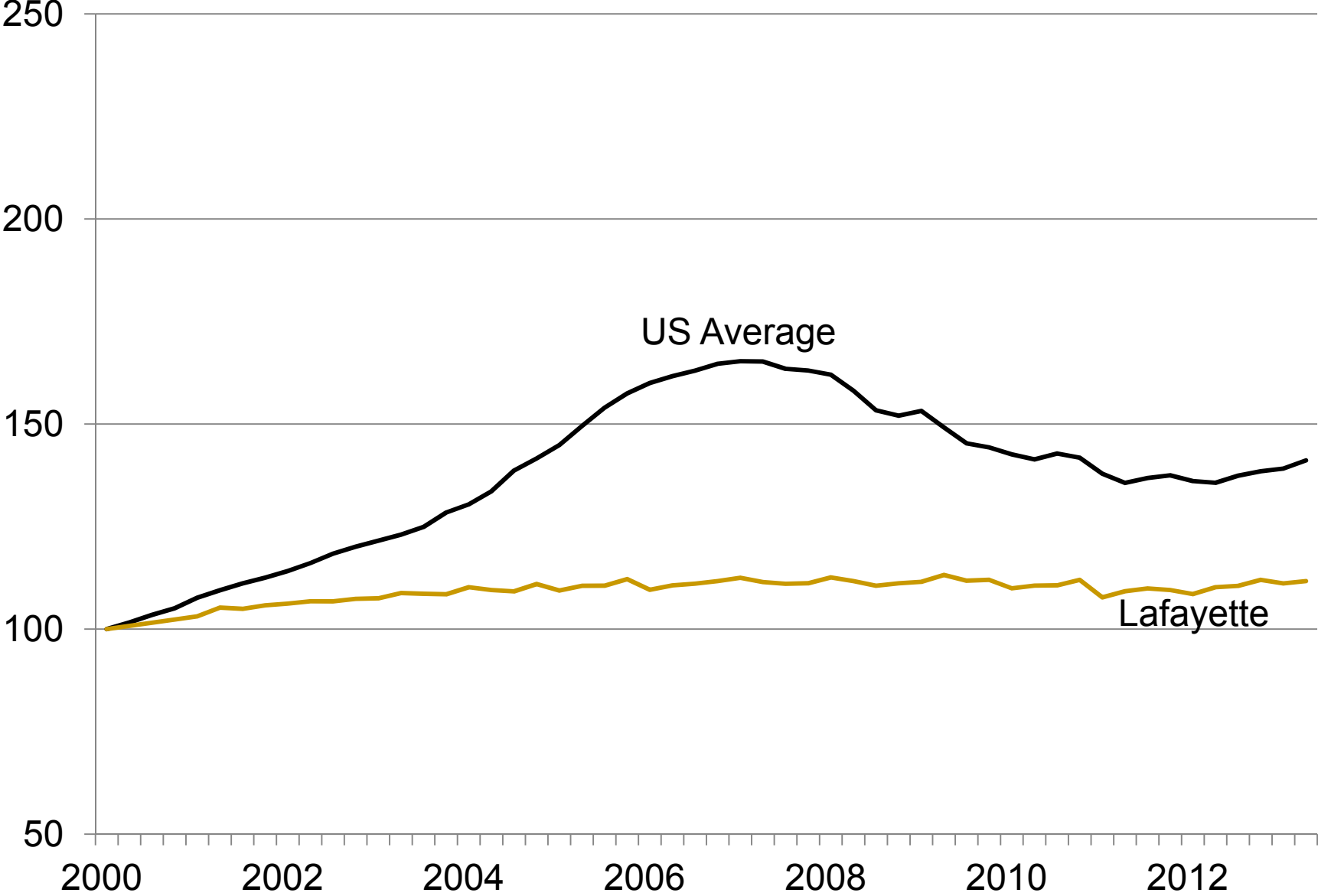


# Effects of the Housing Boom and Bust



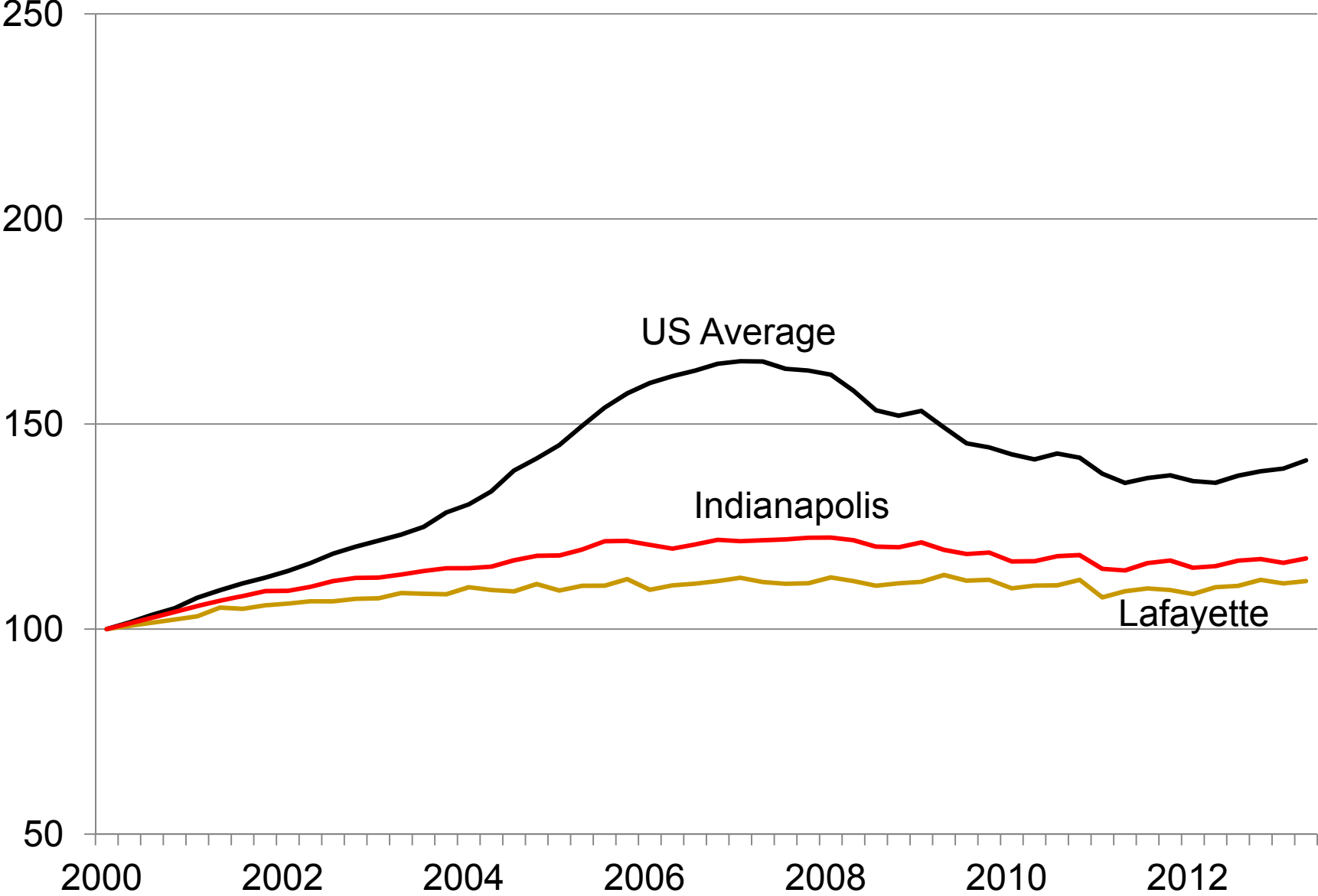
Kevin Mumford  
October 11, 2013

