restrike options at the money, request novation. Again, even with collateral, it’s a pain when your dealer fails. Go elsewhere.
 - (b) p. 66 If the dealer’s credit rating is downgraded, it has to post more collateral, again draining cash. This is the central story of AIG.
 - (c) 66-67 Replacement of derivatives positions. This is important. If a dealer fails, it has to replace derivatives positions with new derivatives from other counterparties.

(This comes out of other assets that otherwise flow to bondholders.) Thus, it pays the bid/ask spread on its entire book. It does not get to net. (But, this lowers the incentive for derivatives counterparties to run! There is a reason this feature is here!) However, it means a big post-default cash drain, so others have even greater incentives to run.

4. 67 loss of cash settlement privileges

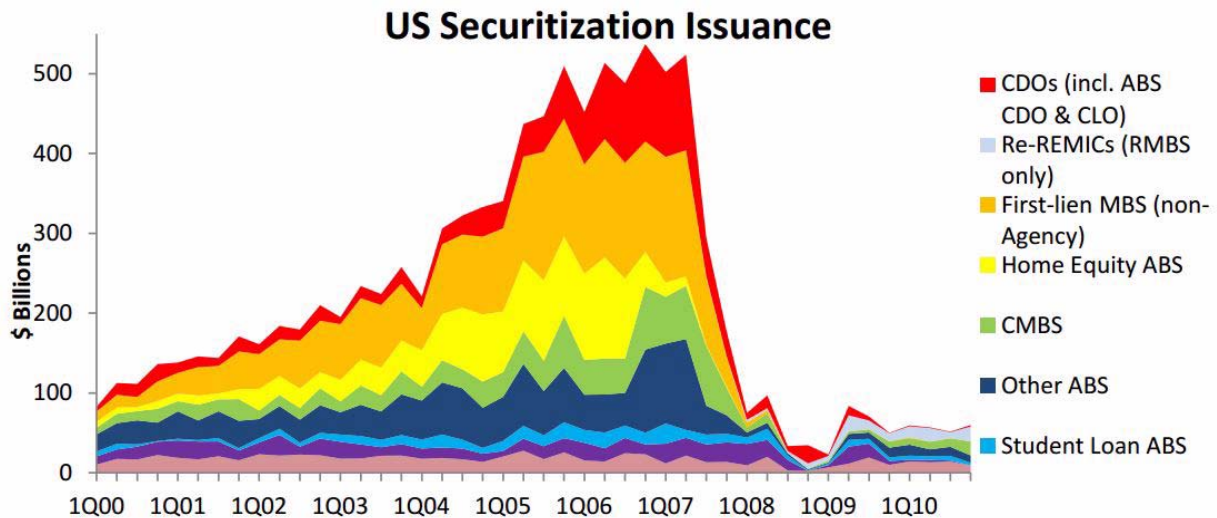
- (a) Daylight overdraft explained. This is the end of the line

5. BOTTOM LINE: Dealer banks turn out to have run-prone contracts

- (a) Overnight debt is functionally the same as a bank deposit. By refusing to renew, you almost always have the option to leave at the first sign of trouble and avoid losses in bankruptcy. Why run? People understand the danger, so short term debt gets paid early in bankruptcy. But not early enough; you earn so little each day that it's better to pull out.
- (b) Brokerage: "They're my stocks". It turns out they're not, so you have an incentive to run. Second, when you withdraw that hurts the firm a lot, draining cash from it and forcing sales of illiquid assets. Thus, it's run-prone too.
- (c) Derivatives: Obviously, you'd want to get out of a derivative contract if you see trouble. People have thought about this too, and that's why derivatives contracts "exempt from bankruptcy" But not quite, so you still have an incentive to run, and your run causes problems for the bank.
- (d) In each case, there is an incentive to run; there is an externality: if you run, the bank is in deeper trouble, so I run. In each case, there are structures in place to try to address runs: Collateral, stay in bankruptcy, etc. But they are not quite good enough. (Is there also "socially inefficient liquidation?" Not so clear.)

