Pensions and Homeownership after the Great Recession

Tim Murray
Department of Economics and Business
Virginia Military Institute

United States Naval Academy

March 12, 2021

VIRGINIA MILITARY INSTITUTE
DEPARTMENT OF ECONOMICS AND BUSINESS

Outline of Talk

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)
- Housing equity accounts for most of retirees wealth and savings portfolio (Begley and Chan, 2018; Moulton et al., 2016)

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)
- Housing equity accounts for most of retirees wealth and savings portfolio (Begley and Chan, 2018; Moulton et al., 2016)

- **The Life-Cycle Hypothesis** (Modigliani and Brumberg, 1954)
  - Save during working years

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)
- Housing equity accounts for most of retirees wealth and savings portfolio (Begley and Chan, 2018; Moulton et al., 2016)

- **The Life-Cycle Hypothesis** (Modigliani and Brumberg, 1954)
  - Save during working years
  - Live off savings in retirement

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)
- Housing equity accounts for most of retirees wealth and savings portfolio (Begley and Chan, 2018; Moulton et al., 2016)

- **The Life-Cycle Hypothesis** (Modigliani and Brumberg, 1954)
  - Save during working years
  - Live off savings in retirement

- The Life-Cycle Hypothesis suggests that retirees should use their accumulated housing equity to help smooth and increase consumption in retirement.

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)
- Housing equity accounts for most of retirees wealth and savings portfolio (Begley and Chan, 2018; Moulton et al., 2016)

- **The Life-Cycle Hypothesis** (Modigliani and Brumberg, 1954)
  - Save during working years
  - Live off savings in retirement

- The Life-Cycle Hypothesis suggests that retirees should use their accumulated housing equity to help smooth and increase consumption in retirement.
  - Moving from owning to renting

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)
- Housing equity accounts for most of retirees wealth and savings portfolio (Begley and Chan, 2018; Moulton et al., 2016)

- **The Life-Cycle Hypothesis** (Modigliani and Brumberg, 1954)
  - Save during working years
  - Live off savings in retirement

- The Life-Cycle Hypothesis suggests that retirees should use their accumulated housing equity to help smooth and increase consumption in retirement.
  - Moving from owning to renting
  - Downsizing

Introduction

- Nearly 80% of retirees own a home (US Census Bureau, 2018)
- Housing equity accounts for most of retirees wealth and savings portfolio (Begley and Chan, 2018; Moulton et al., 2016)

- **The Life-Cycle Hypothesis** (Modigliani and Brumberg, 1954)
  - Save during working years
  - Live off savings in retirement

- The Life-Cycle Hypothesis suggests that retirees should use their accumulated housing equity to help smooth and increase consumption in retirement.
  - Moving from owning to renting
  - Downsizing
  - Reverse Mortgage

Introduction

- Most households do not reduce housing equity unless they suffer an idiosyncratic negative shock (Poterba et al., 2011; Fisher et al., 2007; Ai et al., 1990)
  - Death of a spouse
  - Divorce

Introduction

- Most households do not reduce housing equity unless they suffer an idiosyncratic negative shock (Poterba et al., 2011; Fisher et al., 2007; Ai et al., 1990)
  - Death of a spouse
  - Divorce
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)

Introduction

- Most households do not reduce housing equity unless they suffer an idiosyncratic negative shock (Poterba et al., 2011; Fisher et al., 2007; Ai et al., 1990)
  - Death of a spouse
  - Divorce
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)
- Fewer than 10% of households move in a given year

  (Munnell et al., 2020; Poterba et al., 2011)

Introduction

- Most households do not reduce housing equity unless they suffer an idiosyncratic negative shock (Poterba et al., 2011; Fisher et al., 2007; Ai et al., 1990)
  - Death of a spouse
  - Divorce
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)
- Fewer than 10% of households move in a given year

  (Munnell et al., 2020; Poterba et al., 2011)
- Retirees who move from owning to owning, are just as likely to upsize as downsize (Calvo et al., 2009; Clark et al, 2003; Venti and Wise, 1989)

Introduction

- Most households do not reduce housing equity unless they suffer an idiosyncratic negative shock (Poterba et al., 2011; Fisher et al., 2007; Ai et al., 1990)
  - Death of a spouse
  - Divorce
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)
- Fewer than 10% of households move in a given year

  (Munnell et al., 2020; Poterba et al., 2011)
- Retirees who move from owning to owning, are just as likely to upsize as downsize (Calvo et al., 2009; Clark et al, 2003; Venti and Wise, 1989)
- Few households take take out reverse mortgages

  (Davidoff et al., 2017; Kaul and Goodman, 2017; Nakajima and Telyukova, 2017)

Introduction

- Many households die with large amounts of housing equity they could have used to increase and smooth consumption

Introduction

- Many households die with large amounts of housing equity they could have used to increase and smooth consumption
- This behavior violates the predictions of the Life-Cycle Hypothesis

Introduction

- Many households die with large amounts of housing equity they could have used to increase and smooth consumption
- This behavior violates the predictions of the Life-Cycle Hypothesis
  - Bequest motive (Begley, 2017; Suari-Andrew et at., 2019)

Introduction

- Many households die with large amounts of housing equity they could have used to increase and smooth consumption
- This behavior violates the predictions of the Life-Cycle Hypothesis
  - Bequest motive (Begley, 2017; Suari-Andrew et at., 2019)
  - Precautionary savings (Murray 2020; Nakajima and Telyukova, 2017; Poterba et al., 2011)

Introduction

- Many households die with large amounts of housing equity they could have used to increase and smooth consumption
- This behavior violates the predictions of the Life-Cycle Hypothesis
  - Bequest motive (Begley, 2017; Suari-Andrew et at., 2019)
  - Precautionary savings (Murray 2020; Nakajima and Telyukova, 2017; Poterba et al., 2011)
  - Non-pecuniary utility flows from staying in house

    (Carstensen, 2006; Fisher et al., 2007)

Introduction

- Pension Plans

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer
    - Retiree usually bears little risk

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer
    - Retiree usually bears little risk
  - Defined Contribution Plans (DC Plan)

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer
    - Retiree usually bears little risk
  - Defined Contribution Plans (DC Plan)
    - Employee contributes with some level of employer matching

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer
    - Retiree usually bears little risk
  - Defined Contribution Plans (DC Plan)
    - Employee contributes with some level of employer matching
    - Plan is subject to the risk of the market

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer
    - Retiree usually bears little risk
  - Defined Contribution Plans (DC Plan)
    - Employee contributes with some level of employer matching
    - Plan is subject to the risk of the market
    - Retiree bears the risk

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer
    - Retiree usually bears little risk
  - Defined Contribution Plans (DC Plan)
    - Employee contributes with some level of employer matching
    - Plan is subject to the risk of the market
    - Retiree bears the risk
- Over the last 30 years, employers have shifted away from DB Plans in favor of DC Plans (Butrica et al., 2009; Hurd and Rohwedder, 2010)

