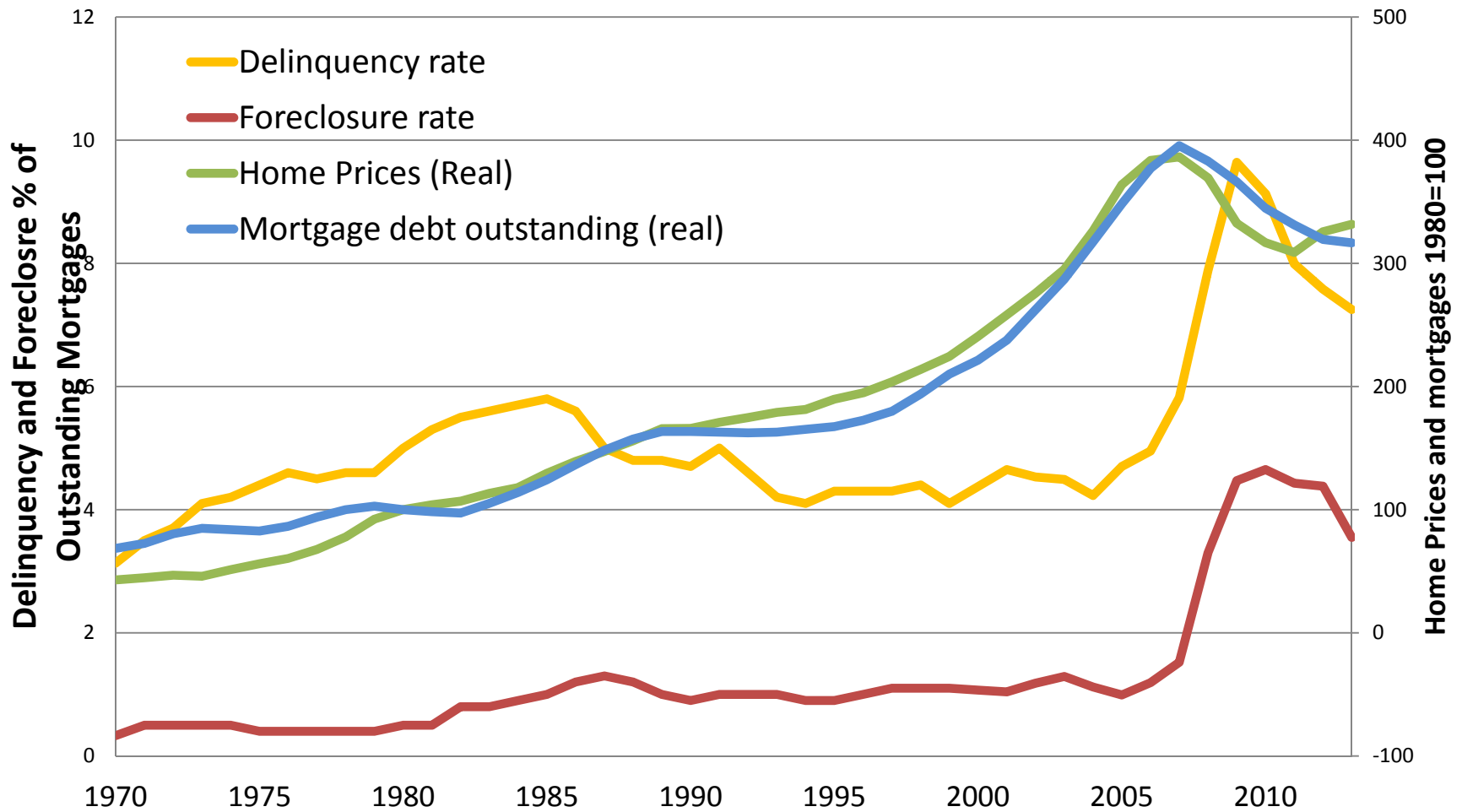


11-27 Class 18 Government and financial structure

11-27 Class 18 Government and financial structure

Regulated vs unregulated financial actors; Banks vs the shadow banking sector; Commercial banks vs investment banks; Aided vs unaided financial actors; Consequences for firms; Consequences for investors. Bail outs vs No bail outs

