Lessons From The Great Recession

Causes And Consequences

Berkeley Econ 196

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Overview

- Deepest downturn since the Great Depression has shaken world economy as well as the economics profession
  - What can we learn from the forces that precipitated and amplified the Great Recession?

- Talk based on the following papers (available on my website):
  - Mian and Sufi (QJE 2009, AER 2010, IMF Econ Rev 2010)
  - Mian, Sufi and Trebbi (AER and working paper)

What drove the Great Recession?

- Dominant policy rhetoric
  - It was driven by problems in "bank balance sheets"
  - e.g. failure of Lehman and others created a sharp reduction in credit …
  - Major policy interventions driven by this view, e.g. TARP

- Our view (Mian and Sufi 2010, IMF Economic Review)
  - The fundamental problem lay in *household* balance sheets.
  - Recession driven by the ensuing reduction in aggregate demand
  - Very different policy implications

Evidence (updated)

- Household leverage-driven recession
  - Household leverage is an *early* and *strong* predictor of real downturn.

- Policy implications
  - Investment subsidies, focus only on bank capital, durables subsidy, general expenditure is not targeted enough.
  - Need to "workout" household balance sheets as swiftly as possible.

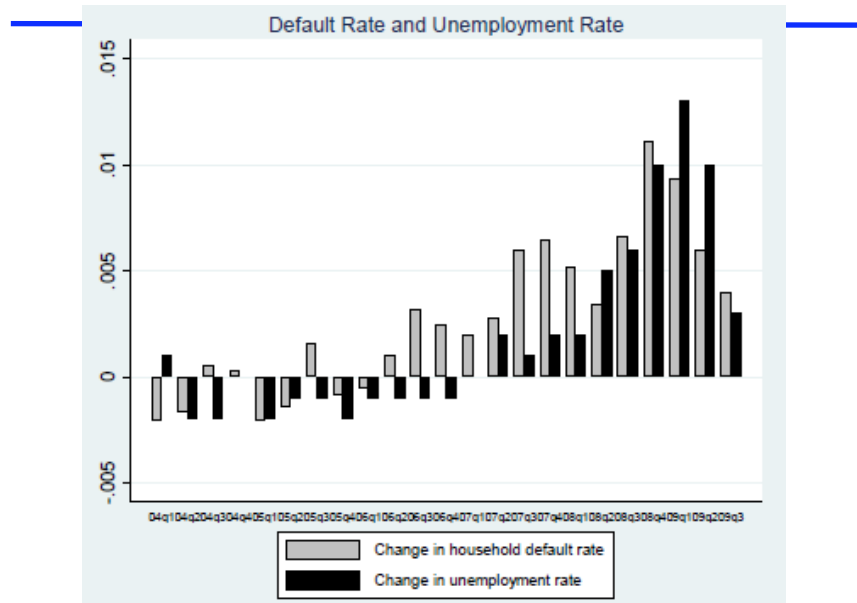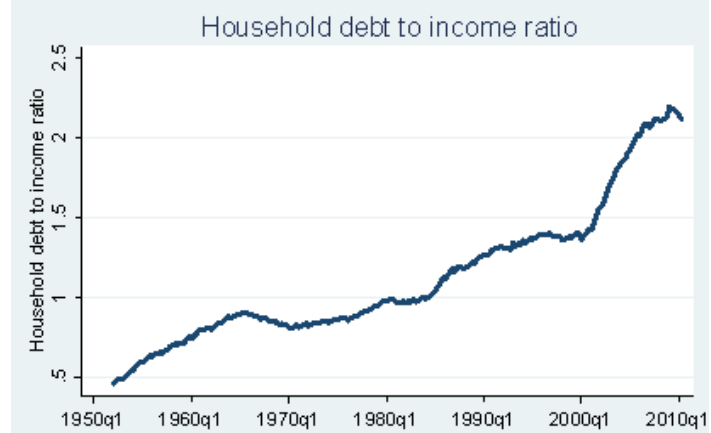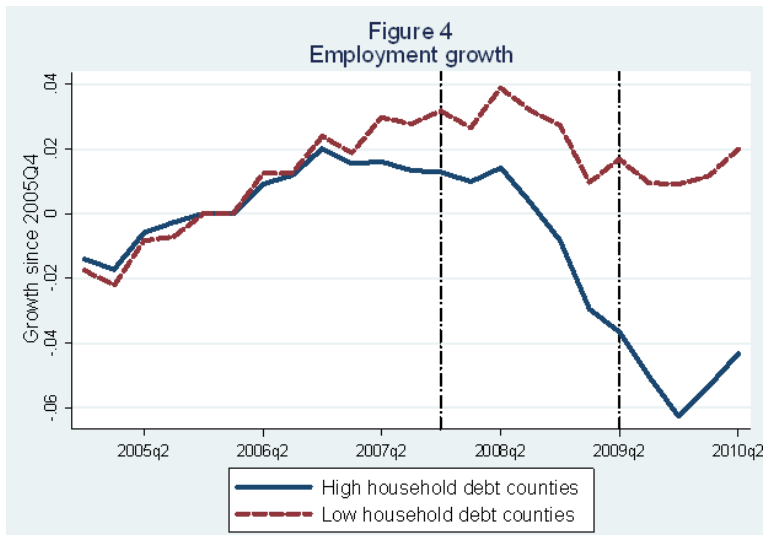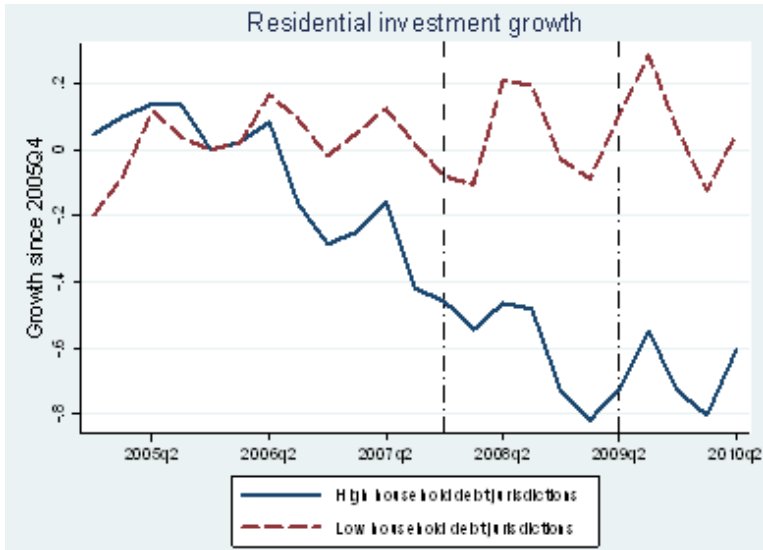**Mortgage Defaults Increased Long Before Unemployment**

