

THE GREAT RECESSION

EVENTS, POLICY RESPONSES, ROOT CAUSES AND LESSONS

Today's Discussion:

Fabrice Tourre (CBS – Finance Department)

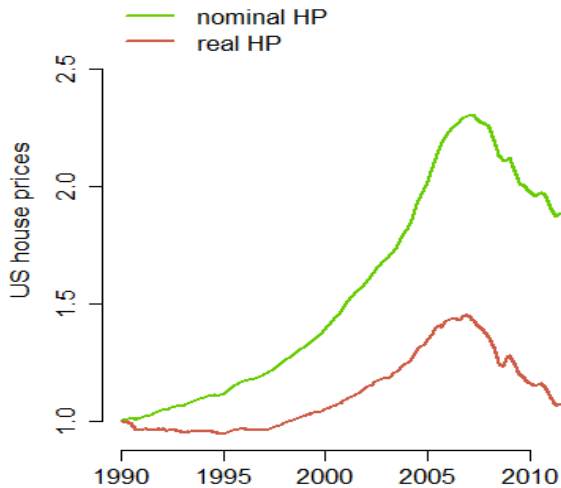
May 8, 2019

1. Timeline of key facts
2. Policy responses
3. Likely causes of the boom-bust
4. Lessons

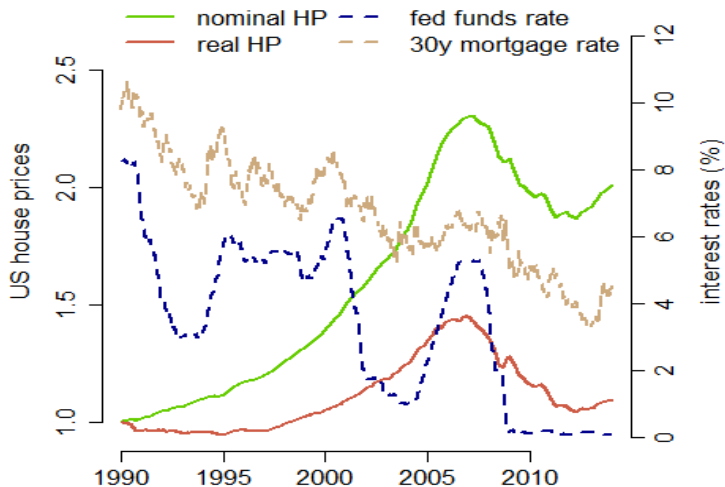
PART I

TIMELINE OF THE KEY FACTS

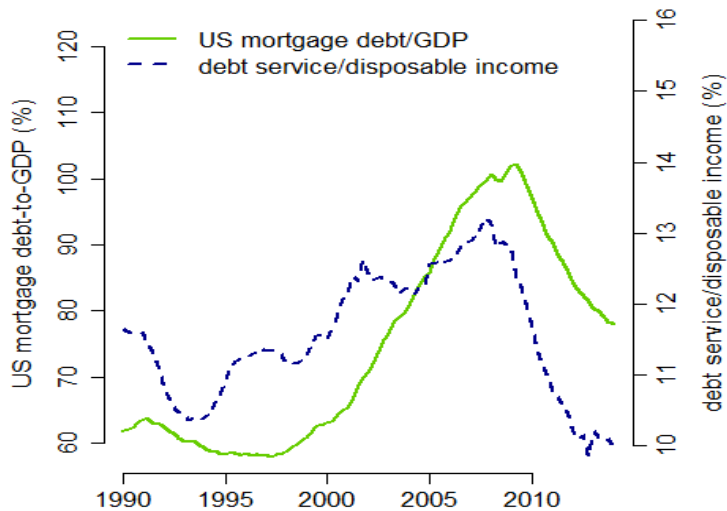
US HOUSING BOOM: 1999 – 2006



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US HOUSEHOLD LEVERAGE



STRUCTURE OF US HOUSING FINANCE MARKET

Q2 1999 - Q2 2006: 44% cumulative real house price growth in the US

Housing finance in the US at the time

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- Conforming mortgages
 - Fannie Mae and Freddie Mac (mortgage “agencies”)
 - conforming limits
 - LTV and DTI ratios
 - most conforming mortgages securitized into “agency MBS”