# Housing Price Index (Jan 2000 = 100)



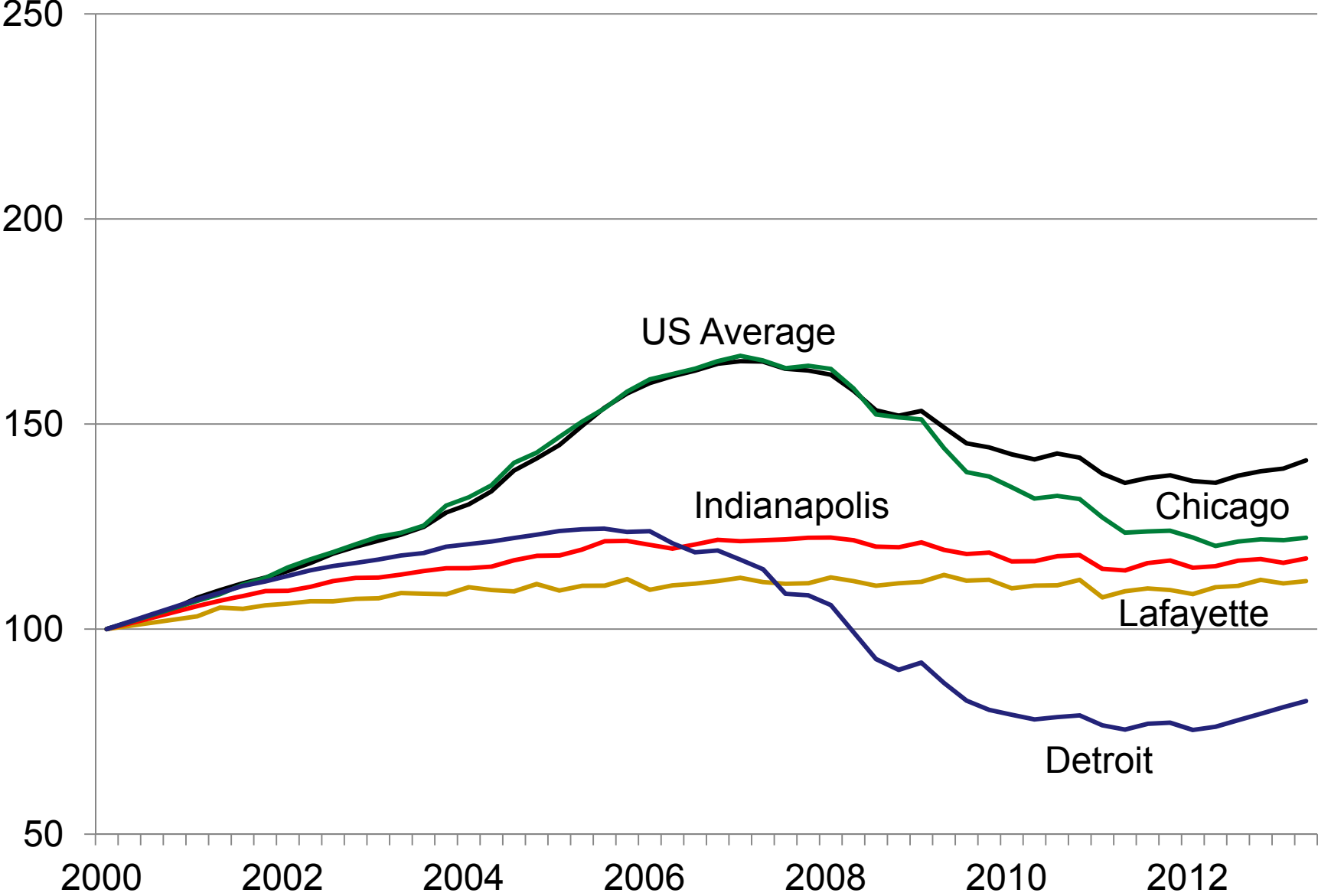
Source: Federal Housing Finance Agency, All Transactions Index