Introduction

- Pension Plans
  - Defined Benefit Plan (DB Plan)
    - Guaranteed income in retirement after working long enough for employer
    - Retiree usually bears little risk
  - Defined Contribution Plans (DC Plan)
    - Employee contributes with some level of employer matching
    - Plan is subject to the risk of the market
    - Retiree bears the risk
- Over the last 30 years, employers have shifted away from DB Plans in favor of DC Plans (Butrica et al., 2009; Hurd and Rohwedder, 2010)
- Retirement portfolios of future retirees will look different than what we have historically observed

Research Question

- Households with DB Plans had guaranteed income in retirement, even if they saw declines in their housing equity and other investment accounts

Research Question

- Households with DB Plans had guaranteed income in retirement, even if they saw declines in their housing equity and other investment accounts
- Households with DC Plans that saw losses in retirement accounts, housing equity, and other investments did not have the "security blanket" households with DB Plans did

Research Question

- Households with DB Plans had guaranteed income in retirement, even if they saw declines in their housing equity and other investment accounts
- Households with DC Plans that saw losses in retirement accounts, housing equity, and other investments did not have the "security blanket" households with DB Plans did
- Did this cause households with DC Plans to consider forgoing homeownership and consider renting where they could use their accumulated housing equity to offset other losses they experienced during the Great Recession?

Research Question

- Households with DB Plans had guaranteed income in retirement, even if they saw declines in their housing equity and other investment accounts
- Households with DC Plans that saw losses in retirement accounts, housing equity, and other investments did not have the "security blanket" households with DB Plans did
- Did this cause households with DC Plans to consider forgoing homeownership and consider renting where they could use their accumulated housing equity to offset other losses they experienced during the Great Recession?
- Does access to DB Plans help explain part of the Housing-Equity Puzzle?

Table of Contents

The Great Recession

- The Great Recession was unique due to simultaneous shocks in labor, stock, and housing markets

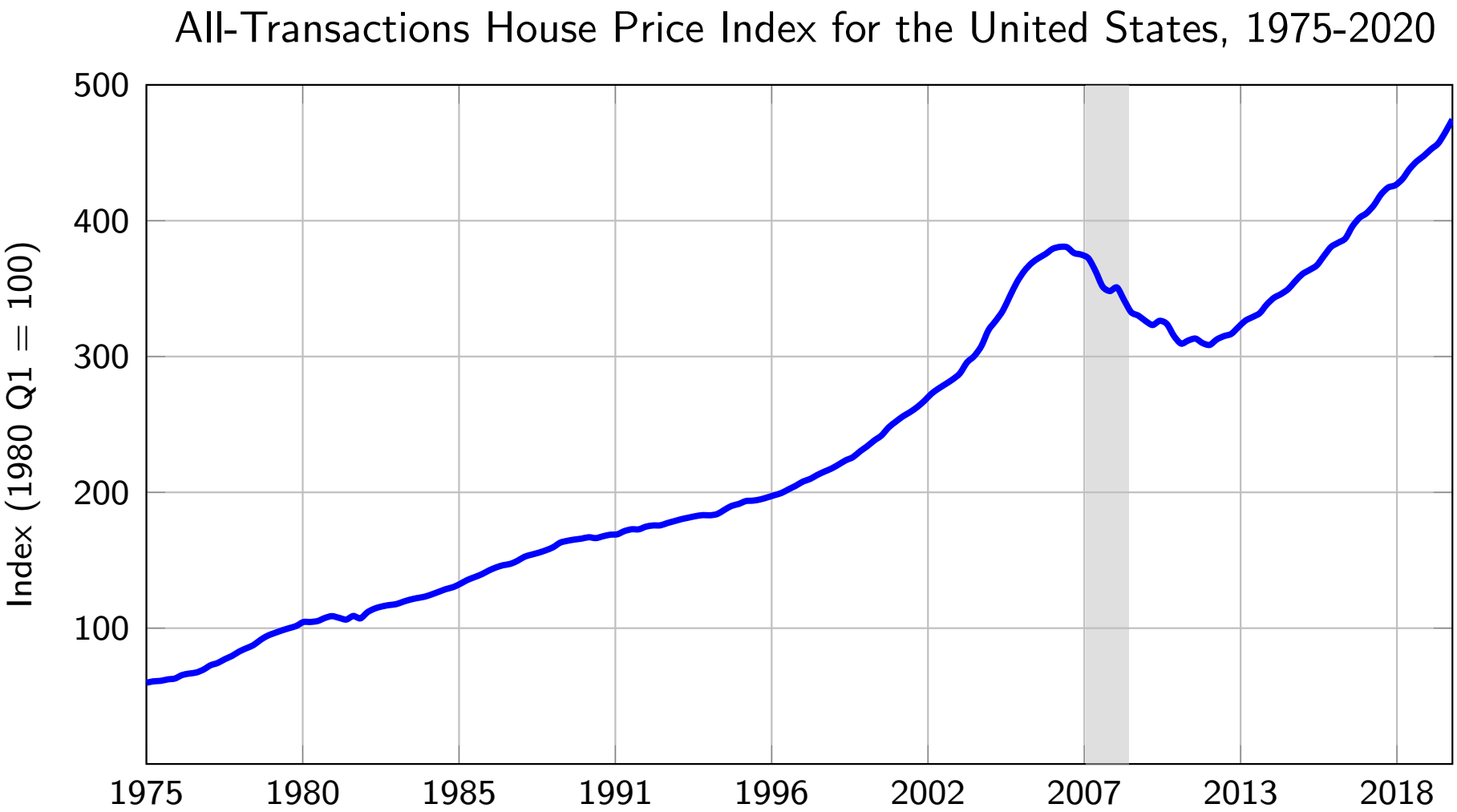
The Great Recession

- The Great Recession was unique due to simultaneous shocks in labor, stock, and housing markets
- Many older Americans saw the value of their house decline with simultaneous losses in their retirement portfolios

The Great Recession

- The Great Recession was unique due to simultaneous shocks in labor, stock, and housing markets
- Many older Americans saw the value of their house decline with simultaneous losses in their retirement portfolios
- It is possible that individuals may no longer view the house as safe as an investment has it has historically been

The Great Recession



Note: Great Recession Shaded, December 2007 – June 2009
Source: U.S. Federal Housings Finance Agency, FRED

Table of Contents

Data

- Restricted geocoded version of the Health and Retirement Study (HRS)
  - Longitudinal Survey
  - Representative of adult population in US over age 50
  - Includes around 20,000 households every other year

Data

- Restricted geocoded version of the Health and Retirement Study (HRS)
  - Longitudinal Survey
  - Representative of adult population in US over age 50
  - Includes around 20,000 households every other year
- Sample Restriction
  - 10 waves used from 1996-2016
  - Restricted to only single and married retired households

Preview of Results

- Households with a DC Plan are 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan

