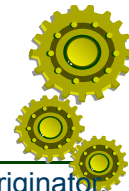


# The Mortgage Market

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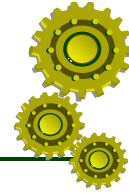
## Concepts and Buzzwords

- Mortgage lending
- Loan structures
- Loan quality
- Securitization
- Agencies/GSEs
- MBS
- The subprime story
- Collateral, RMBS, CMBS, originator, service, FRM, ARM, GPM, balloon, PTI, LTV, FICO, prime, Alt-A, jumbo, subprime, pass-through, WAM, WAC, IO, PO, CMO, PAC, TAC, XS, OC, FHA, VA, GNMA, FNMA, FHLMC, private label, CDO, senior, subordinated, mezzanine, ABX, HPA, SPV, step-up rate

## Readings

- Tuckman and Serrat, Chapter 20
- Veronesi, Chapters 8 and 12
- Gorton, 2008, The Panic of 2007
- Acharya, et al., 2010, Guaranteed to Fail
- Economist, 2013, Two Albatrosses Take Flight

## Mortgage



- A mortgage is a loan secured by the collateral of some specific real estate property.
- The mortgage obliges the borrower (mortgagor) to make predetermined series of payments.
- The lender (mortgagee) has the right of foreclosure (can seize the property) if the mortgagor defaults.

## Typical Loan Structures



- Fixed-rate mortgage (FRM) – level monthly payments of principal and interest until maturity, typically 15 or 30 years.
  - Adjustable-rate mortgage (ARM) – monthly payments based on a floating interest rate, adjusted periodically, according to a pre-determined interest rate index. It usually also has interest rate caps.
  - Balloon mortgage – like FRM until balloon date when all principal comes due.
  - Graduated payment mortgage (GPM) – monthly payments increase over time.
- ★ Borrower has the option to pay the loan off early (prepay) at pre-specified terms.

## **The Mortgage Market 1930s–1960s**



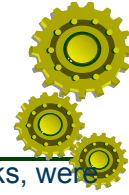
- Before the crash of 1929, banks, S&Ls, and insurance companies originated and held residential mortgages. Then widespread defaults and foreclosures lead to thousands of bank and S&L failures.
- In 1932, Congress created the FHLB system of 12 regional banks that could borrow at favorable rates and lend to homeowners to facilitate household borrowing and promote home ownership.
- In 1934, the New Deal created the FHA to offer mortgage insurance on qualifying loans and FNMA to buy FHA-insured mortgages using money borrowed from capital markets in the form of Fannie Mae bonds, subsequently classed as “Agencies.”
- 1940s-60s: FNMA expanded to buy VA-insured loans and provide “special assistance” to certain kinds of mortgagors; enjoyed favorable tax status.

## **Securitization – the 1970s**

- 1968 – The Johnson administration privatized FNMA to get it off the government books, but FNMA retained special privileges.
- Also created GNMA (Ginnie Mae) inside HUD and FHLMC (Freddie Mac) inside the FHLB.
- These agencies were authorized to buy even non-insured loans from originators that met “conforming” size limit, guarantee them, pool them, and sell them to the broader investment community in the form of mortgage-backed securities (MBS).
- The first pass-through was issued in 1970. A pass-through pays a pro-rated share of all pool cash flows.
- Mortgages were sorted into pools characterized by their weighted average coupon (WAC) and weighted average maturity (WAM).
- The mortgages were insured so that defaults showed up as prepayments in the pool.

## CMOs – the 1980s

- Soon, cash flows from pools, and their prepayment risks, were packaged in more exotic ways to create collateralized mortgage obligations (CMOs):
  - IOs and POs – Interest-only securities
  - POs – Principal-only securities
  - Sequential-pay tranches – short- and long-term bonds
  - PACs – Planned amortization classes
  - TACs – Targeted amortization classes
  - Support classes
- The MBS market took off. Lewis Ranieri at Salomon Brothers created a mortgage trading operation and tapped into a new class of MBS investors.



