

Minority borrowers, Subprime lending and Foreclosures during the Financial Crisis*

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* The work presented is joint with Patrick Bayer, Fernando Ferreira and/or Yuan Wang. We thank the Ford Foundation, Research Sponsors Program of the Zell/Lurie Real Estate Center at Wharton, and the Center for Real Estate and Urban Economic Studies at the University of Connecticut for financial support. Gordon MacDonald, Kyle Mangum, Yuan Wang and Ailing Zhang provided able research assistance. The analyses presented in this paper uses information provided by an unnamed proprietary credit reporting agency; however, the substantive content of the paper is the responsibility of the authors and does not reflect the specific views of any credit reporting agencies.

Minority borrowers, Subprime lending and Foreclosures

- The subprime lending and the foreclosure crisis have disproportionately affected low income and minority borrowers and neighborhoods (Geradi and Willen 2009; Fisher, Lambie-Hanson and Willen 2010; Mayer and Pence 2007).
- Further, Mian and Sufi (2009) show that between 2002 and 2005 mortgage credit expanded relatively quickly in zip codes with large fractions of borrowers with subprime credit scores and falling incomes, and foreclosure rates in those neighborhoods are higher.
- Many scholars point to subprime mortgages with little documentation and predatory terms as a key explanation (Been, Chan, Ellen and Madar 2011).
- Alternatively, subprime lending provides credit to borrowers who face significant constraints in the prime mortgage market, are concentrated in poor neighborhoods, are expected to have worse credit outcomes and so pay higher interest rates.
- The growth of subprime lending and foreclosure were driven by middle and higher income white borrowers who dominate the housing market (Adelino et al. 2015), and their higher risk loans may have been financially attractive (Gerardi et al. 2011).

What We Do

- We assemble a panel of mortgage originations from 2004-2008 combining HMDA and public records data with credit report data from 2004-2009 in seven metropolitan sites.
- We estimate racial and ethnic differences in foreclosure controlling for detailed borrower and loan risk attributes plus current loan to value ratio, race by county employment shocks, and origination year.
- We estimate racial and ethnic differences in the incidence of rate spread or high cost lending controlling for borrower, loan and lender attributes including the ex-post foreclosure risk of each lender.
- We examine the correlation between mortgage foreclosure and the extent of high cost lending in a location, and examine which location attributes (including the market share of high cost lenders) explain this correlation.

Sample Construction

- Merge Home Mortgage Disclosure Act Data with Dataquick housing transaction and mortgage refinance data
 - Mortgages in April-July 2004, 05, 06, 07, and 08
 - Mortgages in the following metropolitan markets: SF Bay area, Los Angeles, Chicago, Cleveland, Denver, Maryland DC-Baltimore Suburban Corridor and Miami-Palm Beach Corridor
- Draw a sample of approximately 4,000 mortgages per site, year and type (home purchase or refinance)
- Provide files to credit repository for merger with Credit History archival data drawn in March of the year preceding the mortgage and every year after through 2009. Credit file data returned without names, addresses or identifying information.
- Models include combined loan to value ratio, credit score, expense to income ratios, site by origination year by year FE's, site by origination week FE's, interactions of subprime credit score with loan attributes, county by year FE's, contemporaneous loan to value ratio interacted with race specific county employment rate.

