The Consequences of Mortgage Credit Expansion

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What is the Nature of the Mortgage Default Crisis?

Change in Mortgage Defaults, 2005 to 2007
Prime versus Subprime Zip Codes

	Subprime zip codes	Prime zip codes	Subprime multiple
Atlanta, GA	3.3%	1.3%	162.5%
Boston, MA	5.0%	1.1%	351.7%
Charlotte, NC	1.4%	0.5%	160.7%
Chicago, IL	3.6%	1.6%	122.2%
Cleveland, OH	3.4%	1.4%	138.1%
Dallas, TX	1.5%	0.5%	197.1%
Denver, CO	1.8%	1.0%	80.4%
Detroit, MI	6.6%	1.8%	265.9%
Las Vegas, NV	7.1%	6.0%	18.3%
Los Angeles, CA	7.8%	2.3%	237.6%
Miami/Fort Lauderdale, FL	10.1%	6.5%	55.6%
Minneapolis, MN	4.2%	1.2%	266.9%
New York, NY	6.3%	1.0%	532.9%
Phoenix, AZ	7.7%	2.9%	163.7%
Portland, OR	0.9%	0.9%	0.1%
San Diego, CA	7.4%	1.0%	621.4%
San Francisco, CA	3.5%	1.0%	264.4%
Seattle, WA	1.3%	0.6%	143.6%
Tampa, FL	4.7%	5.0%	-6.4%
Washington, DC	6.1%	2.2%	176.7%
Full Sample Average	4.8%	1.5%	217.8%

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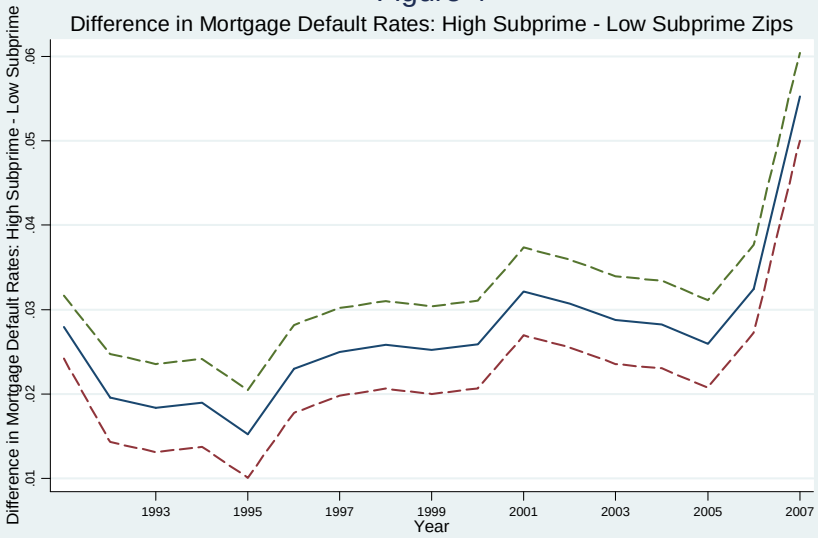
Figure 4

Difference in Mortgage Default Rates: High Subprime - Low Subprime Zips



Change in Mortgage Credit Growth, 2002 to 2005
Prime versus Subprime Zip Codes

	Subprime zip codes	Prime zip codes	Subprime multiple
Atlanta, GA	19.3%	15.7%	22.9%
Boston, MA	24.5%	12.0%	104.6%
Charlotte, NC	7.1%	11.3%	-37.1%
Chicago, IL	24.9%	15.3%	62.6%
Cleveland, OH	15.5%	7.1%	118.3%
Dallas, TX	11.4%	9.7%	17.2%
Denver, CO	8.8%	7.1%	24.0%
Detroit, MI	24.6%	2.3%	984.0%
Las Vegas, NV	-2.1%	12.3%	-117.0%
Los Angeles, CA	34.9%	13.9%	151.0%
Miami/Fort Lauderdale, FL	7.7%	14.8%	-47.8%
Minneapolis, MN	12.9%	5.4%	140.2%
New York, NY	35.3%	14.6%	141.0%
Phoenix, AZ	47.8%	20.7%	130.9%
Portland, OR	28.8%	17.6%	63.7%
San Diego, CA	21.9%	11.7%	88.1%
San Francisco, CA	20.3%	14.1%	44.1%
Seattle, WA	28.3%	18.6%	52.3%
Tampa, FL	46.0%	32.3%	42.3%
Washington, DC	33.0%	20.2%	63.4%
Full Sample Average	23.0%	13.3%	73.1%