Default Rate and Unemployment Rate

Figure 1
U.S. Household Debt

Household debt to income ratio

Figure 2
Debt to income increase from 2002 to 2006, by county

Figure 3
Auto Sales and Residential Investment

Residential investment growth
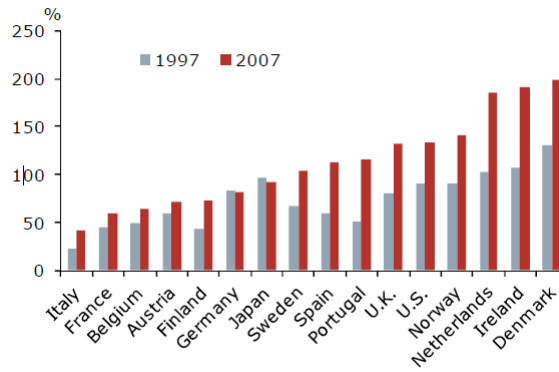

Figure 4
Employment growth

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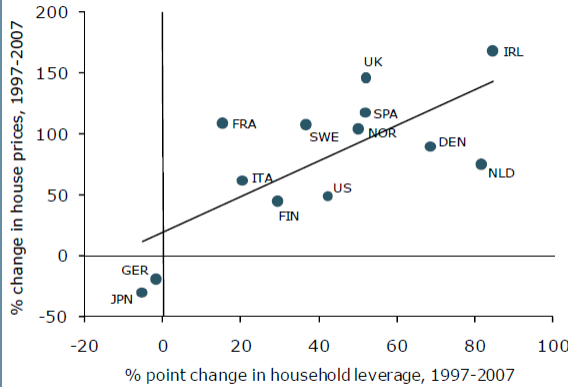# It is not just the U.S. ….

- *Glick and Lansing (2010)*

Figure 1
Household leverage ratios: Debt to disposable income

Note: The following countries use different data years: Japan 1997, 2006; Spain 2000, 2007; Ireland 2002, 2007.

House Prices and Credit

Figure 3
Household leverage and the run-up in house prices

Note: The plotted line depicts the best fit relationship in the data as generated by a simple least square statistical regression.
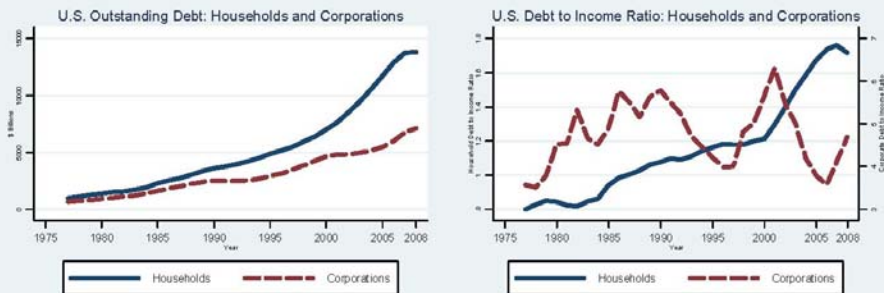
Household Leverage And The Recession

Figure 4
Household leverage and the decline in consumption

Note: The plotted line depicts the best fit relationship in the data as generated by a simple least square statistical regression.
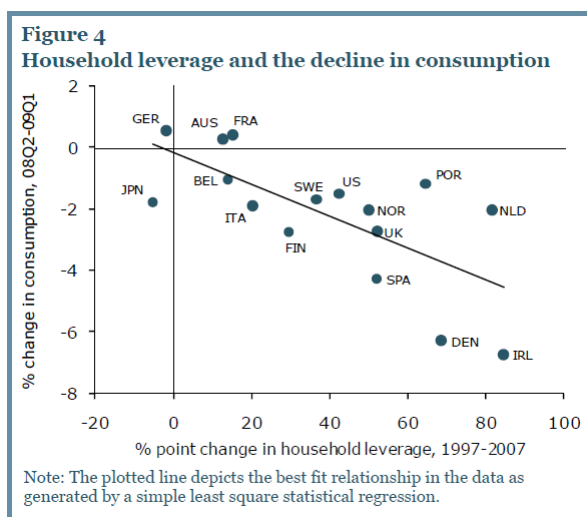
Summary 1

- Household leverage-driven recession
  - Household leverage is an *early* and *strong* predictor of real downturn.

- Policy implications
  - Investment subsidies, focus only on bank capital, durables subsidy, general expenditure is not targeted enough.
  - Need to "workout" household balance sheets as swiftly as possible.
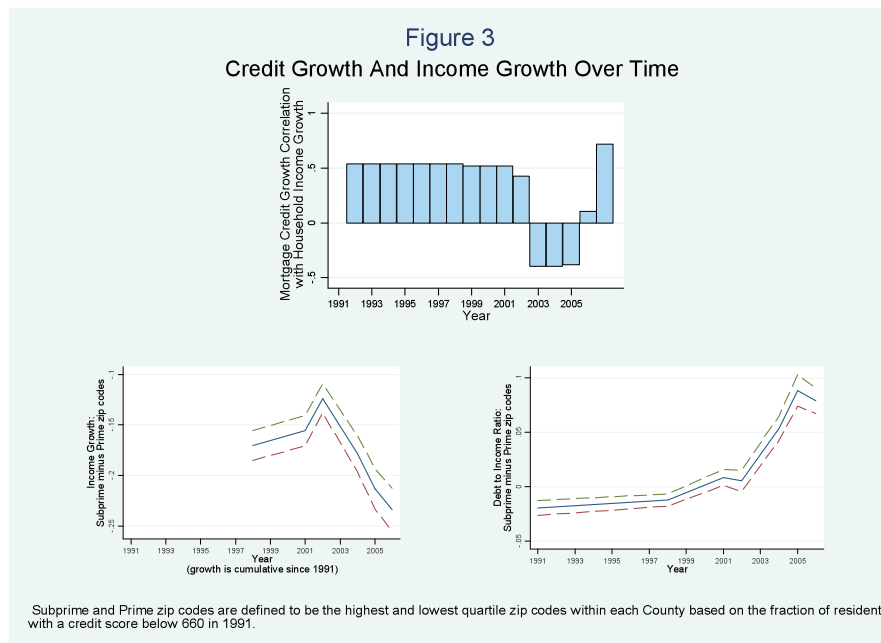
Why did household leverage go up?