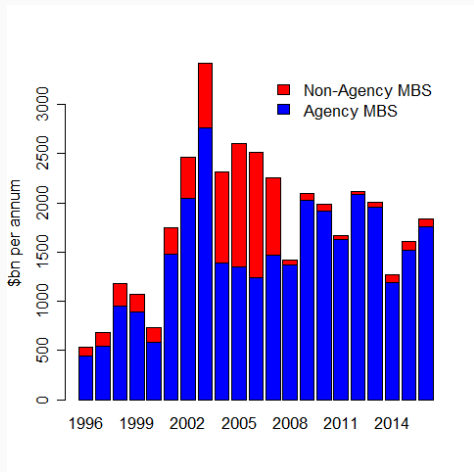
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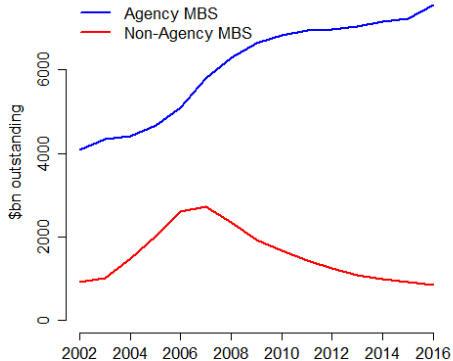
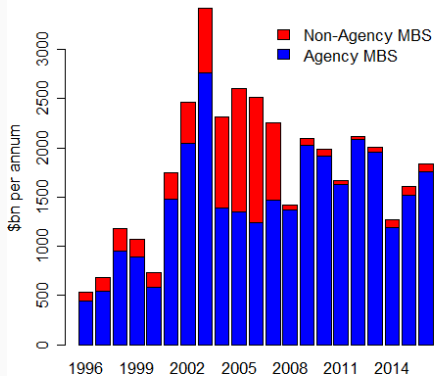
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 - conforming limits
 - LTV and DTI ratios
 - most conforming mortgages securitized into “agency MBS”
- Private label mortgages
 - ARMs, hybrid ARMs
 - sub-prime, alt-A (or “mid-prime”), HELOCs
 - most private-label mortgages securitized into “non-agency MBS”

STRUCTURE OF US HOUSING FINANCE MARKET



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ORIGINATE AND DISTRIBUTE BUSINESS MODEL

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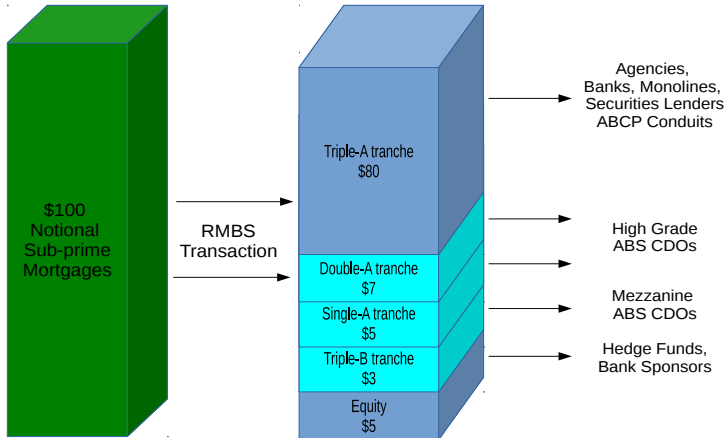
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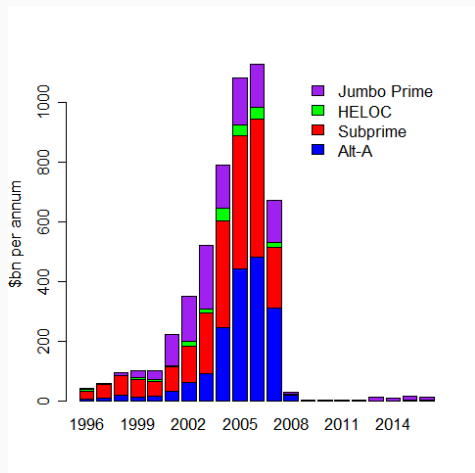
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- Wall-street firms aggregate loan pools and securitize
- RMBS bonds sold to:
 - Mortgage agencies, banks, ABCP conduits, financial guaranty insurance companies and securities lenders for the triple-A risk;
 - ABS CDOs for the double-A through triple-B risk;
 - Hedge funds or retained by the sponsor for the equity risk

