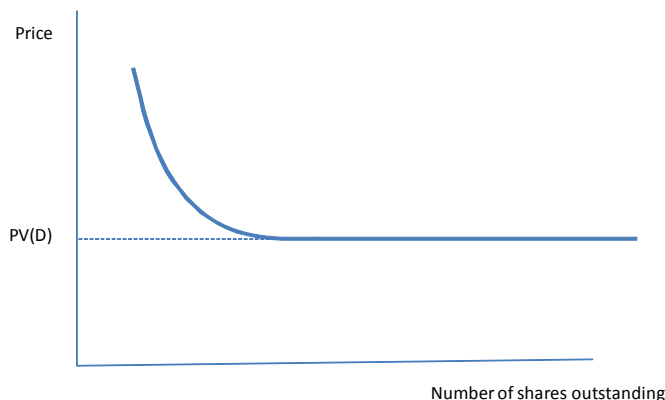


Mispricing, Liquidity, Financial Crisis

Themes:

1. “Limits to arbitrage” including short sales constraints, margin calls, investors bailing out, “limited capital” etc.
 - (a) Focus on mis-pricings
 - (b) But why are prices wrong in the first place?
 - (c) Where are the long-only multistrategy investors? (Answer, they come in but slowly)
2. “Downward sloping demands,” (supply?). The curve should be flat at $P = E \int m_{t,t+j} D_{t+j}$
 - (a) Short run stories: informed vs. uninformed trading
 - (b) Brandt and Kavajecz for example, the correlation of price change with signed volume.
3. Why is there so much bloody trading? Well, “information” obviously, that’s why markets *exist*. Is all the trading just about a few basis points around a frictionless, no - trade price? Or does the mechanics of trading have first order impact on prices. At least sometimes?
4. Short term debt. *The financial crisis was at heart a “run” on the shadow-banking system composed of repo financing, prime-brokerage, and derivatives.* Mortgages, “global imbalances” etc. are really beside the point. This is how banks lost money, but that could have been anything. The central story is why these assets were held in fragile financial structures, that vastly multiplied the effects of losses. A run is an externality (*if* there are socially inefficient liquidations; just selling assets does not count.)

