



15.482 Healthcare Finance

Spring 2017

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Unit 8, Part 1: The Financial Crisis
and Securitization

Unit Outline

- The Financial Crisis and Securitization
- Megafunds
- Sizing Megafunds and Modeling Correlation
- When Megafunds Fail

The Financial Crisis

The Many Narratives of the Crisis

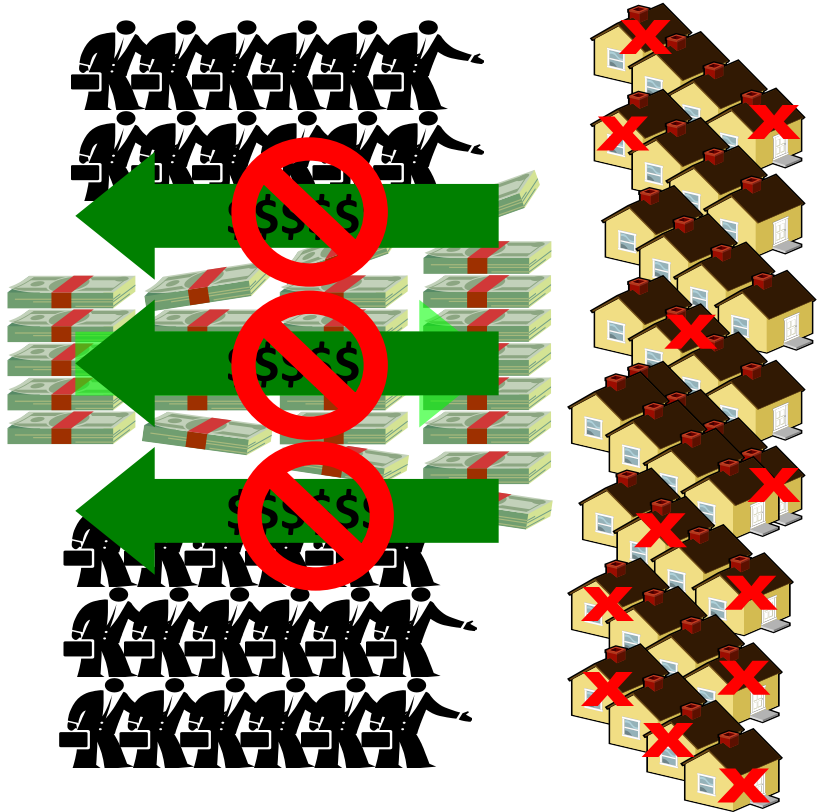
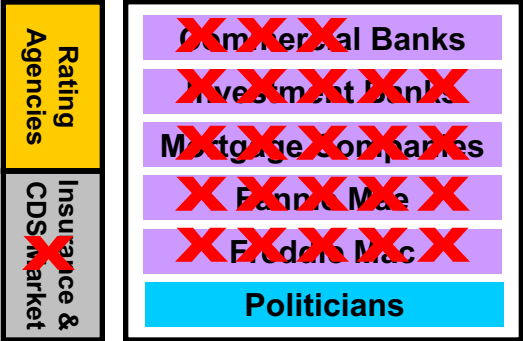
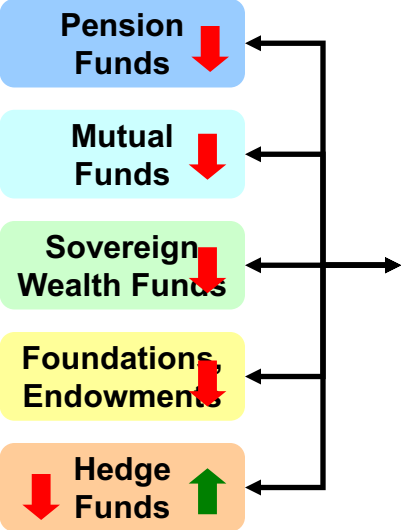
Journal of Economic Literature 2012, 50:1, 151–178
<http://www.aeaweb.org/articles.php?doi=10.1257/jel.50.1.151>