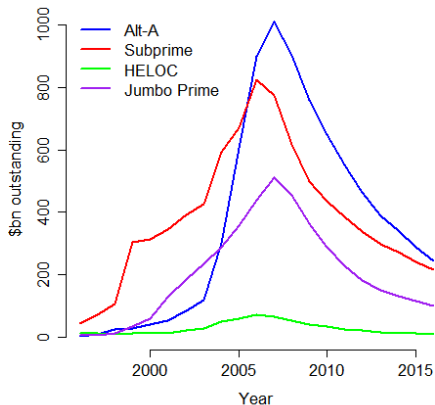
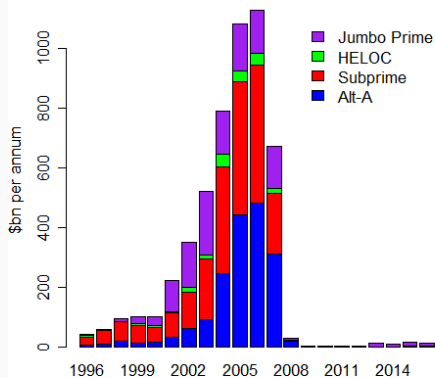
SUBPRIME RMBS SECURITIZATION EXAMPLE



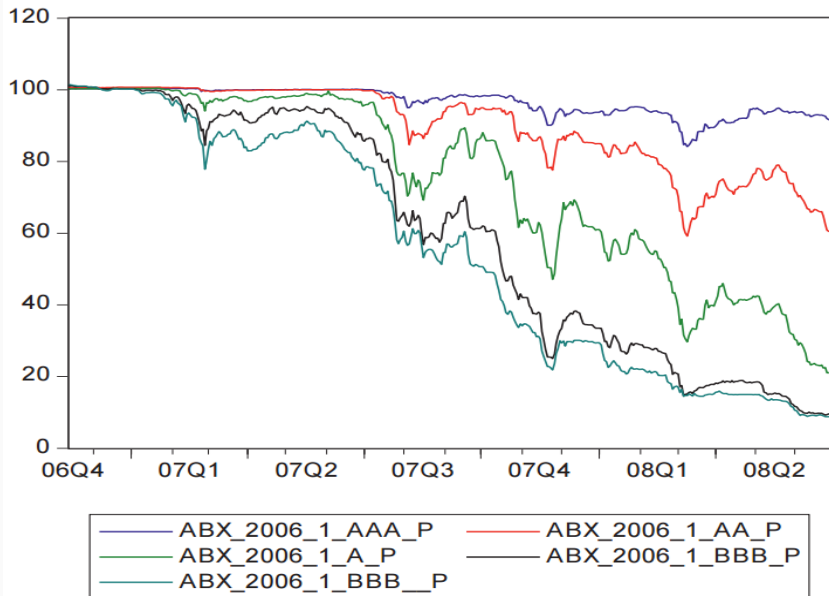
NON-AGENCY RESIDENTIAL MORTGAGE BACKED SECURITIES



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EARLY 2007: CRACKS IN THE FOUNDATIONS – ABX PRICES



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THE MORTGAGE LENDER Implode-Meter™

Tracking the housing finance breakdown: a saga of corruption, hypocrisy, and government complicity.

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- Porn Addict Got \$250,000 In Hush Money From Michigan Taxpayers
- Former COO of Long Island Federal Credit Union Pleads Guilty

We tallied 388 mortgage co. *implosions* from 2006.

Housing & Economic Crisis News Picks

- AIME Accuses Quicken Loans Of Screwing Veterans On VA Loans** - [2019-03-29] - AIME Accuses Quicken Loans And Other Major Retail Lenders Of Scamming Veterans On VA Loans
- The Counter-Spin on Hysterical News of "Finland Government Collapses Due To Universal Healthcare"** - [2019-03-27] - Certain articles (which we won't dignify with a link) are circulating to the effect that "Finland's government has collapsed due..."
- Scam Alert: Brooklyn Reverse Mortgages** - [2019-03-27] - SCAM ALERT! Lenders Are Pulling A Scam With Brooklyn Reverse Mortgages. What You Need To Know!
- SCAM ALERT! Lenders are Pulling A Scam With Queens Reverse Mortgages** - [2019-03-26] - SCAM ALERT! Lenders Are Pulling A Scam With Queens Reverse Mortgages. What You Need To Know!
- Facebook Scammer Scams \$122 Million From Facebook And Google** - [2019-03-26] - Facebook And Google Paid \$122 Million Worth Of Phony Bills To European Facebook Scammer