Three broad hypotheses

- The "fundmentals" (credit demand) hypothesis
  - Leverage (and house prices) was driven by fundamentals, the economy got a bad unlucky shock leading to the recession
  - "House price increases largely reflect strong economic fundamentals …" - Oct. 20, 2005

- The "excess credit" (credit supply) hypothesis
  - Supply curve for credit shifted out – credit supply became cheaper and more abundant. Why? Could be due to one or more of: securitization, agency problems, lose monetary policy, global imbalances etc.

- The irrational exuberance in housing market hypothesis
  - People (irrationally) expected house prices to go up forever, and credit just followed these hyper-expectations.

Evidence Against Fundamentals View

- Mian and Sufi QJE 2009
  - Areas with largest growth in credit have declining relative (and absolute) incomes.
    - i.e. correlation of income and credit growth turned negative in 02-05. Only period in last 20 years.
    - Inconsistent with standard demand side explanations

Figure 3
Credit Growth And Income Growth Over Time

Subprime and Prime zip codes are defined to be the highest and lowest quartile zip codes within each County based on the fraction of residents with a credit score below 660 in 1991.

Evidence in favor of supply expansion

- Cross-sectional growth strongly correlated with growth in non-GSE securitization and initial mortgage denial rates.

- Why supply expanstion?
  - Securitization? (financial innovation more broadly)
    - Yes
  - Loose monetary policy? (e.g. Taylor rule not followed)
    - However, low and declining interest rates not a sufficient explanation
  - Global imbalances?
    - Likely

Is Securitization To Blame?

- The market imposed a strong credit supply constraint on prospective borrowers in 1996, esp. subprime.
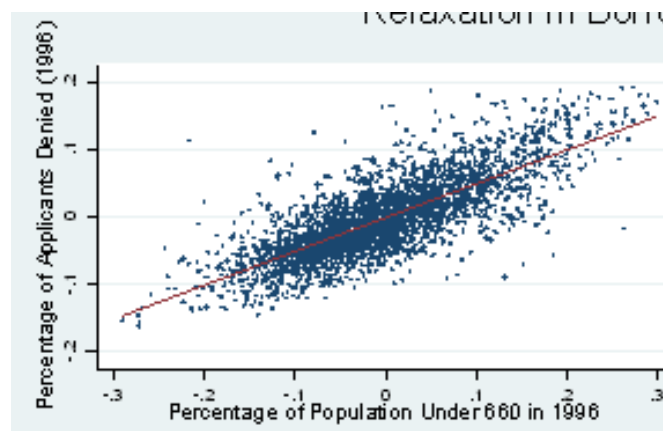
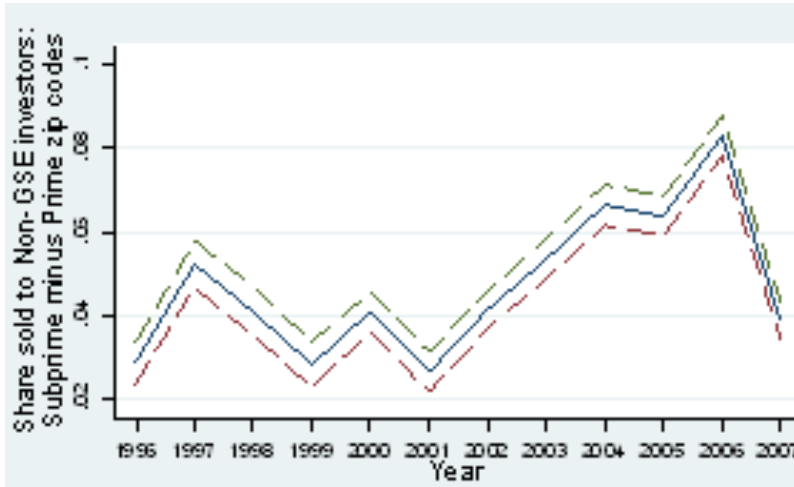# The constraint kept tightening ….
Until 2002
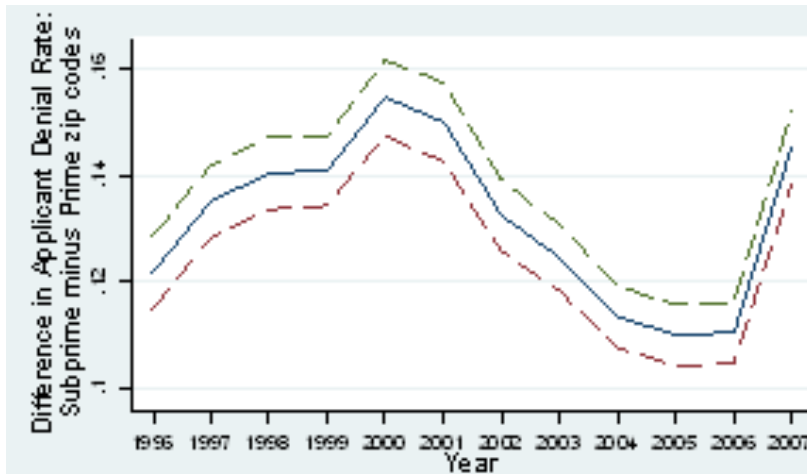
That is when (private) securitization kicks in as well …