Pictures



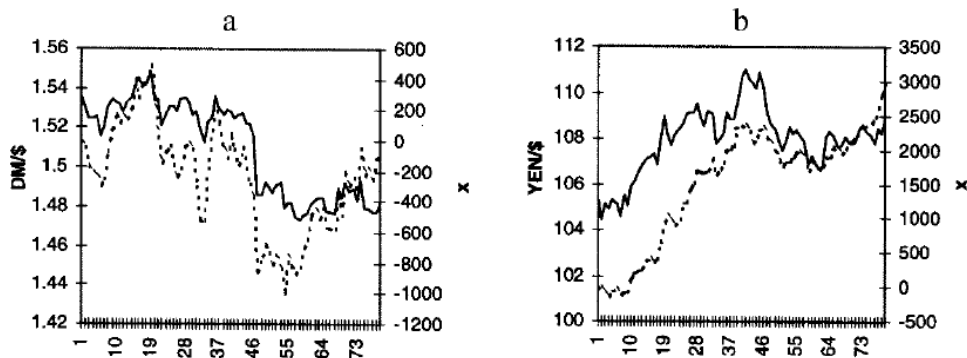
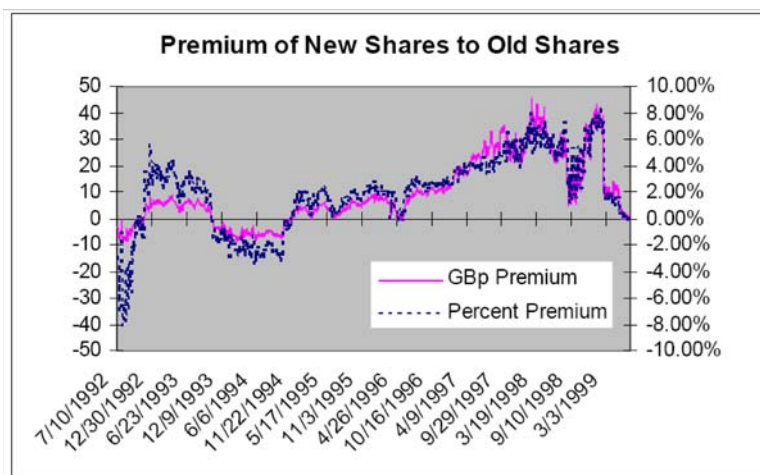
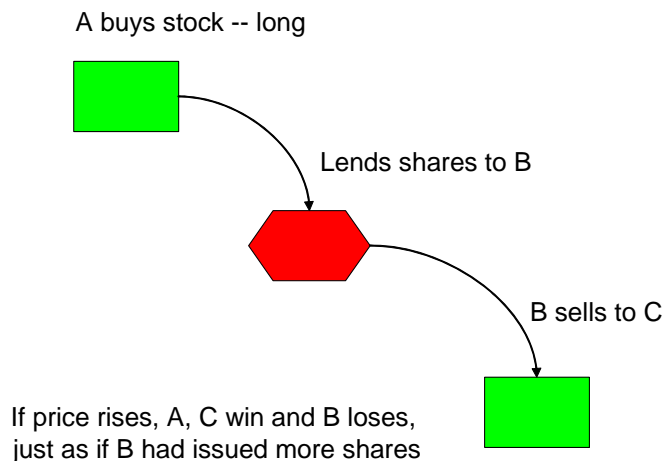
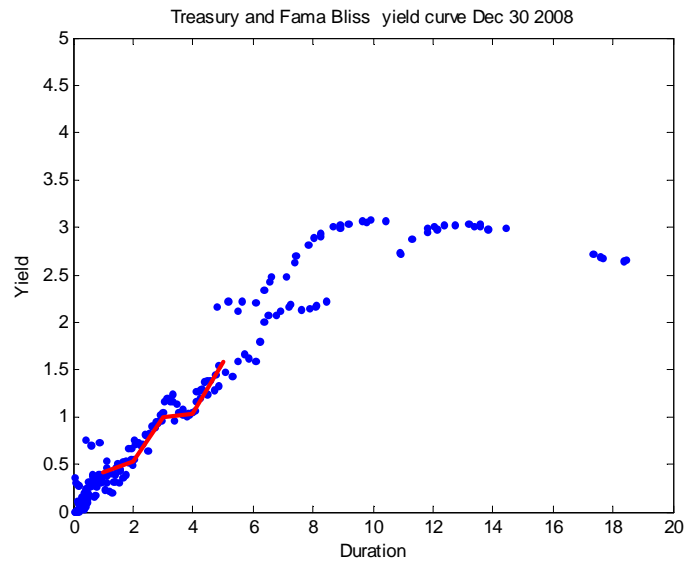
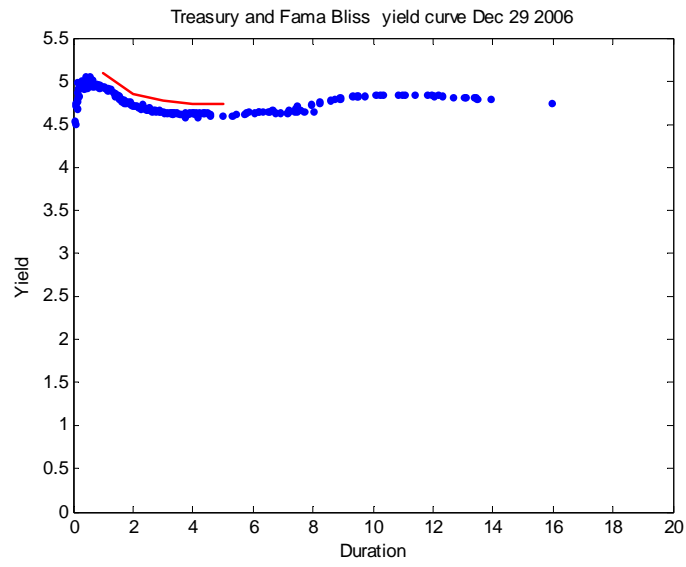
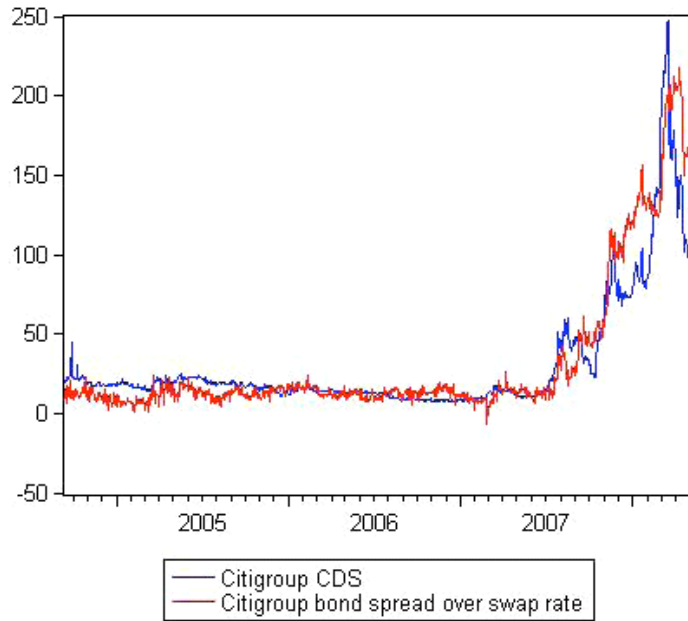
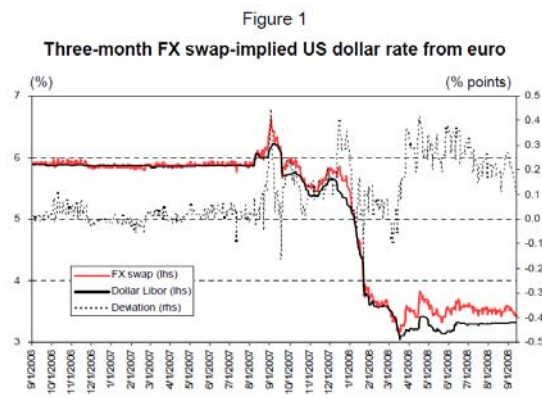