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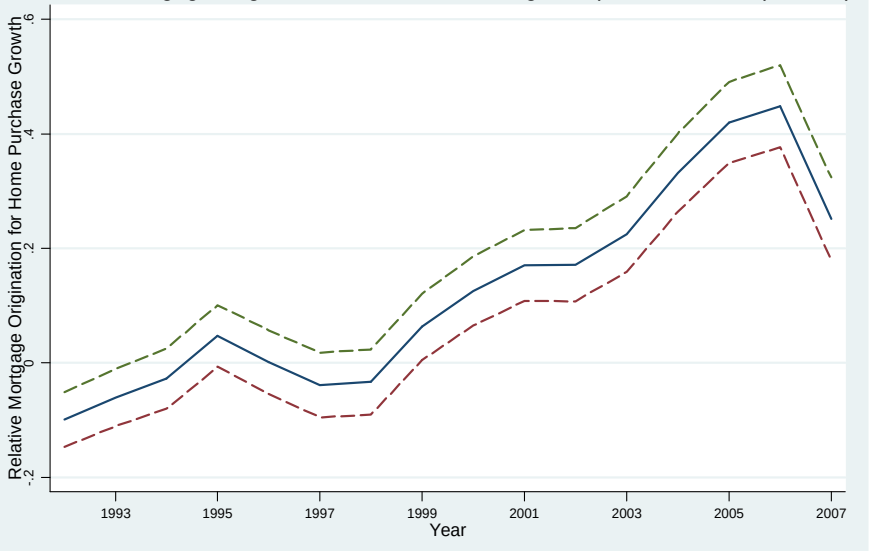
Figure 3

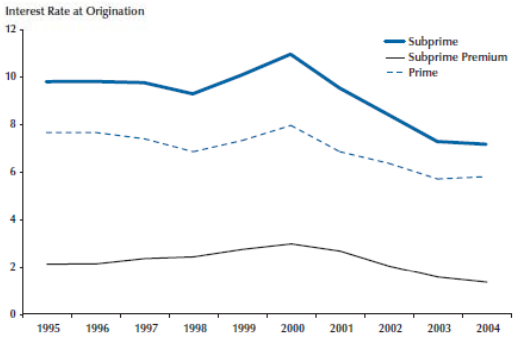
Relative Mortgage Origination Amount Growth: High Subprime - Low Subprime Zips



Chomsisengphet and Pennington-Cross

Figure 1

Interest Rates



NOTE: Prime is the 30-year fixed interest rate reported by the Freddie Mac Primary Mortgage Market Survey. Subprime is the average 30-year fixed interest rate at origination as calculated from the LoanPerformance data set. The Subprime Premium is the difference between the prime and subprime rates.

What is the Nature of the Mortgage Default Crisis?

- Both the mortgage credit expansion from 2002 to 2005 and the mortgage default crisis from 2005 to 2007 is amplified in high subprime share zip codes throughout the U.S.
- This is not a Florida/California/Las Vegas crisis—this is a nationwide subprime crisis (may start to spill over more to prime areas)
- Explaining the credit expansion and subsequent default crisis within high subprime zip codes is critical to understanding the mortgage default crisis

Why Did Mortgage Credit Expand to High Subprime Zip Codes?