# Housing Price Index (Jan 2000 = 100)



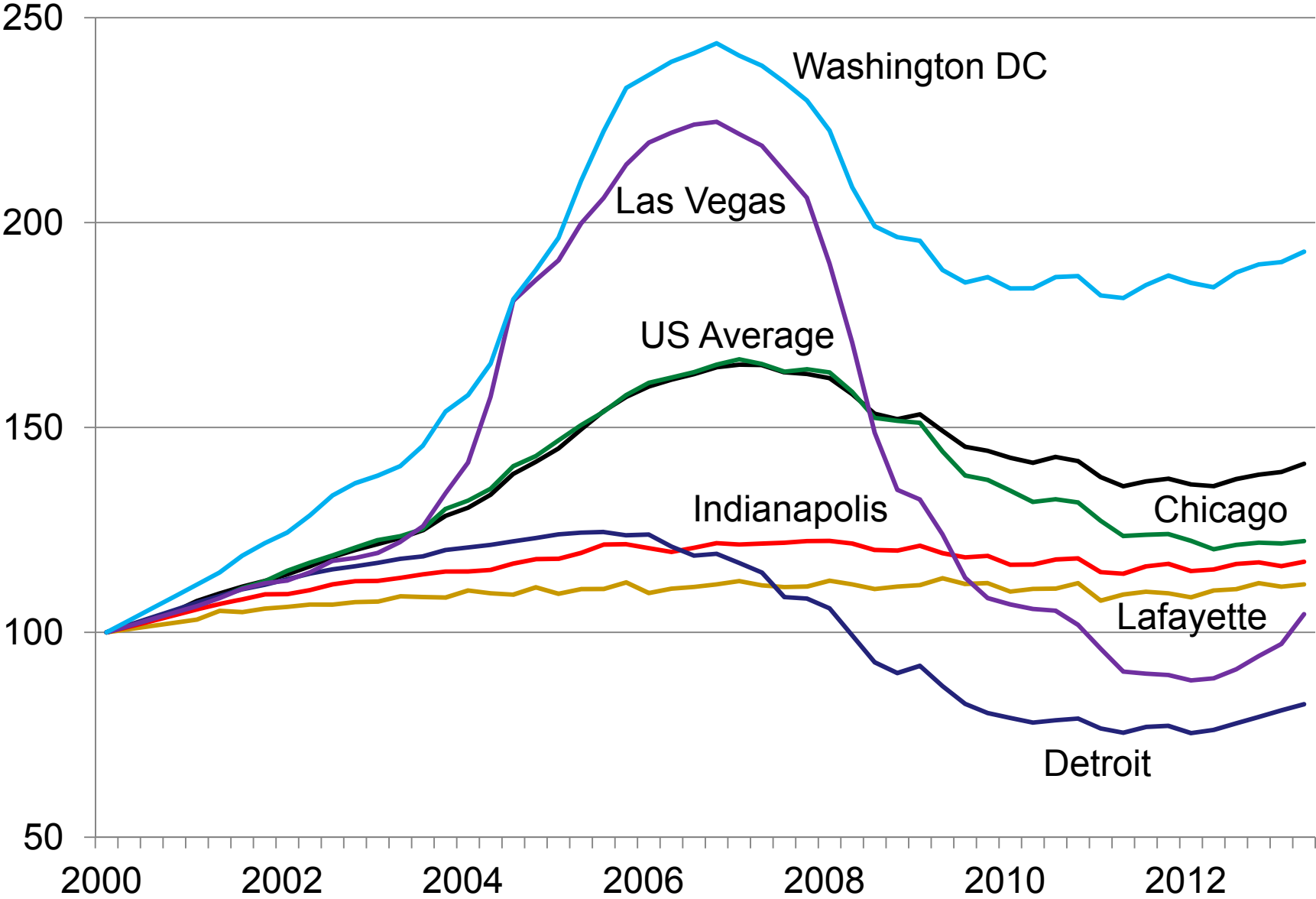
Source: Federal Housing Finance Agency, All Transactions Index