FIG. 1.—Four months of exchange rates (solid) and cumulative order flow (dashed), May 1–August 31, 1996: *a*, deutsche mark/dollar; *b*, yen/dollar.





Citigroup CDS and bond spreads. Source: Fontana (2010)



Note: The FX swap-implied US dollar rate is defined as the total cost, in terms of the dollar rate, from raising euros in the uncollateralised cash market and converting them into dollars through the FX swap market. Euro Libor is used as the uncollateralised euro cash rate.

Covered interest parity violations in the financial crisis. Source: Baba and Parker (2008).

Lamont and Thaler.

Why? A well documented mis-pricing, many similar things happened in the financial crisis.

1. Basic facts of the 3Com/Palm case?

- (a) p. 230. March 2, 2000 equity carve-out – 5% of palm sold in IPO, 3Com keeps 95%. 3Com shareholders to receive the rest of Palm in 6 months

- (b) Day before: 3Com = \$104.13. Day after: Palm at \$95.06, meaning 3Com should be at least \$145. Instead 3Com falls to \$81.81, for a -\$63 Stub!
 - (c) This mispricing was widely noted yet persisted for months.
2. The point is not an exploitable Arbitrage p. 231, middle Short costs explain why arbitrage didn't eliminate the mispricing.
3. Real world shorting vs frictionless textbook:
- A: p.248 ff description of shorting process and my notes; p. 256 ff problems in shorting
- (a) You must borrow shares, typically from institutional investors.
 - (b) You must post collateral – no “short x, buy y, no money out of pocket” This is why long-short funds need your money!
 - (c) The interest rate rebate may be negative – you pay for the privilege of borrowing– or there may be none to borrow at any price.
 - (d) Then p. 256, bottom, the lender has the right to call the loan at any time, forcing you to sell at a loss; you may have to post more collateral if the price rises, and rebate may increase.
256ff:
 - (e) Cost of finding a lender – Lending just after IPO is frowned on – supply of lendable shares is low. .
 - (f) May need to post more collateral if Palm goes up
 - (g) Palm lender might recall the loan, forced to close out the position
 - (h) Cost of shorting may be high, and may increase at any time (daily loans)
 - (i) *You cannot use short proceeds to buy stock – long/short is not a zero investment strategy in the real world.*
4. “You can't make money” does not mean markets are efficient!
5. *But why are prices wrong in the first place?*
- A: Their opinions 231 : “irrational. woefully uninformed, endowed with strange preferences.” But they could be anything that causes a downward sloping demand curve for specific stocks (despite the presence of cheaper and nearly identical substitutes). My paper: liquidity, convenience yield delivers such a demand curve.
- JC: Morons is a poor theory. Maybe an “explanation” (like “the market went up on profit-taking”) but not a “theory” with much predictive content. What if prices are too low next time!
6. Facts:
- (a) Figure 1-4; 3. *Stub value is negative, persists.* But it does respond to news
 - (b) 246, Table 4. *It is risky at a monthly horizon.* This is the key to all mispricings. And an interesting comment on the great weakness of our monthly return methodology. It does not notice arbitrage opportunities!

- (c) Despite frictions, *there is a massive amount of shorting!* Table 5, Figure 5,6 The trouble is, there are not many shares outstanding. It builds up over time. (compare 1st, second month, see figure). Who in the heck are the 2.6% *short 3Com???* Actually, it makes sense – people who are short the whole tech industry.
- (d) *Shorting creates more “share supply.”* See the picture below. Figure 5, 6, *As supply increases “mispricing” decreases.* “supply and demand for shares?” A “demand curve” that is rising for small number of shares?
- (e) *Option market is delinked* Table 6: synthetic short at \$39.12 is much less than the stock price at \$55.12. What do you do...short stock! (Put call parity is also violated:the puts are more expensive than the calls)
- (f) Table 8 *Huge turnover in Palm Shares.* Why do morons change their minds?
- (g) Table 9 263-264. *3Com declines as Palm shoots up.* Even though 3com holds 95% of Palm Shares. L&T explanation: “mystifying.”
- (h) Related mispricings: Royal Dutch/Shell. Phil Maymin, A vs. B shares of HSBC

Cochrane Stocks as Money

Big point: Palm - 3com looks a lot like money or “convenience yield” in commodities “liquidity premiums” in bonds. If so, we don’t need “moron” investors to explain “overpricing.”