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SUMMER 2007: CREDIT MARKET FREEZE

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- Canadian ABCP liquidity crisis
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- September 2007

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- **July 2007** – S&P 500 (end of July): 1,455
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- **August 2007** – S&P 500 (end of August): 1,473
 - BNP's suspension of withdrawals at 3 ABS investment funds
 - Countrywide taps its credit lines
 - Sachsen LB's ABCP conduit fails to roll its CP
 - Canadian ABCP liquidity crisis
 - Fed decreases discount rate by 50bps
- **September 2007** – S&P 500 (end of September): 1,526
 - Fed cuts federal funds target by 50bps

FALL 2007 AND WINTER 2008: BEAR'S COLLAPSE

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- Fall 2007

- Collapse of \$ 300bn of SIVs
- Fed cuts federal funds target by
 - 50bps (Sep. 2007)
 - 25bps (Oct. 2007)
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- Emergency liquidity provided by BofE to Northern Rock
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- Bear Sterns' collapse, acquisition by JPM, Maiden Lane I
- Fed introduces Primary Dealers' funding facilities
 - Primary Dealer Credit Facility
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FALL 2007 AND WINTER 2008: BEAR'S COLLAPSE

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- **Winter 2008** – S&P 500 (end of March 2008): 1,322 (down 10% in 3 mo)
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- S&P 500 on August 31: 1,282
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- Sep 16: \$85bn emergency Fed loan to AIG
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- Sep 21: GS and MS become bank holding companies
- Sep 25: Largest bank failure in history: Washington Mutual
- Sep 29: TARP rejected by house of rep
- S&P 500 on September 30: 1,166 (down 9% in 1 mo)

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- Oct 3: FDIC insurance coverage increased to \$250,000
- Oct 14: FDIC guarantees bank debt under 3 years
- Oct 14: TARP funds used for bank capital injections
- S&P 500 on October 31: 968 (down 17% in 1 mo)

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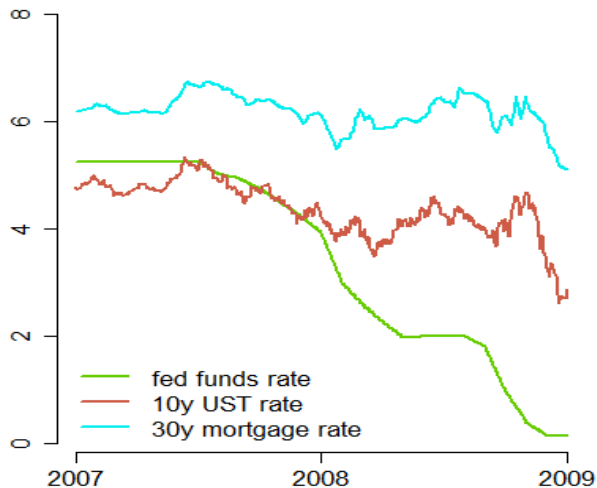
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- Dec 2008: Fed funds rate hits “zero lower bound”
- Jan 16, 2009: BofA receives assistance from Treasury, FDIC and Fed
- S&P 500 on March 31: 797 (down 18% in 5 mo)