Reading About the Financial Crisis: A Twenty-One-Book Review

ANDREW W. LO*

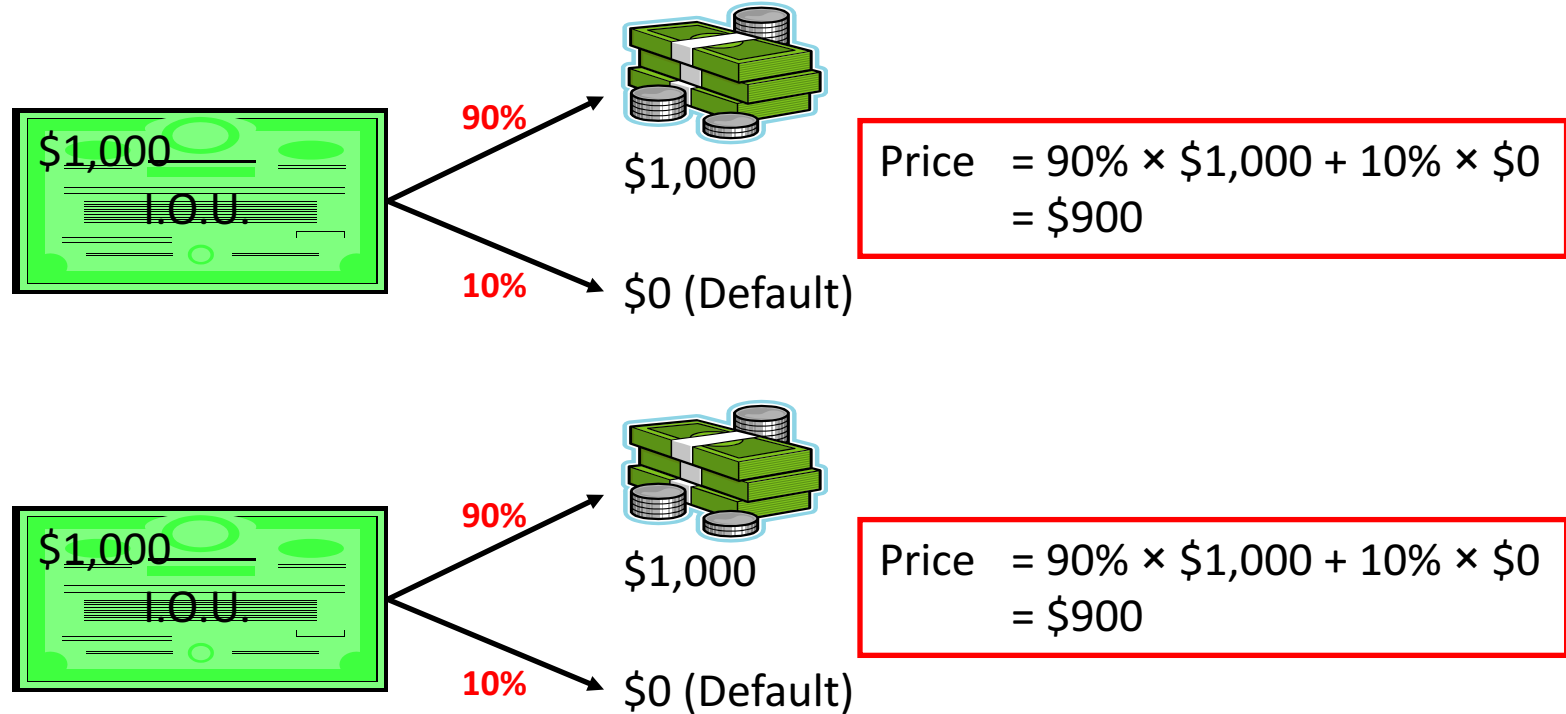
The recent financial crisis has generated many distinct perspectives from various quarters. In this article, I review a diverse set of twenty-one books on the crisis, eleven written by academics, and ten written by journalists and one former Treasury Secretary. No single narrative emerges from this broad and often contradictory collection of interpretations, but the sheer variety of conclusions is informative, and underscores the desperate need for the economics profession to establish a single set of facts from which more accurate inferences and narratives can be constructed. (JEL E32, E44, E52, G01, G21, G28)