# Housing Price Index (Jan 2000 = 100)



Source: Federal Housing Finance Agency, All Transactions Index

# Housing Price Index (Jan 2000 = 100)



Source: Federal Housing Finance Agency, All Transactions Index

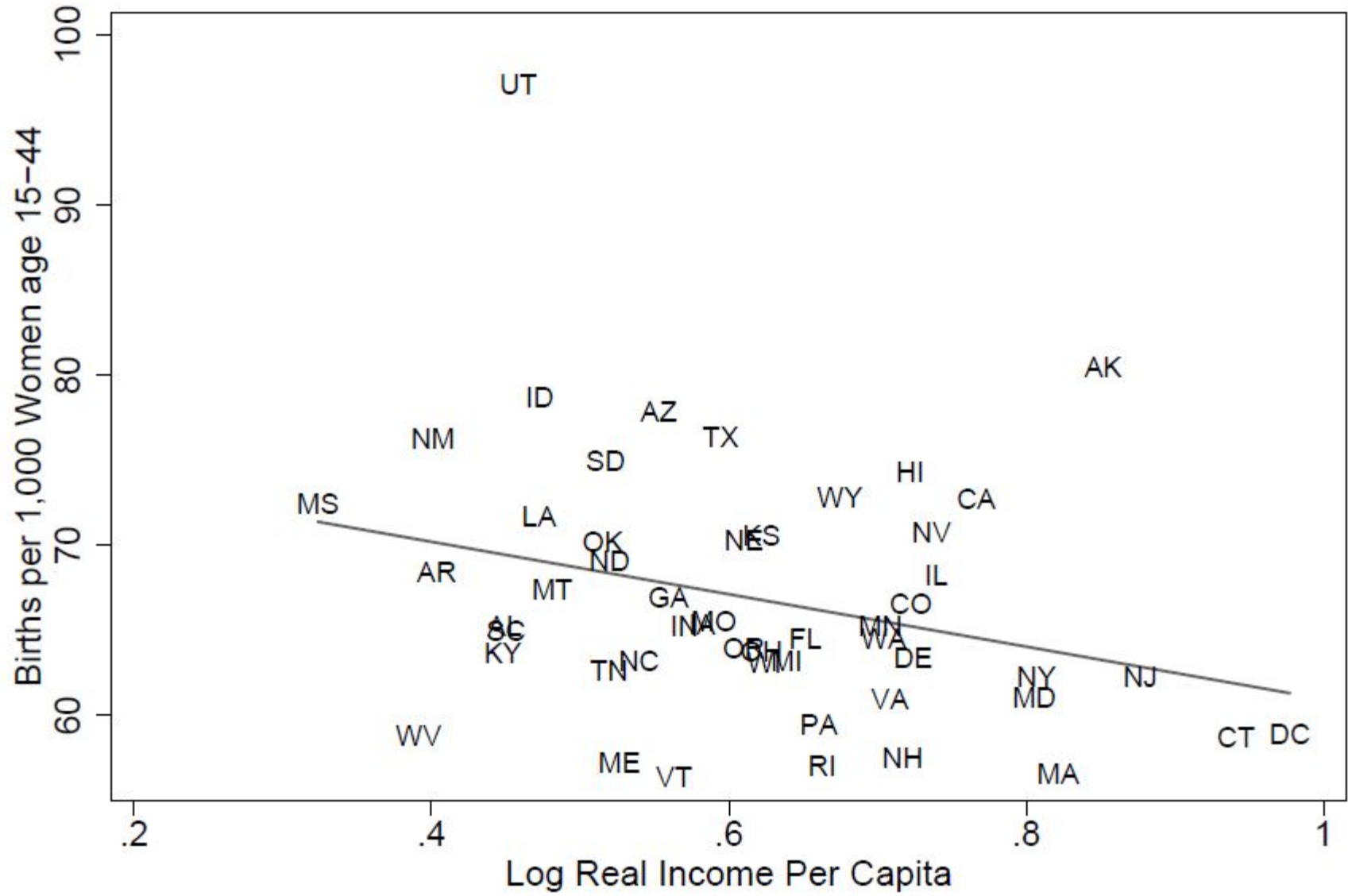
# Today's Presentation

- I don't know what caused the boom and bust
  - Was it the government's housing subsidies?
  - Was it the change in bank lending standards?
  - Was it Fannie Mae and Freddie Mac buying loans?
  - Was it people borrowing more than they should?
  - Was it Wall Street securitizing mortgages?
- The housing boom and bust gives researchers a great “natural experiment” that we can use to answer questions