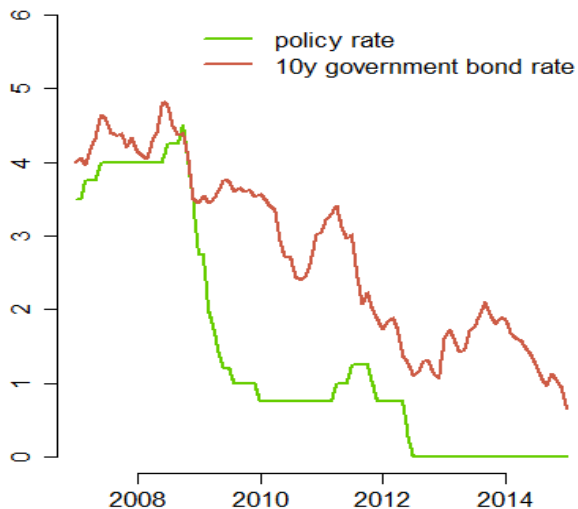
PART II

POLICY RESPONSES

CONVENTIONAL MONETARY POLICY



CONVENTIONAL MONETARY POLICY IN DENMARK



UNCONVENTIONAL MONETARY POLICY INTERVENTIONS

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- The “Alphabet” Soup of Funding Programs
 - Term Auction Facility
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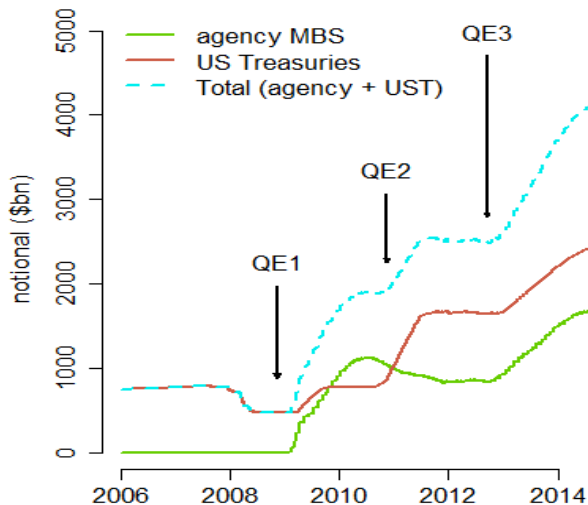
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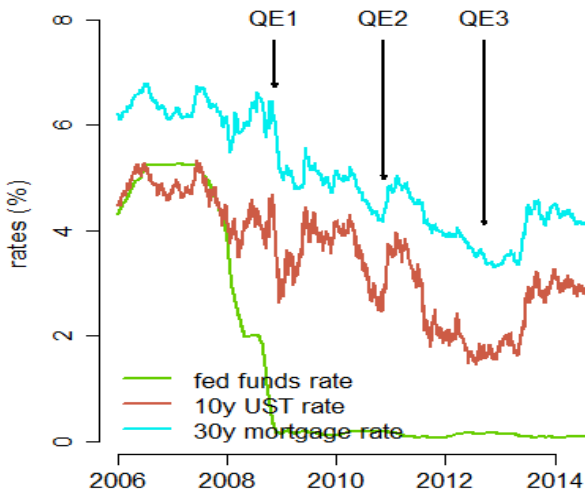
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- Central banks coordination: cross-currency swap lines

UNCONVENTIONAL MONETARY POLICY – FED BALANCE-SHEET



UNCONVENTIONAL MONETARY POLICY – RATES



GOVERNMENT INTERVENTION AND FISCAL POLICY

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- \$800bn Troubled Asset Relief Program (“TARP”)
 - \$200bn for bank preferred stock purchases
 - \$70bn for AIG preferred stock purchases
 - \$40bn for Citi and BofA additional stock purchases
 - \$80bn for US auto makers’ finance companies

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- **Housing stabilization programs**
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- **Housing stabilization programs**
 - Home Affordable Modification Program (“HAMP”)
 - Home Affordable Refinance Program (“HARP”)
- **\$800bn American Recovery and Reinvestment Act**
 - Tax incentives for individuals
 - Tax incentives for firms
 - Infrastructure investments
 - Extension of unemployment benefits

GOVERNMENT INTERVENTION AND FINANCIAL REGULATION

Dodd-Frank Act

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- Anti-predatory lending act (Reg “QM”)

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- Transparency and mandatory clearing of OTC derivatives
- Volcker rule
- Risk-retention requirements for securitizations

Basel III

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- Capital adequacy
 - Increased risk-based capital requirements (from 2.5% to 7%)
 - Capital surcharges, TLAC requirements for SIFIs
 - Non-risk based leverage ratio
 - Discretionary counter-cyclical capital buffers

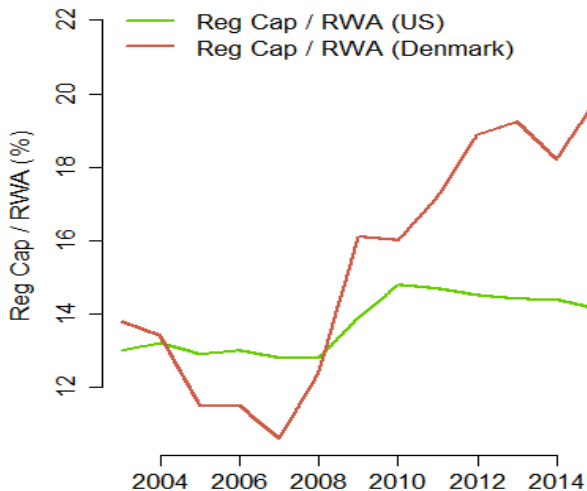
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 - Discretionary counter-cyclical capital buffers
- Stress testing
- Minimum liquidity requirements
 - Liquidity coverage ratio
 - Net stable funding ratio