- Relative expansion in credit and relative decline in interest rates for subprime zip codes
- Three potential reasons for subprime credit expansion:
  1. Relative improvements in household income
  2. House price expectations higher
  3. Securitization → Worsen incentives of originators, reduction in risk premium

Can Income Growth Explain Subprime Credit Expansion?

	(1) Mortgage origination growth 2002 to 2005	(2) Income growth 2002 to 2005	(3) Employment growth 2002 to 2005	(4) Establishment growth 2002 to 2005
Fraction subprime borrowers, 1996	0.469**	-0.141**	-0.074**	-0.042**
	(0.029)	(0.006)	(0.011)	(0.005)
N	2946	2946	2946	2946
R^2	0.42	0.35	0.15	0.33

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- Income growth, employment growth, establishment growth relatively negative for high subprime share zip codes

Can Income Growth Explain Subprime Credit Expansion?

- Focus only on subprime zip codes with *negative* nominal income growth from 2002 to 2005 (26 such zip codes)
- Compare with prime zip codes in same county with *positive* nominal income growth from 2002 to 2005

		Income Growth 2002 to 2005			**Mortgage origination growth 2002 to 2005**		
Subprime Zip code	County	This zip code	Prime zips in county	Difference	This zip code	Prime zips in county	Difference
93905	Monterey, CA	-0.001	0.126	-0.130	0.789	0.164	0.625
07801	Morris, NJ	-0.001	0.071	-0.076	0.339	0.019	0.320
48227	Wayne, MI	-0.005	0.014	-0.030	0.318	0.026	0.292
48141	Wayne, MI	-0.008	0.014	-0.040	0.277	0.026	0.251
92083	San Diego, CA	-0.051	0.074	-0.232	0.399	0.154	0.245
02149	Middlesex, MA	-0.003	0.074	-0.081	0.285	0.078	0.206
48235	Wayne, MI	-0.003	0.014	-0.024	0.224	0.026	0.197
	AVERAGE:	-0.012	0.056	-0.092**	0.241	0.124	0.117**

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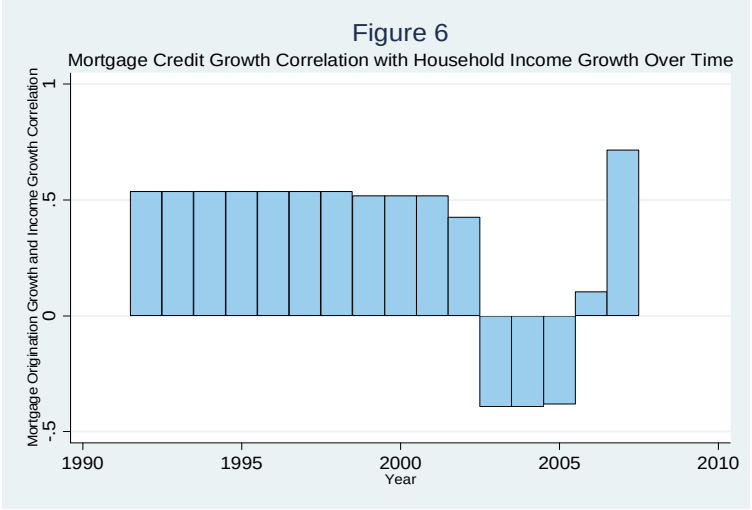
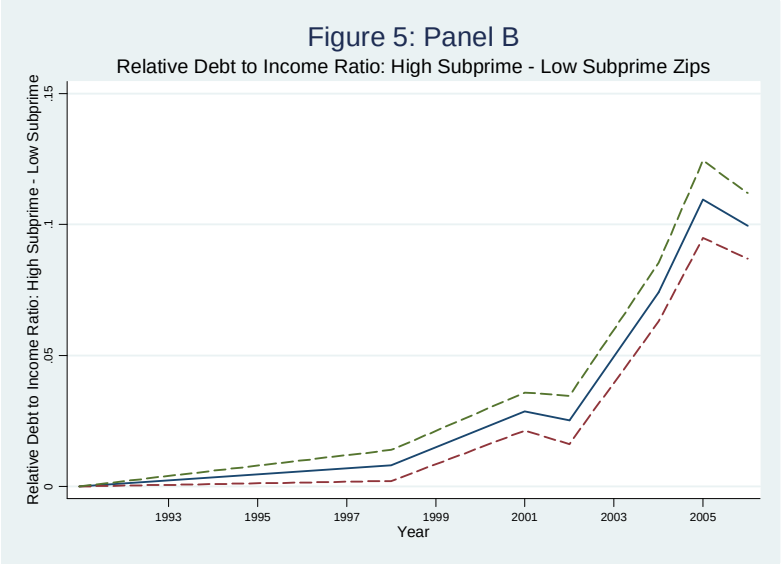
Historical Income/Mortgage Credit Growth Correlation