What needs to be explained



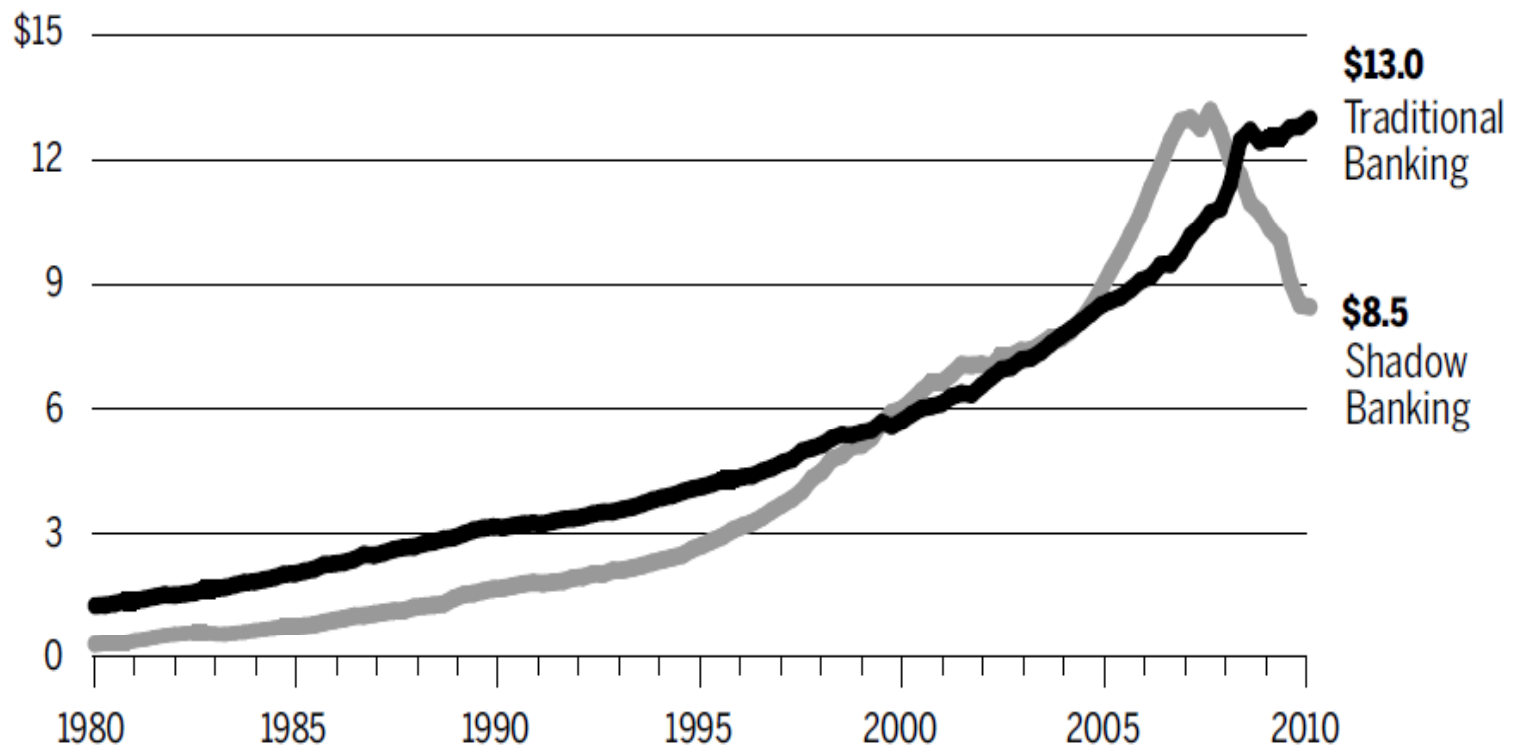
The Evolution of mortgage markets

- Pre Great Depression
 - Unregulated at federal level
 - Dominated by peer to peer lending and local savings institutions
- Post Great Depression
 - Regulated through FSLIC and OTS and to some extent by state
 - Government enters through GSEs (Fannie Mae Freddie Mac and FHA)
 - Little securitization
- Post 1985
 - Deregulation
 - Exits of Savings and loans
 - Entry of Banks
 - Entry of non-bank mortgage providers

Banks and shadow banks

- The US has always had two set of financial intermediaries
- Banks and other regulated entities (the banking system)
 - Critically, the regulatory regime is never unified
 - For national banks Comptroler of the currency (1863) Federal Reserve (1913), Federal Deposit insurance Co (1932), Securities and Exchange commission (1932)
 - Different regulators for different entities (National banks, investment banks, insurance co...). Some state level, some national level
- And non bank intermediaries (the shadow banking system)
 - Bank partnerships
 - Investment banks
 - Hedge funds
- One side has advantages and costs of regulation the other the advantage and cost of not being regulated

IN TRILLIONS OF DOLLARS



Central banks and regulators

- Benefit:
 - Reputation for safety
 - access to resources in times of stress
- Cost
 - Limits on activity
 - And thus limits on profits
 - And thus limits on what returns you pay investors
- Important here is that the regime is chosen by the intermediary.
- Investment banks (Goldmans-Sachs, Merryll-Lynch, Bear-Stearns)...all chose to be unregulated
- AIG entry into the mortgage world occurred by starting a tiny S&L supervised by OTS not FED or FDIC, CoC.