FINANCIAL REGULATION



PART III

ROOT CAUSES

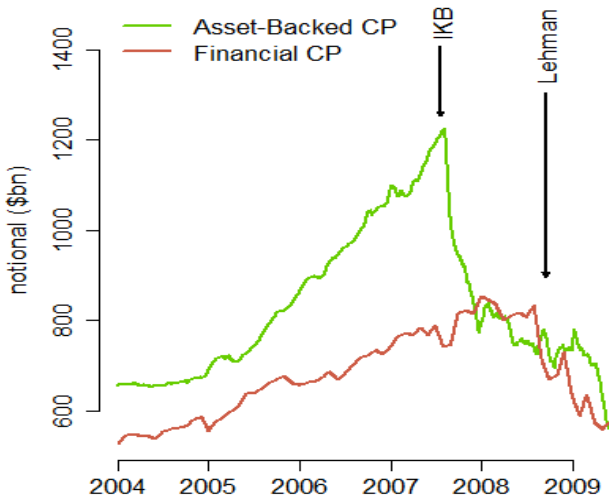
CREDIT SUPPLY EXPANSION “FUELED” BY REGULATORY FRAMEWORK

Banks and ABCP conduits

- Largest buyers of non-agency RMBS and CDOs (2002-2007)
- Via liquidity backstops, banks effectively guaranteeing credit risk of assets purchased by ABCP conduits

ABCP Issuer Type	Outstanding (Q1 2000)	Outstanding (Q2 2007)	2000 - 2007 % Increase
Multi-seller	~ \$340bn	\$651bn	+91%
Single-seller	~ \$50bn	\$227bn	+354%
Credit arbitrage	~ \$50bn	\$296bn	+388%
SIVs & Hybrids	~ \$25bn	\$122bn	+492%

CREDIT SUPPLY EXPANSION “FUELED” BY REGULATORY FRAMEWORK



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Regulatory capital arbitrage by banks

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Regulatory capital arbitrage by banks

- Requirement for US banks to be “well capitalized”:

$$\frac{\text{Total Risk-Based Capital}}{\text{Risk Weighted Assets}} \geq 10\%$$

$$\frac{\text{Tier 1 (core) Capital}}{\text{Risk Weighted Assets}} \geq 6\%$$

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- Asset risk weights are crucial and (for structured finance bonds) entirely driven by credit ratings

CREDIT SUPPLY EXPANSION “FUELED” BY REGULATORY FRAMEWORK

Regulatory capital under Basel II: example of a AAA bond @ $L+0.40\%$

CREDIT SUPPLY EXPANSION “FUELED” BY REGULATORY FRAMEWORK

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- On the bank's balance-sheet (Basel II, advanced IRB approach)
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- On the bank's ABCP conduit (Basel II, standardized approach)
 - 20% credit conversion factor for eligible liquidity facilities
 - 20% risk weight
 - 8% risk based capital ratio
 - \Rightarrow 0.32% equity capital requirement and 125% ROE

RISK-WEIGHTS FOR SECURITIZATIONS FROM BASEL I TO BASEL II

Credit Rating	Basel I	Basel II standardized	Basel II advanced IRB senior	Basel II advanced IRB non-senior
AAA	100	20	7	12
AA	100	20	8	15
A+	100	50	10	18
A	100	50	12	20
A-	100	50	20	35
BBB+	100	100	35	50
BBB	100	100	60	75
BBB-	100	100	100	100
BB+	100	350	250	250
BB	100	350	425	425
BB-	100	350	650	650
NIG	deduction	deduction	deduction	deduction

CREDIT SUPPLY EXPANSION “FUELED” BY REGULATORY FRAMEWORK

Regulatory capital arbitrage by monoline bond insurers

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Regulatory capital arbitrage by monoline bond insurers

