THE OHIO STATE UNIVERSITY

How House Price Dynamics and Credit Constraints affect the Equity Extraction of Senior Homeowners

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Disclaimer:

The research reported herein is being performed pursuant to a grant from the **MacArthur Foundation** as part of the “How Housing Matters” Research Competition and with funding from The **U.S. Department of Housing & Urban Development’s Office of Policy Development and Research (PD&R)**. The opinions and conclusions expressed are entirely those of the authors and do not represent the opinions of the MacArthur Foundation or HUD.

The views expressed in this paper are those of the authors and do not necessarily represent the views of the Federal Reserve Board, the Federal Reserve System, or their staffs.

Research Program (2012-2017)

1. Empirical Modeling of Reverse Mortgage Borrower Behavior
   - Take-up of HECMs (and other equity extraction products among seniors)
   - HECM technical default (property tax and insurance default)
   - HECM loan terms, withdrawal behaviors and termination outcomes
   - Equity extraction (including HECMs) and longer term credit outcomes

2. Survey of Counseled Seniors
   - Longer term well-being of HECM borrowers
   - May 2014-July 2015, about 2,000 respondents: (1) current HECM borrowers, (2) terminated HECM borrowers, and (3) seniors who sought counseling but did not get a reverse mortgage.

3. Post Origination Monitoring Pilot
   - RCT design; financial planning and reminders after closing
   - Launched January, 2015

Motivation

Home equity is an important part of a senior household's financial portfolio:

- ✓ Approximately 80% of households over the age of 62 own their homes (Poterba et al. 2011)
- ✓ Home equity comprises about half of seniors' median net wealth (2013 SCF)
- ✓ Home equity is a significant source of retirement funds for baby boomers (Lusardi and Mitchell 2007; Wolff 2007)

Different options to extract equity:

- ✓ Selling and moving
- ✓ Cash-out refinancing, second liens or HELOCs
- ✓ Reverse mortgages- federally insured HECMs

Research Questions

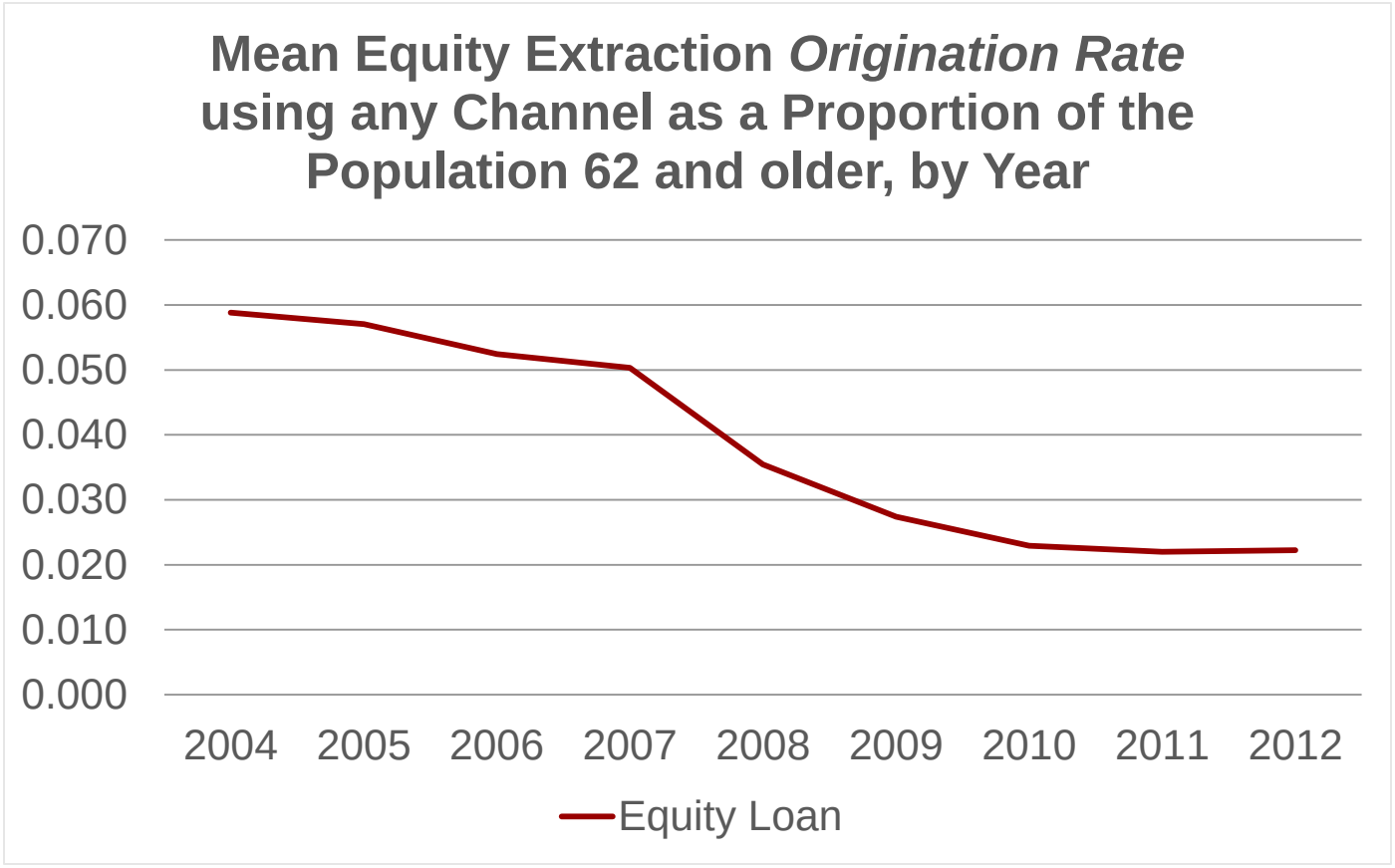
What factors are associated with seniors' extraction of equity through *various channels*, including a reverse mortgage?

- Do neighborhood house price dynamics and credit conditions differentially affect originations *by channel*?
  - Do homeowners in credit constrained areas respond differentially to an increase in house prices than homeowners in non-constrained areas?
  - Do high minority share neighborhoods respond differently than low minority share neighborhoods? (50+% minority vs 90+% white)

- Is the share of equity extracted through *particular channels* differentially associated with foreclosure rates among extractors?

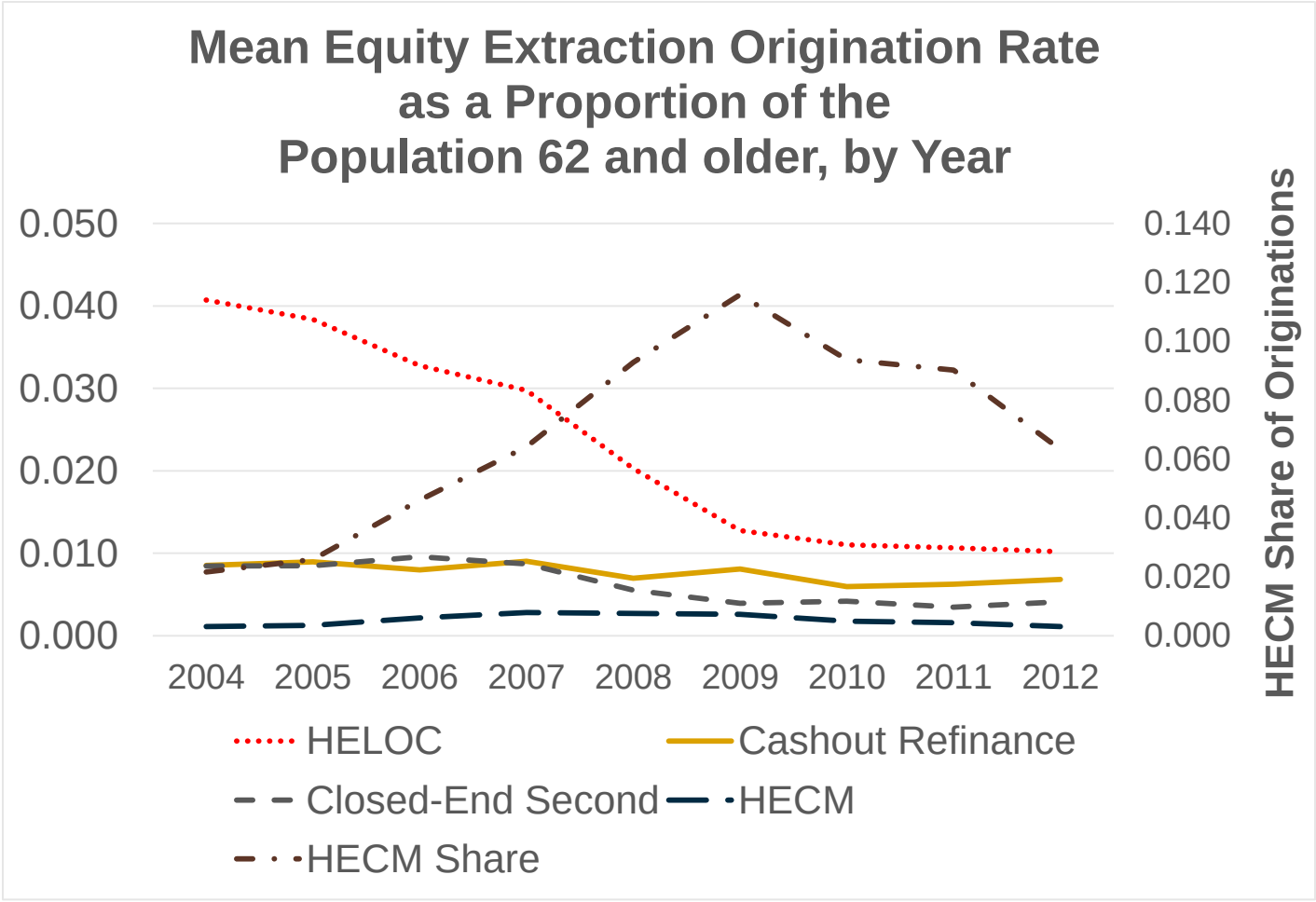
Previous studies have generally focused on the broader population and exclude reverse mortgages (Hurst and Stafford 2004; Mian and Sufi 2011; Do 2012; Bhutta and Keys 2014; Duca and Kumar 2014; LaCour-Little et al. 2014). Further, they do not jointly model different channels of equity extraction.