Figure 2. Unconditional rates of mortgage foreclosures by race

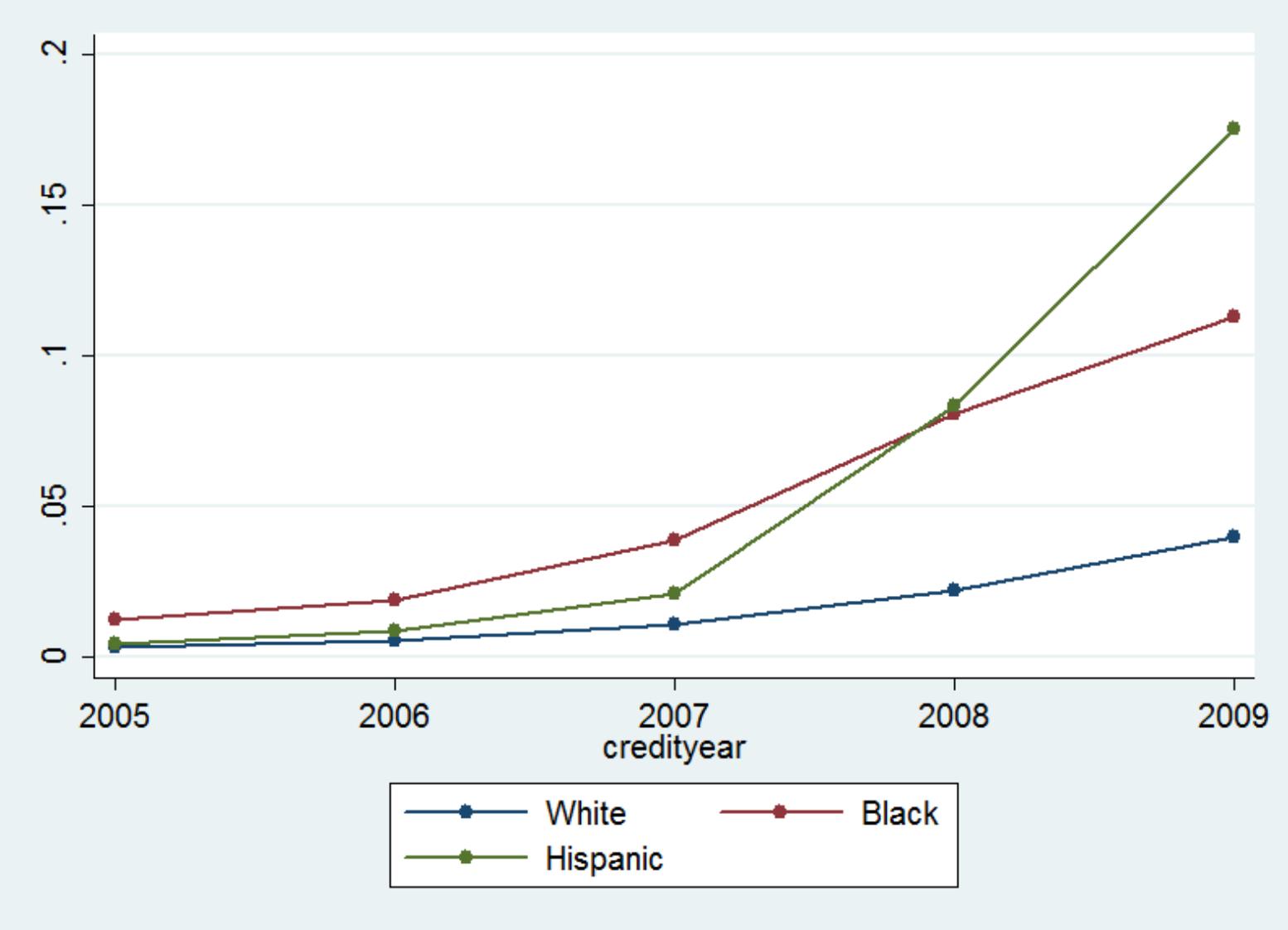


Table 3: Mortgage Foreclosure

Home Purchase Sample				
Race	Unconditional	Underwriting	Subprime	Contemporaneous
Black	0.086433*** (0.003107)	0.041556*** (0.003571)	0.029516*** (0.003861)	0.016820*** (0.004299)
Hispanic	0.090703*** (0.002381)	0.038351*** (0.002469)	0.030509*** (0.002704)	0.025001*** (0.002770)
Sample Size	331,608	331,608	331,608	330,912
R-Square	0.016	0.074	0.122	0.137

Refinance Sample				
Race	Unconditional	Underwriting	Subprime	Contemporaneous
Black	0.029577*** (0.001848)	0.016815*** (0.002351)	0.014564*** (0.002519)	0.006965** (0.002972)
Hispanic	0.043360*** (0.001695)	0.023669*** (0.001963)	0.020815*** (0.002101)	0.018652*** (0.002137)
Sample Size	309,137	309,137	309,137	308,459
R-Square	0.005	0.045	0.095	0.102