Preview of Results

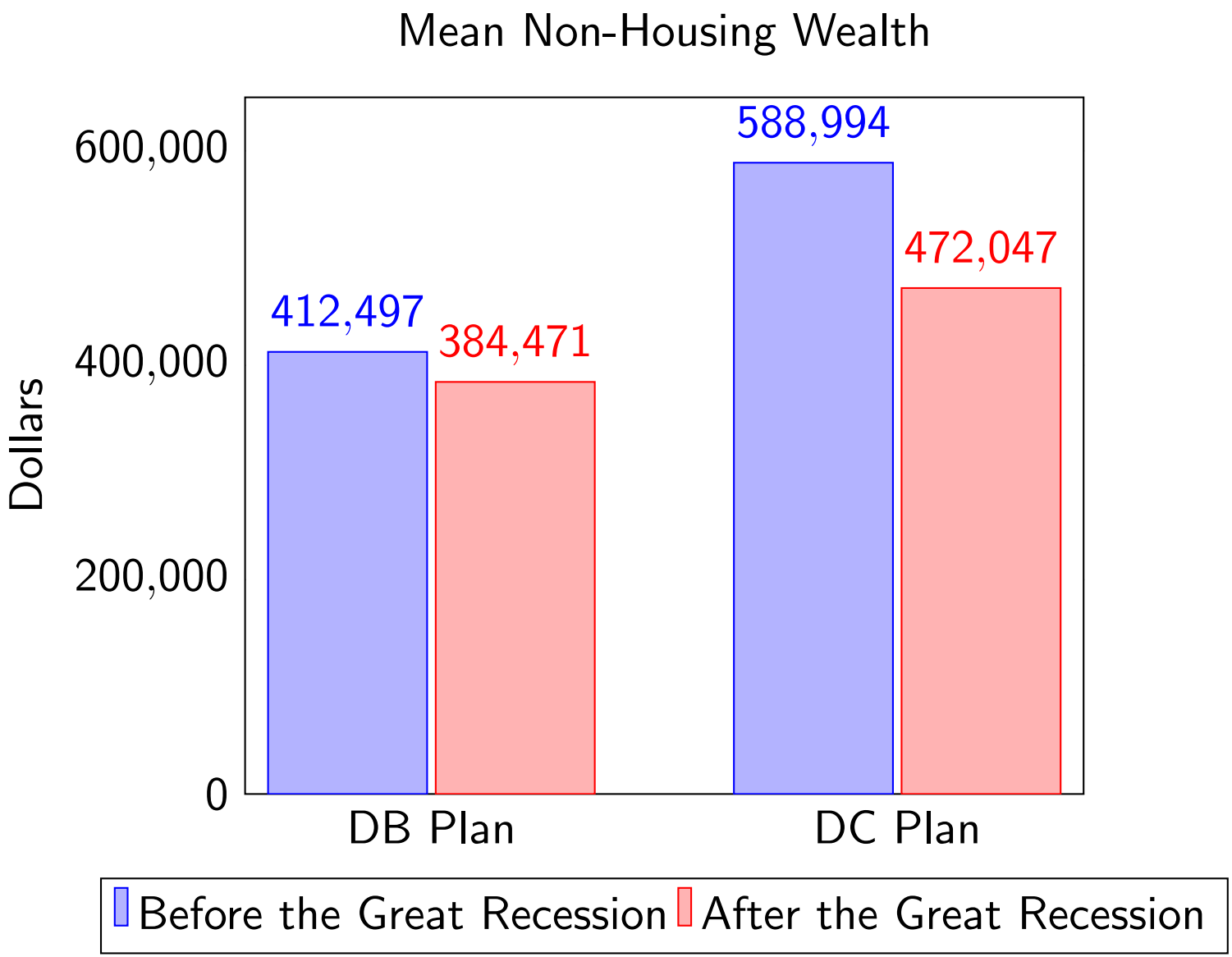
- Households with a DC Plan are 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan
- Mostly concentrated in Urban Households

Preview of Results

- Households with a DC Plan are 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan
- Mostly concentrated in Urban Households
- Homeowners who move to renting are able to cover losses they suffer in non-housing wealth