Equity Extraction



Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

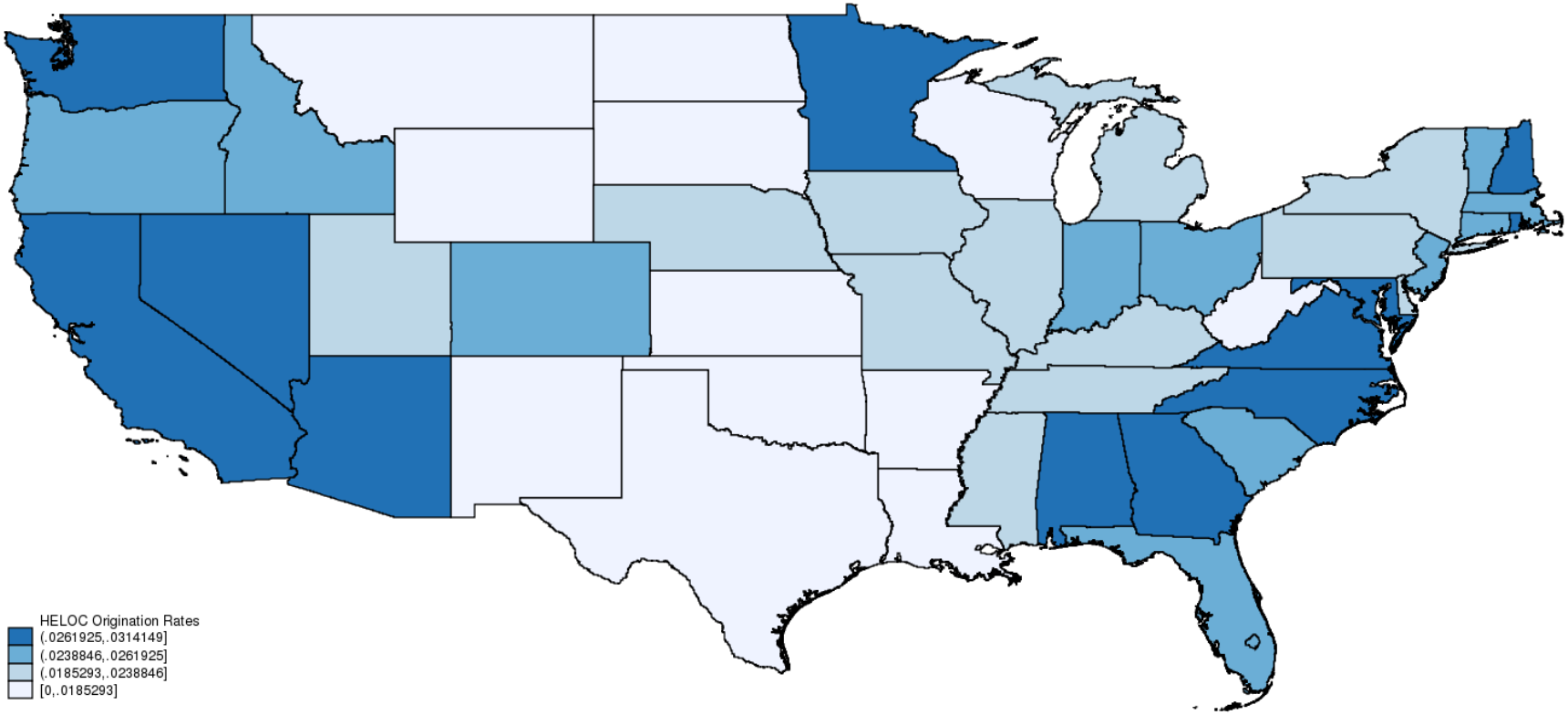
Equity Extraction by Channel



Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

Geographic Variation (U.S.): HELOCs

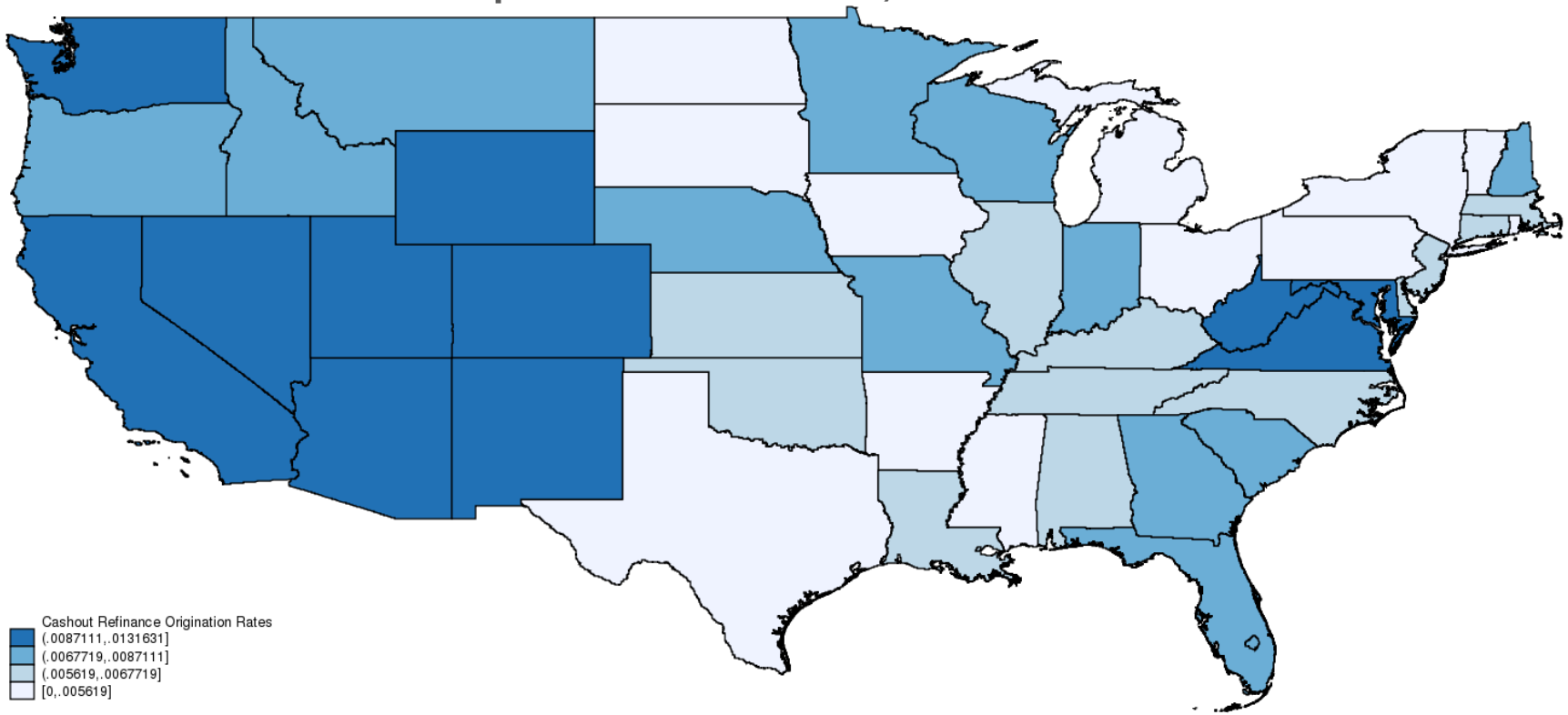
Mean HELOC Origination Rate as a Proportion of the Population 62 and older, 2004-2012



Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

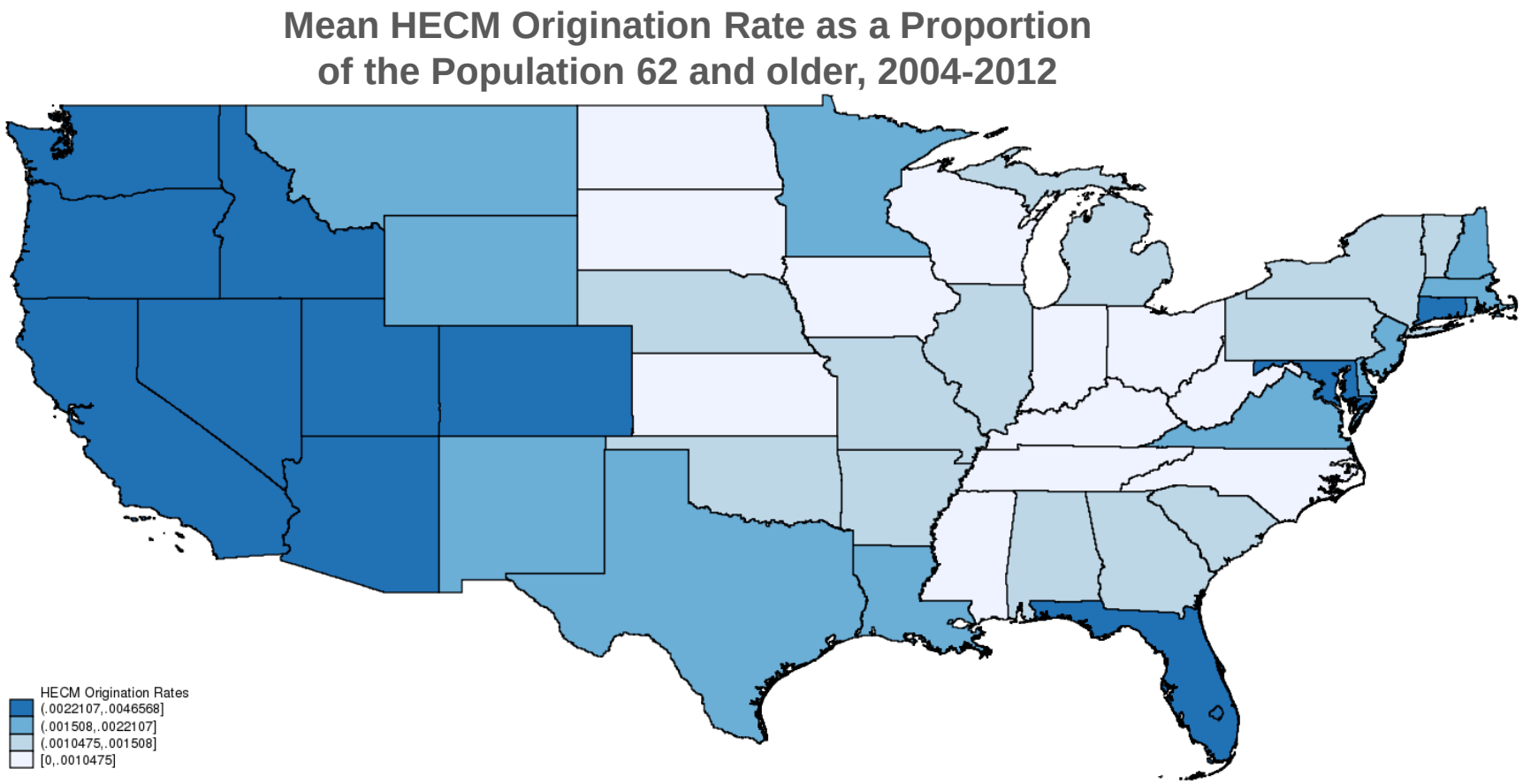
Geographic Variation (U.S.): Cash-Out Refinancing

Mean Cash-Out Refinancing Origination Rate as a Proportion of the Population 62 and older, 2004-2012



Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

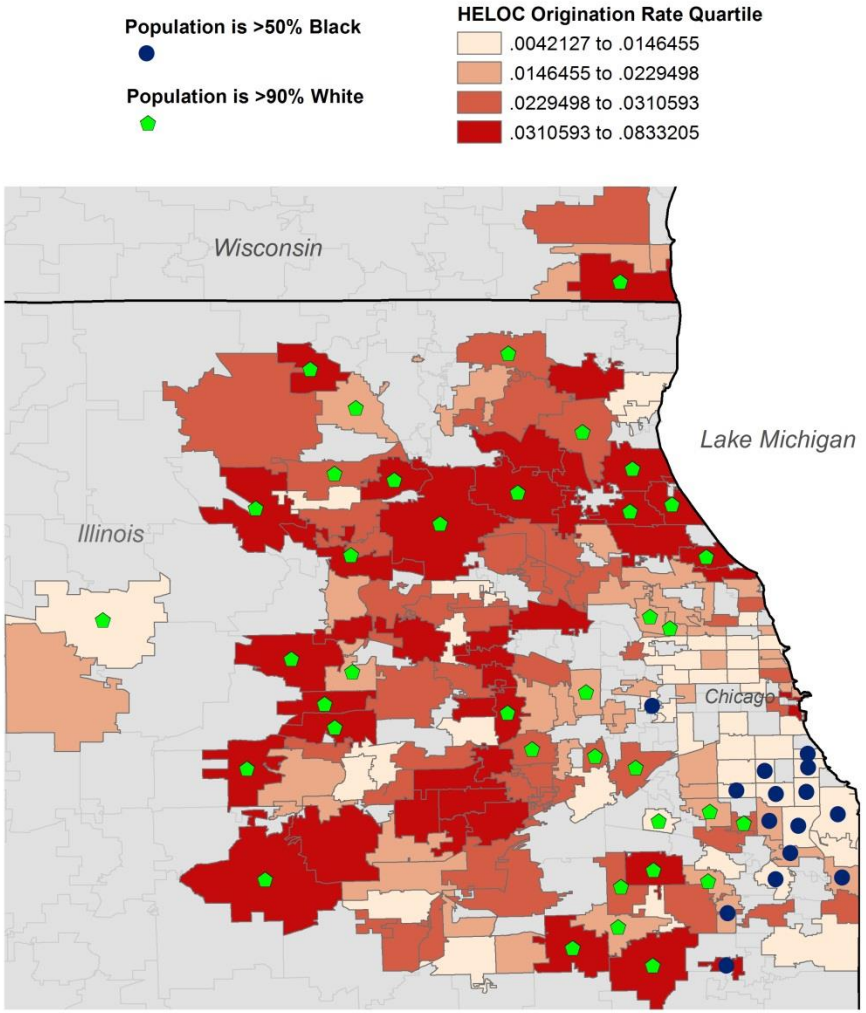
Geographic Variation (U.S.): HECMs



Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

Geographic Variation

Chicago MSA

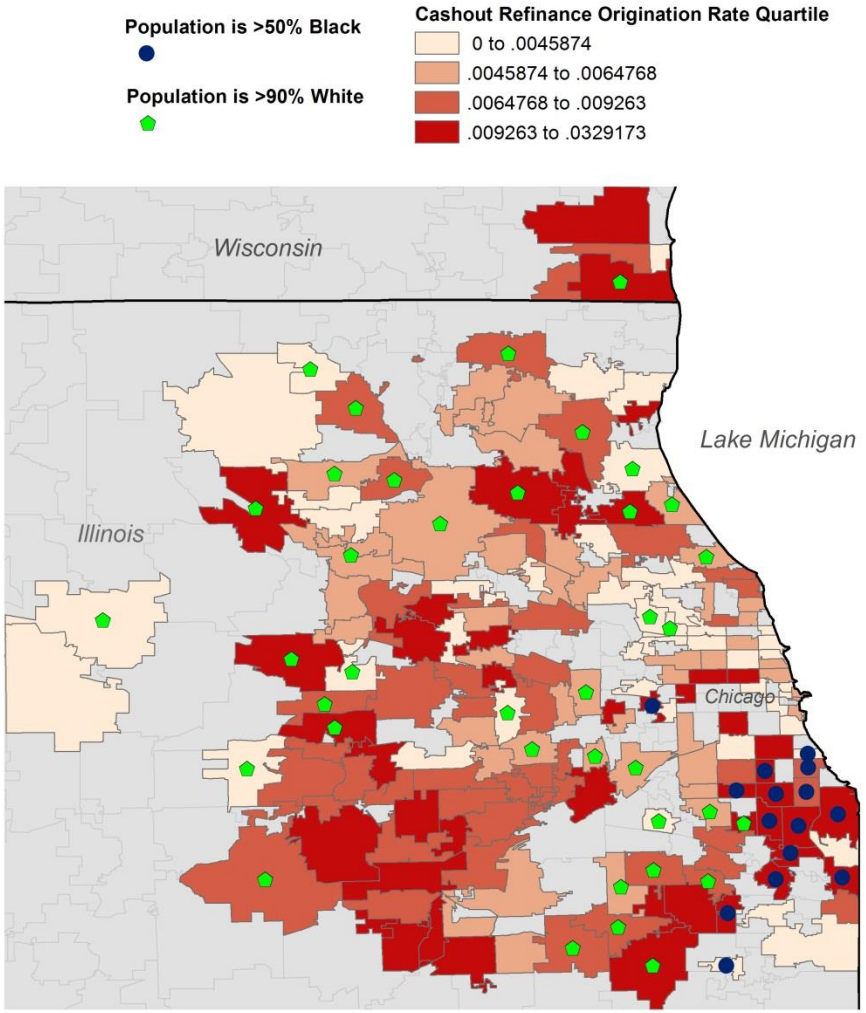


Mean HELOC Origination Rate as a Proportion of the Population 62 and older, 2004-2012

Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

Geographic Variation

Chicago MSA

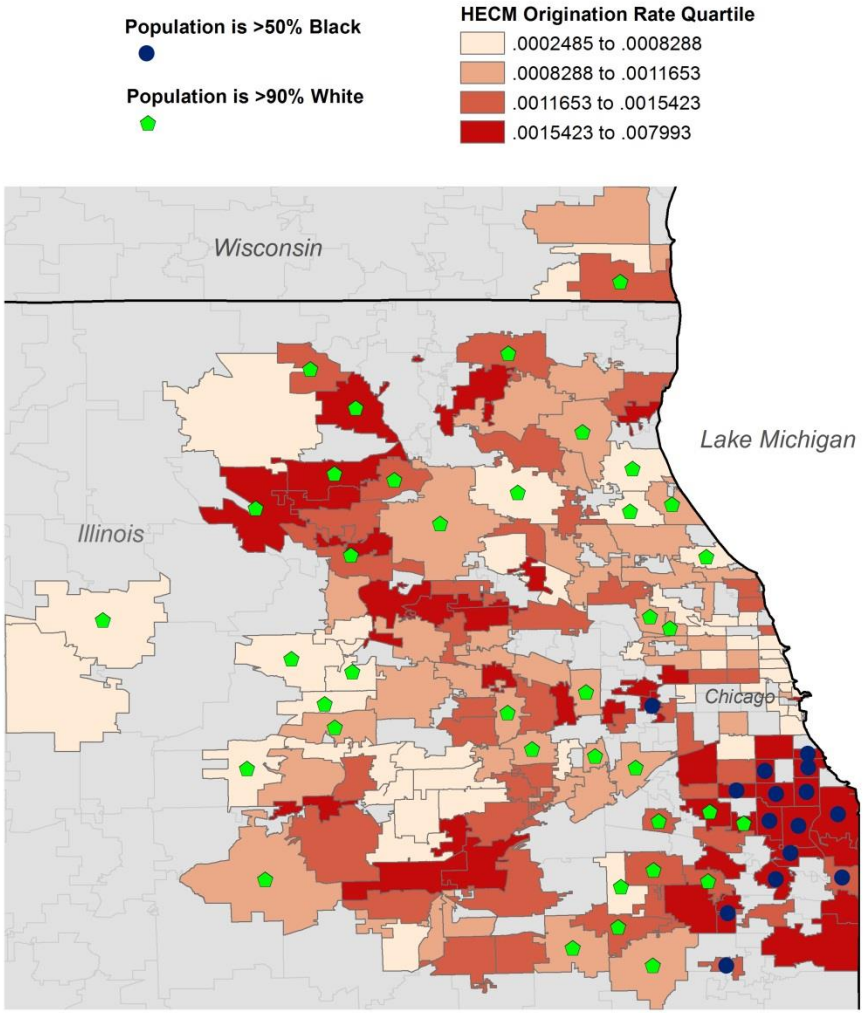


Mean Cash-Out Refinancing Origination Rate as a Proportion of the Population 62 and older, 2004-2012

Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

Geographic Variation

Chicago MSA



Mean HECM Origination Rate as a Proportion of the Population 62 and older, 2004-2012

Source: Author's calculations from HUD HECM data and the New York Fed's Consumer Credit Panel Data

Theoretical Expectations

- House prices & channel of extraction
  - ✓ Higher house prices, wealth effect (+ all channels); also relax borrowing constraint, allowing access to products with lower LTV requirements (+ HELOC and HECMs)
  - ✓ As house prices are increasing, preserve option to extract again in future periods; not lock into high initial cost product (- HECM)
  - ✓ As house prices are decreasing, lock in house values today (+HECM)

- Credit conditions & channel of extraction
  - ✓ Supply side credit availability (+ forward originations)
  - ✓ Household credit history, credit standards can create binding constraint (- HELOC)
  - ✓ Household liquidity constraints (+ HELOC and HECM)

- House price*credit constraints
  - ✓ Credit constrained borrowers may be more responsive to house price increases; originate through channels with relaxed credit constraints (+ cash out refinancing)

- Neighborhood demographics (minority share) & channel of extraction
  - ✓ Endowment effects, different levels of explanatory factors in minority areas
  - ✓ Differential responses to explanatory factors due to financial literacy, experience

Data Sources & Sample

Data Sources

1. **New York Federal Reserve's Consumer Credit/Equifax Panel (CCP)** database, 2004-2012
   - 4th quarter, 62 or older, +12 million credit profiles
   - Aggregated to ZIP code and year
2. **HUD HECM database** and actuarial database, 2004-2012
   - 697,772 originations
   - Aggregated to ZIP code and year
3. **CoreLogic**, ZIP code level data, 2004-2012
   - House price and HPI for non-distressed sales
4. **IRS (SPEC) Tax data**, 2004-2012
   - Elderly tax filing data by ZIP code, median adjusted gross income (AGI)
5. **ACS data**, ZIP code level demographic indicators, 2005-2010
   - Data from the 2000 U.S. Census to interpolate values for 2003 and 2004

Sample

- ✓ Limit to ZIP codes within CBSAs with HPI data across all years, and to those with at least 30 CCP records for consumers aged 62 or older in a given year =
  - **5,495** ZIP codes (covers about 45% of the full population)
- ✓ Resulting sample = **39,596** unique ZIP code and year combinations

Empirical Model: Seemingly Unrelated Regression

$$Y_{zt} = \beta_0 + \beta_1 HP_{zt} + \beta_2 CC_{zt} + \beta_3 X_{zt} + \alpha_1 I_{Channel,zt} + \gamma_m + \delta_t + u_{zt}$$

Y= (1) HELOC origination rate
(2) Cash-out refinancing origination rate
(3) Second lien origination rate
(4) HECM origination rate

Allow error terms of 4 equations to be correlated, common component and random component

For each ZIP code $_z$ at time $_t$

HP = house price dynamics (median repeat sales price, HPI growth rate)
CC = credit conditions (credit approval rate, credit utilization rate, credit score, etc.)
X = control variables (median AGI, mortgage debt, median age, black, Hispanic, etc.)
I = interest rate for extraction channel (averaged over the year within the ZIP code)
γ = CBSA fixed effects
δ = year fixed effects

- Alternative specifications include interactions, *HP*CC*
- Estimate subsample regressions in ZIP codes with high levels of racial homogeneity

Findings: Overall

SUR Estimates, % Population 62 + Equity Extraction Method, 2004-2012 (Select Variables Shown)

Values = regression coefficient divided by the mean percentage of originations	HELOC	Cash-Out Refinance	Closed-End Second	HECM
Variable	b/ȳ	b/ȳ	b/ȳ	b/ȳ
Median Real Repeat Sales Price (ln)	0.006***	0.001***	-0.001***	0.001***
HPI Growth Rate, Positive	0.598***	0.408***	-0.145	-2.289***
HPI Growth Rate, Negative	-0.018	-0.295**	0.168	1.016***
Credit Approval Ratio (All)	0.734***	1.096***	0.598***	0.144**
Median Credit Score	0.002***	-0.006***	-0.002***	-0.005**
Median Revolving Credit Utilization Rate	1.115***	-0.145	0.144	0.621**
Median IRS AGI (Monthly, thousands)	0.070***	-0.076***	-0.059***	-0.176***
Black (Share of Population)	-0.328***	0.708***	0.040	1.305***
Hispanic (Share of Population)	-0.171***	0.410***	-0.043	0.075
Year & CBSA Fixed Effects	Y	Y	Y	Y
R-Squared	0.542	0.239	0.215	0.467
Dependent Variable Mean	0.024	0.008	0.007	0.002