Markets *exist* to trade, based on information, a fact our theory ignores so far; this makes trading central. But it does mean that liquidity can be a large, varying, and so-far unaccounted for, part of stock prices.

Related: “Benchmark” effect in Japanese bonds (Richardson and MacKinlay); On the run/off the run spread in US bonds (many); liquidity spread in agency vs. US bonds (same credit risk; Longstaff).

1. 3com/Palm are like money and bonds. p. 4 Both are claims to \$1 in 6 months/both are claims to Palm in 6 months, one is “overpriced”
2. Monetary/convenience yield: Mispricing comes with
 - (a) *Higher turnover* of money. Nobody is in fact a moron. You hold money for at most a few weeks. And more mispricing = higher interest rates = more turnover. When interest rates are high, you take out less, go to the bank more often.
 - (b) *Restricted supply* of money. When the Fed supplies less, interest rates go up, and like part a.
 - (c) *Binding short sales constraints.* You can’t print money. Banks can’t expand checking accounts without reserves.
 - (d) *Money is special.* It is required for transactions. If credit cards, foreign currency, other substitutes arise, mispricing is lower for a given money supply.
 - (e) Are these things true of 3com/palm?

3. Facts

- (a) p. 2 note a big common component in palm/3com – “stub” in LT is the difference between these two lines. Note the 3 com drop when it no longer includes a right to Palm. There is lots of “rationality” in here too!
- (b) *Turnover is associated with “overpricing”* for 3Com/Palm Turnover difference is huge. See L&T, or Figure 2. 19% per day of Palm in first 20 days post ipo. 38% average *daily* turnover in all their cases (T8). 4.5% 3Com; 2% is typical. (Much of this reflects a tiny denominator – small “float”). Figure 4: in the time series too (a bit) Volume is higher when price is higher. Figure 2. Notice the huge drop when 3com issues the remaining shares. There seems to be a demand for *dollar volume* not *proportional* volume. When there are only a few shares outstanding, that is a much larger *turnover*. (The time series is harder of course because price is the present value of the convenience yield, not today’s convenience yield.)
- (c) *A typical Palm investor does not lose much by holding Palm, not 3Com* p. 6 At 1-5 day horizon, even this huge price error is only 0.2% loss per day. This is not “moronic” to a day trader. It’s less than bid/ask spread; much less than typical weekly variation (Fig 3). p. 6: “Overpricing” means 2/10 percent per day drag; this is tiny compared to 7% σ of daily returns or 1% typical round-trip cost. *A day trader really doesn’t care about even the huge Palm/3Com price difference.* As you really don’t care about lost interest from \$40 in your wallet. Figure 3: .2-1% loss is trivial in the one - five day return distribution. (This is admittedly the “greater fool” theory – why do people want to trade so much? I don’t know!)
- (d) *As supply rises the mispricing fades* Fig. 5 As massive shorting of small number of available shares increases supply, price goes down. Just like banks meeting money supply by creating checking accounts. This is the same as L&T’s figure, with a different interpretation
- (e) p. 10. *If you want to day trade you must hold Palm shares.* This is vital for a money-like explanation. If you can day-trade in 3com or the options market, there is nothing special about Palm shares. (If you can pay for coffee with a T bill, money cannot survive with 0 interest) We need a special demand for *Palm* shares, not even these closest of substitutes.
 - 1. Palm and 3com do move together – Figure 1.
 - 2. But surprisingly little at the hourly, 1, 5 day horizon. (This is especially surprising since the entire value of 3com is Palm).
 - 3. Evidence: Table 1, a) R^2 of only 0.5 – 0.6. b) $\sigma(\varepsilon)$ is the tracking error of buying 3com to bet on palm; it is half or more of the standard deviation of Palm. 11, bottom “At short horizons, Palm prices and 3Com prices are delinked.”
 - 4. Figure 7. Intraday evidence. Buying 3com is a *really* bad way of betting on Palm.
- (f) Figure 6: *3 com stub value is very affected by the presence of palm shares.* More “delinking” of Palm, embedded 3-com. This addresses the concern that there really is a 3 com negative stub, that the difference between Palm and 3Com price

really does reflect changes in “real” 3com value, which *can* be negative. If so, why does the character of the 3 com return change so drastically after the spinoff?

4. Might the “money” story apply more broadly?
 - (a) *The bubble was very concentrated*, Figure 8; p. 17. Why should irrational enthusiasm apply only to a narrow category of stocks?
 - (b) *Volume was high where price was high*, Figure 9,10. Fig 8, 9,10 *are the stars in the volume/price correlation*.
 - (c) *The same thing happened in 1929*, Figure 11, for the market as a whole!
 - (d) *Price and volume are associated across stocks*. Table 3! *High M/B growth stocks also trade a lot more. All the information trading, active management, alpha searching, etc. are in the growth stocks. This is also where there is a lot of new information*.
5. The big Puzzle: Who are all these day traders? How can we all rationally think we know more than the other person? Volume is a big puzzle. *Why does the NYSE exist at all?*
6. Big bottom line *“bubbles” only come with “trading frenzies”*. *Most models of bubbles ignore this fact. Money makes sense of it. Any model of bubbles must account for the trading frenzy*.