Table 4: Home Purchase Sample Interactions

Race	Baseline	Risk Factor	Employment
Black	0.016820*** (0.004299)	0.000276 (0.004978)	-0.001328 (0.006944)
Hispanic	0.025001*** (0.002770)	0.020394*** (0.003365)	-0.056116*** (0.004627)
Black*Subprime		0.035089*** (0.008448)	
Hispanic* Subprime		0.008271 (0.006920)	
Black*Rate Spread		-0.010640 (0.006715)	
Hispanic*Rate Spread		0.002054 (0.005088)	
Black*High DTI		0.058062*** (0.009223)	
Hispanic*High DTI		0.021163*** (0.006953)	
Black*Unemp Rate			0.753887*** (0.092242)
Hispanic*Unemp Rate			1.521358*** (0.088721)

Figure 3: Foreclosure by Origination Year

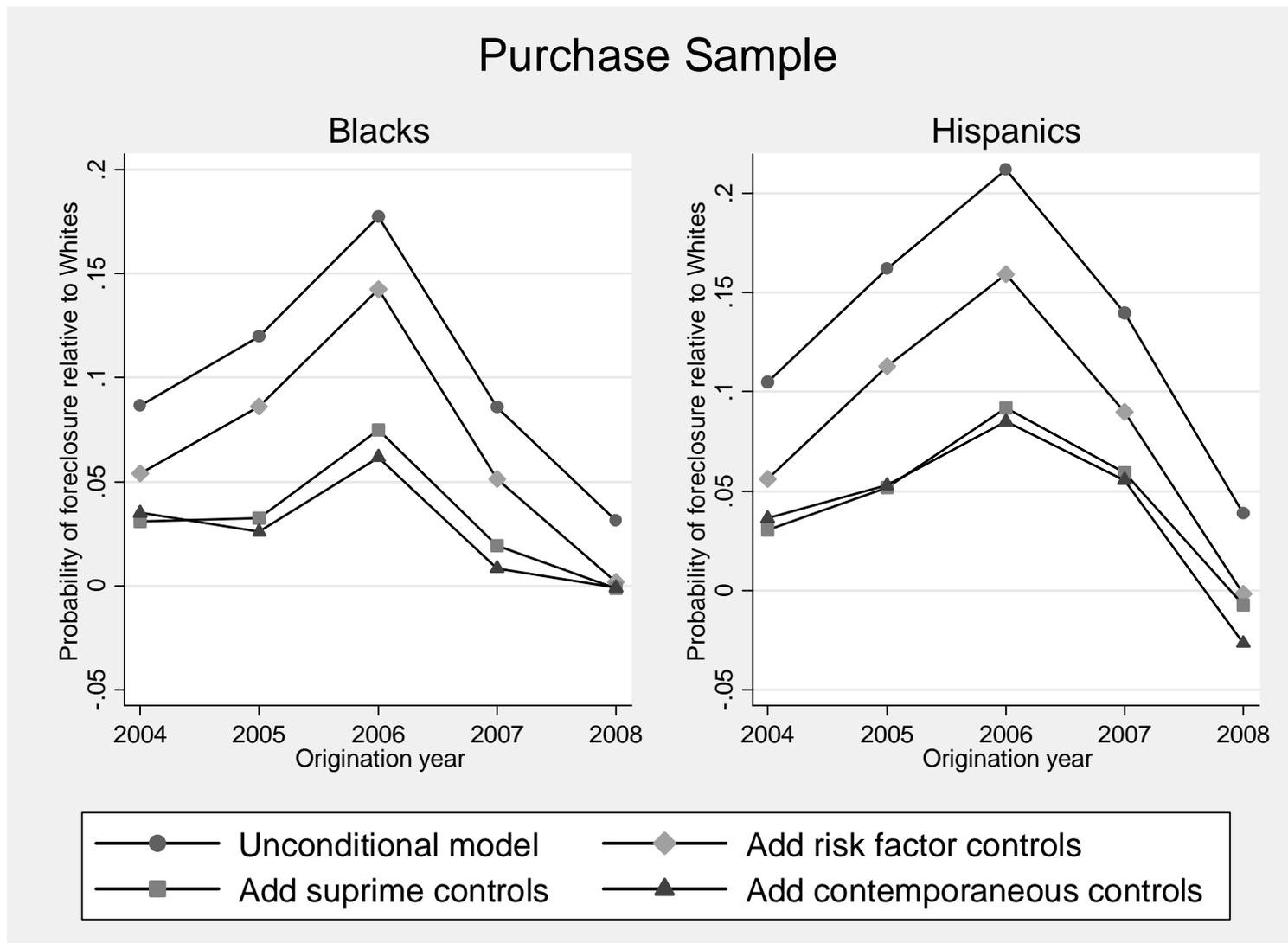


Table 3. Rate Spread Models

Variable Names	Home Purchase Sample				
	HMDA	Dataquick	Experian	Subprime	Lender FE
Asian	0.008381*** (0.003)	0.012628*** (0.003)	0.009762*** (0.003)	0.010172*** (0.003)	0.005141** (0.003)
Black	0.171082*** (0.005)	0.132853*** (0.004)	0.080027*** (0.004)	0.076816*** (0.004)	0.032651*** (0.003)
Hispanic	0.116930*** (0.003)	0.079161*** (0.003)	0.061337*** (0.003)	0.061963*** (0.003)	0.024886*** (0.003)
Observations	120,732	120,732	120,732	120,732	120,732
R-squared	0.224	0.311	0.369	0.418	0.594

Variable Names	Refinance Sample				
	HMDA	Dataquick	Experian	Subprime	Lender FE