*** p<0.01, ** p<0.05, * p<0.1

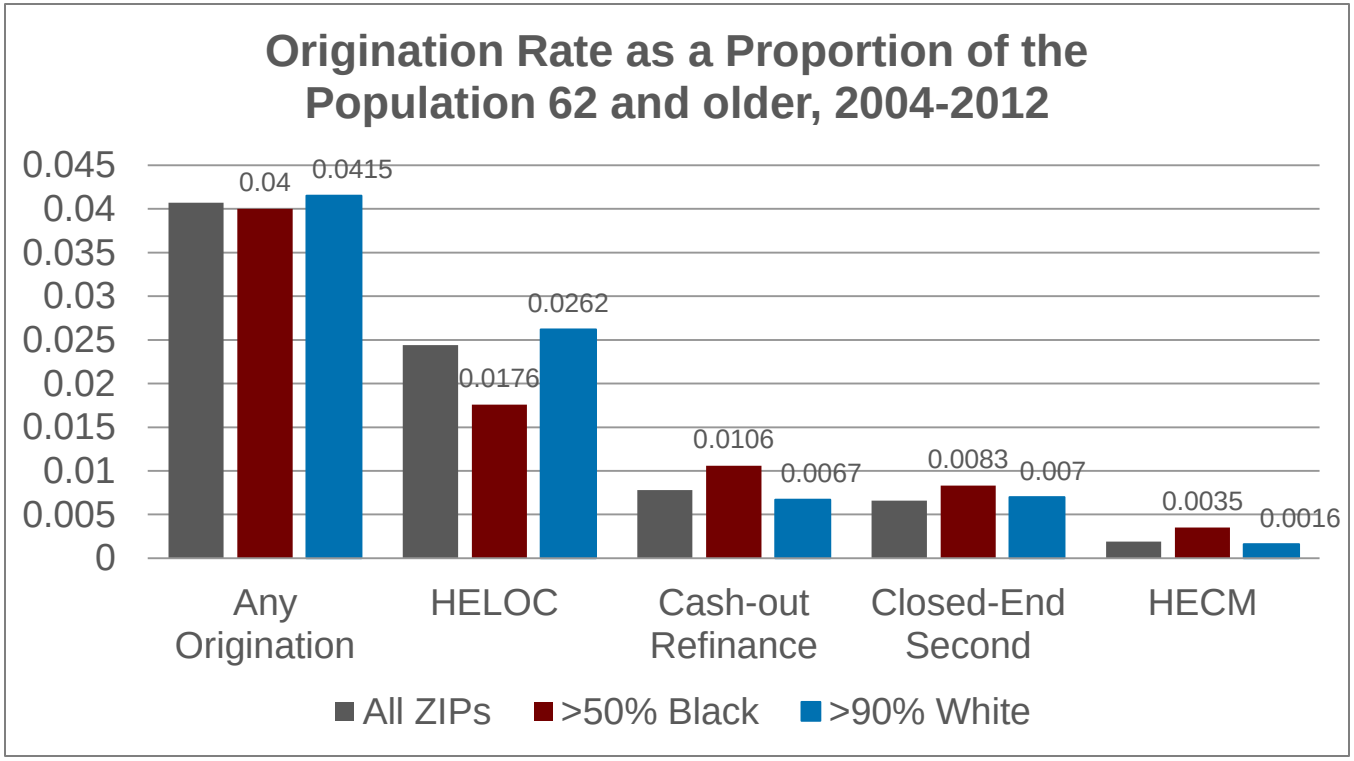
Findings: House Price Growth*Credit Constraints

Credit Constraint Interactions with Positive and Negative HPI Growth Rate

Panel A: Credit Score Interactions

	% Δ HELOC	% Δ Cash-Out	% Δ Second	% Δ HECM	% Δ Rate
*At mean credit score (**784**)*					
0.01 Increase in HPI Rate	0.9257	0.2285	-0.0763	-2.1108	0.493
0.01 Decrease in HPI Rate	-0.1375	-0.2538	0.2379	0.6427	-0.065
*One standard deviation (20 points) below the mean credit score (**763**)*					
0.01 Increase in HPI Rate	0.2821	0.5881	-0.2253	-2.3539	0.150
0.01 Decrease in HPI Rate	0.0819	-0.3088	0.0110	1.6224	0.063
*One standard deviation (20 points) above the mean credit score (**803**)*					
0.01 Increase in HPI Rate	1.5331	-0.1110	0.0644	-1.8814	0.836
0.01 Decrease in HPI Rate	-0.3446	-0.2020	0.4520	-0.2821	-0.192

Findings: Geographic Subsample Regressions



	HELOC	Cash-Out	Second	HECM
Minority Area Difference	-	+	+	+
Endowment Effect	+	-	-	-
Behavioral Response	+	-	+	+

Findings: Geographic Subsample Regressions

SUR Estimates, % Population 62 + Equity Extraction Method, 2004-2012, by Geographic Subsamples

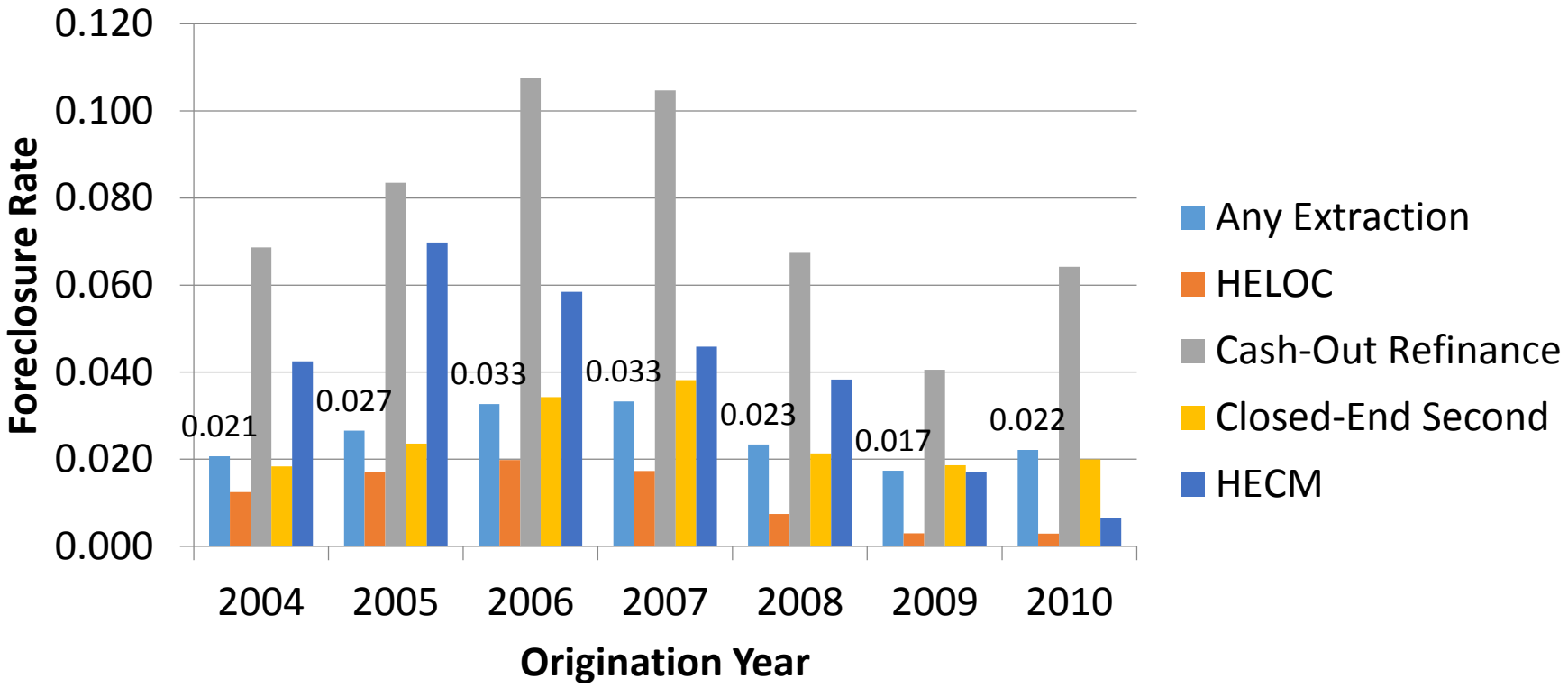
	HELOC	HELOC	Cash-Out Refinance	Cash-Out Refinance
	High Minority	Low Minority	High Minority	Low Minority
Variable	b/ȳ	b/ȳ	b/ȳ	b/ȳ
Median Real Repeat Sales Price (ln)	0.004***	0.007***	0.000	0.000
HPI Growth Rate, Positive	0.020	0.637***	0.447	0.041
HPI Growth Rate, Negative	-0.111	-0.542***	-0.826**	0.091
Credit Approval Ratio (All)	0.790**	0.618***	1.226***	0.630***
Median Credit Score	0.002*	0.001	-0.001	-0.010***
Median Revolving Credit Utilization Rate	0.457	2.000***	0.594	-1.881***
Median IRS AGI (Monthly)	0.120**	0.072***	-0.120**	-0.030*
Black (Share of Population)	-0.565**	0.342	0.561**	-0.087
Hispanic (Share of Population)	-0.841**	0.086	0.159	0.282
Year & CBSA Fixed Effects	Y	Y	Y	Y
R-Squared	0.485	0.524	0.408	0.179
Dependent Variable Mean	0.018	0.026	0.011	0.007

*** p<0.01, ** p<0.05, * p<0.1

Findings: Geographic Subsample Regressions

SUR Estimates, % Population 62 + Equity Extraction Method, 2004-2012, by Geographic Subsamples				
	Closed-End Second	Closed-End Second	HECM	HECM
	High Minority	Low Minority	High Minority	Low Minority
Variable	b/ȳ	b/ȳ	b/ȳ	b/ȳ
Median Real Repeat Sales Price (ln)	0.000	-0.001*	0.002***	0.000***
HPI Growth Rate, Positive	-0.478	0.089	-3.914***	-2.169***
HPI Growth Rate, Negative	-0.260	0.447**	0.070	2.594***
Credit Approval Ratio (All)	0.739*	0.446***	0.343	-0.208**
Median Credit Score	-0.001	-0.006***	0.000	0.003*
Median Revolving Credit Utilization Rate	-0.282	0.861	0.250	-0.062
Median IRS AGI (Monthly)	-0.035	-0.047***	-0.326***	-0.189***
Black (Share of Population)				
Hispanic (Share of Population)				
Year & CBSA Fixed Effects	Y	Y	Y	Y
R-Squared	0.296	0.208	0.617	0.517
Dependent Variable Mean	0.008	0.007	0.004	0.002
*** p<0.01, ** p<0.05, * p<0.1				