Longstaff flight to liquidity

- Refcorp bonds are *identical* to Treasuries. Unlike Fannie mae (“agency”) debt they are *explicitly* backed by the “full faith and credit of the US”
- Show p. 516, bottom, Table 2 and Figure 1.

“Table 2 shows that there are significant liquidity-related premia in Treasury bond prices. The average premia range from about 10–16 basis points and are highly significant, even after taking into account the serial correlation of the premia. Table 2 and figure 1 also show that the premia vary significantly over time. The maximum values of the premia range from 90 basis points for the 3-month premium to about 35 basis points for the 7-year premium. I note that the minimum premium for a number of the maturities is negative. This is clearly because there are undoubtedly measurement errors in the data adding noise to the estimates of the premia. Despite this noise, however, the mean estimates are statistically significant, indicating that the results are not entirely due to measurement errors. It is straightforward to translate the differences in yields between the Treasury and Refcorp zero-coupon bonds into percentage price differences. The mean percentage price difference between the two bonds (measured as a percent of the Treasury zero-coupon bond price) ranges from .035% for the 3-month maturity to 5.05% for the 30-year maturity. The pricing differences for the longer-maturity bonds, however, can exceed 10% or even 15%.”

Krishnamurthy and Vissing-Jorgensen

- Show Figure 1. It looks like a demand curve for all government debt. It looks like a liquidity - money demand curve, in that the right axis flattens out.
- Doubt. Why is there a shift in supply with steady demand? Fall 2008 is an obvious shift in demand against supply that can't keep up. ("Understanding Policy")

"Arbitrage" in the financial crisis

- See pictures from "discount rates", reprinted above

Brandt and Kavajecz

1. Signed volume and price changes are correlated! Maybe "markets went up on a wave of buying" isn't so silly?
2. Like many discoveries in finance, this came from new data: we finally have data on who initiated a trade.
3. Some possibilities for the ways that price and volume can be correlated:
 - (a) Macro announcement; prices change, no immediate volume. Volume follows as people rebalance.
 - (b) "Price discovery." People with ideas trade, markets move. (p. 2624.)
 - (c) "Price impact" downward sloping demand in any given market – "selling pressure," "inventory".
 - (d) "Trend followers." Price changes, then afterward we see a lot of volume. (Like a, but 'piling on' rather than 'rebalancing')
4. The investigation: Figure 2 p. 2629. The correlation between daily price change and morning signed volume.
5. Central facts:
 - (a) Table IV 2637, top. yield changes depend on own orderflow, and *much more also the 2-5 year order flow*.
 - (b) Table IV 2636 last column. You forecast yield changes almost as well with *one "order flow in all maturities" variable*
 - (c) Numbers in T IV are *larger for liquid on the run rather than illiquid off the run*. Inventory premiums should be higher in illiquid markets.
 - (d) More strongly in Table VI, *off the run bond yields respond to on the run order flow*.

- (e) Table VII *there is no response to one-day lagged order flow* – no “recovery” following a “depressed” price. Orderflow imbalances are associated with *permanent* rather than temporary price changes. (My MBAs note that inventory will spill over to other markets, potentially explaining Table IV, VI. This addresses that concern)

Brunnermeier

- A very nice concise chronology of the crisis, with short descriptions of many market problems. We learn a lot about how specific markets work, and sometimes don't. I'm less enthused about “liquidity spirals” and so forth. Also pay attention to terminology (italicized). If you know what each of these terms mean, you know most of the stories about the crisis.
- p. 77 The central issue: why did “small” mortgage losses cause such big problems? (Answer: the central “crisis” is the run on the “shadow banking system,” which we are here to understand. It doesn't really matter where the loss came from. What matters is those losses were concentrated in fragile financial structures.)
- p. 78, bottom. “*originate and hold*” to “*originate and sell*.” *shorter maturity financing* (of investment banks, not
- p. 78-79. *Securitization*. How an *MBS* works, How a *CDO* works. (Pool of MBS, tranches)
 1. 80 Why securitization is a good idea
 - (a) Relative to investing in bank stock / deposits. It's easier for investors to monitor a mortgage pool than a whole bank. (Even if they didn't do a great job last time)
 - (b) Global risk transfer.
 - (c) Separation of “origination” skills from “risk management” skills in the bank. It's *good* that if the mortgage goes sour all the people who (supposedly) know how to originate them don't lose their jobs.
 - (d) Berananke's famous work: In the great depression, mortgage losses brought down the local banks, local investors, and blew up the local knowledge of how to make loans. MBS avoid all this
 - (e) Obviously, we study the failures and try to fix them. Mostly how MBS were held, not the structure itself. How to bring back this market?
 2. *Ratings* issues
- p. 79-80 *SIV, SPV* MBS (and CDO) held by SIV, funded with commercial paper, and off-balance-sheet liquidity and credit guarantees from the bank.
 1. This is a bank! (But a very simple one, not commingled with other stuff, which is good)