- Bond insurers historically specialized in municipal bond insurance
 - AMBAC, MBIA, FSA, FGIC, CIFG, XLCA
 - Triple-A rated
 - Regulated by state insurance regulators
 - Regulations relying on credit rating of insured portfolio
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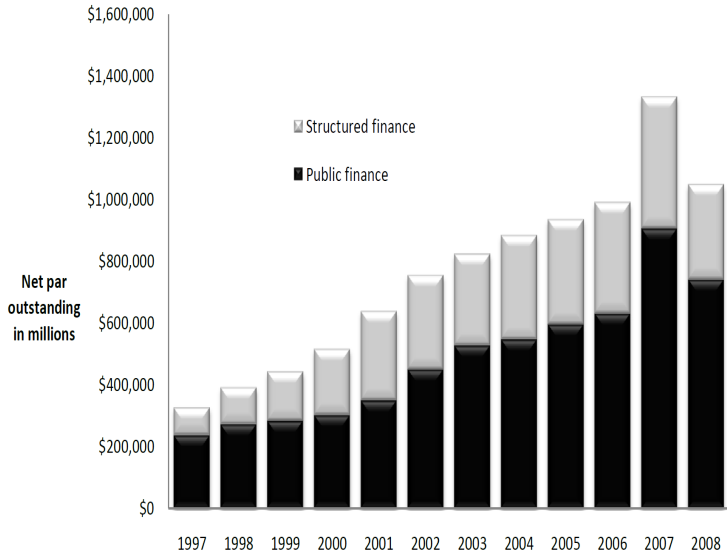
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BOND INSURANCE PORTFOLIOS (AMBAC, FSA, MBIA)



THE ROLE OF RATING AGENCIES

Who are they

What they do

Inherent conflicts

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- Moody's, S&P, Fitch

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- Provide an “opinion”
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- For-profit businesses
- Issuer-pay business model

RATING AGENCY PROCESS

- Quantifying structured finance bond losses
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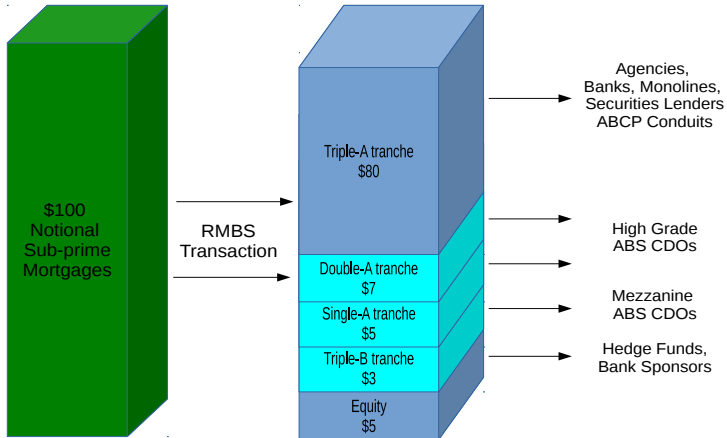
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- Rating based on expected (or first dollar) loss tables