Findings: Foreclosure Rates by Extraction Channel



Findings: Foreclosure Rates by Extraction Channel

OLS, Proportion of Extractors Foreclosing as of Q42013, By Origination Cohort (Select Years)

	2004	2006	2007	2010
Cash-Out Refinancing	0.041***	0.045***	0.063***	0.034***
Closed-End Second	0.002	0.005	0.012	0.001
HECM	0.004	0.014	-0.016	-0.004
% w/Mortgage Past Due	0.079*	0.080**	0.095***	0.126***
Credit Utilization Rate	0.010**	0.004	0.0197**	-0.025***
Credit Score (100s)	-0.016***	-0.022***	-0.013***	-0.030***
Credit Approval Ratio	-0.018	-0.056***	-0.045***	-0.051***
Constant	0.148**	0.290***	0.148**	0.447***
Observations	4,555	4,646	4,586	2,828
CBSA Fixed Effects	Yes	Yes	Yes	Yes
R-squared	0.203	0.234	0.231	0.243

*** p<0.01, ** p<0.05, * p<0.1

For 2007 Originations:

- A 10 percentage point increase in cash-out refinancing is associated with a 19% increase in the foreclosure rate among extractors (0.0063/0.033)
- A 10 point increase in median credit score is associated with an 4% decrease in the foreclosure rate (0.0013/0.033)
- If HECMs were replaced by cash-out refinancing, the foreclosure rate could have been 12% higher

Conclusions

- Significant differences in the determinants of the origination of a home equity extraction loan by channel:
  - ✓ Variation in responsiveness to house prices by channel
  - ✓ Variation in responsiveness to credit conditions by channel
  - ✓ Variation in responsiveness to house prices in credit constrained areas by channel
- Differences in channel use in high vs. low minority areas is due in part to differences in endowments and differences in behavioral responses.
  - ✓ Minority areas less responsive to house price increases and decreases (to originate HELOCs or HECMs)
  - ✓ Low-minority areas less likely to use cash-out refinancing or HECMs when credit conditions improve
- The usage of particular channels in an area is significantly associated with foreclosure rates among extractors.
  - ✓ An increase in the share of extractions through cash-out refinancing is associated with significantly higher foreclosure rates
  - ✓ While HECMs are originated in similarly credit constrained areas, HECM origination share in an area is not significantly associated with foreclosure

Discussion & Implications

- As of April 2015 HECM lenders must assess a borrower's "ability to pay" and follow minimum credit, debit and affordability standards.
  - In a prior paper, we estimate a **6 percent reduction in HECM volume** due to the **credit portion of the policy**, based on the proportion of households who would "fail" the criteria and be unable to afford an escrow for taxes and insurance.
  - We estimate that the policy could reduce tax and insurance default by as much as **40 percent**.
  - Using the characteristics of the households who we estimate would be excluded from HECMs based on the policy, we predict the probability that they would instead obtain another equity extraction loan. We estimate that these **excluded households** would be very unlikely to have originated a HELOC, but would be **more likely** to have originated a second lien or **cash-out refinance loan instead of a HECM**.
  - To the extent that HECM loans have built in protections (e.g., insured against negative equity), these households may turn to more "risky" alternatives.

Moulton, S., D. Haurin and W. Shi. 2015. An Analysis of Default Risk in the Home Equity Conversion Mortgage (HECM) Program. *Journal of Urban Economics*

Thank You!

Research Program (2012-2016)

1. Empirical Modeling
   - HECM terminations & default
   - Take-up of HECMs
   - HECM loan terms and withdrawal behaviors

2. Survey of Counseled Seniors
   - Longer term well-being of HECM borrowers
   - May 2014-May 2015, about 2,000 respondents: (1) current HECM borrowers, (2) terminated HECM borrowers, and (3) seniors who sought counseling but did not get a reverse mortgage.

3. Post Origination Monitoring Pilot
   - RCT design; financial planning and reminders after closing
   - Launched January, 2015

Table 1: Descriptive Statistics for Model Variables, Full Sample (N=39,596)				
	mean	sd	min	max
HELOC Origination Rate	0.0244	0.0209	0.0008	0.2670
Cash-out Refinance Origination Rate	0.0078	0.0079	0	0.1470
Closed-End Second Origination Rate	0.0066	0.0073	0	0.0771
HECM Origination Rate	0.0019	0.0020	0	0.0293
Median Repeat Sales Price (ln)	12.4800	0.5600	10.2800	14.9700
HPI Growth Rate, Positive	0.0460	0.0762	0	0.7840
HPI Growth Rate, Negative	0.0367	0.0568	0	0.5690
HELOC ZIP-level Interest Rate	0.0579	0.0126	0.0200	0.1225
First Mortgage ZIP-level Interest Rate	0.0538	0.0088	0.0250	0.0825
Closed End Second ZIP-level Interest Rate	0.0668	0.0102	0.0206	0.1161
Average HECM MSA-level Interest Rate	0.0561	0.0004	0.0425	0.0657
Credit approval rate (All)	0.6720	0.0836	0.2310	1.0000
Median Credit Score	783.58	20.18	634	820
Median Revolving Credit Utilization Rate	0.0793	0.0478	0.0152	0.5760
Past Due Mortgage Rate	0.0165	0.0198	0	0.2310
Bankruptcy Rate	0.0090	0.0090	0	0.1360
Foreclosure Rate	0.0027	0.0047	0	0.0760
Revolving Debt to Income Ratio (1 yr lag)	0.0204	0.0136	0	0.5670
Share of Population with Mortgage (1 yr lag)	0.3370	0.1090	0.0502	1.0000
Median Mortgage Debt to Median Sales Price (1 yr lag)	0.3720	0.1560	0	2.4420
Median Monthly Mortgage Payment (1 yr lag)	0.8840	0.3380	0.1360	3.5630
Median IRS AGI (Monthly)	3.5520	1.3520	0.4170	8.3330
Median Age of Seniors with Credit Files	72.4600	2.3100	65	84
Black (share of population)	0.0980	0.1460	0	0.9810
Hispanic (share of population)	0.1300	0.1510	0	0.9750

Research Program (2012-2016)

Our other papers:

- Haurin, D., C. Ma, S. Moulton, W. Shi, M. Schmeiser, and J. Seligman. (Forthcoming). Spatial Variation in Reverse Mortgages Usage: House Price Dynamics and Consumer Selection. *Journal of Real Estate Finance and Economics.*
- Moulton, S., D. Haurin and W. Shi. 2015. An Analysis of Default Risk in the Home Equity Conversion Mortgage (HECM) Program. *Journal of Urban Economics* (forthcoming)
- Working Papers: (1) Reverse mortgage choice and the influence of counseling; (2) Dynamic model of reverse mortgage outcomes; (3) Seniors' accuracy of home valuation