Profits in a low real interest world

- Starting in the mid 1990s the US enters into a low real interest phase.
 - Low inflation
 - Large capital inflows (from China and other parts of the world)
 - For a while federal government surpluses
- Rate of return= risk free return+ price of undiversifiable risk
 - So if financial intermediaries want to make money they have to bear risk
 - But if they bear risk they run into regulatory problems

Rise of Hedge funds

- Hedge funds can be profitable by bearing more risk and diversifying it
 - Junk bonds
 - Risk equity portfolios
 - Derivatives (that thus bear the risk of the underlying security)
 - Counter party to options
- And they can do so at their own discretion
- Migration of “rich” people wealth out of the banking system into the shadow banking system

Evolution of regulation

- Pre 1980
- Regulation difficult and qualitative
 - Limits on activities and distribution of assets (e.g pre 1970 no mortgages in national bank balance sheets) No junk bonds
 - Banks have discretion as to when to call a loan delinquent. This is a global pb and efforts to address this lead to rounds of global regulation know as Basel accords
- Move to more quantitative and market based regulation
 - Minimum tier one capital (equity must be at least 10% of liabilities)
 - Minimum tier two capital (very liquid claims that can be sold very easily to offset losses and all rated AA or above)
 - Mark to market firm have to 'price' their assets in establishing their levels of capitalization