Growth in private securitization strongest in sub-prime neighborhoods

- Result driven by mortgages sold to "unrelated" parties!
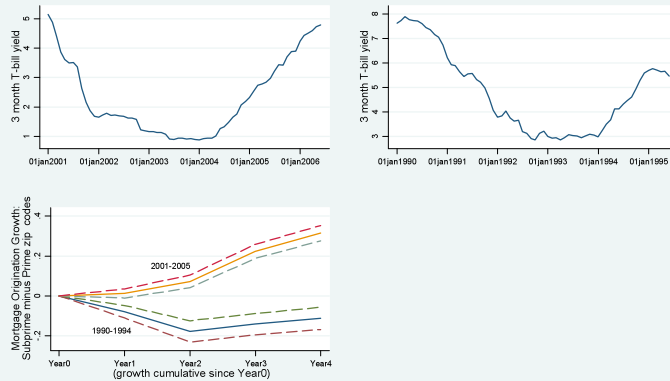

Loose Monetary Policy?
Sub-prime expansion did not happen in previous monetary expansion

Figure 4
Relative Mortgage Origination Growth For Subprime Zip Codes
In Falling Interest Rate Periods

Subprime and Prime zip codes are defined to be the highest and lowest quartile zip codes within each County based on the fraction of residents with a credit score below 660 in the base year.

Global Imbalances?

- Securitization may be a "proximate cause" of sub-prime credit expansion and house price appreciation
  - But securitization has been around for years
  - Why did it jump up all of a sudden around 2001-02?
  - A "deeper cause" of the rise in securitization and hence the housing bubble is likely to be related to "global imbalances"
- Global imbalances
  - Fast-growing and oil-rich Asian economies start saving large amounts of capital (primarily through their central banks)
  - This capital is pushed into western countries … primarily the U.S.
  - Why did Asia do that?
  - We need to get understand a bit of history to appreciate the full backdrop. [See Appendix Slides: Will cover time-permitting]

House price appreciation expectations?

- There are two Americas
  - Flat America (Atlanta)
  - Rocky / coastal America (San Francisco)
- Flat America has high housing supply elasticity
  - Any house price appreciation pressure leads to more housing that can be easily built
  - House prices are not expected to go up
    (Caveat: no one understands Nevada!!)
- Hence, is house price appreciation created the sub-prime boom, we should not observe it in Flat America (e.g. Texas, Atlanta)
  - But we do! (Source: Mian and Sufi 2009)

Flat America saw no house price bubble
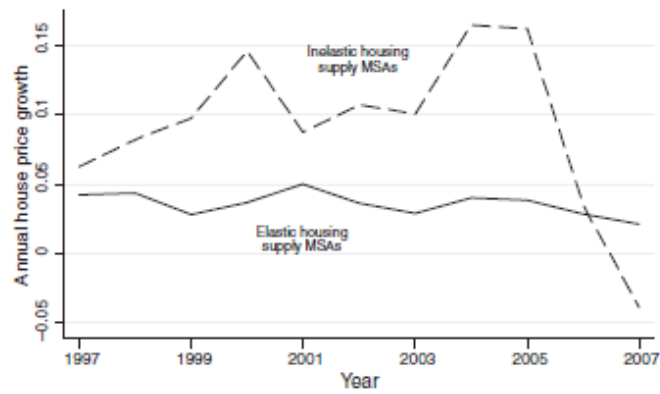
Flat America saw no *relative* boom in sub-prime house prices either
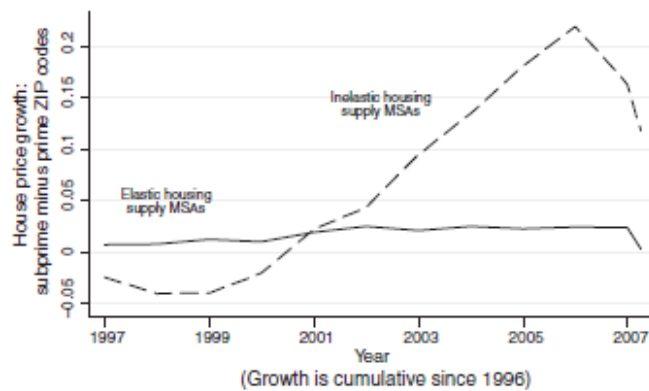
Yet Flat America received its fair share of sub-prime credit boom

TABLE VII

MORTGAGE ORIGINATION GROWTH AND MORTGAGE DEFAULT RATE CHANGES FOR HIGH–HOUSING SUPPLY ELASTICITY MSAs

	Income growth 2002–2005	Change in fraction sold in securitizations 2002–2005	Change in fraction to other financial firms 2002–2005	Mortgage origination growth 2002–2005		Change in mortgage default rate 2002–2005	
					With controls		With controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fraction subprime borrowers, 1996	−0.069**	0.100**	0.061**	0.305**	0.413**	0.057**	0.056**
	(0.010)	(0.009)	(0.014)	(0.061)	(0.069)	(0.015)	(0.018)
N	655	655	655	655	655	655	655
R^2	.17	.28	.43	.10	.12	.04	.05

The Amplification Mechanism

- May be there was more mortgage credit availability due global savings / securitization etc.

- Why should it have much impact on the economy beyond the construction sector?
  - Look for household "accelerator" effects through housing collateral.

- Use micro data to instrument house price growth with housing elasticity and its interaction with credit scores.