Figure 6



Debt to Income Ratio: Subprime - Prime

Figure 5: Panel B



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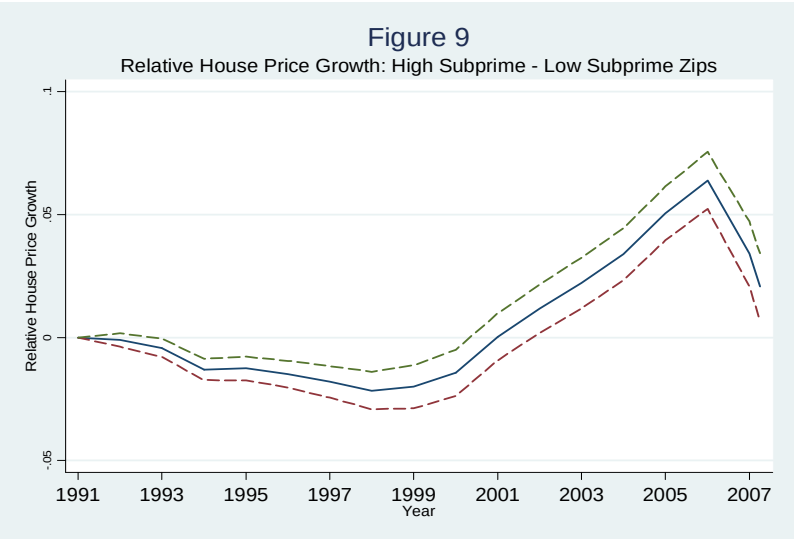
Relative House Price Growth: Subprime – Prime Zips

Figure 9



House Price Growth: Some Thoughts

- House prices go up by more in subprime areas from 2002 to 2005
- This would justify more lending at lower prices
- But, there is a reverse causality problem:
  - Maybe expansion in credit is causing increase in house prices?
  - Our approach: is the house price growth in subprime areas consistent with historical models?
  - I've already shown: subprime areas are experiencing relatively negative income/employment/business growth!

Can Income Growth Explain House Price Growth in Subprime Areas?

- Focus only on subprime zip codes with *negative* nominal income growth from 2002 to 2005 (26 such zip codes)
- Compare with prime zip codes in same county with *positive* nominal income growth from 2002 to 2005

		Income Growth 2002 to 2005			**House price growth 2002 to 2005**		
Subprime Zip code	County	This zip code	Prime zips in county	Difference	This zip code	Prime zips in county	Difference
1841	Essex, MA	-0.008	0.066	-0.091	0.123	0.063	0.060
94509	Contra Costa, CA	-0.003	0.086	-0.095	0.192	0.143	0.049
93905	Monterey, CA	-0.001	0.126	-0.130	0.227	0.191	0.036
92083	San Diego, CA	-0.051	0.074	-0.232	0.203	0.167	0.036
48219	Wayne, MI	-0.003	0.014	-0.023	0.062	0.031	0.031
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	AVERAGE:	-0.012	0.057	-0.092	0.110	0.099	0.011