Table of Contents

Non-Housing Wealth



Homeownership Rates

Homeownership and Renter Rates by Pension Plan Type, 1996-2016

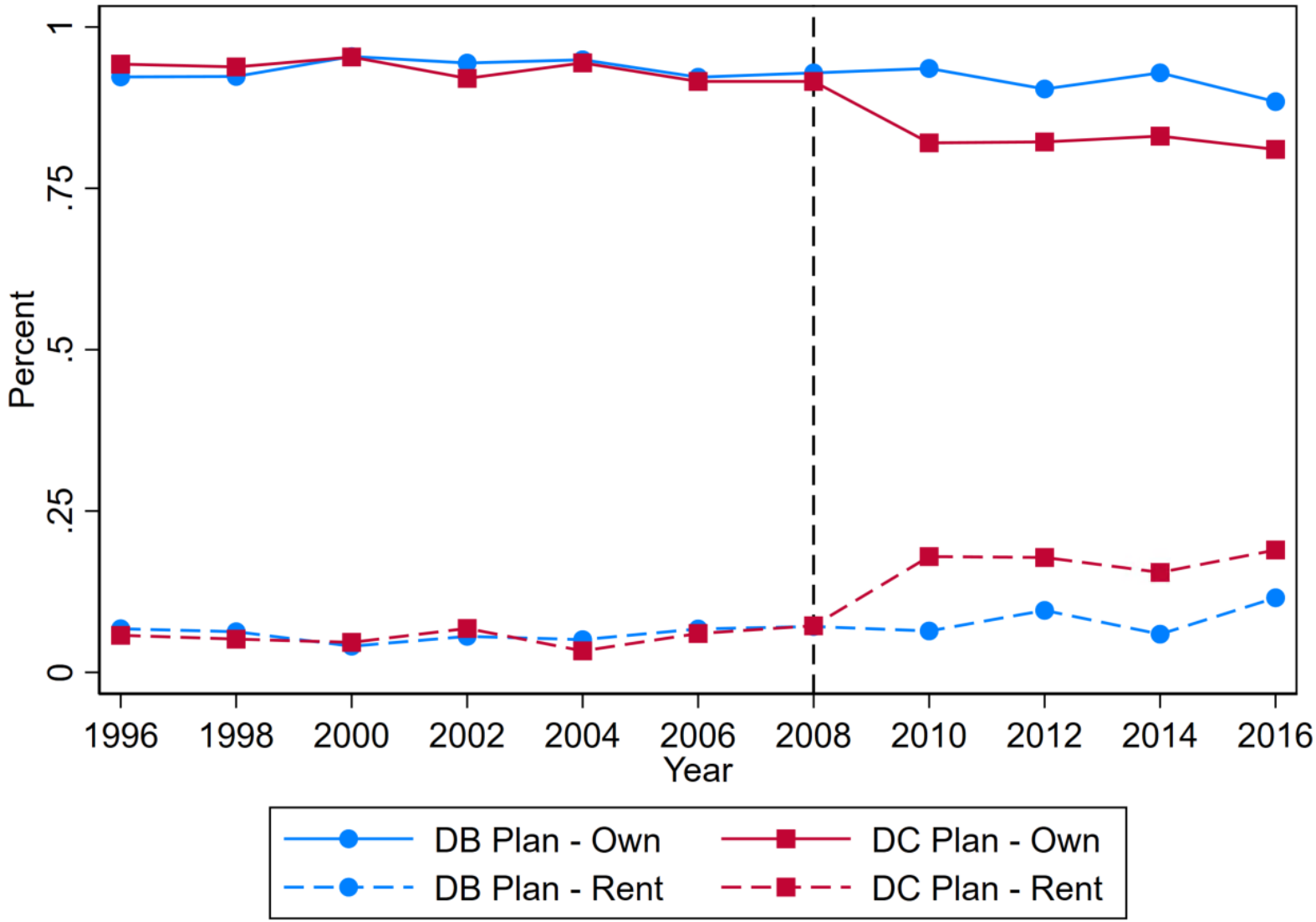


Table of Contents

Empirical Methodology

- Difference-in-Difference Framework

Empirical Methodology

- Difference-in-Difference Framework
  - Treatment Group: Households with a DC Plan

Empirical Methodology

- Difference-in-Difference Framework
  - Treatment Group: Households with a DC Plan
  - Comparison Group: Households with a DB plan

Empirical Methodology

- Difference-in-Difference Regression

$$prob(y_{it} = 1|X) = \beta_0 + \beta_1 DC_{it} + \beta_2 Post_t + \beta_3 DC_{it} Post_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

Empirical Methodology

- Difference-in-Difference Regression

$$prob(y_{it} = 1|X) = \beta_0 + \beta_1 DC_{it} + \beta_2 Post_t + \beta_3 DC_{it} Post_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

- Event-Study Regression

$$prob(y_{it} = 1|X) = \beta_0 + DC_{it} \times \sum_{\substack{z=1998 \\ z \neq 2006}}^{2016} \beta_z Year_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

y_{it}: Dummy Variable for Homeownership and Dummy Variable for Renter

X_{it}: age, age^2, age^3, years of education, number of children, $\sinh^{-1}(income)$, $\sinh^{-1}(Non\text{–}Housing\ Wealth)$, indicator for marital status, indicator for race

ϕ_i: State Fixed-Effect

λ_t: Year Fixed-Effect

Pre-Treatment Characteristics

Balance in Pre-Treatment Characteristics between DC and DB Households

	(1)		(2)		(3)	
	All Households		Urban Households		Rural Households	
	DC Plan	Difference for DB Plan	DC Plan	Difference for DB Plan	DC Plan	Difference for DB Plan
$\sinh^{-1}$ (*Income*)	11.505	-0.103**	11.535	-0.065	11.423	-0.279***
$\sinh^{-1}$ (*Non–Housing Wealth*)	11.354	-0.626**	11.438	-0.462	10.843	-1.543***
Years of Education	13.163	-0.643***	13.386	-0.414***	12.010	-1.964***
Number of Children	2.825	-0.113	2.633	-0.299***	3.875	0.896***
Married	0.770	-0.003	0.751	-0.031	0.885	0.005
Age	66.977	0.717**	66.624	0.233	68.606	2.402***
Black	0.132	0.028	0.135	0.022	0.125	-602.875
Other Race	0.002	-0.034***	0.002	-0.039***	0.000	-0.010

Notes: The first column for each panel provides the mean of the treatment group. The second and third panel for each panel shows the difference between the means of the treatment and comparison groups for the unweighted sample. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Pre-Treatment Characteristics

- To improve balance of pre-treatment characteristics, propensity scores, $\hat{p}(x)$, are estimated using a probit model

Pre-Treatment Characteristics

- To improve balance of pre-treatment characteristics, propensity scores, $\hat{p}(x)$, are estimated using a probit model
- The comparison group is weighted using the Inverse Probability weights (IPW) using the estimated propensity score, $\frac{\hat{p}(x)}{1-\hat{p}(x)}$

(Cunningham and Goodman-Bacon, 2020; Abadie, 2005)

Pre-Treatment Characteristics

Balance in Pre-Treatment Characteristics between DC and DB Households

	(1) All Households			(2) Urban Households			(3) Rural Households		
	DC Plan	Difference for DB Plan		DC Plan	Difference for DB Plan		DC Plan	Difference for DB Plan	
	Mean	Unweighted	Weighted	Mean	Unweighted	Weighted	Mean	Unweighted	Weighted
$\sinh^{-1}$ (*Income*)	11.505	-0.103**	-0.024	11.535	-0.065	-0.055	11.423	-0.279***	-0.226**
$\sinh^{-1}$ (*Non–Housing Wealth*)	11.354	-0.626**	0.281	11.438	-0.462	-0.123	10.843	-1.543***	-0.834
Years of Education	13.163	-0.643***	-0.285	13.386	-0.414***	-0.226	12.010	-1.964***	-1.582***
Number of Children	2.825	-0.113	0.151	2.633	-0.299***	1.851	3.875	0.896***	0.382
Married	0.770	-0.003	-0.003	0.751	-0.031	-2.035	0.885	0.005	0.012
Age	66.977	0.717**	0.602	66.624	0.233	0.744	68.606	2.402***	2.352***
Black	0.132	0.028	-0.05**	0.135	0.022	-0.025	0.125	-602.875	0.069
Other Race	0.002	-0.034***	-0.001	0.002	-0.039***	0.002	0.000	-0.010	-0.014

Notes: The first column for each panel provides the mean of the treatment group. The second and third panel for each panel shows the difference between the means of the treatment and comparison groups for the weighted and unweighted sample. Weighting is done using the Inverse Propensity Score (IPW).
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Difference-in-Difference Assumptions

$$prob(y_{it} = 1|X) = \beta_0 + \beta_1 DC_{it} + \beta_2 Post_t + \beta_3 DC_{it} Post_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

- In the difference-in-difference regression, β_3 represents the effect of the Great Recession on homeownership/renter rate for households with a DC plan relative to households with a DB Plan

Difference-in-Difference Assumptions

$$prob(y_{it} = 1|X) = \beta_0 + \beta_1 DC_{it} + \beta_2 Post_t + \beta_3 DC_{it} Post_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

- In the difference-in-difference regression, β_3 represents the effect of the Great Recession on homeownership/renter rate for households with a DC plan relative to households with a DB Plan
- For the difference-in-difference model to be valid, two things must be true:

Difference-in-Difference Assumptions

$$prob(y_{it} = 1|X) = \beta_0 + \beta_1 DC_{it} + \beta_2 Post_t + \beta_3 DC_{it} Post_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