- Very large home-equity based borrowing channel (25-30 cents for a dollar). (Mian and Sufi AER forthcoming)

The young and "credit-constrained" most affected
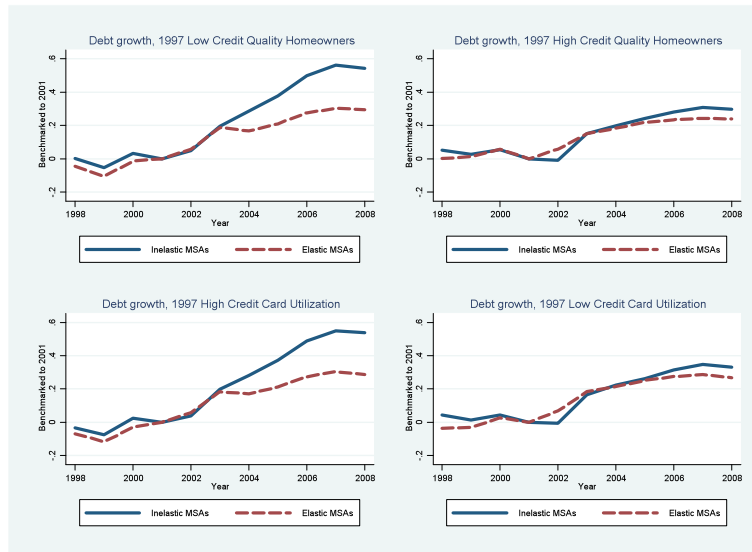
Summary 2

- The "fundmentals" (credit demand) hypothesis
  - Rejected. Credit followed lower income growth

- The "excess credit" (credit supply) hypothesis
  - Yes. Lending standards significantly loosened
  - Securitization strong suspect
  - Loose monetary policy not sufficient
  - Global imbalances strong suspect too.

- The irrational exuberance in housing market hypothesis
  - Not a sufficient explanation, causality runs the other way

- Amplification mechanism
  - The home equity withdrawal effect

## Fundamental Flaw In Financial System: Appropriate Risk Sharing

- Even if household "over borrow" for some reason, why should it have real effects?
  - One household's liability is another households asset
  - Shocks are simply transfers between lenders and borrowers.
  - Hence why should financial distress for some households lead to *aggregate* downturn?
  - One Answer: marginal propensity to consume is not the same for lender/borrower
    - Redistribution due to financial shocks matters!
    - Hence need for better risk-sharing – e.g. financial contracting that allows for automatic restructuring.
  - Another answer: Fire sale dynamics … evidence: Mian, Sufi and Trebbi (working paper)

To Foreclose or not?

- We generate exogenous variation in foreclosures by utilizing variation induced by state laws on whether foreclosures are required to take place through courts

- We examine the effect of foreclosures on house prices, residential investment, and durable consumption

- Findings

  - Judicial states have much lower incidence of foreclosures, even conditional on delinquency and even right at the border

  - We find a large negative effect of foreclosures on house prices

  - We also find a large negative effect of foreclosures on both residential investment and auto sales

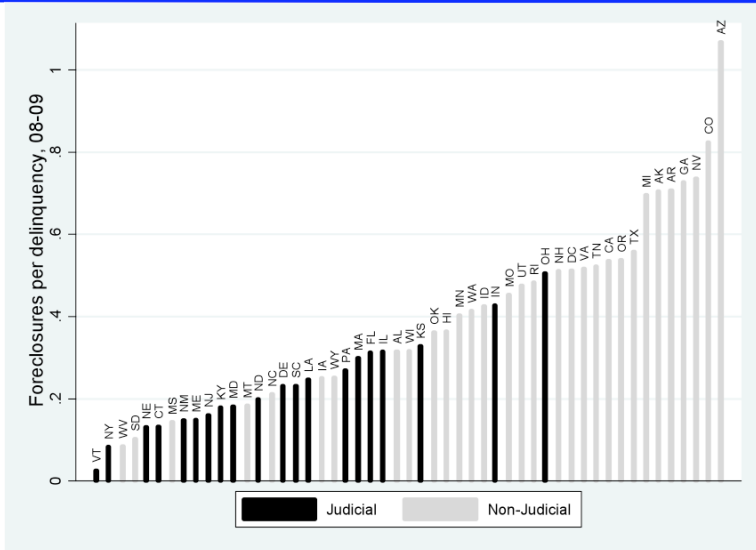## States with Judicial Foreclosure Requirement (Dark Gray)
(Figure 3)

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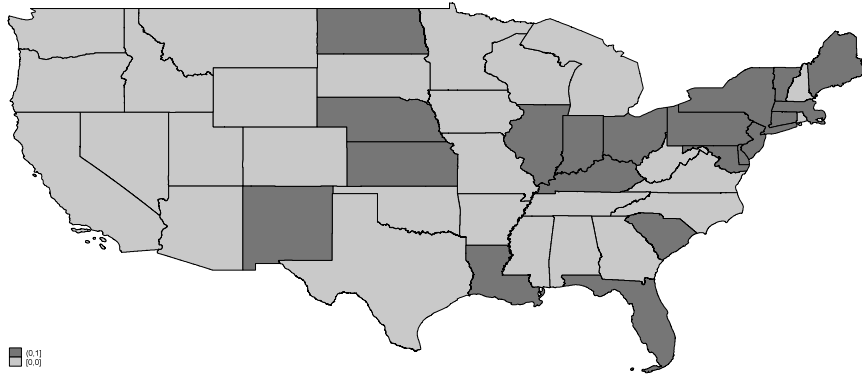
First Stage
(Table 4)

	(1)	(2)	(3)	(4)
	Foreclosures per homeowner 08-09	Defaults per homeowner 08-09	Foreclosures per homeowner 08-09	Foreclosures per default 08-09
Judicial foreclosure	-0.030**	-0.004	-0.026**	-0.236**
	(0.010)	(0.012)	(0.006)	(0.048)
Defaults per homeowner, 08-09			0.788**	
			(0.143)	
Constant	0.057**	0.096**	-0.019	0.464**
	(0.009)	(0.008)	(0.012)	(0.041)
N	51	51	51	51
R^2	0.116	0.003	0.698	0.277