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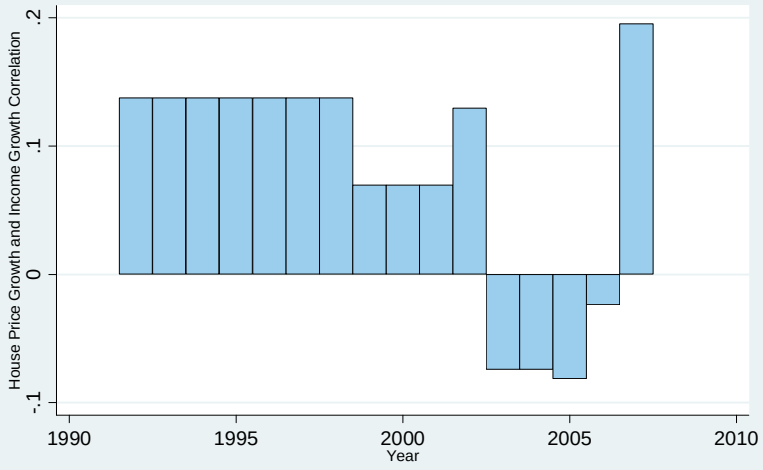
Historical Income/House Price Growth Correlation

Figure 10

House Price Growth Correlation with Household Income Growth Over Time



Why Did Mortgage Credit Expand to High Subprime Zip Codes?

- Three potential reasons for subprime credit expansion:

1. ~~Relative improvements in household income~~

2. House price expectations higher
   - House prices did grow faster in subprime areas
   - But seem to grow faster for reasons different than at any other time in history
   - Hard to prove credit expansion caused higher house price growth, but evidence suggestive

3. Securitization → Worsen incentives of originators, reduction in risk premium

Figure 12: Panel A

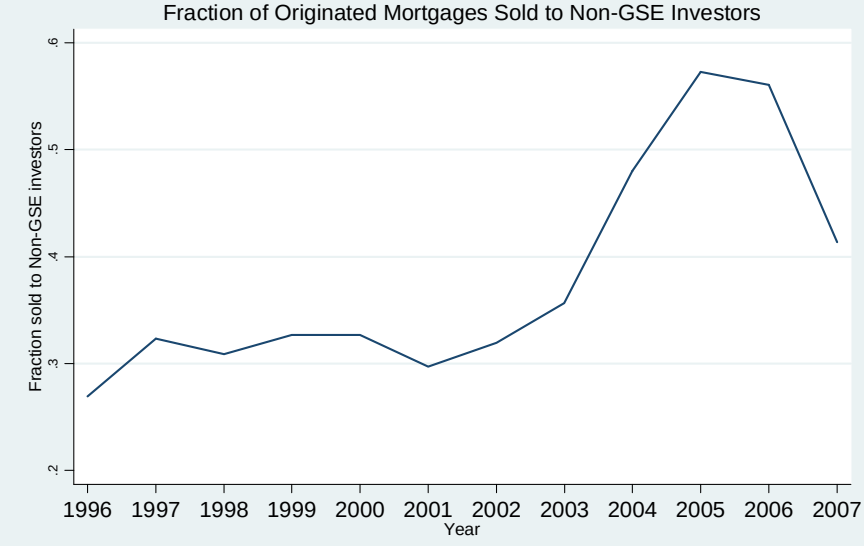


Figure 12: Panel B

Relative Share Sold to Non-GSE Investors: High Subprime - Low Subprime Zips

Expansion of Securitization in Subprime Zip Codes

	Change in fraction sold to all investors, 2002 to 2005	Change in fraction sold to affiliates, 2002 to 2005	Change in fraction sold to banks, 2002 to 2005	Change in fraction sold in private securitizations, 2002 to 2005	Change in fraction sold to other financial firms, 2002 to 2005
Fraction of subprime borrowers, 1996	0.048**	-0.055**	-0.007*	0.104**	0.077**
	(0.009)	(0.005)	(0.003)	(0.004)	(0.004)
N	2946	2946	2946	2946	2946
R^2	0.46	0.56	0.46	0.68	0.61

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Does Securitization Predict Defaults?