2. But this may be simply avoiding capital constraints. Again, a warning about hoping regulation will do too much.
 3. Risk is not eliminated! It's only shifted! Many observers were surprised that so much risk was, in the end, on bank balance sheets.
- p. 80, middle. *Repo financing*.
 1. How it works. These are very collateralized overnight loans.
 2. Investment banks hold CDOs (etc) with overnight repo financing.
 3. Who holds the risk? "We'll sell on the way down" is not risk management!
 - p. 82 *Silly mortgages*. Really, just products that gave homebuyers a one-way bet on house prices, shared by investors.
 - p. 82 "*Pipeline risk*," the charge that banks had "no incentive" to monitor loan qualities.
 1. This might make sense for MBS sold to Fannie/Freddie, but the buyers of equity and low-rated tranches have every incentive to read the fine print!
 2. And the bank often keeps the equity tranche – and BB buyers have every incentive to insist that it so so.
 - p. 83 Timeline. Phase 1 (summer 2007) (Show slide of interest rates at the same time)
 1. Spring 2007. House prices start to level off, subprime defaults skyrocket, ABX indices plummet.
 2. Summer 2007. Some hedge funds implode.
 3. Amazingly, (83) Bear bails out its *internal hedge funds* (Duffie talks about this too). Now we learn something about hedge funds inside banks!
 4. (84) *ABCP*. The SIV and SPV funding mechanism. Banks have to provide liquidity, take back the assets when you can't roll over the debt.
 5. Note regular commercial paper is ok – the crisis seemed to be "contained."
 6. Fall 07 Libor, Ted spreads rise. A sign that bank default probabilities are much higher. (86) Central banks step in, Northern Rock Fails. Banks raise more equity to cover losses. (This is an important observation. Banks can and do raise equity after losses!)
 7. (86) Losses now \$200b. (But this is tiny!)
 - 87 Monoline story
 1. *Monoline insurers and insured assets in funds*. Municipal bond funds must hold insured bonds (like bonds + cds), and insured by AAA rated. If the insurer loses its rating, the fund must sell bonds. But to who? Other funds have the same restriction, so they have to be held by individual investors. Price goes down.

2. Like many stories we tell, this one isn't as obvious as it sounds. Why aren't there competing bond insurers? Why can't the monoline issue equity and restore its AAA rating? What is an insurer doing being leveraged at all? Do uninformed sales in fact trigger price declines, an issue we've been struggling with all along? I've heard stories of savvy fund managers noticing such "forced sales" and picking up bargains, especially in Fall 2008. This is the mechanism that keeps prices up!

- 88 **Bear Stearns**

1. pp2. The Fed's TSLF. This is a great story of how "sending signals to the market" can fail. If you see a firetruck, do you sigh relief, or realize there's a fire somewhere? (I think much of the same happened with the TARP speeches.)
2. pp3. "Novation" requests to Goldman (more details in Duffie)
3. *The key to Bear*. It mixes *proprietary trading* with a big MBS position, *brokerage*, and *derivatives dealer*. All of this is funded with 30:1 leverage by *overnight debt*. *Bear experienced a run in 1) brokerage 2) derivatives counterparty 3) overnight debt*
 - (a) Background: how an old-fashioned *bank run* works. The key: 1) Illiquid assets, 2) liabilities (demand deposits) that promise a fixed value, and 3) first-come first serve payment. 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." Is this a problem? If the 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.
 - (b) Our challenge: understand how each of *brokerage*, *derivatives*, and *overnight debt* have an incentive to "run," and how those runs precipitate firm demise. See Duffie. For now, this is what *happened*.
4. The Bear bailout. A sale with lots of Fed help.
 - (a) Why not just raise new equity? 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 conventional approach to debt overhang is bankruptcy. 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.
 - (c) 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.
 - (d) 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
5. Whew, it's over, now Wall Street will clean up its act, separate brokerage from prop trading losses, start thinking about counterparty risk and set it up so banks can fail without too much trouble....HA!
- 89 Fannie/Freddie fail. GSEs and what they do: Fannie and Freddie guarantee mortgages and mortgage backed securities. They also hold them, i.e. they sell "agency debt" and use that to invest in MBS. Since people presumed they had a government guarantee, they were able to borrow very cheaply, make a huge profit, and fly around in private jets. It turned out the market expectation that there was a government guarantee turned out to be correct. My story of call options giving risk-taking incentives applies on a grand scale.
 - 89 **Lehman Brothers**
 1. Borrowed a lot from Fed, did not issue new equity.
 2. Another run on brokerage, derivatives counterparties, and short term debt.
 3. Another weekend meeting with suitors Barclays, Bof A. But this time the suitors want a lot of bailout. (Moral hazard happens faster than you think, and alas this was the lesson they learned from Bear!)
 4. "Fed and treasury decided not to offer a guarantee funded by taxpayers since Lehman, clients and counterparties had ample time."
 5. Lehman goes to bankruptcy!
 - 90 *Money markets break the buck*, and are guaranteed by the Treasury
 1. How money markets work vs. stock funds. If a stock fund is 105 and loses value to 95, your NAV loses and that's that. A money market fund keeps share value and right to redeem at 100 always. As interest (profits) build, it pays interest separately, i.e. the \$5 would be paid out as interest. If a MMMF loses value to 95, now we have a promise to pay 100, first come first serve, and assets worth 95. A run! It's harder to argue this run is "socially inefficient" however, since we're not prematurely liquidating real projects, just dumping financial assets on the market.