- *Can bankruptcy be fixed?* Every time we get past generalities, "they should have saved Lehman" to specifics of "what went wrong," you say "I can fix that! Money market funds; rights of derivatives counterparties, segregation of assets, etc. Why are we not fixing bankruptcy law, segregating accounts, making these contracts less prone to runs?"

- Shadow banking is dead?



Source: Federal Reserve Bank of New York Staff Reports 559 Shadow Banking Regulation
Tobias Adrian Adam B. Ashcraft

22.2 Duffie Q&A

Duffie. Big picture. You know how a run on bank deposits works. Here we see how “shadow banking” contracts of broker dealers are also prone to runs. p. 54-60 are excellent on what dealer banks *do*. Bankruptcy happens when you run out of cash. Full stop. Forget fancy theories and present values! Runs happen if securities promise cash on demand, first come first serve, if the bank can’t easily raise cash to satisfy demands, and if my getting my cash out makes the bank closer to failure so you have an incentive to get your cash out. Look for these characteristics in dealer banks. Obviously important to operating in markets.

1. p. 52. Alpha lost money, so is undercapitalized. Why not just sell more equity?
A: “debt overhang” is the story. More equity goes to raise the market value of debt.
2. p. 59. What advantage is there, as a client, to investing in a hedge fund owned by a large dealer bank, rather than a standalone. After all, standalone management needs to work for you to keep their jobs!
A: The chance that the bank will bail out hedge fund clients!
3. p.61. Suppose you lend to a dealer bank, taking securities in repo as collateral. Why should you run if you suspect trouble? After all you have the collateral
A: Not really, it’s still a pain and not worth 5%/365 interest. You may not be eligible to hold the collateral and hence forced to sell. On the day Lehman goes under!
4. Why not just borrow from the Fed?

A: Not really fully answered. Dealer banks can't, of course. Though the Fed allowed them to in the crisis, and Goldman became a bank holding company for just that reason. The Fed also wants collateral, whose value may be collapsing. But 'why can't a lender of last resort stop all this without bailouts' is a bit unanswered.

5. p. 63. If your dealer is in trouble, why remove securities from the brokerage account? They're your securities after all. If your car dealer goes bankrupt, and your car is in for repair, you can go get it out even after bankruptcy.

A: Rehypothecation. "Your" securities aren't there, any more than "your" money is at the bank

6. p. 64 If you take your securities out, why does that make the dealer less liquid and more likely to go under

A: He was using your securities as collateral for his own trades!

7. p. 66. If a dealer is downgraded, this alone drains cash. Why?

A: AIG. Derivatives contracts make you post cash if downgraded.

22.3 Gorton and E Coli

- Duffie is about a run on an *individual* bank, not really about a *financial crisis*. Gorton helps us to understand a run on the *financial system*

- Ideas

1. "Information insensitive" securities. This is big and important. To Gorton, the point of Repo, AAA tranches, and AAA corporate is to create "information insensitive" securities, that you can invest in without doing much research. Unlike, say common stock or low grade debt. "Ignorance is bliss": "information insensitive" securities are also "liquid" because people don't fear asymmetric information (remember the story that asymmetric information is behind the bid ask spread and the no-trade theorem).

Not everyone agrees with this. Diamond and Rajan have a series of important papers arguing that short-term debt is crucial (they want to explain why there is so much of it), and acts as a discipline device. The threat to run keeps managers honest. However, this means that in their view, short-term repo investors spend all their time monitoring management. It's diametrically opposed to the "money" view here.