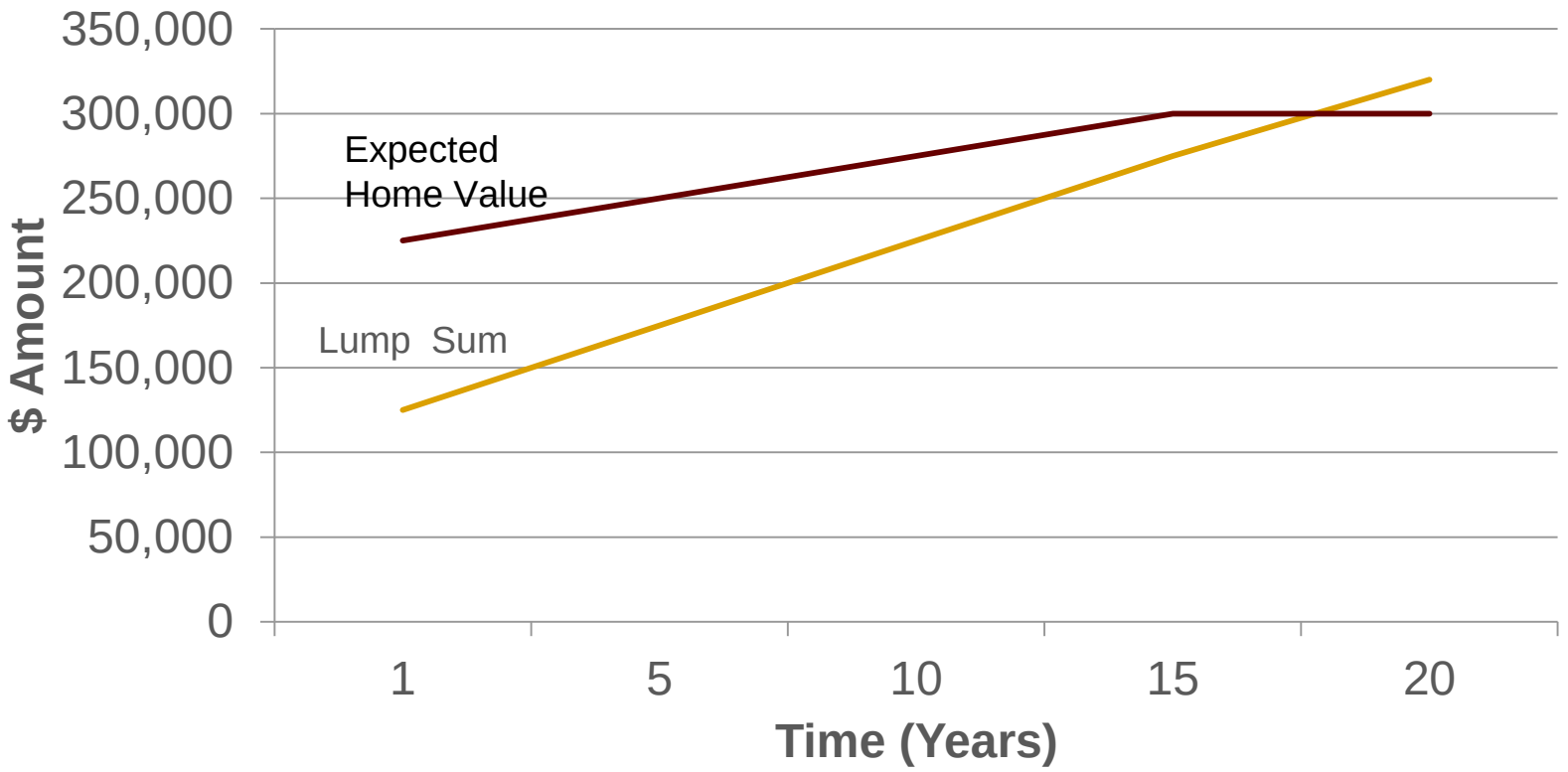
Reverse Mortgage 101

- In the U.S, the federally insured Home Equity Conversion Mortgage (HECM) comprises 95% of the market. Small, but potentially growing market.

- Extract equity from the home through a mortgage that does not become due until the last borrower sells the home, moves out permanently, or dies, as long as the borrower meets the obligations of the mortgage note
  - Obligations include living in the home as primary residence, **pays property taxes, homeowners insurance**, homeowners association dues and assessments, and maintains the home.

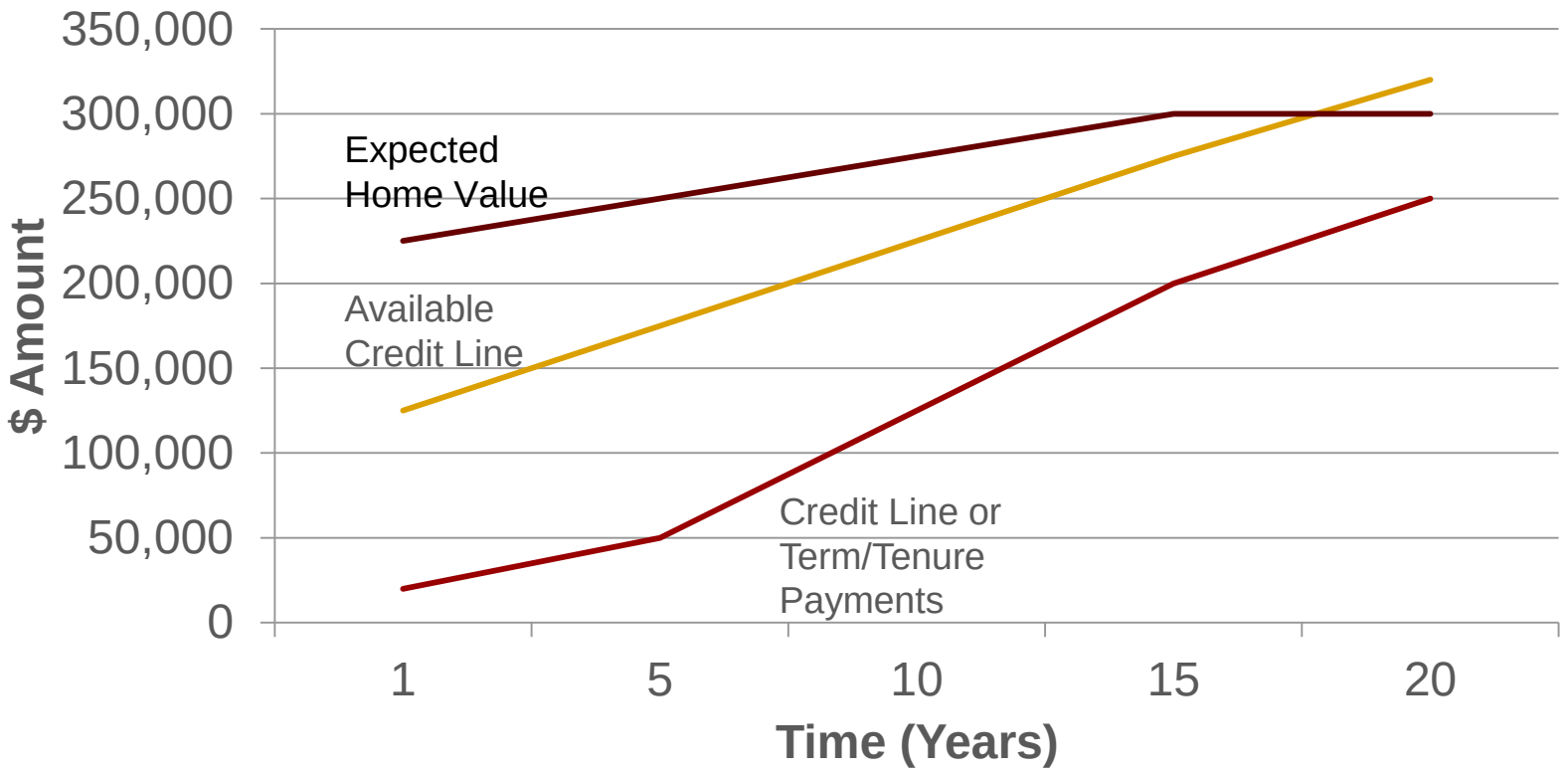
- No payments on the loan are required during the life of the loan. Money borrowed, plus associated interest and fees, are added to the balance due that continues to grow over time (mortgage “in reverse”)
  - Line of Credit
  - Tenure or Term (similar to annuity)
  - Lump Sum Distribution
  - Some combination of the above

Reverse Mortgage Debt



Maximum Claim Amount (home value at closing)= $225,000
Initial Principal Limit = $125,000