Magnitude: Judicial foreclosure requirement states have foreclosure rate that is 2/3 standard deviation lower, 2/3 of mean
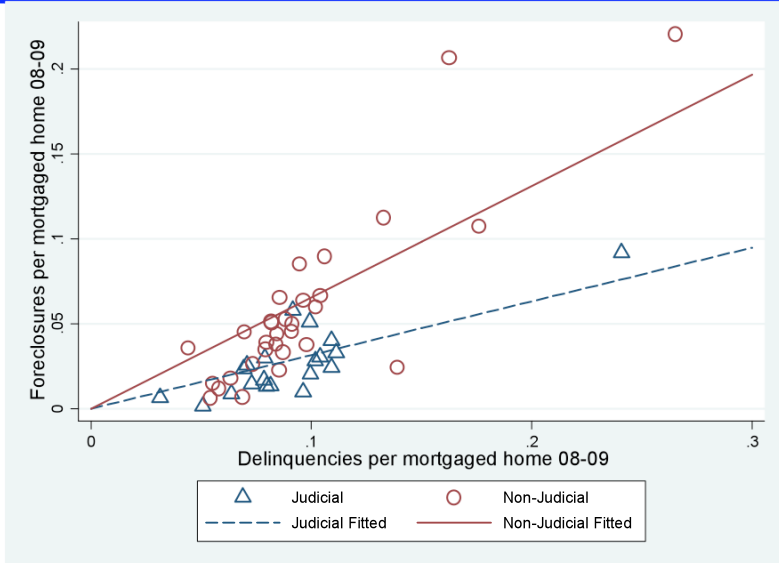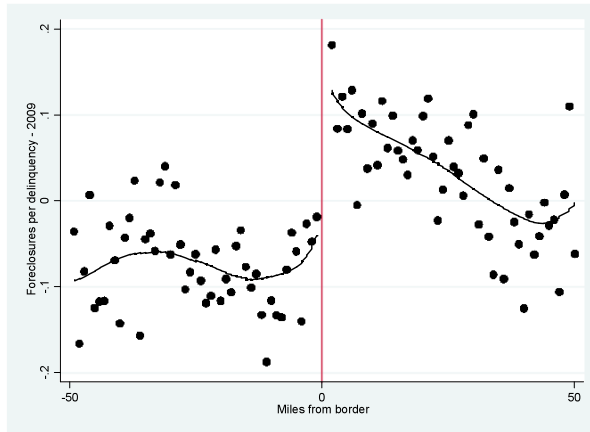
First Stage: More evidence
(Figure 4)

First Stage: More evidence
(Figure 4)

19

First Stage: Border Discontinuity
(Figure 5)

Exclusion Restriction
(Table 4)

	Judicial foreclosure requirement	N	R^2
Delinquencies per homeowner, 06	0.0014	51	0.003
	(0.004)		
Delinquencies per homeowner, 09	-0.0028	51	0.001
	(0.010)		
Zillow house price growth, 2002 to 2005	0.029	45	0.007
	(0.050)		
FCSW house price growth, 2002 to 2005	0.049	24	0.018
	(0.073)		
Debt to income increase, 2002 to 2005	-0.026	51	0.007
	(0.042)		
Subprime consumer fraction, 2000	-0.0161	51	0.014
	(0.018)		
Ln(Income, 2005)	0.0332	51	0.010
	(0.050)		
Fraction with income less than 25K, 2005	-0.0046	51	0.003
	(0.012)		
Unemployment rate, 2000	-0.0046	51	0.029
	(0.004)		
Black fraction, 2000	0.0103	51	0.002
	(0.030)		
Hispanic fraction, 2000	0.0050	51	0.001
	(0.021)		
Less than high school education fraction, 2000	0.0013	51	0.000
	(0.012)		

The Effect of Foreclosures on House Prices
Reduced Form
(Figure 8)
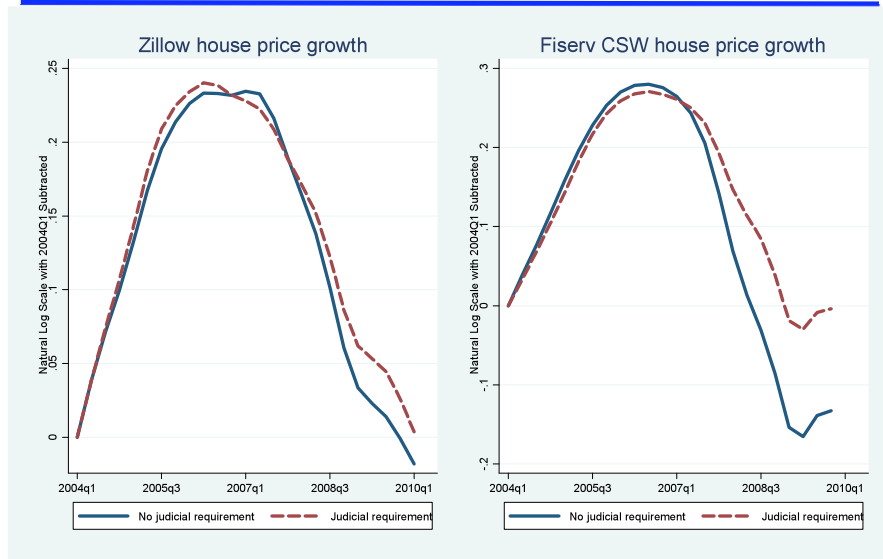
The Effect of Foreclosures on House Prices
State-Level 2SLS Estimates
(Table 5)

	Zillow house price growth, 07-10q1			FCSW house price growth, 07-09		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 08-09	-1.749*	-1.642*	-2.348*	-1.457+	-1.074	-3.575
	(0.818)	(0.671)	(1.027)	(0.731)	(0.652)	(3.059)
Delinquencies per homeowner, 08-09	-0.903	-0.099	2.087	-1.384*	-0.158	5.920
	(0.722)	(0.637)	(3.088)	(0.637)	(0.673)	(17.638)
House price growth, 02-06		-0.053	-0.104		-0.126	-0.300
		(0.067)	(0.110)		(0.118)	(0.316)
House price growth, 06-07		0.988**	0.848+		1.151+	1.491
		(0.234)	(0.432)		(0.648)	(1.920)
Additional Controls	N	N	Y	N	N	Y
N	46	43	43	24	24	24
R^2	0.643	0.746	0.758	0.753	0.835	0.858

Magnitude: 1SD increase in foreclosures → 2/3 SD fall in house price growth

Median to 90th percentile of foreclosures distribution → -10% HP growth

The Effect of Foreclosures on Residential Investment
2SLS Estimates
(Table 8)