## Securitization – the 1990s

- In the 1990s, the market for private labels, i.e., non-Agency issuers, grew. The underlying loans need not conform to agency requirements (e.g., jumbo loans). Some loans are uninsured.
- Mostly prime borrowers with good credit history, PTI and LTV. Risk of default was low.
- Loans are also characterized by whether the collateral is residential or commercial (RMBS, CMBS).
- The first European MBS were issued in the UK in 1987. These tend to be variable-rate securities with lower and more stable prepayment rates than the FRMs in the US.
- In the 1990s MBS issuance spread to Australia, Japan, southeast Asia, Latin America, and Canada.



## Ideal of Securitization



- The mortgage originator, typically a commercial bank, thrift, mortgage banker, investigates and certifies that standards are met for the borrower's credit history (FICO), payment-to-income ratio (PTI), down payment and loan-to-value ratio (LTV); earns revenue from origination fee (points) and any secondary marketing profits, and sells the loans.
- A servicing institution collects and forwards monthly payments, keeps records, and earns fees (e.g., 50 bps) and float on monthly payments.
- A broad, ultimately global, class of investors provides capital and manages mortgage risks.
- Mortgages are pooled, to remove idiosyncratic risks, and tranced, to serve different investor clienteles.

## Perverse Incentives Created by Government Guarantees

- Institutions that enjoy explicit or implicit (too-big-to-fail) federal guarantee borrow at close to riskless rates, because debt holders anticipate a bailout in the event that asset value falls.
- Anything that increases the value of the federal guarantee, such as an increase in asset risk or leverage, increases equity value.

### Guaranteed Firm's Balance Sheet

Assets	"Riskless" Debt
Gov't Guarantee	Equity

- $\text{Equity} = \text{Assets} - \text{Riskless Debt} + \text{Guarantee}$
- i.e.,  $\text{Call} = \text{Assets} - \text{Riskless Bond} + \text{Put}$
- Equity holders of ordinary corporations pay for their put in higher borrowing rates, and debt is risky.
- Too-big-to-fail institutions get their put from taxpayers for free.

### Government Guarantees are the “Puts” associated with Equity’s “Call” on Assets

#### Guaranteed Firm’s Balance Sheet – Low Asset Volatility

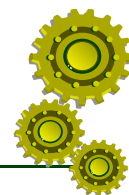
Assets	100	<	110 90	“Riskless” Debt	100	<	100 100
Guarantee/ Bailout	5	<	0 10	Equity	5	<	10 0

**Boosting asset volatility without boosting asset value increases the value of the equity of the levered guaranteed firm at taxpayers’ expense.**

#### Guaranteed Firm’s Balance Sheet – High Asset Volatility

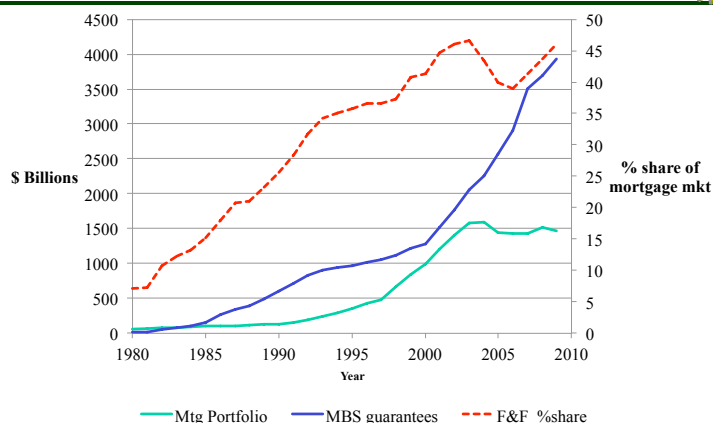
Assets	100	<	120 80	“Riskless” Debt	100	<	100 100
Guarantee/ Bailout	10	<	0 20	Equity	10	<	20 0

### Capital Ratio Game



- The GSEs not only created and guaranteed MBS, they also held huge portfolios of MBS.
- Under the FHEFSS Act of 1992: GSEs were only required to hold 0.45% capital against mortgage loan default risk and 2.5% capital against their mortgage portfolio.
- By contrast, ordinary banks had to hold 4% capital against mortgage loans.
- But banks only had to hold 1.60% capital against GSE MBS, which created a huge demand for the relabeling of GSE securitization, but not necessarily redistribution of the risk.