# How Does Income Affect Fertility?

- Important policy question
- Income and family size are negatively correlated:
  - across countries
  - across states
  - across families
  - over time

# State Birth Rates and Per Capita Income





# Correlation is not the Causal Effect

- Areas with high incomes have a higher cost of living (raising a child is more expensive)
- High wages implies a higher opportunity cost of raising a child
- People with a lower preference for children are more likely to move to a high-cost, high-wage location

# We need an exogenous shock

- Winning the lottery
- Winning the housing lottery
  - exogenous variation in household wealth
  - PSID data (32,000 homeowners age 15-44)

“Do Family Wealth Shocks Affect Fertility Choices? Evidence from the Housing Market Boom and Bust” *Review of Economics and Statistics* (2013) 95:2, 464-475. (with Michael F. Lovenheim)

# Results

- A \$100,000 increase in home value leads to a 8.5 increase in fertility rate.
- Historically around 70 women per 1,000 age 15-44 give birth each year, so this estimated effect is a **12 percent increase** (before the housing bust).
- Response to the housing bust is smaller
  - Fertility rate fell every year during the bust from 70 births per 1,000 women (15-44) to 63 today.
- Robust to within or across MSA price variation
- No fertility response for renters
- Strongest effect for women with 1 child

# Estimates by Age Group

Age Group	Effect of \$100,000 Increase	Mean Fertility Rate	Percent Change in Birth Probability
15-19	-5.9 (1.6)	32.7	-18%
20-24	-4.9 (3.7)	74.0	-7%
25-29	17.5 (5.4)	117.2	15%
30-34	14.4 (8.1)	86.5	17%
35-39	8.1 (2.0)	26.3	31%
40-44	4.2 (1.4)	5.6	75%

# Housing Market Effects

- Fertility -  $\uparrow$  housing wealth  $\rightarrow$  more children
- Consumption
- Education
- Health
- Marriage
- Mobility
- Unemployment