Asian	0.006870* (0.004)	0.005474 (0.004)	0.009850*** (0.004)	0.009691*** (0.003)	0.004260 (0.003)
Black	0.106412*** (0.005)	0.096666*** (0.005)	0.045484*** (0.004)	0.041889*** (0.004)	0.017197*** (0.004)
Hispanic	0.043228*** (0.003)	0.028954*** (0.003)	0.016951*** (0.003)	0.017307*** (0.003)	0.004977* (0.003)
Observations	115,763	115,763	115,763	115,763	115,763
R-squared	0.169	0.234	0.347	0.384	0.555

Table 6: Lender Foreclosure Risk (Split Sample IV)

Variable Names	Home Purchase Sample			
	Foreclosure Risk		Pooled	
	Baseline	White Risk	Baseline	White Risk
African American	0.04612*** 0.009	0.04673*** 0.010	0.0436*** 0.009	0.0423*** 0.012
Hispanic	0.02546*** 0.006	0.0198*** 0.007	0.0250*** 0.006	0.0168* 0.009
Foreclosure risk by lender	3.3305*** 0.261		3.5586*** 0.337	
Foreclosure risk by lender white borrowers		4.2952*** 0.85104		4.818 2.0961

Variable Names	Refinance Sample			
	Foreclosure Risk		Pooled	
	Baseline	White Risk	Baseline	White Risk
African American	0.02931*** 0.009	0.03132*** 0.007	0.0205*** 0.005	0.022429*** 0.007
Hispanic	0.00053 0.012	0.011018 0.00881	-0.00170 0.013	0.0128 0.007
Foreclosure risk by lender	4.22531*** 0.623		4.50168*** 0.723	
Foreclosure risk by lender white borrowers		4.35938*** 1.53136		4.4421* 2.69905