The Many Narratives of the Crisis

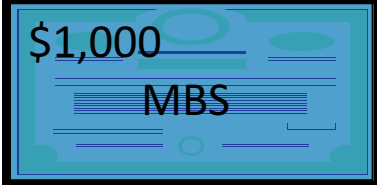
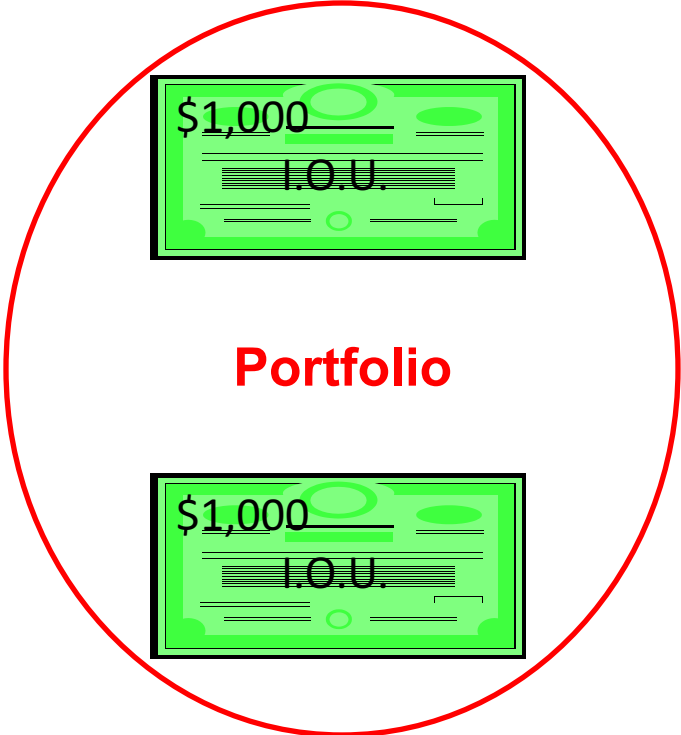


Securitization

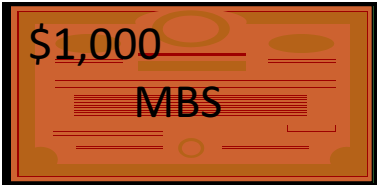
Consider Simple Securitization Example:



Securitization

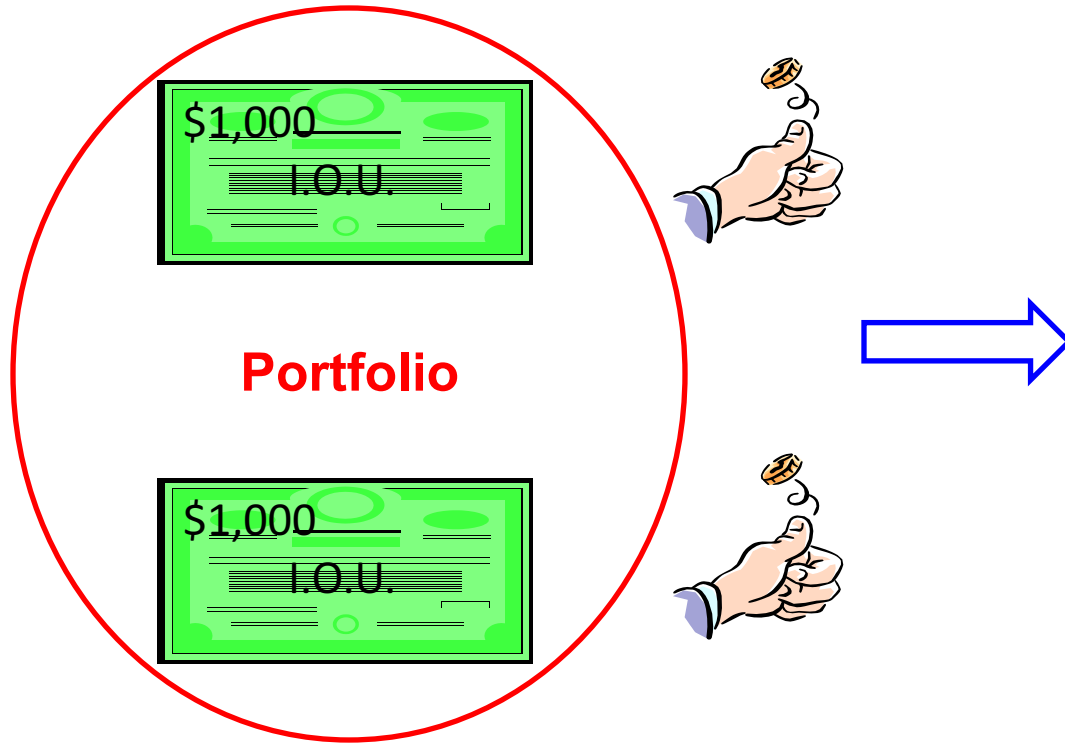


Senior Tranche



Junior Tranche

Securitization



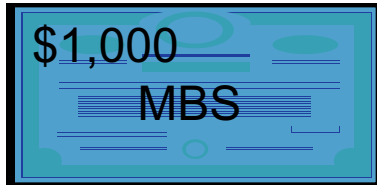
Assuming Independent Defaults

Portfolio Value	Prob.
\$2,000	81%
\$1,000	18%
\$0	1%

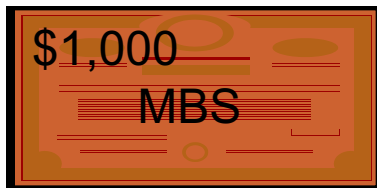
Securitization

Assuming Independent Defaults

15.482



Senior Tranche



Junior Tranche

Portfolio Value	Prob.	Senior Tranche	Junior Tranche
\$2,000	81%	\$1,000	\$1,000
\$1,000	18%	\$1,000	\$0
\$0	1%	\$0	\$0

Bad State
For Senior
Tranche (1%)

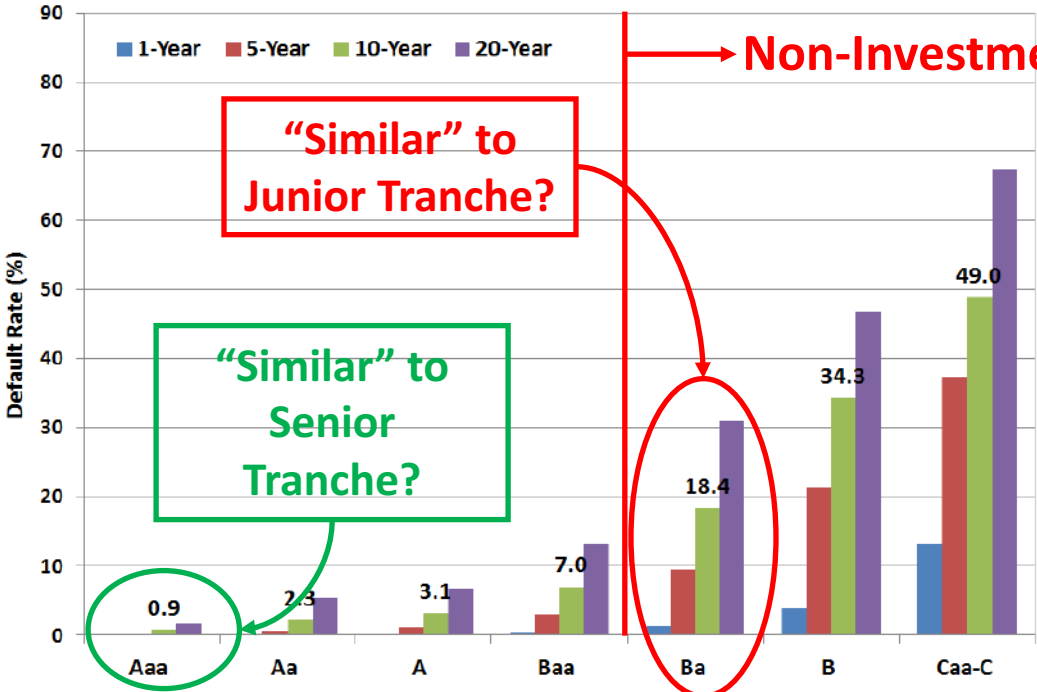
Bad State
For Junior
Tranche (19%)