2. Was this so horrible that Lehman should have been bailed out to stop it? It seems to me that simpler procedures for “breaking the buck” every time asset values decline below 100 solve the problem.
- Other Lehman bankruptcy effects. Yes, markets went wrong, but what *technically* went wrong?
 1. CDS market cleared
 2. Ok, bond holders got about 10c on the dollar. (Duffie on how liquidating offsetting positions is really bad). But we’re used to bankruptcy costs.
 3. Collateral got stuck in UK bankruptcy court. Not good, but people are now paying attention and willing to pay a few basis points of yield to actually own their collateral.
 4. *No* “chain of defaults.” ATM machines did *not* go dark. Brokerage, payments services were up and running in 3 days under new owners. Remember bankruptcy is “reorganization” not a crater.
 5. JC summary. As I look at it, I do not see anything technical about Lehman bankruptcy that could not be fixed by changing bankruptcy law. Ok, not easily, but for a cost a whole lot less than \$700billion of bailout or 1.5 trillion of deficit.
 - 89 AIG is bailed out. AIG wrote CDS on CDOs. These need collateral when prices fall or when the sponsor AIG AAA is downgraded. What happens if your CDS writer fails? A: You need to take collateral and buy new CDS. AIG did not fail to cover a default, and ex post looks like it could have done so. The latest in Washington: this was not done to protect counterparties, but to protect retail insurance. ???
 - 90 TARP 1. The Plan was to buy MBS on the open market to raise all values. Also, Fed and Treasury needed legal authority to buy stock rather than just give credit guarantees to suitors, which I think makes sense for why they did it. In my view, though, they caused the panic. If you see a \$700 billion firetruck going by, you learn there is a fire somewhere. More seriously, think of all the effort put in (Term lending facility, eventual TARP purchases) not to leak information about where bad banks are. These speeches clearly told everyone in the country “things are much worse than you thought” and if you needed a hint “we’re trying to prop up bank stock prices with a short sale ban” didn’t help
 - 90 Wamu, Wachovia fail, stock market “falls off a cliff”
 - 90. The final TARP. Rather than MBS purchases, Treasury buys preferred stock, and offers credit guarantees to commercial banks, whether in trouble or not. It does this for many banks, not just a few that might be in trouble. Most of the motivation is “recapitalize the banks so they will lend,” not “save the banks.” The best story for this is that they felt that almost the whole banking system did not have enough capital, and could not raise more capital. Up against a capital constraint, the banks would not lend, and there weren’t enough good banks left to take over. There would be a huge wedge between supply and demand in the loan market. We’ll look at evidence in a bit.

- 91 “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.

Gorton and Metrick Haircuts

- Bottom line *look at the haircuts on p. 8,9. This is the main “run”*
- 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.
- p. 1,2. A very nice analogy between repo and demand deposits. Collateral and haircut mean the lender usually doesn’t have to worry about monitoring, counterparty risk, etc. Repo is “information insensitive” .
- This paper does not explain usefulness of repo to borrowers. That’s maybe too obvious – you can fund a huge position with almost no equity by reposing the securities.
- p. 2 Panics in us history. This is a nice explanation of bank runs and why they are “systemic.” (Socially inefficient liquidation). When some banks may be in danger, you suddenly need to worry about counterparty risk in deposits. They lose their “information insensitivity,” and thus their “liquidity” and ability to function as money. A buyer wants to know which bank your check is drawn on
- p. 2 Banks invented clearing houses to solve this problem. This is an example of how regulation makes the system more fragile. Clearing houses disappeared with Fed lender of last resort and deposit insurance.
- p. 4. repo -> tranches -> MBS Similarly, high quality corporate bonds and AAA tranches are “information insensitive.” Most of the time. Investment grade bonds move with interest rate rather than stock news because the chance of default is so low. Then it’s not worth collecting information about default probability and they become liquid.
- p. 4 quick summary of subprime mortgages and interest rate resets as a way to create a 2-year maturity asset. We didn’t talk much about the economic functions of some supposedly pernicious mortgage products, but this is a nice one.
- p. 6. Why are tree haircuts, and when do they get bigger? You may have to take the collateral and sell it in “illiquid” market (facing asymmetric information). Also, it can take a few days to get and sell the collateral. Thus you demand more when markets are illiquid, i.e. when MBS have become more “information sensitive”