Table 7: Ex-post Foreclosure Risk

Variable Names	Home Purchase Sample			Refinance Sample		
	Borrower	Census Tract	Loan Attributes	Borrower	Census Tract	Loan Attributes
	Attributes	Attributes		Attributes	Attributes	
African American	0.055021*** (0.002)	0.045542*** (0.003)	0.038000*** (0.003)	0.022862*** (0.002)	0.014386*** (0.002)	0.013883*** (0.002)
Hispanic	0.071541*** (0.002)	0.058415*** (0.002)	0.049231*** (0.002)	0.022097*** (0.001)	0.016143*** (0.002)	0.014859*** (0.002)
Logarithm of Income	0.009794*** (0.001)	0.014420*** (0.001)	0.015319*** (0.001)	0.002065** (0.001)	0.004958*** (0.001)	0.004182*** (0.001)
Subprime Credit Score	0.114161*** (0.003)	0.111715*** (0.003)	0.105858*** (0.003)	0.098500*** (0.002)	0.097090*** (0.002)	0.095160*** (0.002)
Tract Percent African-American		0.023610*** (0.005)	0.016523*** (0.005)		0.016354*** (0.003)	0.016150*** (0.003)
Tract Percent Poverty		0.049990*** (0.015)	0.044219*** (0.015)		0.064701*** (0.010)	0.057179*** (0.011)
Loan to Value Ratio above 0.80			0.013634*** (0.001)			0.010592*** (0.002)
Loan to Value Ratio above 0.90			0.018245*** (0.002)			0.015839*** (0.002)
Loan to Value Ratio above 0.95			0.071277*** (0.002)			0.018928*** (0.003)
Housing Expense to Income Ratio above 0.26			-0.014638*** (0.002)			-0.005199*** (0.001)
Housing Expense to Income Ratio above 0.33			-0.011557*** (0.002)			-0.014396*** (0.002)

Table 8: Interactions for Home purchase sample

Variable Names	Subprime			Lender FE		
	Credit Quality	Neighborhood	Foreclosure	Credit Quality	Neighborhood	Foreclosure
African American*Subprime	0.031646* (0.017)	0.027473* (0.016)	-0.0097 0.01443	0.015355 (0.011)	0.013289 (0.011)	0.0069 0.00612
Hispanic*Subprime	-0.029497* (0.017)	-0.030494* (0.017)	-0.0123 0.01267	-0.009208 (0.010)	-0.010295 (0.010)	-0.0168 0.00419
African American*High LTV	-0.014992 (0.013)	-0.018167 (0.013)	0.0057 0.01086	0.008919 (0.008)	0.007073 (0.008)	0.0030 0.00378
Hispanic*High LTV	0.113059*** (0.013)	0.110192*** (0.013)	0.06115*** 0.01636	0.055733*** (0.011)	0.053670*** (0.011)	0.0491*** 0.01444
African American*Pct Poverty		0.144973** (0.063)	0.0579 0.07236		0.056546 (0.067)	0.05929 0.17919
Hispanic*Pct Hispanic		0.042483*** (0.016)	0.0184 0.024526		0.000850 (0.012)	0.0013 0.00905
African American*Rent to Price Ratio		-0.021181 (0.018)	0.0478*** 0.01461		0.030683*** (0.010)	0.0282*** 0.0082
Hispanic*Rent to Price Ratio		0.042483*** (0.016)	0.0178 0.01125		0.013291 (0.009)	0.0109 0.0071
African American*Lender Foreclosure			0.52371** 0.22504			0.1865 0.2080
Hispanic*Lender Foreclosure			0.18518 0.21662			0.1970** 0.0799

Modeling Foreclosure at the Neighborhood Level

- Estimate foreclosure in year (t) as function of share high cost loans in location (n) in each site (s) and purchase year (p)

$$y_{instp} = \alpha Z_{nsp} + \beta X_i + \delta_{stp} + \varepsilon_{instp}$$

- Include controls for location fixed effects (across purchase year variation)

$$y_{instp} = \alpha Z_{np} + \beta X_i + \delta_{stp} + \theta_{nt} + \varepsilon_{instp}$$

- Include neighborhood trends by purchase year (triple difference)

$$y_{instp} = \alpha Z_{np} + \beta X_i + \delta_{stp} + \theta_{nt} + \varphi_p W_n + \varepsilon_{instp}$$