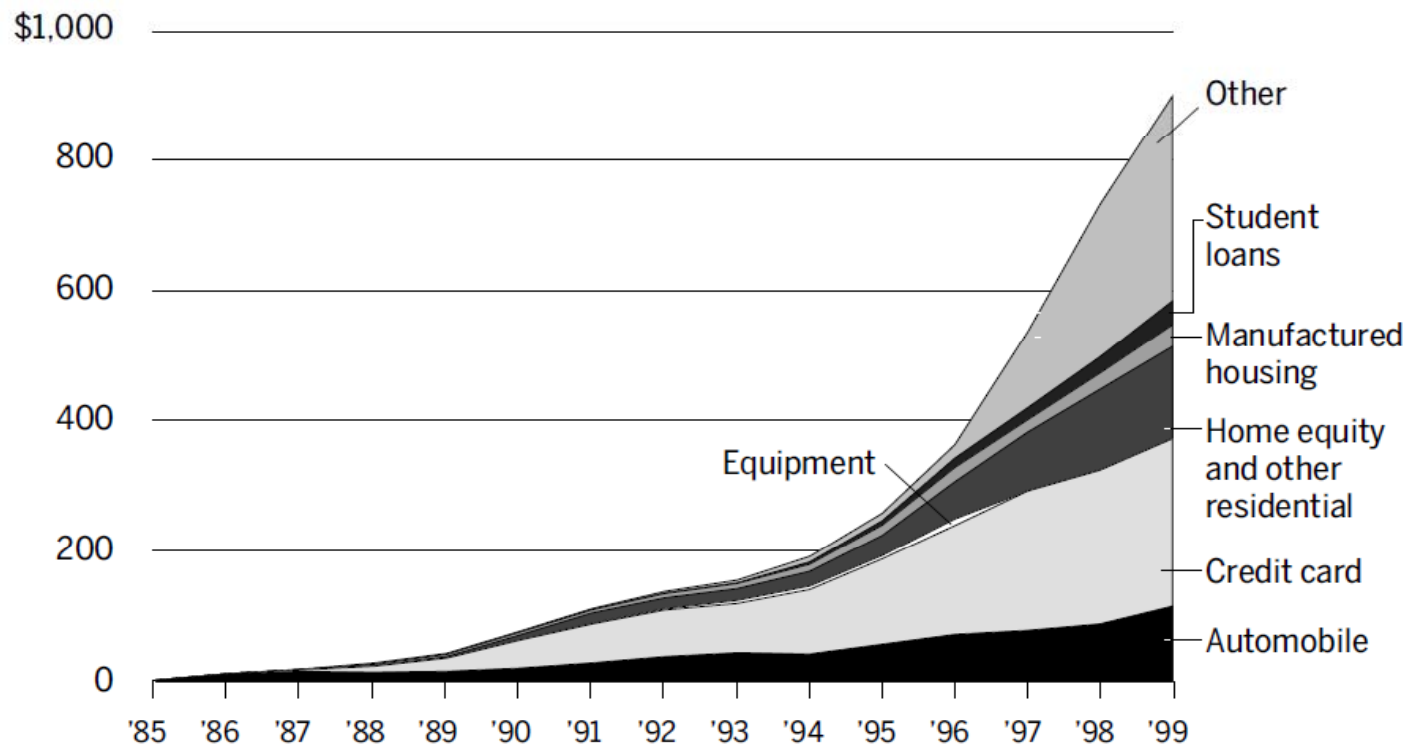
Problem with Regulation

- Lots of the stuff on balance sheets of banks is difficult to mark to market because it is not traded (e.g. mortgages, business loans and consumer loans). If regulators for banks to hold extra reserves (low return assets) if they have non market debt, that is a problem.
- So want to make market where ever possible, so securitization is attractive.
 - Take a bundle of non market loans and create securities with these (if you believe in additivity, then the value of the underlying loans can be derived from the price of the new securities).
- Notice the interaction between regulation and innovation
Innovation is partly a response to new regulation, and partly a way to escape it.

Asset-Backed Securities Outstanding

In the 1990s, many kinds of loans were packaged into asset-backed securities.

IN BILLIONS OF DOLLARS



Response to funds scarcity (post inflation of the 1980s)

Notice the rapid rise in securitization after the deregulation of the 1980s and that in 99 it is still a small share of total assets (about 1 in 12)

Securitization and Tranching

Until you get to mortgages you do not have a large pool of assets to worry about

Mechanics

Note three sets of tranches

Senior tranches are extremely safe. Losses are extremely unlikely to arise

Mezzanine tranches Losses possible in severe down turn

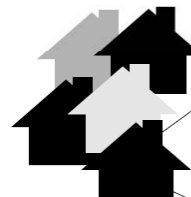
Equity tranches: returns only in the best possible states

Residential Mortgage-Backed Securities

Financial institutions packaged subprime, Alt-A and other mortgages into securities. As long as the housing market continued to boom, these securities would perform. But when the economy faltered and the mortgages defaulted, lower-rated tranches were left worthless.

1 Originate

Lenders extend mortgages, including subprime and Alt-A loans.



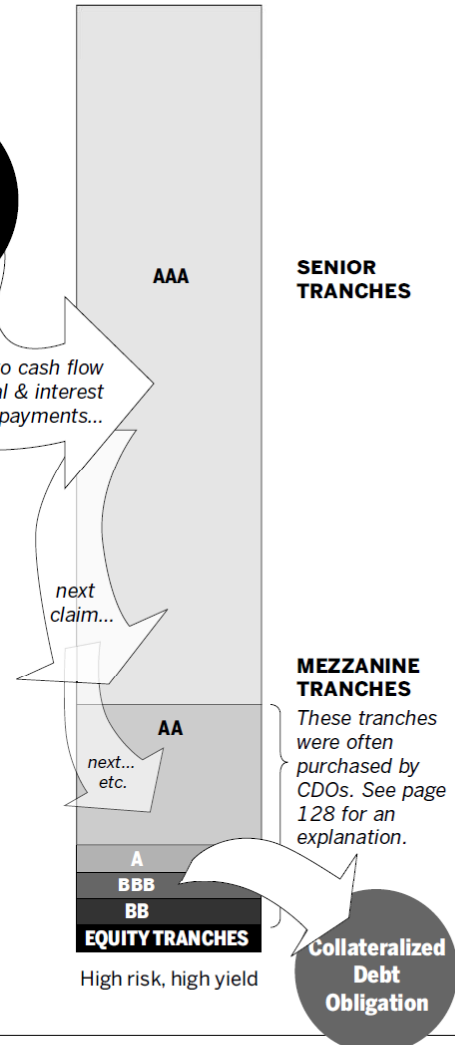
2 Pool

Securities firms purchase these loans and pool them.

3 Tranche

Residential mortgage-backed securities are sold to investors, giving them the right to the principal and interest from the mortgages. These securities are sold in tranches, or slices. The flow of cash determines the rating of the securities, with AAA tranches getting the first cut of principal and interest payments, then AA, then A, and so on.

RMBS TRANCHES
Low risk, low yield



Securitization step 1

- Create Mortgage Backed Securities
- Senior tranches rates AAA investment grade
 - So they can go into the regulated parts of many portfolios
 - They can serve as reserve assets (they are supposed to be very safe and very liquid)
 - Value is anchored by the value of the collateral not by expectation of performance. Likelihood of collateral losses beyond 30% is extremely low
- Mezzanine tranches' value depends both on collateral value and performance.
- Equity tranches even more

Quiz 11

example

Initial pool 950 Million dollars in Mortgages (about 400 or so)
 Cut up into 16 tranches
 Where the first payments of interest and capital go to the most senior tranche and then on down in strict order
 So as soon as a loan in pay off, the senior tranche gets partly paid off,
 As soon as a foreclosure arises the senior tranche gets paid off.