2. Aggregate runs are the dangerous ones. Then the "whole system becomes insolvent." A reason to dislike runs even without individual "socially inefficient liquidation"
3. "Insolvent" here means lack of cash, not the present value of projects is too low.
4. Haircuts and "velocity" of collateral; Repo haircuts are just like reserve requirements. If you raise them, suddenly the whole system needs more cash.
5. the "E coli" analogy to systemic runs. You see Lehman go under. Why do you pull money out of Goldman? Well, you were not paying too much attention, and if Lehman was in trouble, who knows. More deeply, Goldman's debt is no longer "information insensitive." If someone is trying to sell you Goldman debt, maybe he knows something.

6. Fact: The repo market fell apart, forcing many investment banks and hedge funds to deleverage. Someone has to hold assets, so that means they must be held directly by investors. That seems to involve a big price discount. “Haircuts” increased.

- Paper

1. It’s nice to start with history. This event was not so different!
2. Why did *all* asset prices decline? His answer “fire sales.”
3. p. 169. Repo market. Collateralized repo is better than bank accounts for a big institution because you can’t get a guarantee on \$100m bank account. Repos are money – just as bank deposits are “money.”
4. Figure 7. People get scared about the value of collateral. Haircuts increase. Like the money multiplier, this means the system as a whole needs more cash.
5. p 171 Why did people get scared? E coli analogy. Normally, repo is safe or “information insensitive.” You do *not* spend a lot of time analyzing the value of the AAA bonds you have in repo, just like money. But if one company goes under, who knows?
6. Figure 8, 172. AAA trade under AA, as so many companies are trying to dump AAA to raise cash!

22.4 Gorton Q&A

1. p. 165. If everyone wants their money back from *every bank* at the same time, what must happen?

A: There isn’t that much money to go around. An individual bank can sell assets to other banks, but not collectively. That’s when the system is insolvent.

2. p. 167. The crisis originated in subprime. So why are other bond prices collapsing?

A: Banks are selling in a panic to raise cash to meet the run, there isn’t enough cash around.

3. p. 169 Why do institutional investors favor repo over bank deposits?

A: You can’t get deposit insurance on \$10 million

4. p. 171 Central issues. How is the repo haircut like the money multiplier?

They are the same thing. If we expand lending in a chain of repo, the haircut is like the reserve requirement. If the haircut rises, the amount of supported lending falls. We need to get cash from somewhere...where?

p. 171. Read the e-coli analogy. For class, how is repo like e-coli?

22.5 Cochrane Discount Rates comments

p. 1070. “Segmented” and “Intermediated” markets. Many crisis stories involve something like this. The banks want to sell assets in a “fire sale.” OK, why don’t we buy?

→In the end, *we hold the same assets*. Why do we seem to care so much about holding them through an intermediary vs. directly? Remember, we hold the intermediary equity too.

→These are stories of “limited risk-sharing ability.” One of our perfect-market assumptions is that risks are all shared equally. These stories generate price variations because a small group must bear all the risk, therefore the premium must go up.

Practical application: You’re a multi-strategy fund, shopping around for risk premiums that seem temporarily high – prices that seem temporarily low. Is this a “inefficiency?” Or better to think of it as a “temporarily elevated risk premium because a risk is narrowly held for institutional reasons?”

p. 1070 bottom, the long-only multi-strategy investor – why isn’t he buying? That’s the key.

p. 1071, middle, Liquidity. Read 2nd paragraph. Liquidity is different from “limited risk-bearing ability”

p. 1073. How much “institutional finance” do we need to understand the financial crisis? Consumption in the financial crisis – note the predictions a) that the market prices “consumption risk” b) that the higher risk premium in the crisis corresponds to the consumption decline.