- In the difference-in-difference regression, β_3 represents the effect of the Great Recession on homeownership/renter rate for households with a DC plan relative to households with a DB Plan
- For the difference-in-difference model to be valid, two things must be true:
  1. The decision to own a home/rent should be exogenous to other policies or observable factors

Difference-in-Difference Assumptions

$$prob(y_{it} = 1|X) = \beta_0 + \beta_1 DC_{it} + \beta_2 Post_t + \beta_3 DC_{it} Post_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

- In the difference-in-difference regression, β_3 represents the effect of the Great Recession on homeownership/renter rate for households with a DC plan relative to households with a DB Plan
- For the difference-in-difference model to be valid, two things must be true:
  1. The decision to own a home/rent should be exogenous to other policies or observable factors
  2. The outcomes in treated and comparison groups must follow parallel trends prior to the Great Recession

Balance Test

Dependent Variable	All Households	Urban Households	Rural Households
$\sinh^{-1}$ (*Income*)	0.09	0.07	-0.10
	(0.11)	(0.12)	(0.18)
$\sinh^{-1}$ (*Non–Housing Wealth*)	0.04	0.14	-1.31
	(0.57)	(0.61)	(1.33)
Years of Education	0.30	0.36	-0.27
	(0.23)	(0.26)	(0.63)
Number of Children	0.22	0.26	0.94**
	(0.15)	(0.18)	(0.45)
Married	0.00	-0.03	0.02
	(0.04)	(0.04)	(0.08)
Age	-0.75	-0.62	-0.25
	(0.65)	(0.74)	(1.47)
Black	0.04	0.04	0.12*
	(0.03)	(0.03)	(0.07)
Other Race	0.00	0.00	0.02
	(0.00)	(0.00)	(0.02)

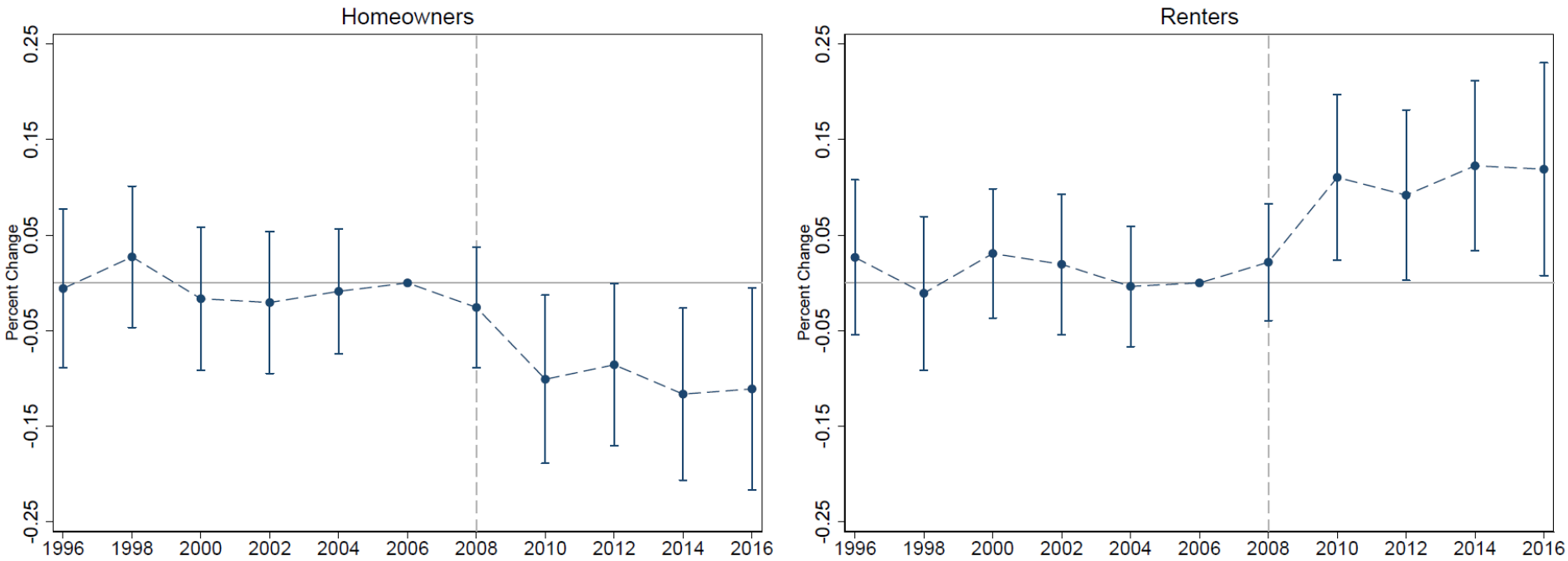
Notes: Standard Errors are clustered at the household level. Each cell represents a separate regression. Comparison units are weighted with IPW, $\frac{\hat{p}(x)}{1-\hat{p}(x)}$. All specifications include a state and year fixed-effect.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table of Contents