Market Share of High Costs Loans on Mortgage Foreclosure

	Credit Score	Demographics	Risk Variables	Shocks
	Cross-Sectional Model			
PUMA High Cost Share	0.370*** (0.042)	0.293*** (0.044)	0.243*** (0.044)	0.213*** (0.044)
Sample Size	327,693	327,693	327,693	326,875
Residual R-square	0.027	0.039	0.053	0.055
	PUMA by Credit Report Years Fixed Effects			
PUMA High Cost Share	0.499*** (0.066)	0.499*** (0.070)	0.505*** (0.070)	0.484*** (0.071)
Sample Size	327,693	327,693	327,693	326,875
Residual R-square	0.021	0.032	0.046	0.046
	Mortgage Year Trends by PUMA Observables			
PUMA High Cost Share	0.420*** (0.100)	0.451*** (0.106)	0.438*** (0.104)	0.444*** (0.104)
Sample Size	302,619	302,619	302,619	301,902
Residual R-square	0.021	0.030	0.044	0.045

Potential Mechanisms

	Lender Controls		
	Baseline	Lender Share	Lender FE
PUMA High Cost Share	0.444*** (0.104)	0.408*** (0.108)	0.449*** (0.107)
Lender Share High Cost		0.107*** (0.010)	
PUMA Composition over Loan Attributes			
	Vantage<701	LTV>0.95	DTI>0.36
PUMA High Cost Share	0.505*** (0.118)	0.492*** (0.114)	0.425*** (0.109)
PUMA Share	-0.035 (0.028)	-0.017 (0.017)	0.016 (0.020)
PUMA Composition over Borrower Attributes			
	Share Black	Share Hispanic	Share Low Inc
PUMA High Cost Share	0.365*** (0.123)	0.538*** (0.127)	0.604*** (0.158)
PUMA Share	0.077 (0.048)	-0.046* (0.028)	-0.064* (0.036)

Market Representation of High Cost Lenders

High Cost Share Thresholds	>.02	>.05	>.12	>.20	Nonparametric
PUMA Share High Cost	0.386*** (0.150)	0.303* (0.181)	0.162 (0.202)	0.146 (0.200)	0.007 (0.235)
PUMA Shr of Lndrs >0.02, 0.02-0.05	0.033 (0.056)				-0.049 (0.074)
PUMA Shr of Lndrs >0.05, 0.05-0.12		0.072 (0.071)			0.043 (0.082)
PUMA Shr of Lndrs >0.12, 0.12-0.2			0.153* (0.090)		0.104 (0.099)
PUMA Shr of Lndrs >0.2				0.201* (0.112)	0.262** (0.124)

Which Lenders' Loans are High Cost?

	Level Coefficients	Interaction with High Cost Lender
PUMA Share High Cost	0.001 (0.234)	
PUMA Shr of Lndrs >0.02, 0.02-0.05	0.062 (0.141)	-0.130 (0.162)
PUMA Shr of Lndrs >0.05, 0.05-0.12	-0.099 (0.107)	0.185 (0.144)
PUMA Shr of Lndrs >0.12, 0.12-0.2	0.136 (0.107)	-0.097 (0.269)
PUMA Shr of Lndrs >0.2	0.267** (0.124)	-0.115 (0.539)

Summary and Conclusions

- Foreclosure is driven by economic risk factors (not neighborhood or lender)
 - Contemporaneous employment and negative equity
 - Racial/ethnic differences larger for high payments and large income shocks
 - Vulnerable populations enter at peak of market (control for negative equity)
- However, high cost loans are mostly associated with specific lenders
 - Minorities concentrated at lenders that have high ex-post foreclosure rates
 - These lenders tend to have low credit score borrowers and high LTV loans, but income, age, and neighborhood do not identify high cost lenders.
 - Racial/ethnic differences largest for high LTV loans, disadvantaged neighborhoods, and high foreclosure risk lenders
- Further, there are spatial clusters of high foreclosure rates that appear associated with the activity of high cost lenders.
 - Robust correlation between changes in share of high cost loans and foreclosure rates in the particular cohort of loans
 - Not explained by lender or demographics/risk factors at location level
 - Explained by the current market penetration of high cost lenders
- While foreclosure primarily driven by risk factors, certain groups and places were still disproportionately affected by the subprime boom and foreclosure crisis.