$$\begin{aligned}\text{Price for Senior Tranche} &= 99\% \times \$1,000 + 1\% \times \$0 \\ &= \$990\end{aligned}$$

$$\begin{aligned}\text{Price for Junior Tranche} &= 81\% \times \$1,000 + 19\% \times \$0 \\ &= \$810\end{aligned}$$

Securitization

Moody's Average Cumulative Issuer-Weighted Global Default Rates
1920 to 2008



Non-Investment Grade

“Similar” to Junior Tranche?

“Similar” to Senior Tranche?

Source: Moody's.

Securitization

U.S. Bond Market Debt Issuance (\$Billions)

	Municipal	Treasury ¹	Mortgage Related ²	Corporate Debt ³	Federal Agency Securities	Asset-Backed	Total
1996	185.2	612.4	479.7	343.7	277.9	168.4	2,067.2
1997	220.7	540.0	577.6	466.0	323.1	223.1	2,350.5
1998	286.8	438.4	1,118.1	610.7	596.4	286.6	3,336.9
1999	227.5	364.6	985.4	629.2	548.0	287.1	3,041.8
2000	200.8	312.4	660.0	587.5	446.6	281.5	2,488.8
2001	287.7	380.7	1,663.9	776.1	941.0	326.2	4,375.6
2002	357.5	571.6	2,283.0	636.7	1,041.5	373.9	5,264.2
2003	382.7	745.2	3,084.3	775.8	1,267.5	461.5	6,717.0
2004	359.8	853.3	1,879.0	780.7	881.8 ⁽⁴⁾	651.5	4,524.3
2005	408.2	746.2	2,182.4	752.8	669.0	753.5	5,512.1
2006	386.5	788.5	2,088.8	1,058.9	747.3	753.9	5,823.9
2007	429.3	752.3	2,186.2	1,127.5	941.8	509.7	5,946.8
2008	389.5	1,037.3	1,362.2	707.2	984.5	139.5	4,620.2
2009	409.8	2,185.5	2,041.4	901.8	1,117.0	150.9	6,806.4
2010	433.1	2,303.9	1,742.7	1,062.7	1,032.6	109.4	6,684.5

¹ Interest bearing marketable coupon public debt.

² Includes GNMA, FNMA, and FHLMC mortgage-backed securities and CMOs and private-label MBS/CMOs.