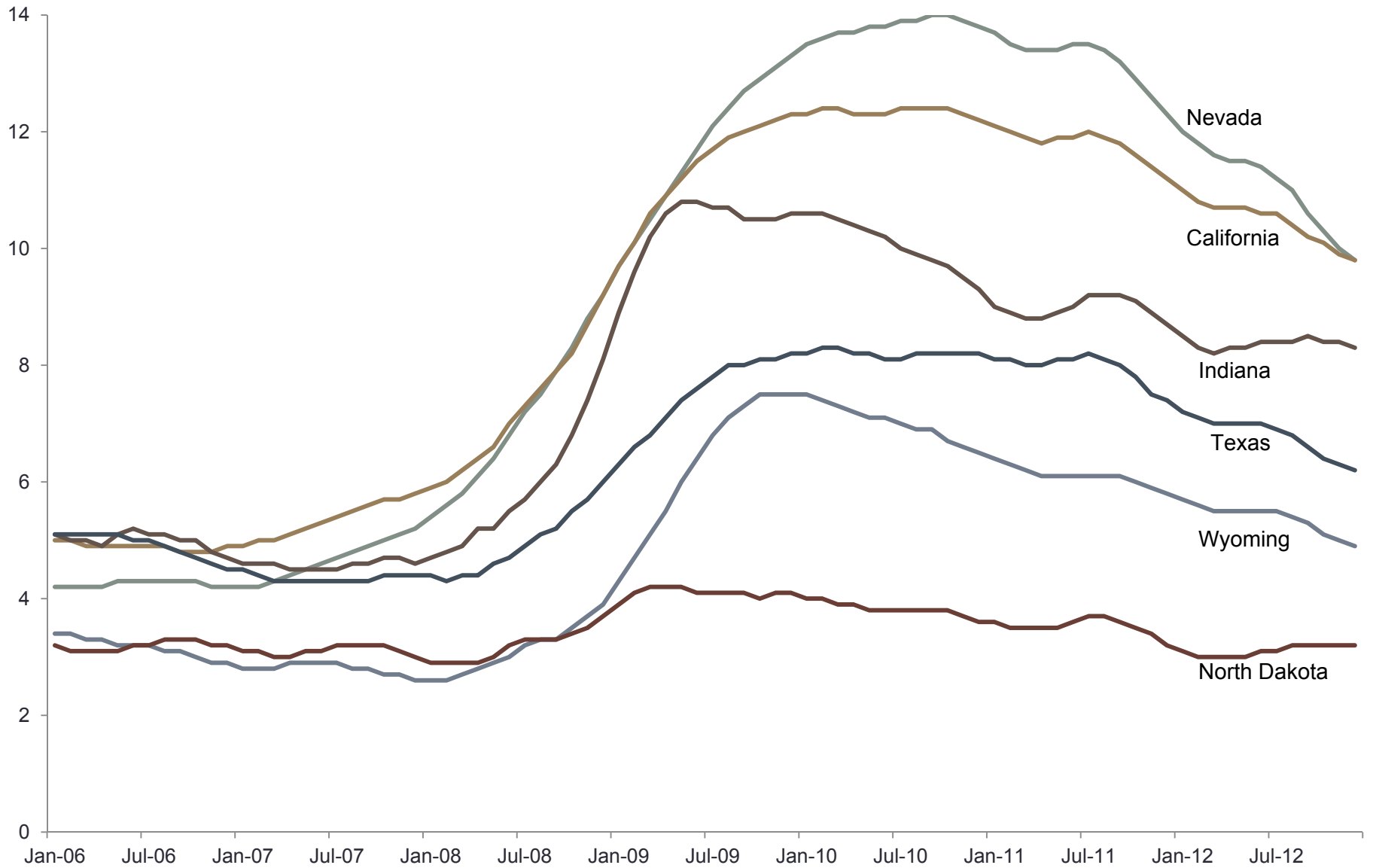
# House Lock

- Underwater Mortgage: value of a home drops below the remaining balance on the mortgage (transaction costs)
- Underwater homes are more difficult to sell:
  - Bring cash to the settlement
  - Get the bank to agree to a short sale
  - Default on the loan
- Underwater homeowners are less likely to move:
  - Englehardt (2003), Ferreira, Gyourko, and Tracy (2010, 2011)
- Loss aversion leads to fewer sales when prices decline:
  - Chan (2001), Genesove and Mayer (2001), Annenberg (2011)

# Geographic Skill Mismatch

- The recession hits some occupations and some locations harder than others:
  - Certain types of jobs disappear in one labor market but there are opportunities for employment in other labor markets
- US migration rate has fallen every year since 2007
  - reduced mobility for underwater homeowners
    - leads to workers staying in bad labor markets
    - leads to higher level of unemployment
- The IMF (2010) estimates that 0.5 to 1.25 percentage points of unemployment were due to underwater mortgages

# Unemployment Rate by State





# Increased Mobility

- Underwater homeowners may be more likely to move:
  - Home mortgages in the US are nonrecourse loans
  - A large drop in home value is a strong incentive to default
  - Lower cost of default: credit score penalty and social stigma
- US migration rate has been declining since the 1980s
- Migration rate fell by less in areas with more underwater homes
  - Molloy, Smith, and Wozniak (2011) – Census, CPS, IRS data
- Underwater homeowners are more likely to move
  - Schulhofer-Wohl (2012) – AHS data

# Underwater and Unemployed?

- The mobility evidence is all based on aggregate statistics or house-specific rather than person-specific data
- High mobility out of underwater markets is not surprising
- Does an underwater mortgage increase unemployment?
- What do we do:
  - PSID restricted-access geocode data, 2005 - 2009
  - Observe if a particular homeowner is underwater
    - in period 1 and period 2
    - Control group are similar homeowners that are not underwater
  - Observe both the mobility and the employment outcomes

“The Effect of Underwater Mortgages on Unemployment” working paper  
(with Katie Schultz)

# Underwater Imputation

- Underwater status in the 1<sup>st</sup> period is measured directly
  - Homeowners reports the remaining balance on the mortgage and the value of the home. We calculate LTV ratio.
- Underwater status in the 2<sup>nd</sup> period is always imputed
  - We use the HPI for the 917 CBSAs to impute home price.
  - Homeowners may have difficulty evaluating their home value during the recession.
  - Homeowners who subsequently move will not have self-reported values
- Estimate the effect of going underwater in period 2 for those that are not underwater in period 1

# Outcome Variables

## Employment

- **Unemployment** – indicates that the individuals reported an unemployment spell in the period 2 interview
- **Job Change** – indicates that the individual changed employers between the period 1 and period 2 interviews

## Mobility

- **Any Move** – indicates that the person lives in a different census tract in period 2 than in period 1
- **Move MSA** – long-distance move to a new MSA
- **Move Tract** – short-distance move within the same MSA

# Results

## Average Marginal Effects - Probit Model

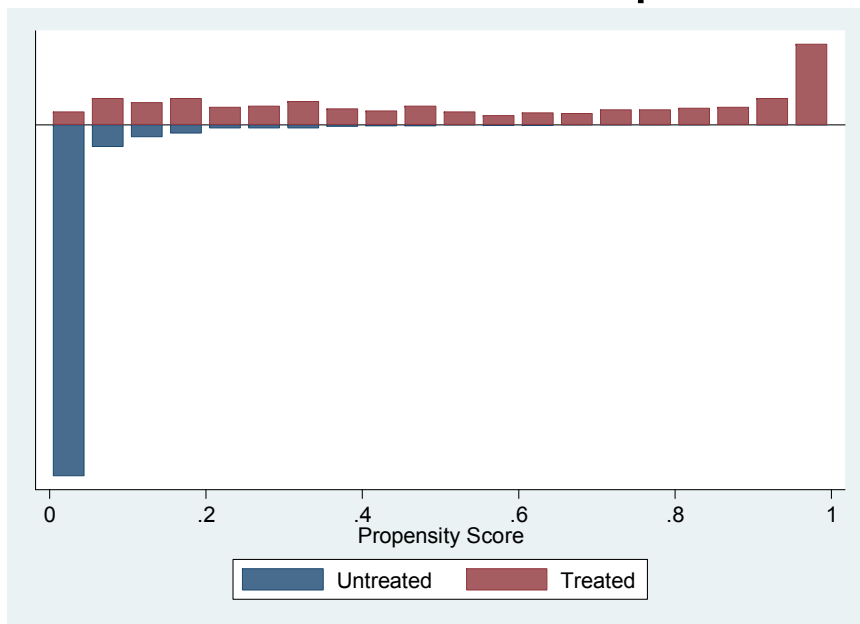
	(1) Unemployment	(2) Job Change	(3) Any Move	(4) Long-Distance	(5) Short-Distance
Underwater: Period 1 Only	0.0136 (0.0138)	-0.0142 (0.0187)	0.0110 (0.0219)	0.0163 (0.0147)	-0.0118 (0.0166)
<b>Underwater: Period 2 Only</b>	<b>-0.0033</b> <b>(0.0203)</b>	<b>0.0010</b> <b>(0.0164)</b>	<b>0.0673*</b> <b>(0.0350)</b>	<b>0.0425*</b> <b>(0.0240)</b>	<b>0.0420*</b> <b>(0.0229)</b>
Underwater: Both Periods	0.0018 (0.0112)	0.0166 (0.0169)	0.0138 (0.0215)	0.0304** (0.0147)	-0.0161 (0.0234)
Additional Control Variables	Yes	Yes	Yes	Yes	Yes
State-by-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	7409	6330	7422	6904	7312