Selected Investors in CMLTI 2006-NC2

A wide variety of investors throughout the world purchased the securities in this deal, including Fannie Mae, many international banks, SIVs and many CDOs.

	Tranche	Original Balance (MILLIONS)	Original Rating ¹	Spread ²	Selected Investors
SENIOR 78%	A1	\$154.6	AAA	0.14%	Fannie Mae
	A2-A	\$281.7	AAA	0.04%	Chase Security Lendings Asset Management; 1 investment fund in China; 6 investment funds
	A2-B	\$282.4	AAA	0.06%	Federal Home Loan Bank of Chicago; 3 banks in Germany, Italy and France; 11 investment funds; 3 retail investors
	A2-C	\$18.3	AAA	0.24%	2 banks in the U.S. and Germany
MEZZANINE 21%	M-1	\$39.3	AA+	0.29%	1 investment fund and 2 banks in Italy; Cheyne Finance Limited; 3 asset managers
	M-2	\$44.0	AA	0.31%	Parvest ABS Euribor; 4 asset managers; 1 bank in China; 1 CDO
	M-3	\$14.2	AA-	0.34%	2 CDOs; 1 asset manager
	M-4	\$16.1	A+	0.39%	1 CDO; 1 hedge fund
	M-5	\$16.6	A	0.40%	2 CDOs
	M-6	\$10.9	A-	0.46%	3 CDOs
	M-7	\$9.9	BBB+	0.70%	3 CDOs
	M-8	\$8.5	BBB	0.80%	2 CDOs; 1 bank
	M-9	\$11.8	BBB-	1.50%	5 CDOs; 2 asset managers
	M-10	\$13.7	BB+	2.50%	3 CDOs; 1 asset manager
	M-11	\$10.9	BB	2.50%	NA
EQUITY 1%	CE	\$13.3	NR		Citi and Capmark Fin Grp
	P, R, Rx: Additional tranches entitled to specific payments				

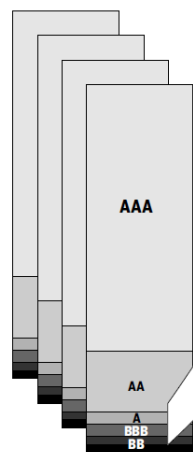
Securitization Step 2

Collateralized Debt Obligations

Collateralized debt obligations (CDOs) are structured financial instruments that purchase and pool financial assets such as the riskier tranches of various mortgage-backed securities.

1. Purchase

The CDO manager and securities firm select and purchase assets, such as some of the lower-rated tranches of mortgage-backed securities.

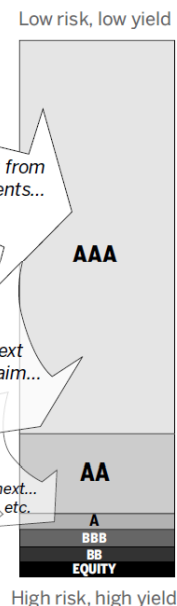


2. Pool

The CDO manager and securities firm pool various assets in an attempt to get diversification benefits.

3. CDO tranches

Similar to mortgage-backed securities, the CDO issues securities in tranches that vary based on their place in the cash flow waterfall.



- Demand for Senior tranches is very high
- So use some financial engineering to create more
- Collect a bunch of Mezzanine tranches into a new portfolio
- Then create a set new set of securities with different claims. Collateralized debt obligations
- One issue
- What is the risk level of the senior tranches
- If default across MBS is idiosyncratic then you can imagine that this kind of aggregation of risky securities will produce some senior tranches that are quite safe (how much?)

Credit Rating Agencies

- All these securities have credit rating.
- Credit rating are handed down by one of three agencies (Moody, S&P, Fitch)
- These agencies are paid by the issuers of the securities to provide a rating.
- Implicitly AAA are quasi riskless (less 1/1000 default probability per year!) though the agencies are very careful not to make a quantitative evaluation of these probabilities
- Rating are correlated with default rates (lower rated bonds and securities have higher loss probabilities), but are they accurate (unbiased)?

Risk Management

- Suppose you know that a bond has $1/10$ chance of default (d) and now I give m different bonds with same probability. What is the risk of that portfolio?
- Risk management is about covariance (or in this case correlation)
- Condition on bond 1 defaulting what is the risk of default of bond 2 and so on and so forth.
- Best case default is idiosyncratic. So the probability of n/m bonds defaulting is $d^n(1-d)^{m-n}$. In this case all default probability is d^m
- Worst case: they all sink or swim together so the probability they all default is $d > d^m$