Event-Study Results

Effect of the Great Recession on Homeownership and Renting – All Households

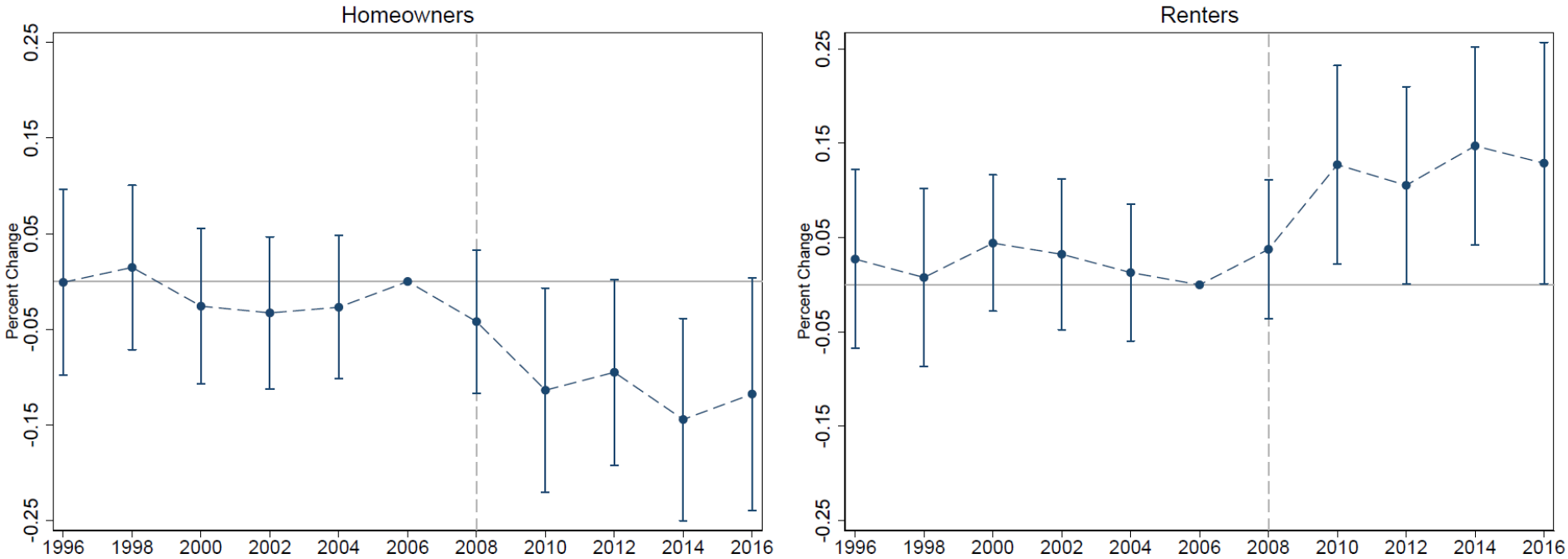


Notes: These graphs report the coefficient estimates of β_z from the Event-Study specification for the outcomes in homeownership and renters. The coefficients represent the difference in outcomes for households with a DC Plan relative to households with a DB Plan, as compared to the period prior to the Great Recession, 2006. Estimates are presented with 95% confidence intervals clustered at the household level.

$$\text{prob}(y_{it} = 1|X) = \beta_0 + DC_{it} \times \sum_{\substack{z=1998 \\ z \neq 2006}}^{2016} \beta_z Year_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

Event-Study Results

Effect of the Great Recession on Homeownership and Renting – Urban Households

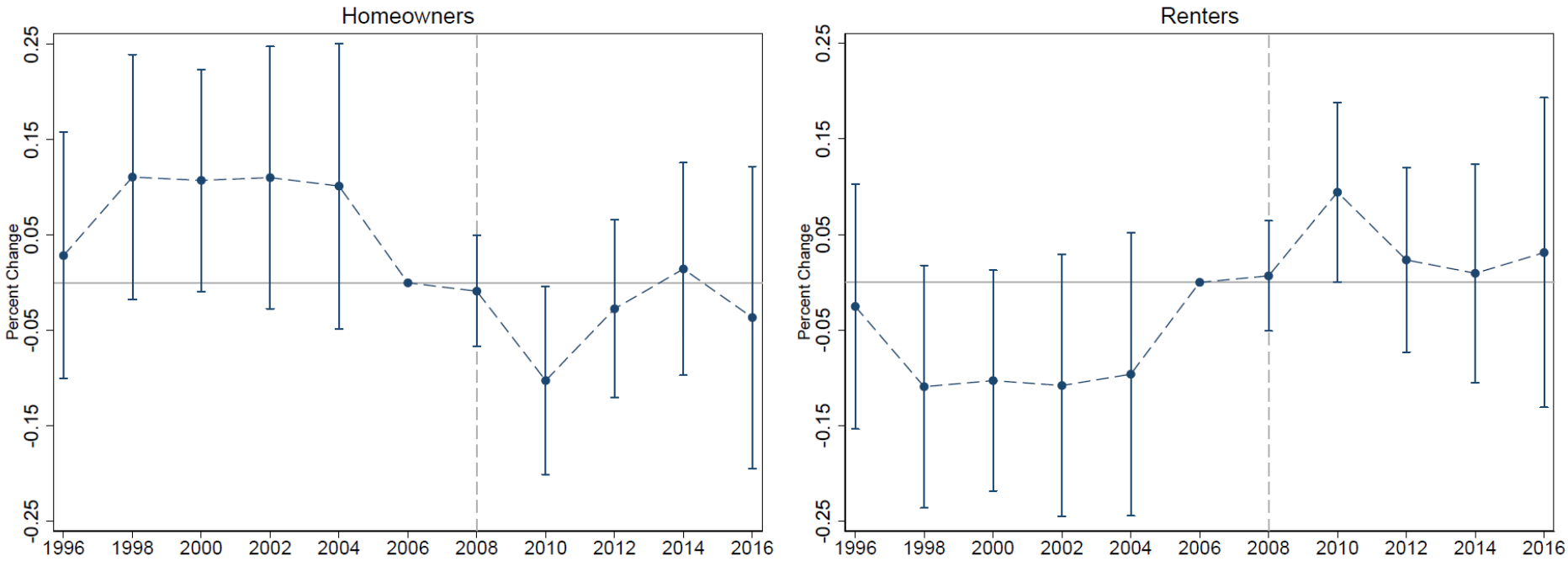


Notes: These graphs report the coefficient estimates of β_z from the Event-Study specification for the outcomes in homeownership and renters. The coefficients represent the difference in outcomes for households with a DC Plan relative to households with a DB Plan, as compared to the period prior to the Great Recession, 2006. Estimates are presented with 95% confidence intervals clustered at the household level.

$$\text{prob}(y_{it} = 1|X) = \beta_0 + DC_{it} \times \sum_{\substack{z=1998 \\ z \neq 2006}}^{2016} \beta_z Year_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

Event-Study Results

Effect of the Great Recession on Homeownership and Renting – Rural Households



Notes: These graphs report the coefficient estimates of β_z from the Event-Study specification for the outcomes in homeownership and renters. The coefficients represent the difference in outcomes for households with a DC Plan relative to households with a DB Plan, as compared to the period prior to the Great Recession, 2006. Estimates are presented with 95% confidence intervals clustered at the household level.

$$\text{prob}(y_{it} = 1|X) = \beta_0 + DC_{it} \times \sum_{\substack{z=1998 \\ z \neq 2006}}^{2016} \beta_z Year_t + \gamma' X_{it} + \phi_i + \lambda_t + \varepsilon_{it}$$

Difference-in-Difference Results

Difference-in-Difference Estimation Results

	All Households		Urban Households		Rural Households	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Homeowners						
Treat × *Post*	-0.089**	-0.096***	-0.098**	-0.101***	-0.085	-0.097**
Observations	2,971	2,969	2,484	2,482	442	442
R^2	0.113	0.306	0.137	0.312	0.384	0.562
comparisons	NO	YES	NO	YES	NO	YES
Panel B: Renters						
Treat × *Post*	0.092**	0.099***	0.101**	0.104***	0.087	0.098**
Observations	2,971	2,969	2,484	2,482	442	442
R^2	0.117	0.301	0.139	0.305	0.374	0.546
comparisons	NO	YES	NO	YES	NO	YES

Notes: Standard errors are clustered at the household level. comparisons include $\sinh^{-1}(\textit{Income})$, $\sinh^{-1}(\textit{Non–Housing Wealth})$, Years of Education, Number of Children, age, age^2, age^3, an indicator for marital status, and an indicator for race. All specifications include a state and year fixed-effect. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Discussion of Results

- The point estimates for the Even-Study Regression's in the years after the Great Recession are consistent and match the point estimate for the Difference-in-Difference regression where the groups are pooled