- p. 8, 9 *Look at the hair cuts!* This forces a massive deleveraging! When investment banks and hedge funds can't repo any more they have to sell securities, which have to be held directly by people. (Or they have to raise more equity which takes time and is hard to do in a crash. Always look for the other way out when reading these stories of forced sales! Every market imperfection is a business opportunity!)

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 this stuff.

- Big picture: Understand why overnight debt, derivatives contracts, and brokerage accounts are “like demand deposits” and prone to runs, and why those runs are bad for the bank forcing bankruptcy. Another big picture: it's all about cash in the end.
 1. 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. If we try to fix bankruptcy for financial institutions, we should keep overnight debt completely out, so that there is no incentive to run.
 2. 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.
 3. 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
- Introduction tells the story. p. 2 Aalpha bank = Bear stearns 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) Bailing out hedge funds, taking the opposite side of cash-draining derivatives contracts, and allowing brokerage customers to leave all “maintain franchise value” of a market-maker.
- Section 2 Background has some economic principles and ideas.
 1. p. 5 Analogy to bank runs, and how standard tools (capital requirements, deposit insurance, restructure) stop runs
 2. p. 6 Top the list of functions of a dealer bank. “They act as intermediaries... conduct speculative trading in conjunction...” 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.

3. p. 6 and before, “voluntary compensation” as we saw with Bear stearns. The “Franchise value” is important, because as we’ll see they need customers.
 4. p. 7 Among the institutional mechanisms of greatest interest here are those associated with short-term repo financing, OTC derivatives, off-balance sheet activities, prime brokerage, and loss of cash settlement privileges at a dealer’s clearing bank.
 5. p. 8 A good reminder on debt overhang, and other capital problems. How bankruptcy is a way to avoid debt overhang.
- p. 9ff Section 3 describes the operation of Large Dealer Banks.
 1. “The relevant research, for example Boot et al. (1999), does not find a strong case for the net benefit of forming large diversified financial conglomerates of this type.” The policy question: Why do we allow big banks like this, which can drag down systemic functions (brokerage) with losses in prop trading? The answer is usually “there are great synergies to being so big.” The cynic’s answer is “you’re big so you can play with the government’s money.” Now, yes, a dealer does have to trade a bit. But this much? How important is it to run internal hedge funds? This survey of research showing bigness is not that efficient is important to the policy debate.
 2. P. 11-12. A nice description of how repo financing works.
 3. p. 13 Description of the OTC derivatives market. Derivatives are zero net supply! This is a good point to remember. There is no loss to society from derivatives losses!
 4. p. 15 *Master swap agreement*. Exposure and collateral are netted across different derivatives positions. This makes it hard to move one (CDS) to exchanges. Then it can’t be netted against another (interest rate swaps)
 5. p. 16 bottom. It’s interesting that CDS traders open new contracts rather than sell old ones. That means CDS books will have huge numbers of redundant offsetting contracts, until reduced by “compression trades.” Huge scary headlines about the notional amount of CDS contracts outstanding are not real!
 6. p. 18 Internal hedge funds. They include implicit put options (JC from taxpayer! Now I know why internal hedge funds make sense!)
 7. p. 19 Off balance sheet financing – special purpose entities described in some detail. \$800 billion in citigroup. p. 19 and how it’s not really off balance sheet – bailing them out for “franchise value” even when not required.
 - **p. 21. Section 4 Failure mechanisms.**
 1. p. 21 *OTC 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.
 - (b) p. 24 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) p. 24 bottom and 25 top 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!)
2. 27 *Repo and other short term creditors*
- (a) Repo means huge leverage for these banks, over 30, and half of that with overnight debt!
 - (b) 29, crucial, *why repos run*. It sounds simple, “they default, you get the collateral” but it’s not, and not worth the 2%/365 day interest! (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. Again, this looks like it’s easy to fix!)
 - (c) 31 Intraday overdraft, discount window, TALF, other ways used to mitigate the liquidity problems.
3. 33 *Flight of prime brokerage*
- (a) 33-34 In the UK your securities are commingled and “cash is equivalent to uninsured deposits.” They can lend out your securities or repo them. In US cash is commingled across customers. 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.
 - (b) 35 “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.
 - (c) 35 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. Problems even if no run. Customer still wants loan, but dealer can’t repo anymore
 - (d) 37 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? Bans (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
4. 37 5 **loss of cash settlement privileges**

(a) 38 daylight overdraft explained. This is the end of the line