Best of times-worst of time

- In good times
 - Housing prices are rising) so default will have to do with household and local labor market shocks => probability of default of a mortgage is idiosyncratic
 - If the mortgages in the MBS bundle are well diversified by location. Using something like $d^n(1-d)^{m-n}$ makes sense
- But if you mortgages are not geographically diversified then you fail that version of the problem
 - Your CDOs might (if you bundle geographically distinct MBS tranches) recover diversification...so you can treat them as if default was idiosyncratic (sort of). Notice that is the situation issuers of CDOs prefer because they get the gains from intermediation
- In bad times housing prices are falling and that introduces correlation.
 - Correlation can be very high and the previous analysis fails
 - Then risk is severe

Inventing Histories

- So what matters here is what span of time you want to use
- Mortgages last a long time (some are held to maturity 30 years).
- So you need long histories (and unfortunately we do not have them).
- In fact we have no histories of how the market for MBS and CDOs affects the market for housing.
- So if credit rating agencies are using statistical models for deciding risk, they have to either use very short histories (bias towards good times) or invent the data.

From Innovation to Crisis

- From a theoretical point of view
 - The rise of securitization allows better diversification of risk and thus a reduction in the cost of capital.
 - What matters here is that you hold the underlying default probabilities constant.
- From a practical pt of view
 - MBS packages depended on a variety of conditions of the mortgages include an average FICO score. For sub-primes this was 615 (range 300-830)
 - New borrowers were given relatively high fico scores ≈ 680 so they could be used to offset people with very low fico scores ≈ 550 . to produce the average around 615. (see Lewis 2010)
 - Clearly someone who is creating (or buying) a MBS package should be concerned with more than the average, but if the average is all you need for the rating, then you want to put it together as fast as you can.
 - Result decline in lending standards (even in subprimes)