Census Permits Growth, 2007 to 2009	State-level 2SLS			CBSA-level 2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 08-09	-4.707*	-4.132*	-1.709	-7.800*	-6.656+	-6.629*
	(2.182)	(1.893)	(2.373)	(3.857)	(3.549)	(3.192)
Delinquencies per homeowner, 08-09	-0.417	-0.896	-12.036**	1.281	-0.084	-2.578
	(1.788)	(1.537)	(4.254)	(2.207)	(2.051)	(1.936)
Residential permits growth, 02-06		-0.115	-0.275+		-0.085*	-0.074
		(0.111)	(0.156)		(0.036)	(0.046)
Residential permits growth, 06-07		-0.040	-0.112		-0.383**	-0.372**
		(0.188)	(0.256)		(0.065)	(0.068)
Additional Controls	N	N	Y	N	N	Y
N	51	51	51	945	943	943
R^2	0.448	0.483	0.620	0.051	0.180	0.225

Magnitude: 1SD increase in foreclosures → 2/3 SD fall in residential investment
Median to 90th percentile of foreclosures distribution → -23% Res Inv

The Effect of Foreclosures on Auto Sales
2SLS Estimates
(Table 9)

Auto Sales Growth, 2007 to 2009	State-level 2SLS			CBSA-level 2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 08-09	-2.342+	-2.643+	-3.300+	-6.181*	-5.489*	-4.296**
	(1.318)	(1.381)	(1.758)	(2.969)	(2.315)	(1.452)
Delinquencies per homeowner, 08-09	-0.441	0.161	-2.745	2.055	1.598	0.361
	(1.084)	(1.087)	(4.438)	(1.729)	(1.338)	(0.870)
Residential permits growth, 02-06		0.172	0.535**		-0.331*	-0.201+
		(0.214)	(0.149)		(0.161)	(0.119)
Residential permits growth, 06-07		0.718	0.752		-0.387*	-0.095
		(0.480)	(0.527)		(0.161)	(0.108)
Additional Controls	N	N	Y	N	N	Y
N	51	51	51	958	958	958
R^2	0.352	0.398	0.514			0.139

Magnitude: 1SD increase in foreclosures → 0.70 SD fall in residential investment
Median to 90th percentile of foreclosures distribution → -14% Auto sales

Summary 3

- To foreclose or not?
    - Use state laws on foreclosure requirements as an instrument for foreclosures and examine the effect of foreclosures on house prices, residential investment, and durable consumption

- Findings

    - Judicial states have much lower incidence of foreclosures, even conditional on delinquency and even right at the border

    - We find a large negative effect of foreclosures on house prices

    - We also find a large negative effect of foreclosures on both residential investment and auto sales

Appendix Slides

Global Imbalances

The International Roots Of U.S. Housing Boom And Financial Crisis

Policy Implications For Emerging Markets After Repeated Crises

- By 2000 Policy implications seem obvious:
  - Avoid currency mismatches
  - Keep inflation under control
  - Adopt flexible exchange rate policy
  - Keep fiscal deficits down
  - Manage Debt to GDP to sustainable levels
  - Don't borrow short and lend long
  - Keep private sector leverage down

Since 2002 EMs became "good citizens"

- Adopted flexible exchange rates
- Kept inflation down
- Controlled deficit spending
- No major sovereign default or banking crisis
- Kept accumulating foreign reserves as a "safety net"
- Did they become too good?
  - The other side of coin: United States

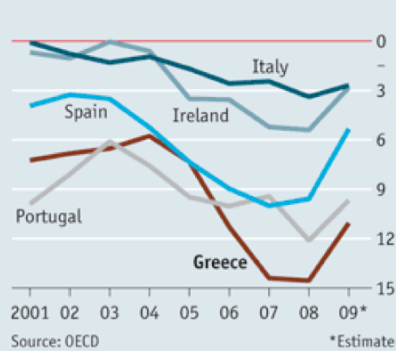# U.S. became an Emerging Market!

Current Account Balance
Percent of GDP
International Monetary Fund, World Economic Outlook Database,
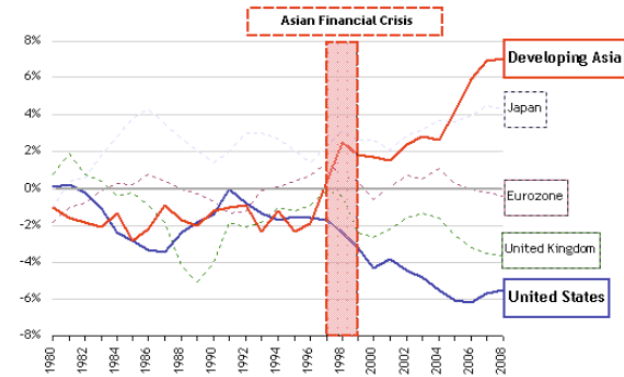
PIIGS (similar to U.S.)

Looking forward …

- EMs have strong tail winds:
  - The forces of convergence (current job market?)
- There are significant adjustments in the short run, especially as "global imbalances" of the past 6-7 years unwind.
- Will emerging markets may emerge stronger?
- Will the global financial markets learn their lessons?
- Does a wave of sovereign defaults and high inflation await us?