(BTW. Do we have to rescue the canard that “the crash proves that markets are inefficient?”

p. 1074. and Figure. Investment behaved as it should, given the behavior of stock prices.

p. 1074 bottom: Note, this is consistent with the “run” being the fundamental cause. Higher risk aversion then amplifies the initial shock. (In other work, the flight to quality is a demand for government bonds, which is deflationary)

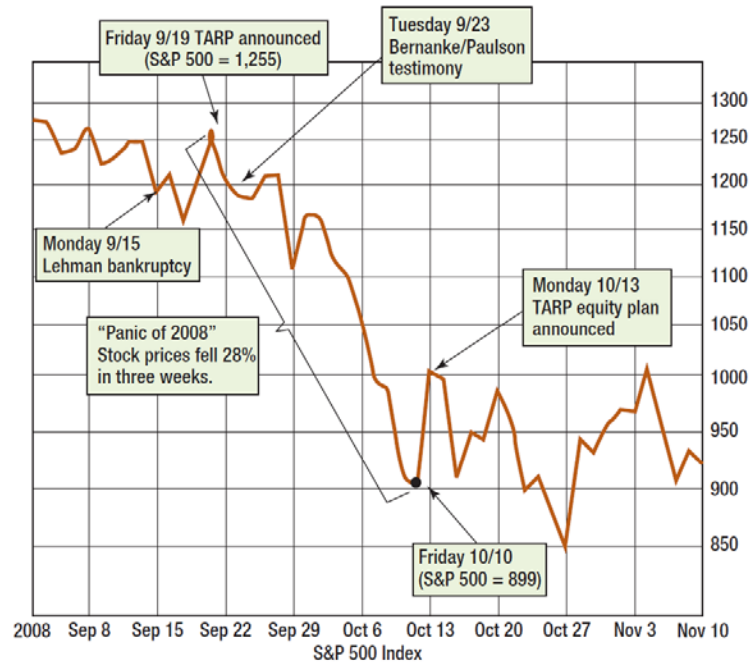
p. 1076 All prices moving together. Notice all markets move together, even ones that are completely un “intermediated” – all of us can buy and sell. We may have all panicked, but this is not just because our hedge funds are worried about quarterly results. This is hard for behavioral or institutional theories to reconcile.

p. 1078. What about the arbitrages? Lots of 3com/palm events showed up. In each case you needed to borrow dollars to arbitrage. A: what’s the dog and what’s the tail? Notice that the arbitrages are small compared to the overall price changes.

Summary: I think there was a shock to mortgages, and the markets saw a recession and house price decline coming. This was greatly amplified by the run on the shadow banks and flight to quality. In the end a large risk premium for all assets opened up. As I see it, “macro” is still first-order, with interesting “arbitrages” as the frosting on the cake.

22.6 Comments

1. What caused the run / would the world be ok if they had just bailed out Lehman? Conventional wisdom: “Lehman caused the crash. If they had bailed out Lehman we’d be ok” Taylor/Cochrane/Zingales: the TARP speeches and short ban had a lot to do with it. Had they bailed Lehman, they would have had to let someone go. Would it have been better if it were AIG or Citi? What did markets learn from Lehman? A: That TBTF is not ironclad. The markets only stabilized when Tarp convinced them that TBTF was really in place. Of course TBTF is a terrible idea overall. Note bailing out Bear didn’t stop the crisis. Why would Lehman have been different? Evidence from John Taylor



2. My focus on runs – runs on the system, not individual banks – is most useful for what is *not* important. If you can fix the runs, you don't have to stop any bank ever from losing money! It would be nice to fix the housing insanity but not vital. People can make money and lose money.
3. The current approach (See my "lessons of the financial crisis" and "how to stop bank runs before they start") is alas an evolving disaster. The cornerstone of the Dodd-Frank law is that the Fed will regulate every financial institution, in great and arbitrary detail. This is the "never lose money again" approach. Then there will be a "resolution authority" which supposedly will quickly close down huge banks before they get in to too much trouble, rather than fix bankruptcy. Since that is arbitrary and politicized, watch investors to run even faster if there is a hint of that happening. It's already falling apart.
4. My view: massively more bank equity pretty much solves the run problem, then we don't need to regulate asset risk and so on. If you want to issue run prone debt, hold treasuries. Period.