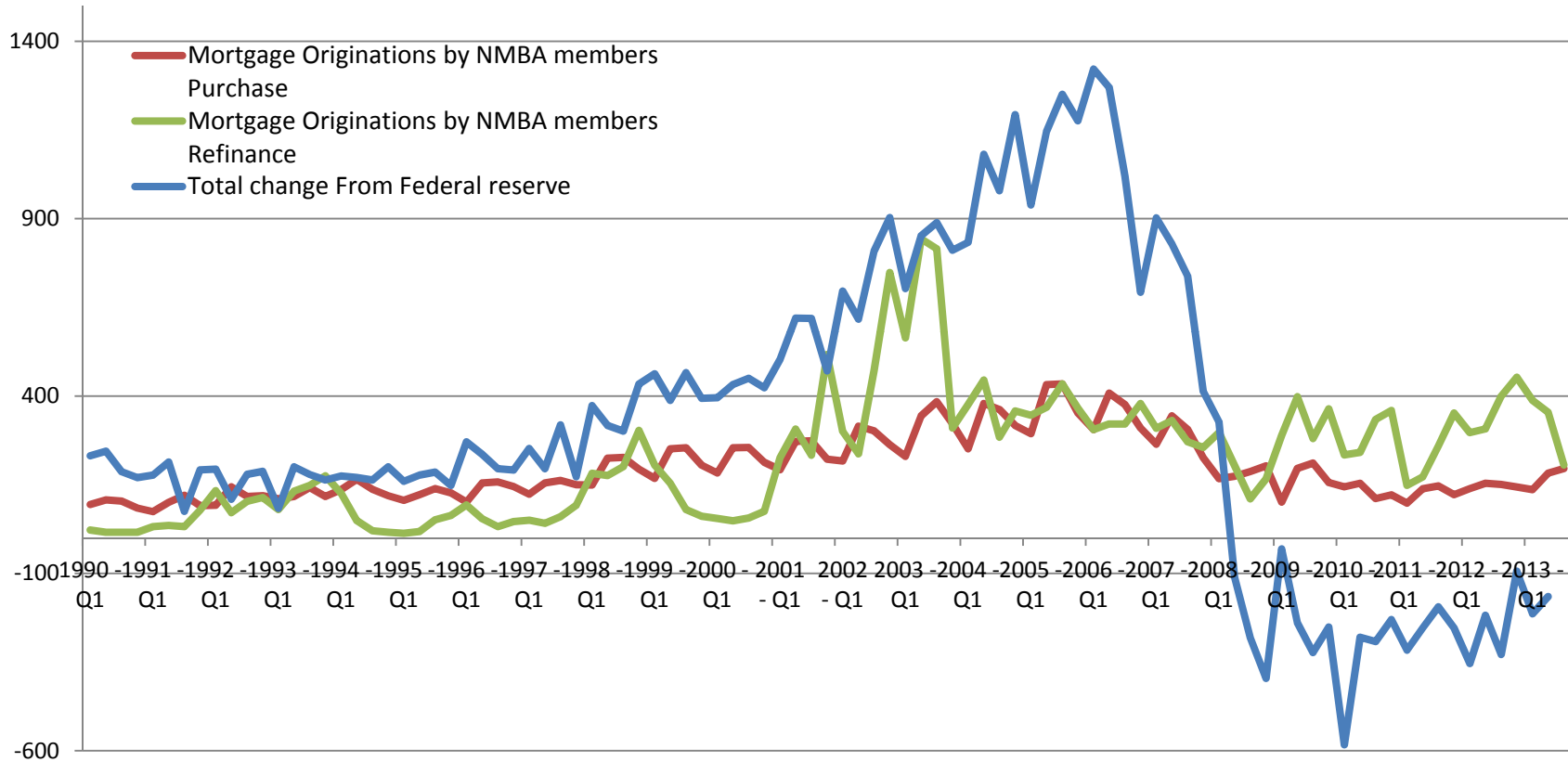
Stopping the bubble

- From a theoretical point of view
 - When people see things like this they should be able to short either the CDOs, the MBSs, or the Housing market.
 - In fact as Michael Lewis describes in The big Short this is very difficult and potentially very expensive. When John Paulson wanted to put a lot of his hedge fund money on a short he had to have Goldman Sachs design the security for him (and that led to the problem that the buyers later thought GS had designed a MBS that was sure to fail)
- From a practical point of view
 - Getting all these individuals into the subprime market involved a double bet.
 - (1) that housing prices would continue to rise (so that they would accumulate equity)
 - (2) that they would refinance in a year or two
 - To induce individuals into taking these bets, mortgage lenders produced teaser rates and other inducement to push payments into the future usually 3 years. And it is precisely when the first set of individuals get hit with the higher rates and cannot refinance that problems begin.
 - Then correlated defaults

Crisis

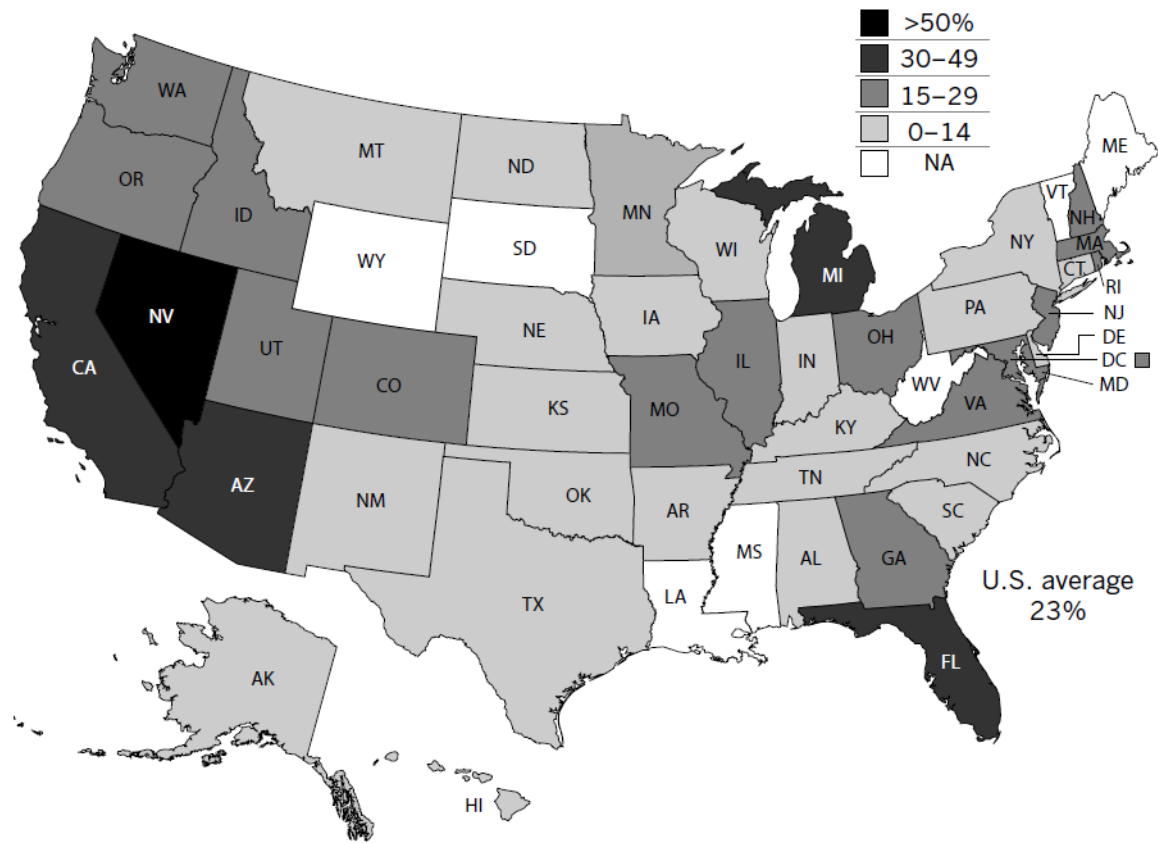
- Once the crisis has hit three things happen at once
- No liquidity (so no one can refinance)
- Massive number of underwater loans
- Massive drop in the value of mortgage backed securities followed by drops in the value of the firms that have large positions.