Discussion of Results

- The point estimates for the Even-Study Regression's in the years after the Great Recession are consistent and match the point estimate for the Difference-in-Difference regression where the groups are pooled
- Can not say that there was a difference in homeownership and renting in rural areas between households with DB and DC plans

Discussion of Results

- The point estimates for the Even-Study Regression's in the years after the Great Recession are consistent and match the point estimate for the Difference-in-Difference regression where the groups are pooled
- Can not say that there was a difference in homeownership and renting in rural areas between households with DB and DC plans
  - A trend seen in other studies (Thiede and Monnat, 2016; Mattingly, Smith, and Bean, 2011)

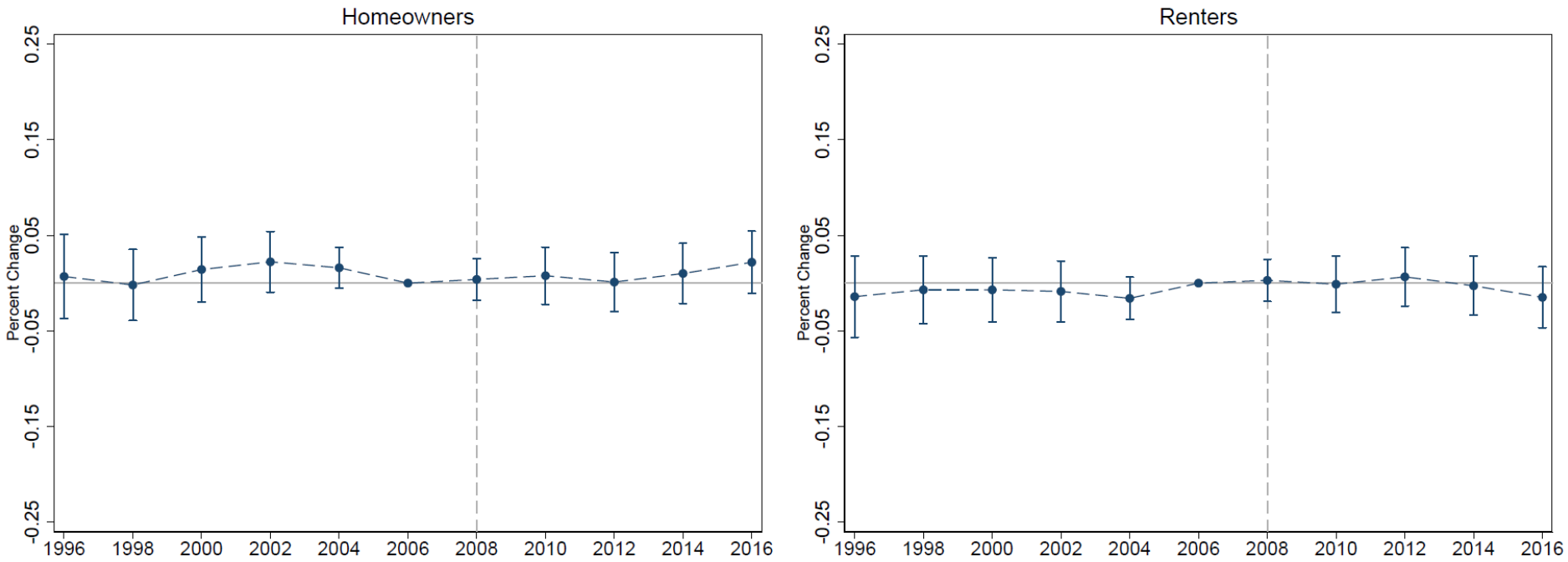
Discussion of Results

- The point estimates for the Even-Study Regression's in the years after the Great Recession are consistent and match the point estimate for the Difference-in-Difference regression where the groups are pooled
- Can not say that there was a difference in homeownership and renting in rural areas between households with DB and DC plans
  - A trend seen in other studies (Thiede and Monnat, 2016; Mattingly, Smith, and Bean, 2011)
  - Many rural areas had troubled labor market before the Great Recession due to lower levels of education, an aging populations, and a declining manufacturing sector (Bailey et al., 2014; Slack, 2014)

Table of Contents

Placebo and Falsification Tests

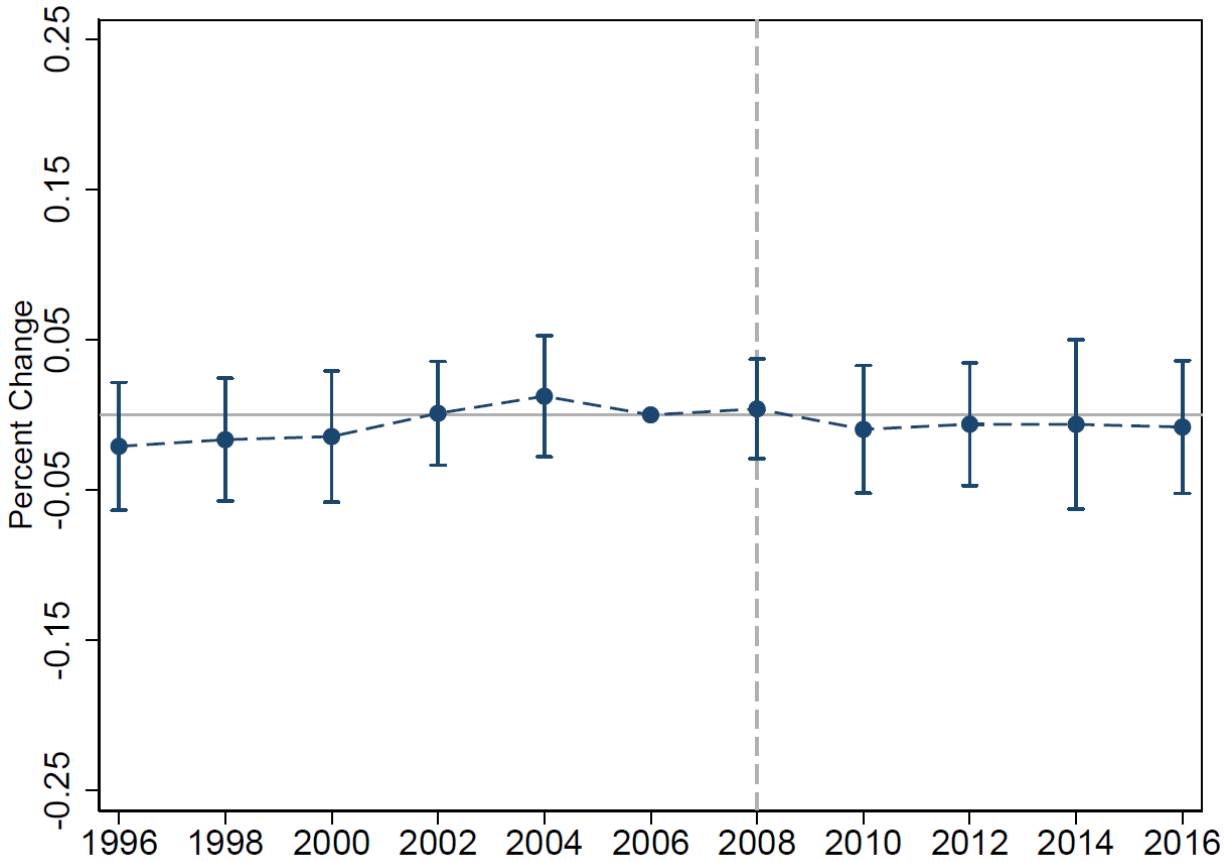
Effect of the Great Recession on Homeownership/Renting – Working Households



Notes: These graphs report the coefficient estimates of β_z from the Event-Study specification for the outcomes in homeownership and renters. The coefficients represent the difference in outcomes for households with a DC Plan relative to households with a DB Plan, as compared to the period prior to the Great Recession, 2006. Estimates are presented with 95% confidence intervals clustered at the household level.