## GSEs Explode in Size



In 2007, 37% of the \$4 trillion GSE MBS was held by the banking sector, concentrated at a few banks and the GSEs themselves.

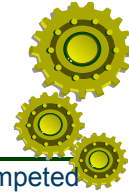
## Lower Underwriting Standards

- The FHEFSS Act of 1992 established a set of mission goals to promote home ownership in traditionally under-served communities (low income and disproportionately minority) often characterized by undocumented income.
- Congress enacted a series of increasing targets for GSE low-income mortgage purchases.

	1993-1995	1996	1997-2000	2001-2004	2005	2006	2007	2008
Low- and Moderate-Income Goal	30%	40%	42%	50%	52%	53%	55%	56%
Underserved Areas Goal	30%	21%	24%	31%	37%	38%	38%	39%
Special Affordable Goal	NA*	12%	14%	20%	22%	23%	25%	27%

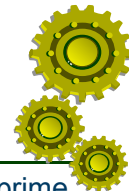
- GSEs began lowering their underwriting standards.

## Subprime Mortgages



- From 2003-2006, the private-label market exploded and competed with the GSEs.
- A new class of too-big-to-fail institutions? Citi, BofA, Wells Fargo, Wachovia, Morgan, Merrill, Goldman, Lehman, AIG ...
- Most of the growth was in subprime and Alt-A mortgage debt. Loans were considered subprime if the borrower had poor or no credit history, income documentation, and down payment. Alt-A was an intermediate class. The market grew for several reasons:
- A long bull market in housing created a widespread belief in the reliability of house price appreciation that would minimize default risk. This led to loan structures that made lending to risky borrowers feasible by relying on the ability of borrowers to refinance their loans or sell their homes.
- Subprime origination and securitization was profitable because of a robust demand for subprime MBS and CDOs.

## Subprime Loan Structure



- The typical fixed-rate loan structure didn't work for subprime borrowers, because the interest rate commensurate for the degree of default risk made payments unaffordable.
- The typical subprime loan was a hybrid structure with an initial 2- or 3-year period during which payments are based on a low (teaser) fixed interest rate. Prepayment penalties are high. Then the rate "steps up" to a high floating rate (e.g., LIBOR + 6%).
- The step-up rate tends to be prohibitively high, forcing the borrower either to default, sell the house and prepay, or refinance the loan to fixed rate, with high prepayment penalties.
- Both sides are betting on strong house price appreciation.

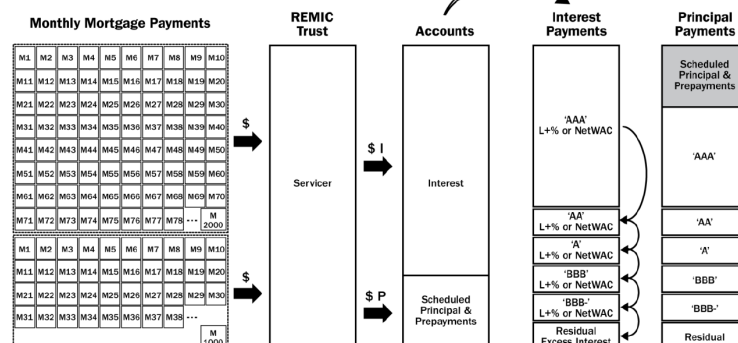


## Subprime MBS

- Subprime loans were pooled, and then tranching into high-rated senior and low-rated subordinated classes with defaults applied first to the lower tranches, partially insulating senior tranches.
- Further credit-enhancement was achieved by over-collateralizing (OC) the pool. The excess spread (XS) accumulated to a pre-specified OC target to insulate tranches from default, and the rest was paid to a residual security, intended to be held by the originator.