Notes: Each column reports the average marginal effect from the estimation of equation (2). All columns include controls for gender, age, race, ethnicity, marital status, education level, household size, type of housing, and other real estate holdings. The columns present results for the five dependent variables considered in Tables 2 through 6: unemployment, job change, any move, long-distance (MSA) move, and short-distance (census tract) move. Robust standard errors are reported in parentheses below the estimates and are clustered at the state level. Statistical significance is indicated as follows: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

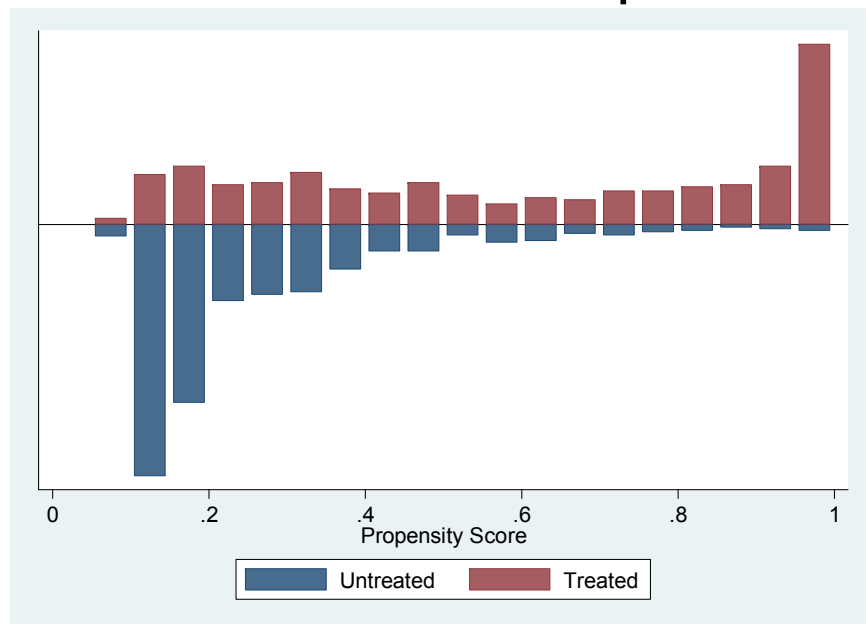
# Sample Selection

Estimate the probability of being underwater in period 2:

## Unrestricted Sample



## Restricted Sample



Notes: The dependent variable is an indicator for being underwater in period 2 (called “treated” in the figures). We estimate a probit model using all the observed variables from period 1 as controls, including: house value, home equity, income, and wealth. Most individuals who were not underwater in period 2 have an estimated propensity score close to zero. In the restricted sample, the 90<sup>th</sup> percentile propensity score cutoff is applied to both the treated and control groups.

# Results – Selected Sample

## Average Marginal Effects - Probit Model

	(1) Unemployment	(2) Job Change	(3) Any Move	(4) Long-Distance	(5) Short-Distance
Underwater: Period 1 Only	0.0564 (0.0642)	0.0140 (0.0488)	0.0940 (0.113)	0.0425 (0.0663)	0.0760 (0.0909)
<b>Underwater: Period 2 Only</b>	<b>-0.0116</b> <b>(0.0385)</b>	<b>0.0103</b> <b>(0.0319)</b>	<b>0.0819*</b> <b>(0.0488)</b>	<b>0.0662**</b> <b>(0.0335)</b>	<b>0.0553**</b> <b>(0.0269)</b>
Underwater: Both Periods	-0.0444 (0.0326)	0.0337 (0.0347)	0.0133 (0.0671)	0.0248 (0.0363)	-0.0106 (0.0557)
Additional Control Variables	Yes	Yes	Yes	Yes	Yes
State-by-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	802	699	874	640	800