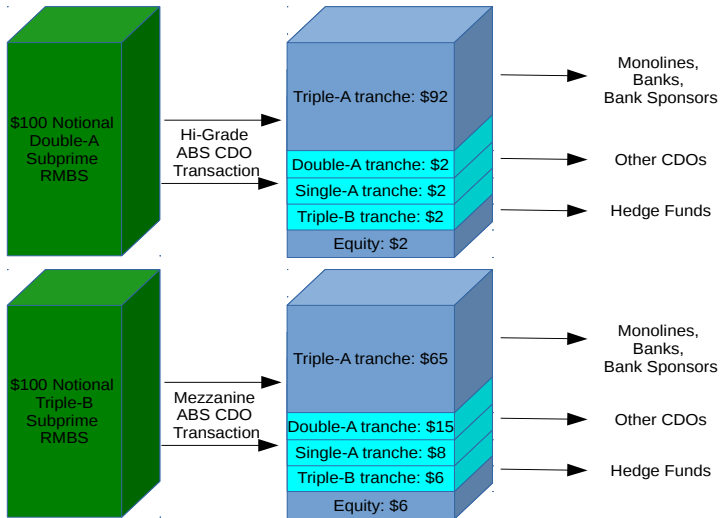
MOODY'S "IDEALIZED" EXPECTED LOSS TABLE

Moody's	Year									
Rating	1	2	3	4	5	6	7	8	9	10
Aaa	0.0000%	0.0001%	0.0004%	0.0010%	0.0016%	0.0022%	0.0029%	0.0036%	0.0045%	0.0055%
Aa1	0.0003%	0.0017%	0.0055%	0.0116%	0.0171%	0.0231%	0.0297%	0.0369%	0.0451%	0.0550%
Aa2	0.0007%	0.0044%	0.0143%	0.0259%	0.0374%	0.0490%	0.0611%	0.0743%	0.0902%	0.1100%
Aa3	0.0017%	0.0105%	0.0325%	0.0556%	0.0781%	0.1007%	0.1249%	0.1496%	0.1799%	0.2200%
A1	0.0032%	0.0204%	0.0644%	0.1040%	0.1436%	0.1815%	0.2233%	0.2640%	0.3152%	0.3850%
A2	0.0060%	0.0385%	0.1221%	0.1898%	0.2569%	0.3207%	0.3905%	0.4560%	0.5401%	0.6600%
A3	0.0214%	0.0825%	0.1980%	0.2970%	0.4015%	0.5005%	0.6105%	0.7150%	0.8360%	0.9900%
Baa1	0.0495%	0.1540%	0.3080%	0.4565%	0.6050%	0.7535%	0.9185%	1.0835%	1.2485%	1.4300%
Baa2	0.0935%	0.2585%	0.4565%	0.6600%	0.8690%	1.0835%	1.3255%	1.5675%	1.7820%	1.9800%
Baa3	0.2310%	0.5775%	0.9405%	1.3090%	1.6775%	2.0350%	2.3815%	2.7335%	3.0635%	3.3550%
Ba1	0.4785%	1.1110%	1.7215%	2.3100%	2.9040%	3.4375%	3.8830%	4.3395%	4.7795%	5.1700%
Ba2	0.8580%	1.9085%	2.8490%	3.7400%	4.6255%	5.3735%	5.8850%	6.4130%	6.9575%	7.4250%
Ba3	1.5455%	3.0305%	4.3285%	5.3845%	6.5230%	7.4195%	8.0410%	8.6405%	9.1905%	9.7130%
B1	2.5740%	4.6090%	6.3690%	7.6175%	8.8660%	9.8395%	10.5215%	11.1265%	11.6820%	12.2100%
B2	3.9380%	6.4185%	8.5525%	9.9715%	11.3905%	12.4575%	13.2055%	13.8325%	14.4210%	14.9600%
B3	6.3910%	9.1355%	11.5665%	13.2220%	14.8775%	16.0600%	17.0500%	17.9190%	18.5790%	19.1950%
Caa1	9.5599%	12.7788%	15.7512%	17.8634%	19.9726%	21.4317%	22.7620%	24.0113%	25.1195%	26.2350%
Caa2	14.3000%	17.8750%	21.4500%	24.1340%	26.8125%	28.6000%	30.3875%	32.1750%	33.9625%	35.7500%
Caa3	28.0446%	31.3548%	34.3475%	36.4331%	38.4017%	39.6611%	40.8817%	42.0669%	43.2196%	44.3850%

SUBPRIME RMBS CAPITAL STRUCTURE



ABS CDO CAPITAL STRUCTURE



RATING ABS CDOs: ASSUMED BOND-LEVEL CORRELATIONS

- An example: Moody's (2005 rating methodology)

Estimated Asset Correlations for Major structured finance Sectors

	Consumer ABS	RMBS	CMBS	Other CDOs	HY Corporate CDOs
Consumer ABS	18%	5%	2%	3%	5%
RMBS		12%	4%	3%	2%
CMBS			4%	2%	3%
Other CDOs				5%	5%
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- “Add-ons”
 - For regional concentration
 - For vintage concentration
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MATURITY TRANSFORMATION, BANKING AND SHADOW BANKING

Repo transactions

ABCP conduits and SIVs

Bank-sponsored puttable debt

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- municipal bond market
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Moral hazard and agency problems

- deposit insurance and too-big-to-fail
- financial industry compensation structure

PART IV

LESSONS AND QUESTIONS

WHAT WE HAVE LEARNED

Lessons drawn

Remaining areas of concern (my views)

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Trade-offs when tightening bank regulations

Financial desintermediation

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