## Sample Subprime MBS Structure

Sample Subprime RMBS Payments



## Growth of Non-Agency MBS Market



Non-Agency MBS Outstanding

Year	Outstandings in \$ Billions						Percent of Total MBS					
	Total MBS	Agency	Total	Jumbo	Alt-A	Subprime	Agency	Total	Jumbo	Alt-A	Subprime	Non-Agency Outstanding
2000	3,003	2,625	377	252	44	81	87%	13%	8%	1%	3%	
2001	3,409	2,975	434	275	50	109	87%	13%	8%	1%	3%	
2002	3,802	3,313	489	256	67	167	87%	13%	7%	2%	4%	
2003	4,005	3,394	611	254	102	254	85%	15%	6%	3%	6%	
2004	4,481	3,467	1,014	353	230	431	77%	23%	8%	5%	10%	
2005	5,201	3,608	1,593	441	510	641	69%	31%	8%	10%	12%	
2006	5,829	3,905	1,924	462	730	732	67%	33%	8%	13%	13%	
2007Q1	5,984	4,021	1,963	468	765	730	67%	33%	8%	13%	12%	

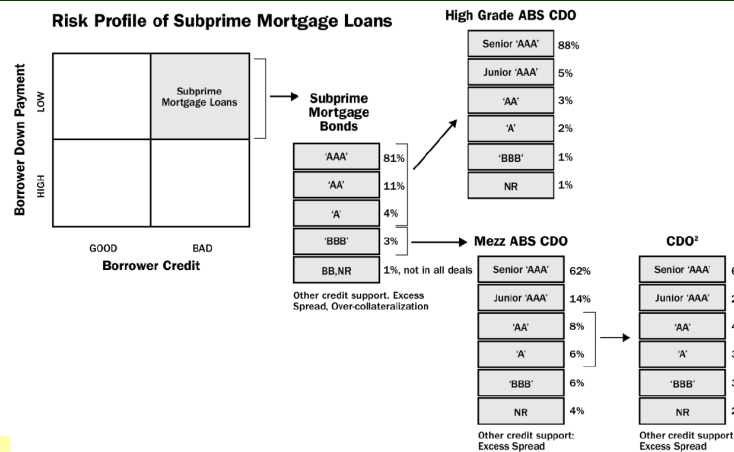
Source: Federal Reserve Board, [Inside MBS&ABS](#), Loan Performance, UBS.

## Subprime CDOs



- The MBS were themselves pooled and tranced again in high grade and mezzanine CDOs.
- The CDOs could themselves be pooled and re-tranced to create CDO<sup>2</sup>s.
- This business grew rapidly, as CDO managers perceived trading opportunities in the menu of subprime MBS rates, CDO rates, and CDS premiums.
- A dozen large financial firms held most of the AAA-rated non-GSE MBS, with favorable capital treatment.
- They could get further capital relief if they bought credit protection from insurers like AIG. Regulatory arbitrage?

## Sample Subprime CDO Structure

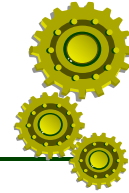


Source: UBS, "Market Commentary," December 13, 2007.