Notes: Each column reports the average marginal effect from the estimation of equation (2). All columns include controls for gender, age, race, ethnicity, marital status, education level, household size, type of housing, and other real estate holdings. The columns present results for the five dependent variables considered in Tables 2 through 6: unemployment, job change, any move, long-distance (MSA) move, and short-distance (census tract) move. Robust standard errors are reported in parentheses below the estimates and are clustered at the state level. Statistical significance is indicated as follows: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

# By Level of Negative Equity

## Average Marginal Effects - Probit Model

	(1) Unemployment	(2) Job Change	(3) Any Move	(4) Long-Distance	(5) Short-Distance
Underwater: Period 1 Only	0.0534 (0.0626)	0.0144 (0.0492)	0.0917 (0.114)	0.0467 (0.0678)	0.0706 (0.0933)
<b>Low Negative Equity</b>	<b>-0.0409</b> <b>(0.0386)</b>	<b>0.0152</b> <b>(0.0501)</b>	<b>0.0486</b> <b>(0.0515)</b>	<b>0.0911**</b> <b>(0.0356)</b>	<b>0.00167</b> <b>(0.0416)</b>
<b>High Negative Equity</b>	<b>0.0111</b> <b>(0.0471)</b>	<b>0.00445</b> <b>(0.0207)</b>	<b>0.111*</b> <b>(0.0573)</b>	<b>0.0443</b> <b>(0.0479)</b>	<b>0.0981***</b> <b>(0.0324)</b>
Underwater: Both Periods	-0.0458 (0.0318)	0.0339 (0.0349)	0.0122 (0.0684)	0.0273 (0.0369)	-0.0119 (0.0579)
Additional Control Variables	Yes	Yes	Yes	Yes	Yes
State-by-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	802	699	874	640	800

Notes: Each column reports the average marginal effect from the estimation of equation (2). All columns include controls for gender, age, race, ethnicity, marital status, education level, household size, type of housing, and other real estate holdings. The columns present results for the five dependent variables considered in Tables 2 through 6: unemployment, job change, any move, long-distance (MSA) move, and short-distance (census tract) move. Robust standard errors are reported in parentheses below the estimates and are clustered at the state level. Statistical significance is indicated as follows: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



# By Income Group

## Average Marginal Effects - Probit Model

	(1) Unemployment	(2) Job Change	(3) Any Move	(4) Long-Distance	(5) Short-Distance
Underwater: Period 1 Only	0.0547 (0.0633)	0.0154 (0.0492)	0.0943 (0.112)	0.0345 (0.0687)	0.0754 (0.0900)
<b>Above Median Income</b>	<b>0.0167</b> <b>(0.0507)</b>	<b>-0.00395</b> <b>(0.0323)</b>	<b>0.0768</b> <b>(0.0711)</b>	<b>0.112***</b> <b>(0.0422)</b>	<b>0.0173</b> <b>(0.0408)</b>
<b>Below Median Income</b>	<b>-0.0377</b> <b>(0.0343)</b>	<b>0.0265</b> <b>(0.0567)</b>	<b>0.0869*</b> <b>(0.0469)</b>	<b>0.00108</b> <b>(0.0519)</b>	<b>0.0830**</b> <b>(0.0358)</b>
Underwater: Both Periods	-0.0454 (0.0325)	0.0351 (0.0351)	0.0136 (0.0664)	0.0195 (0.0375)	-0.00999 (0.0551)
Additional Control Variables	Yes	Yes	Yes	Yes	Yes
State-by-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	802	699	874	640	800

Notes: Each column reports the average marginal effect from the estimation of equation (2). All columns include controls for gender, age, race, ethnicity, marital status, education level, household size, type of housing, and other real estate holdings. The columns present results for the five dependent variables considered in Tables 2 through 6: unemployment, job change, any move, long-distance (MSA) move, and short-distance (census tract) move. Robust standard errors are reported in parentheses below the estimates and are clustered at the state level. Statistical significance is indicated as follows: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

# Summary

- The evidence from prior housing busts showed that underwater homeowners were less mobile
- In this housing bust, underwater homeowners were more mobile and did not have a higher risk of unemployment on average
- Why was this time different?
  - This housing bust was deeper and more widespread
  - Less stigma from a default
- How far underwater matters
  - going a little underwater makes a long-distance move more likely
  - going a lot underwater makes a short-distance move more likely

# Housing Market Effects

- Fertility -  $\uparrow$  housing wealth  $\rightarrow$  more children
- Consumption -  $\uparrow$  h. wealth  $\rightarrow$  more consumption
- Education -  $\uparrow$  housing wealth  $\rightarrow$  better college
- Health -  $\uparrow$  housing wealth  $\rightarrow$  no weight loss
- Marriage -  $\uparrow$  housing price  $\rightarrow$  ?
- Mobility - large  $\downarrow$  housing price  $\rightarrow$  higher mobility
- Unemployment - large  $\downarrow$  housing price  $\rightarrow$  no  $\Delta$

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Teaching:

- Labor Economics (ECON 650) – PhD students
- Econometrics (ECON 562) – Master's students