End to liquidity

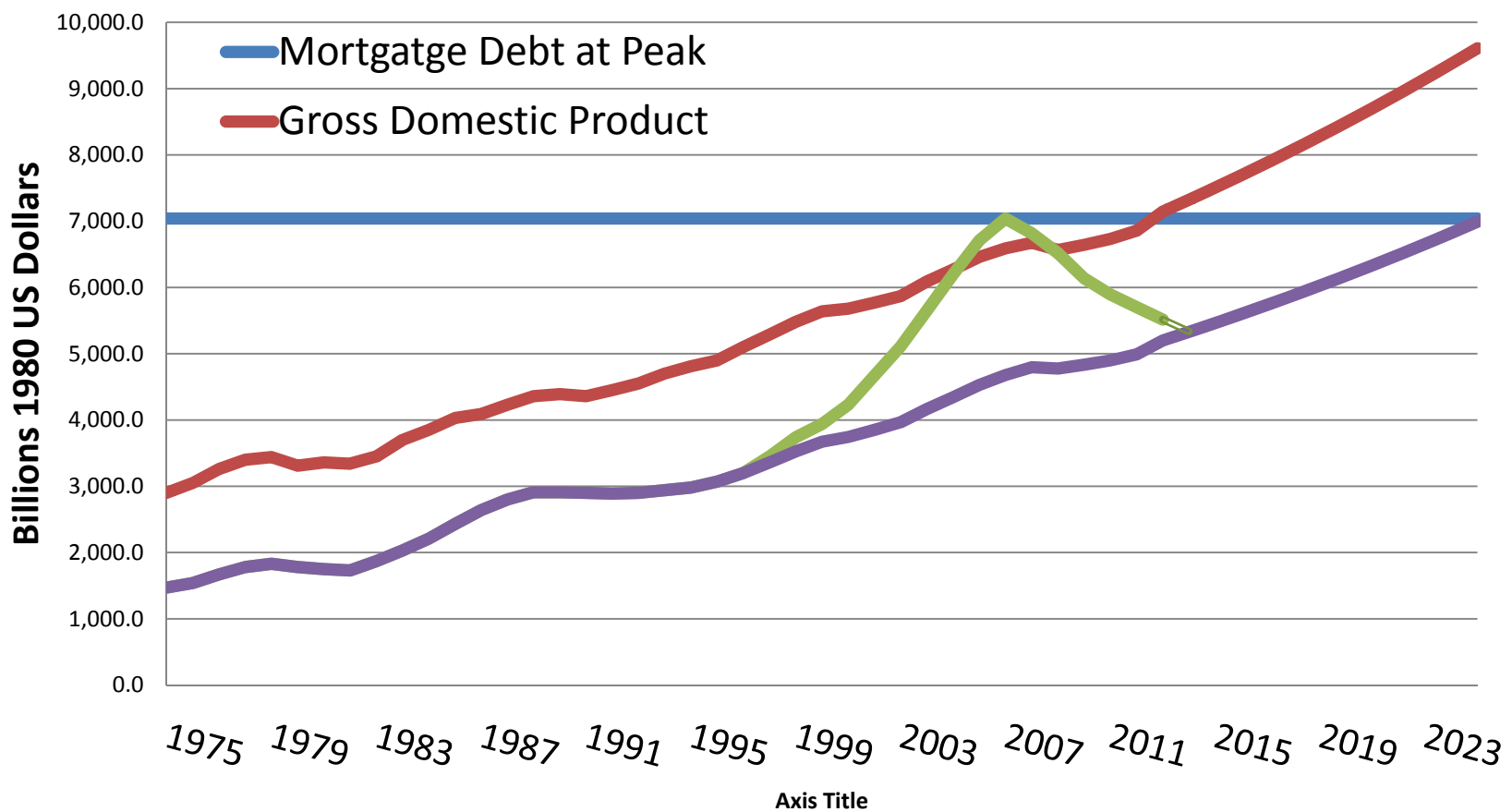


Source MBNA and Federal reserve note difference between blue and red is the appearance and disappearance of the non-bank sector in mortgages

SHARE OF LOANS WITH NEGATIVE EQUITY, THIRD QUARTER 2010



From Crisis to recovery



Next time

- Saving the system

Evaluations