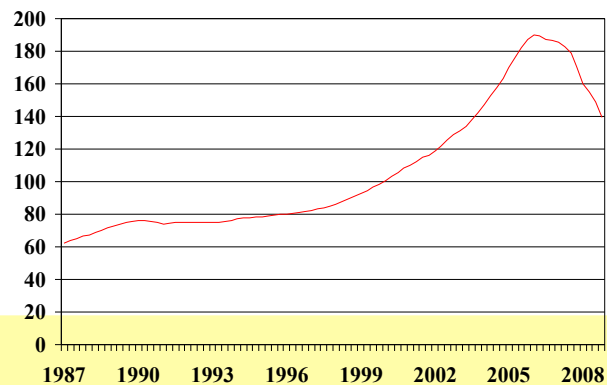
## Complex Deal Structures

- The deal structures became too complex to value using traditional methods. It was impossible to look through the packaging to the underlying loans. There was little common knowledge about pricing or the terms of individual transactions. Investors relied on rating agencies and relationships with sellers.
- Ratings agencies faced pressure to rate large components of pools as AAA.
- Models of CDOs treated pools of thin mezzanine tranches as if they were pools of whole loans, but the diversification of default risk in the second round was illusory and the distribution of payoffs of these thin tranches was almost binary, so tranching of risk was also illusory.

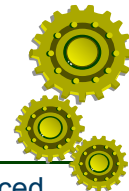
## House Prices Start to Fall



S&P-Case-Shiller Seasonally-Adjusted  
U.S. National Home Price Index



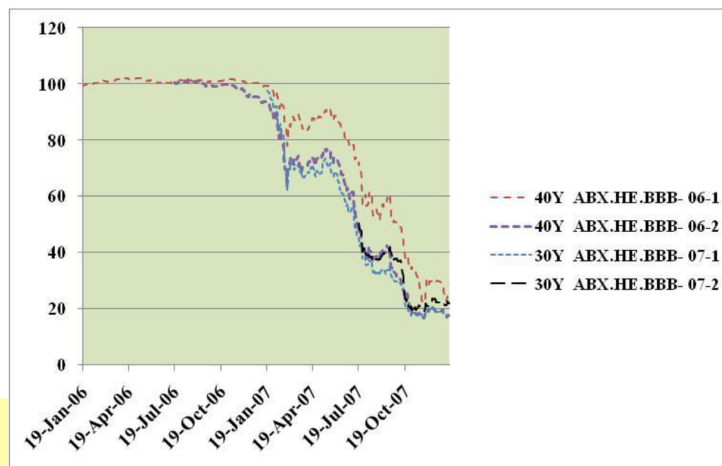
## The Bursting of the Bubble



- In early 2006, ABX indexes and contracts were introduced. These referenced various tranches of subprime MBS and became a way of aggregating subprime pricing information and shorting subprime debt.
- During 2007, the ABX indexes crashed and housing prices fell. Numerous mortgage underwriters went bankrupt. The subprime market shut down. Numerous hedge funds shut down.
- Calls for collateral threatened the solvency of numerous financial institutions.
- Subprime delinquencies and foreclosures mounted up.

## ABX Subprime Indexes Crash

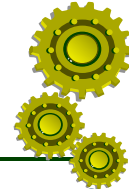
ABX BBB- Prices



## The Financial Crisis and the Bailout of the GSEs in 2008

- Banks and financial institutions held large levered positions in subprime MBS, violating the originate-to-distribute model of securitization.
- When the value of subprime securities crashed, these institutions had difficulty refinancing.
- Those deemed too-big-to-fail were propped up by the government in one way or another, TALF, TARP, etc.
- Fannie and Freddie were taken into conservatorship in September 2008, getting money and giving the government a 79.9% ownership stake.
- Their equity stopped trading in June 2010.

## **GSES Start to Recover in 2012**



- In exchange for agreeing to backstop losses up to \$200B, the US federal government extracted preferred shares with a 10% dividend, as well as almost 80% of equity, leaving in place a prior privately held issue of preferred stock. Losses reached over \$150B.
- In August 2012, the government used its powers as conservator to direct all FNMA and FHLMC to itself. FNMA and FHLMC returned to profitability in 2012-2013, as the housing market recovered.
- Private investors have been suing for a share of the profits.
- During 2019 regulators have considered plans to privatize these GSEs, but reforms have been delayed.
- The government continues to guarantee FNMA and FHLMC and subsidize US homeownership.