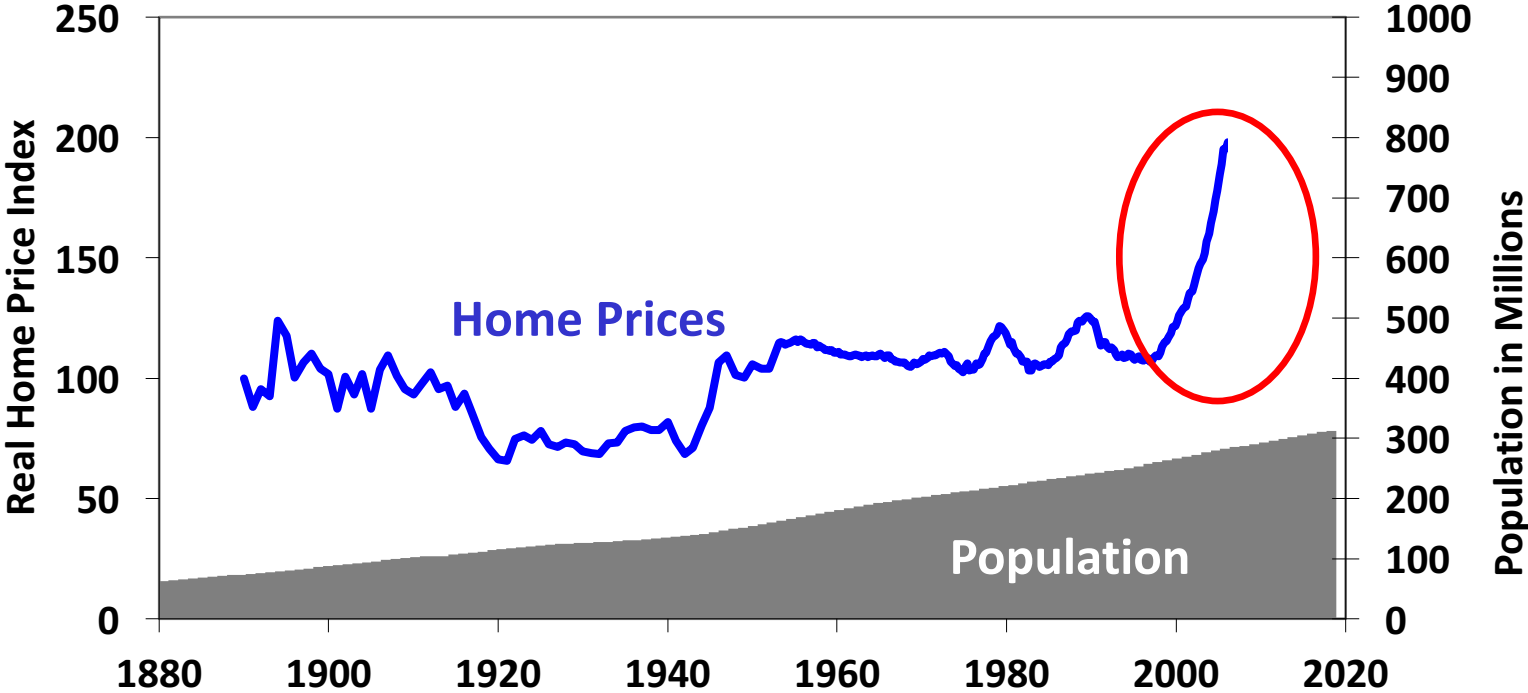
³ Includes all non-convertible debt, MTNs and Yankee bonds, but excludes CDs and federal agency debt.

⁴ Beginning with 2004, Sallie Mae has been excluded due to privatization.

Source: SIFMA

Securitization

U.S. Real Home Price Index, 1890 –2006



Source: Robert J. Shiller

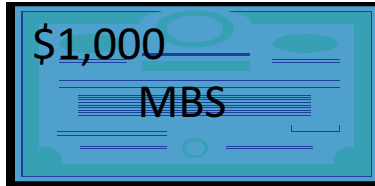
Securitization

“Confessions of a Risk Manager” in *The Economist*, August 7, 2008:

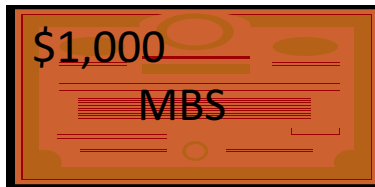
In May 2005 we held AAA tranches, expecting them to rise in value, and sold non-investment-grade tranches, expecting them to go down. From a risk-management point of view, this was perfect: have a long position in the low-risk asset, and a short one in the higher-risk one. **But the reverse happened of what we had expected: AAA tranches went down in price and non-investment-grade tranches went up, resulting in losses as we marked the positions to market.**

This was entirely counter-intuitive. Explanations of why this had happened were confusing and focused on complicated cross-correlations between tranches. In essence it turned out that there had been a short squeeze in non-investment-grade tranches, driving their prices up, and a general selling of all more senior structured tranches, even the very best AAA ones.