Reverse Mortgage Debt



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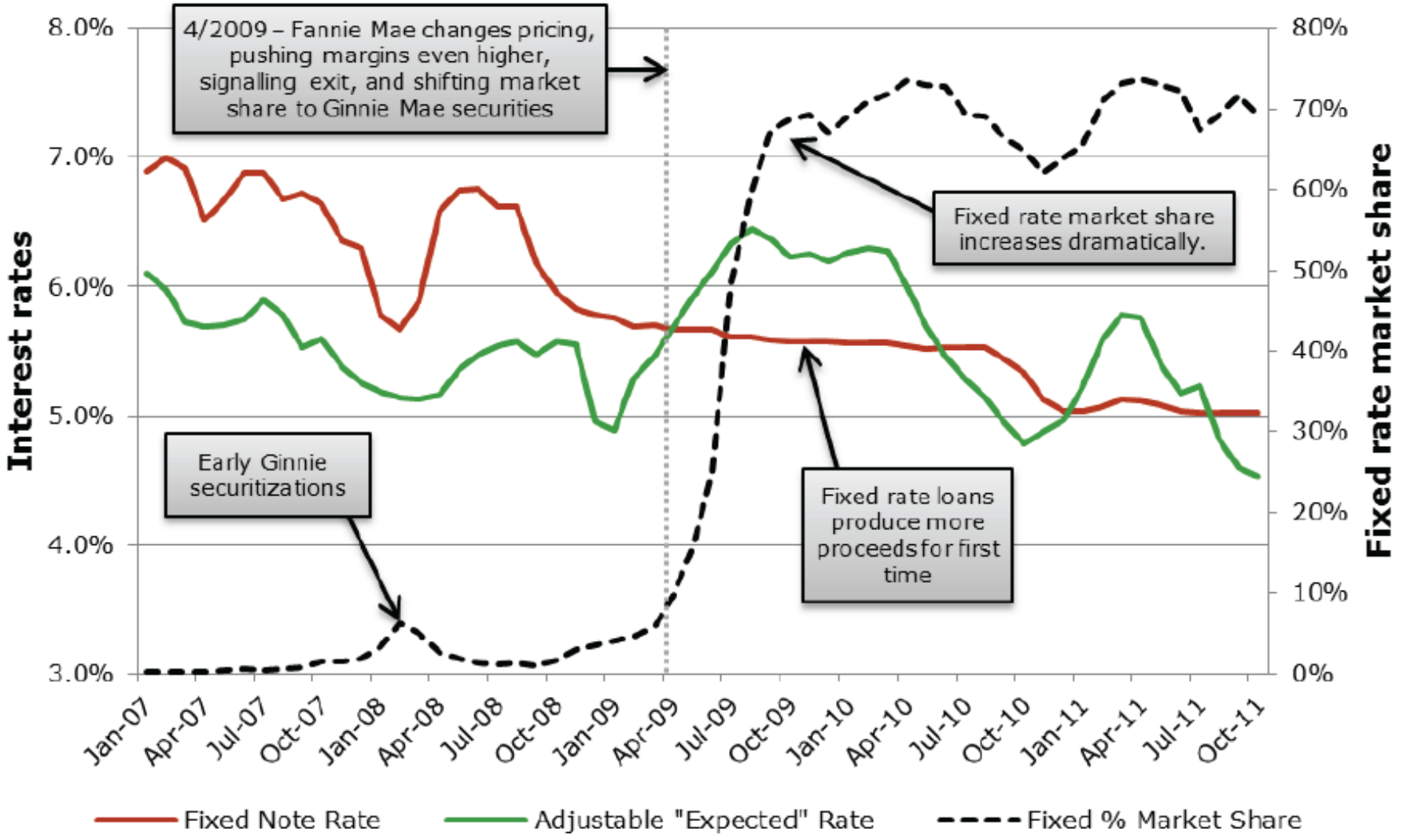
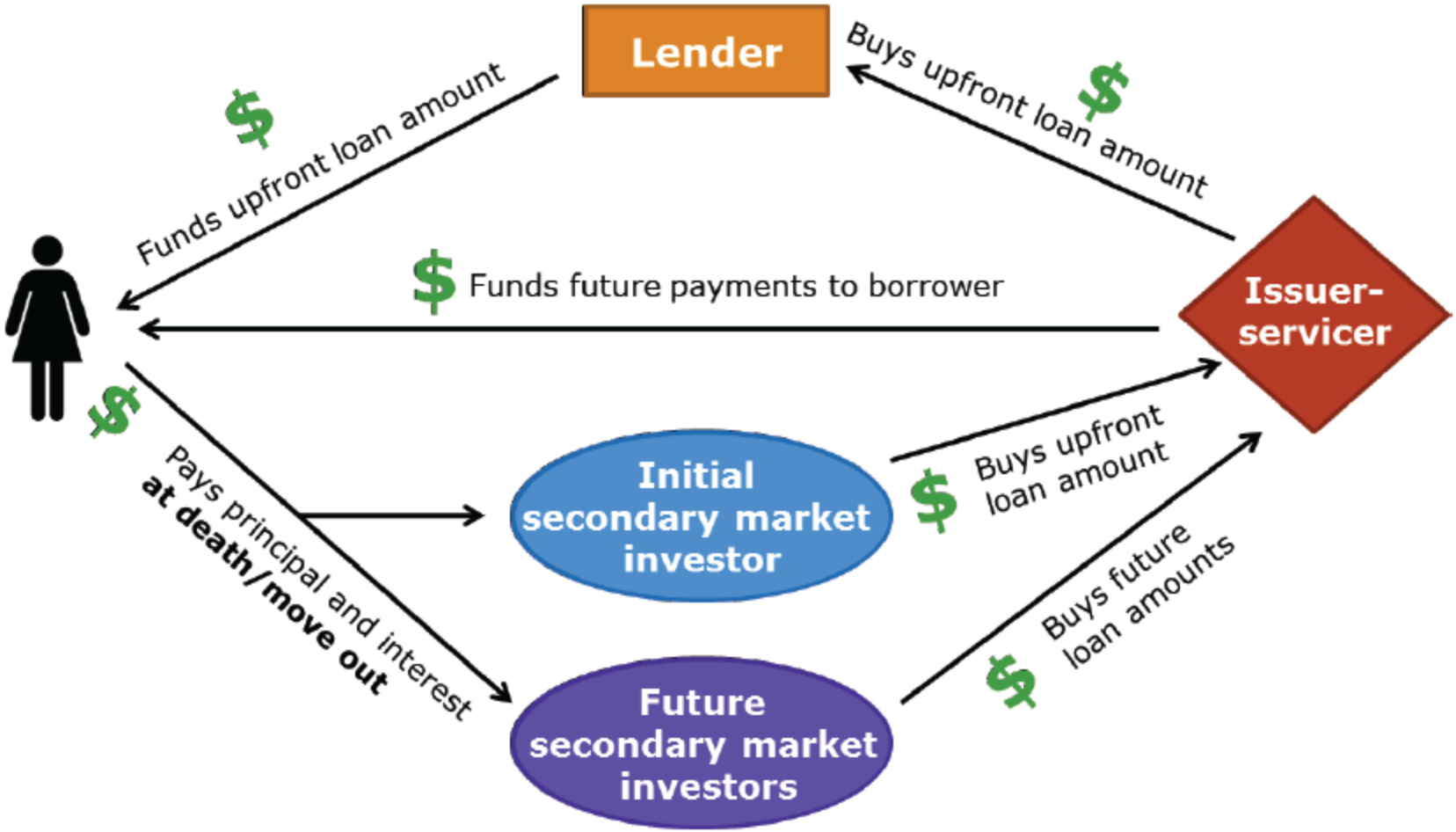
Initial Principal Limit = $125,000

Figure 38: Interest rates and fixed-rate market share



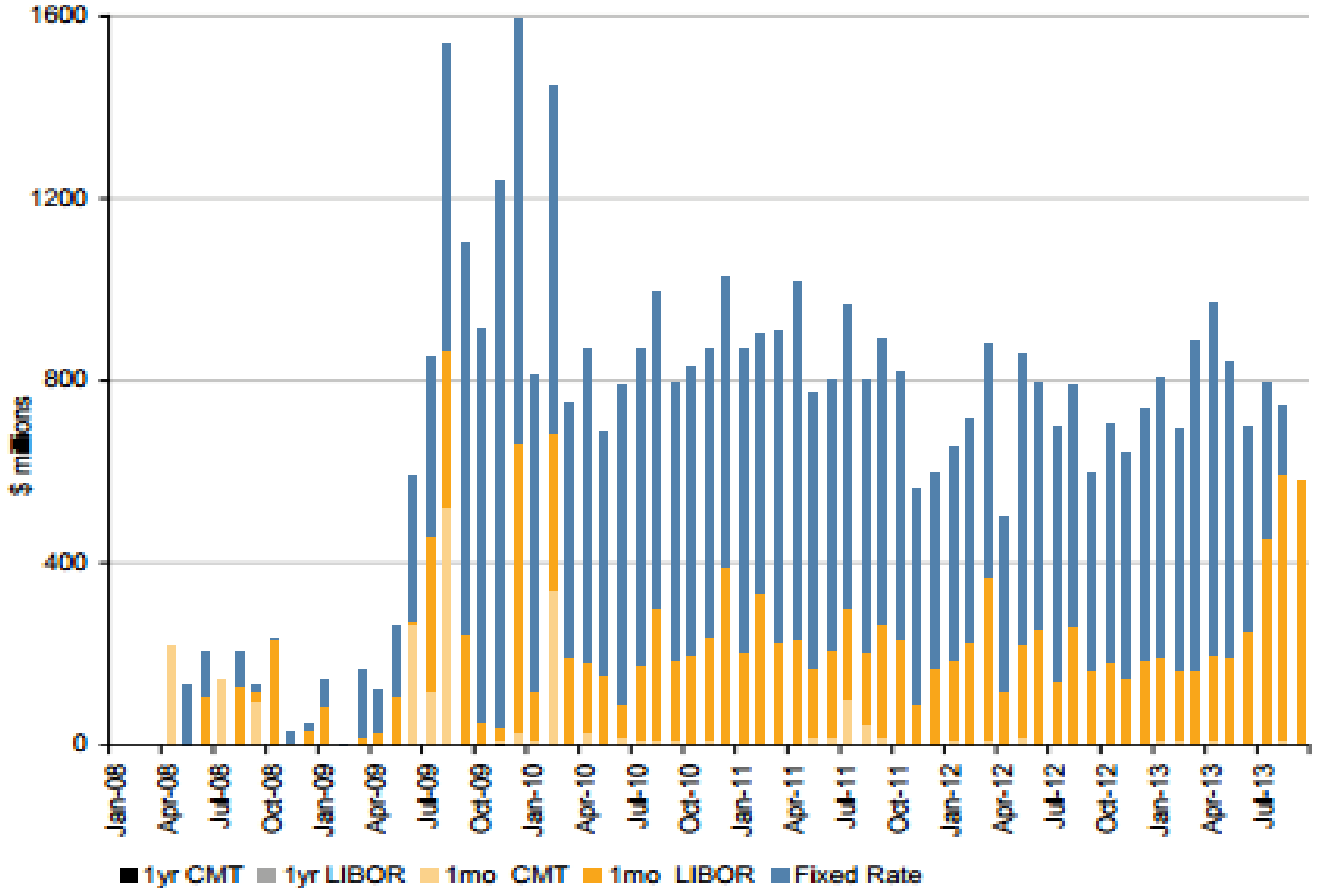
Source: CFPB 2012

Figure 36: Ginnie Mae securitization model



Source: CFPB 2012

Time Series: GN HMBS Issuance



Source: Ginnie Mae, CPRCDR, RBS

http://www.ginniemae.gov/doing_business_with_ginniemae/issuer_resources/ginnienet/NewIssuerTrainingPresentations/20131122_HMBS_Panel.pdf