	(1)	(2)	(3)	(4)	(5)
	Change in mortgage default rate from 2005 to 2007				
Change in fraction sold to all investors, 2002 to 2005	0.027				
	(0.015)				
Change in fraction sold to affiliates, 2002 to 2005		-0.247**			
		(0.027)			
Change in fraction sold to banks , 2002 to 2005			-0.116*		
			(0.046)		
Change in fraction sold in private securitizations				0.360**	
				(0.031)	
Change in fraction sold to other financial firms					0.314**
					(0.029)
N	2946	2946	2946	2946	2946
R^2	0.39	0.40	0.39	0.41	0.41

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	(0.015)				
Change in fraction sold to affiliates, 2002 to 2005		-0.247**			
		(0.027)			
Change in fraction sold to banks , 2002 to 2005			-0.116*		
			(0.046)		
Change in fraction sold in private securitizations				0.360**	
				(0.031)	
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R^2	0.39	0.40	0.39	0.41	0.41

The Greenspan Legacy
(AKA: Did low interest rates cause crisis?)

Figure 7A

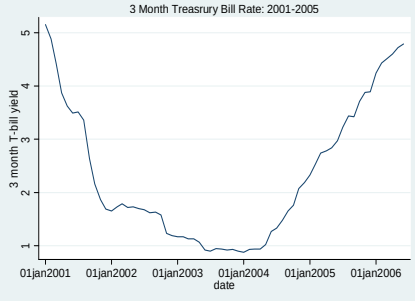
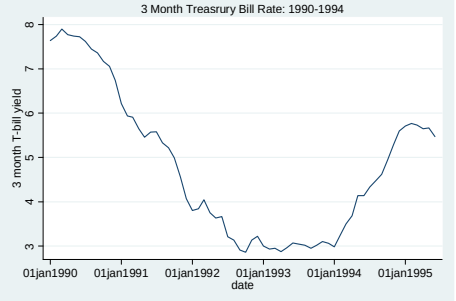


Figure 7B



Do We See Same Patterns from 1991 to 1994? (No)

Figure 8

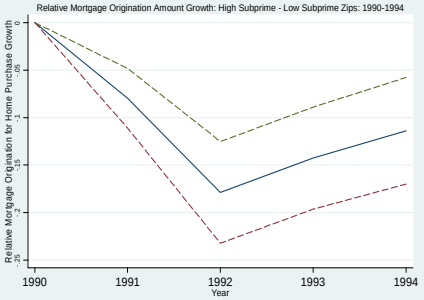
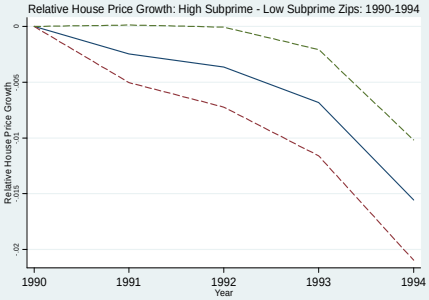


Figure 11



Conclusion

- Evidence suggests a historically unique expansion in credit to subprime areas throughout the U.S. from 2002 to 2005
- Credit expansion seems largely divorced from underlying borrower income/productivity improvements
- Credit expansion to subprime borrowers may have been driven by house price growth expectations
  - But, those expectations also seem divorced from fundamentals
- Evidence strongly suggests role of securitization

Broader Points

1. Importance of micro data: these patterns could have been seen by regulators as early as 2004
2. Importance of fundamentals: credit growth becoming divorced from borrower income is a red flag
3. House price feedback effects: House price process should not be viewed as “exogenous”: credit may contribute to house price growth