Securitization



Senior Tranche



Junior Tranche

Assuming Independent Defaults

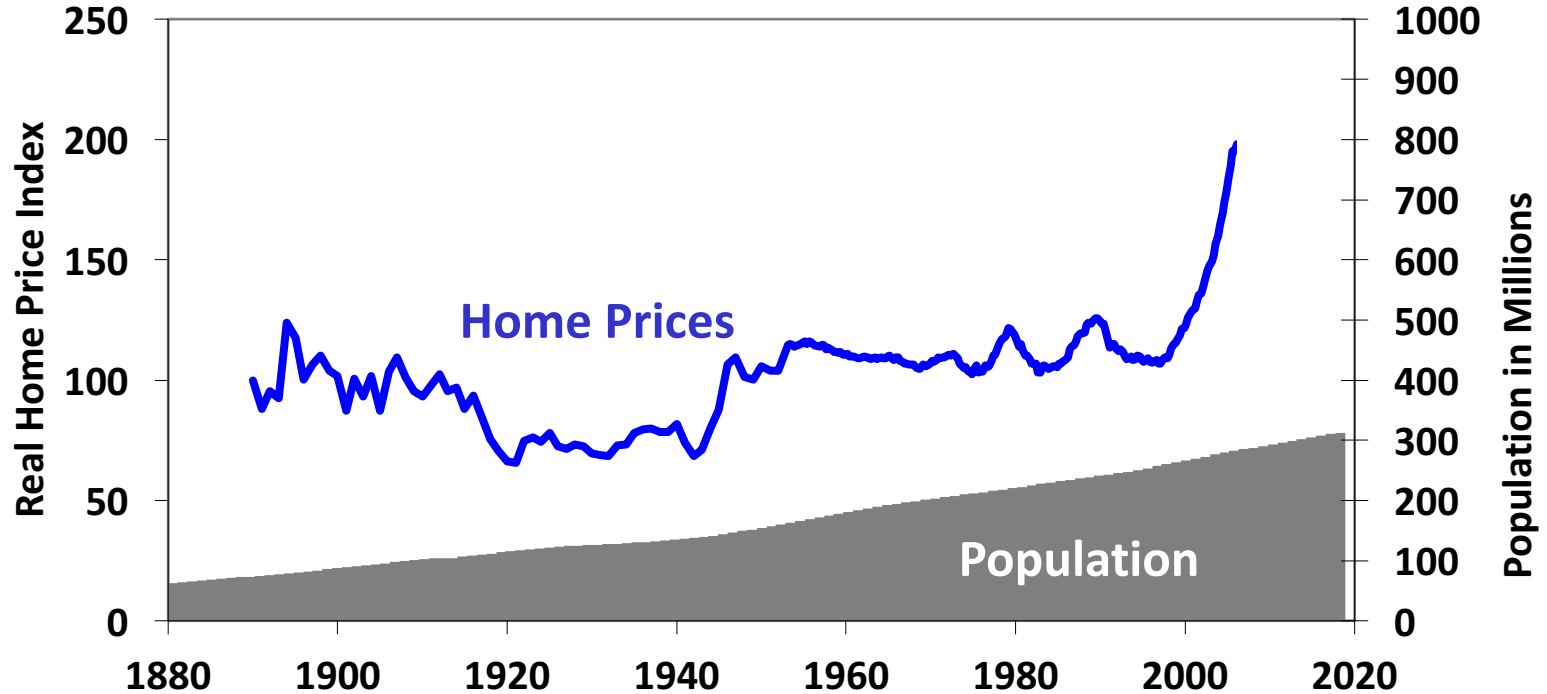
Portfolio Value	Prob.	Senior Tranche	Junior Tranche
\$2,000	81%	\$1,000	\$1,000
\$1,000	18%	\$1,000	\$0
\$0	1%	\$0	\$0

But What If Defaults Become Highly Correlated?

- Why should correlations increase?