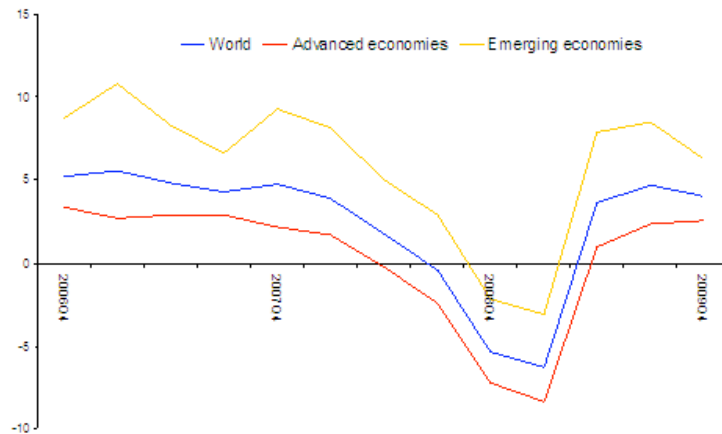**Figure 1.** GDP growth, 2006-2009 (quarter over same quarter of previous year)
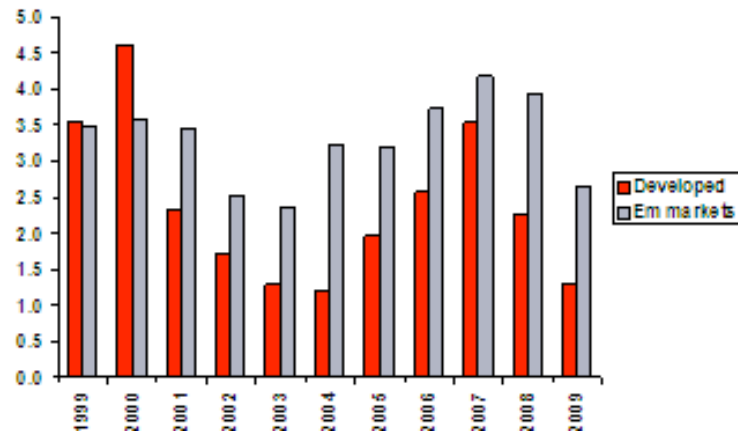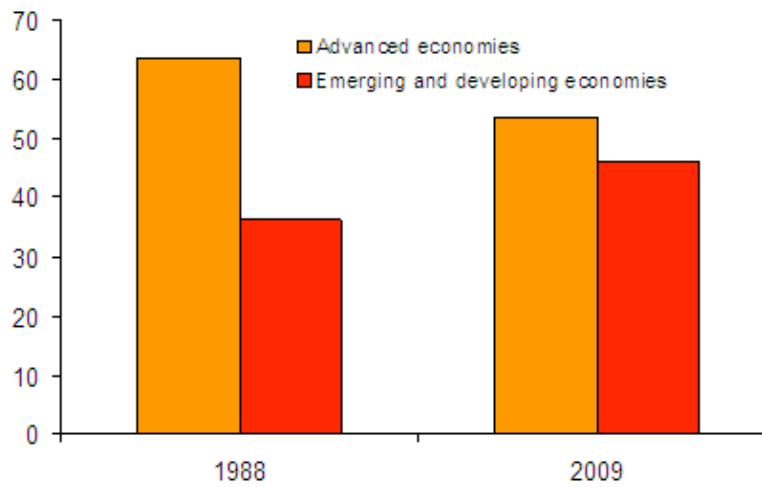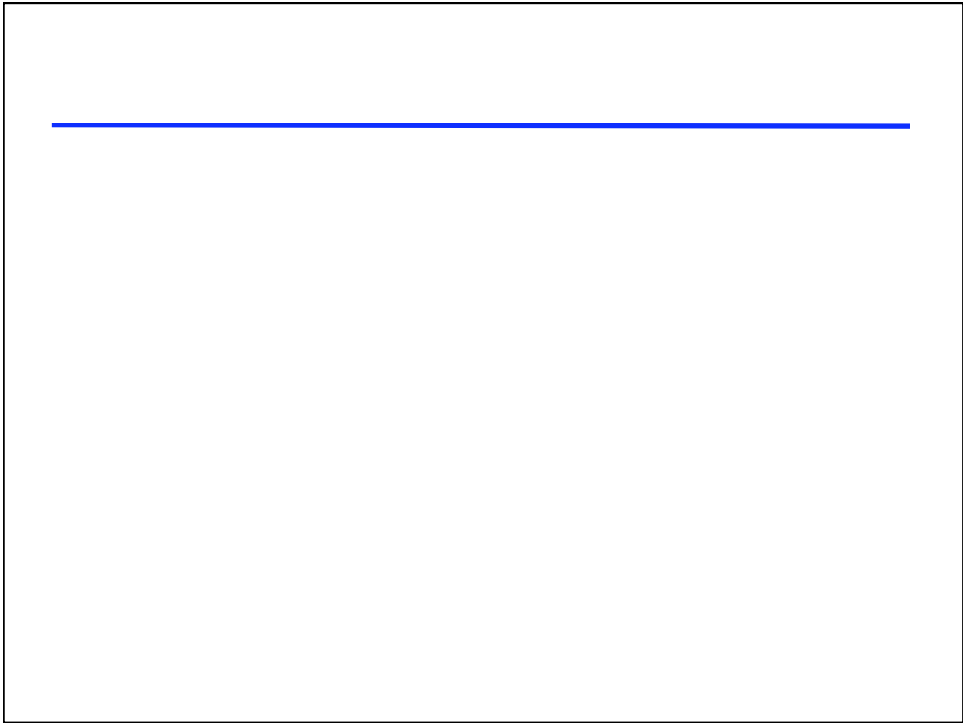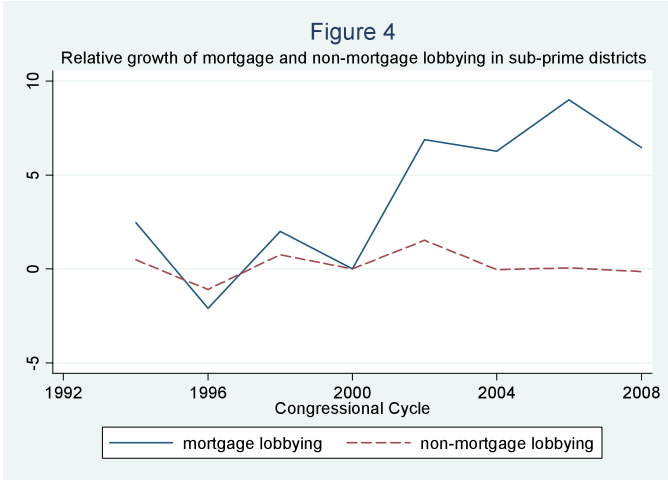
Figure 3b. Global FDI flows, (% of GDP)

Figure 4. Shares in world GDP (at PPP exchange rates)

Why do markets go crazy?
One possibility: Political Commitment Problem

Figure 4
Relative growth of mortgage and non-mortgage lobbying in sub-prime districts

Source: Mian, Sufi and Trebbi (AER 2010)

Figure 5
AHRFPA '08 vote against change in mortgage default rate: By Ideology

Figure 6
EESA '08 vote against Log Campaign Contributions: By Ideology