Securitization

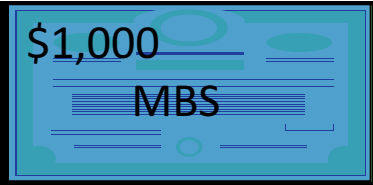
U.S. Real Home Price Index, 1890–2012



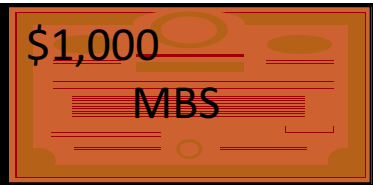
Source: Robert J. Shiller

Securitization

Assuming Perfectly Correlated Defaults



Senior Tranche



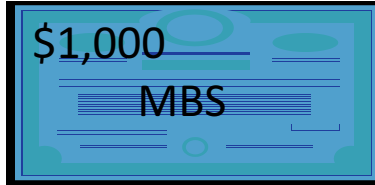
Junior Tranche

Portfolio Value	Prob.	Senior Tranche	Junior Tranche
\$2,000	90%	\$1,000	\$1,000
\$0	10%	\$0	\$0

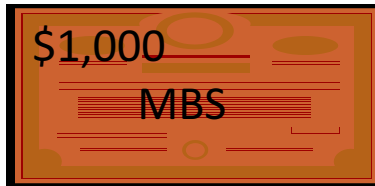
Bad State For Senior Tranche (10%)

Bad State For Junior Tranche (10%)

Securitization



Senior Tranche



Junior Tranche

Assuming Perfectly Correlated Defaults

Portfolio Value	Prob.	Senior Tranche	Junior Tranche
\$2,000	90%	\$1,000	\$1,000
\$0	10%	\$0	\$0

$$\begin{aligned}
 \text{Price for Senior Tranche} &= 90\% \times \$1,000 + 10\% \times \$0 \\
 &= \$900 \text{ (was } \$990\text{)}
 \end{aligned}$$

$$\begin{aligned}
 \text{Price for Junior Tranche} &= 90\% \times \$1,000 + 10\% \times \$0 \\
 &= \$900 \text{ (was } \$810\text{)}
 \end{aligned}$$

Impact on the Banking Sector

Bank XYZ

Assets	Liabilities
\$ 2B Consumer Loans \$ 3B Business Loans \$ 5B Cash \$40B CDOs (AAA)	\$ 5B Deposits \$15B CDOs (Ba) \$25B Money Market Funds \$ 5B Equity
\$50B	\$50B

Well-Capitalized Bank

- Ratio of equity to assets = $\$5B/\$50B = 10\%$
- Leverage ratio of 10:1 not unusual for banks

Impact on the Banking Sector

Bank XYZ

Assets	Liabilities
\$ 2B Consumer Loans \$ 3B Business Loans \$ 5B Cash \$38B CDOs (AAA)	\$ 5B Deposits \$15B CDOs (Ba) \$25B Money Market Funds \$ 3B Equity
\$48B	\$48B

Now Suppose Mortgage Defaults Increase

- AAA CDO declines 5% \Rightarrow lose \$2B on AAA CDOs
- Bank equity declines to \$3B

Impact on the Banking Sector

Bank XYZ

Assets	Liabilities
\$ 2B Consumer Loans \$ 3B Business Loans \$ 5B Cash \$38B CDOs (AAA)	\$ 5B Deposits \$18B CDOs (Ba) \$25B Money Market Funds \$ 0B Equity
\$48B	\$48B

Now Suppose Mortgage Defaults Increase

- Ba CDOs rises 20% ⇒ lose \$3B on Ba CDOs
- Equity declines to \$0B—bank is wiped out!

Impact on the Banking Sector

Bank XYZ

Assets	Liabilities
\$ 2B Consumer Loans \$ 3B Business Loans \$ 5B Cash \$??B CDOs (AAA)	\$ 5B Deposits \$??B CDOs (Ba) \$25B Money Market Funds \$??B Equity
\$??B	\$??B

But What If We Don't Know What CDOs Are Worth??

- CDOs may have gone up or down by 2% to 25%
- Preserve capital, go to cash, stop inter-bank lending ⇒ paralysis, runs, **HELP!!!**