Placebo and Falsification Tests

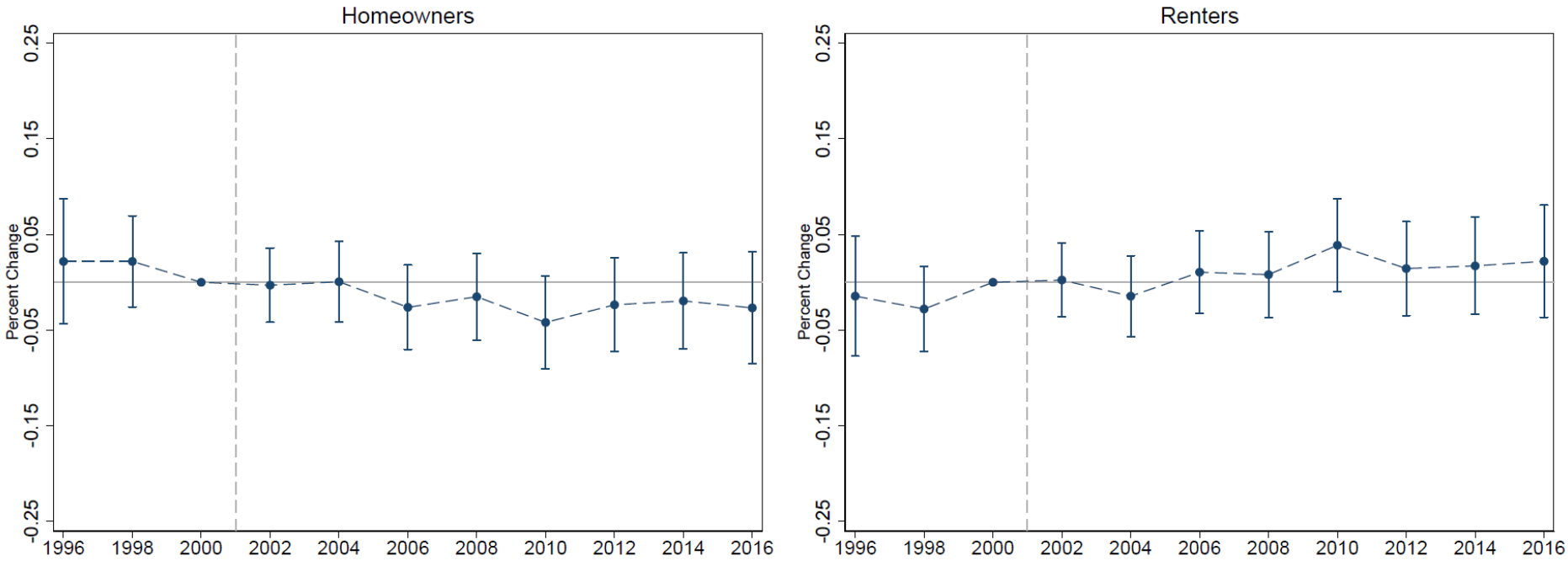
Effect of the Great Recession – Other Housings Accommodations



Notes: This graph reports the coefficient estimates of β_z from the Event-Study specification for the outcomes in households with other housing accommodations. The coefficients represent the difference in outcomes for households with a DC Plan relative to households with a DB Plan, as compared to the period prior to the Great Recession, 2006. Estimates are presented with 95% confidence intervals clustered at the household level.

Placebo and Falsification Tests

Effect of the 2001 Recession on Homeownership and Renting



Notes: These graphs report the coefficient estimates of β_z from the Event-Study specification for the outcomes in homeownership and renters. The coefficients represent the difference in outcomes for households with a DC Plan relative to households with a DB Plan, as compared to the period prior to the 2001 recession. Estimates are presented with 95% confidence intervals clustered at the household level.

Table of Contents

Moving and Equity Extraction

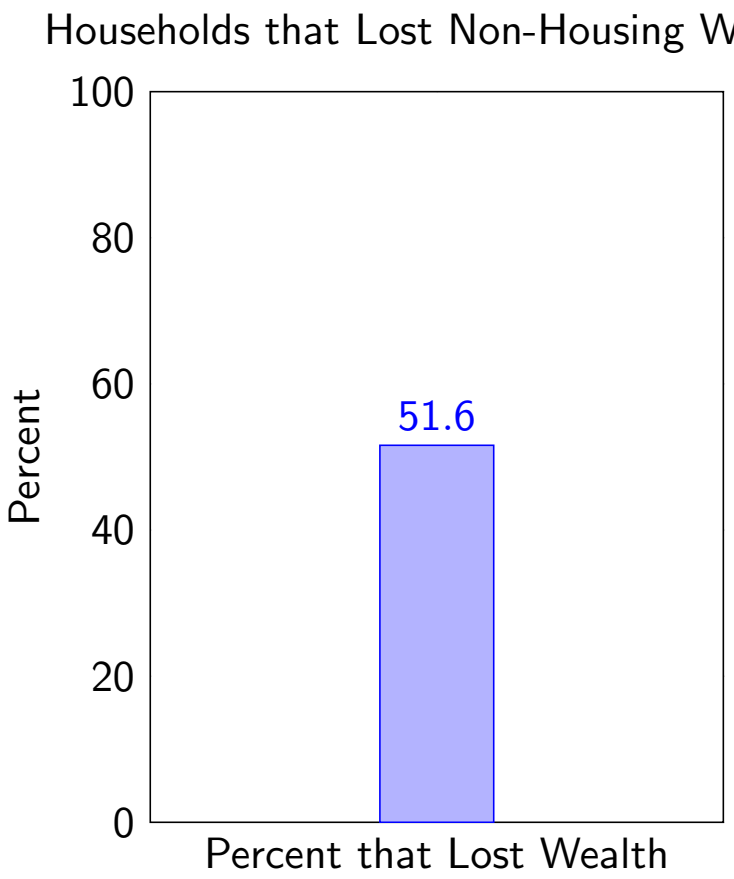
- Do households that move from owning to renting extract equity?

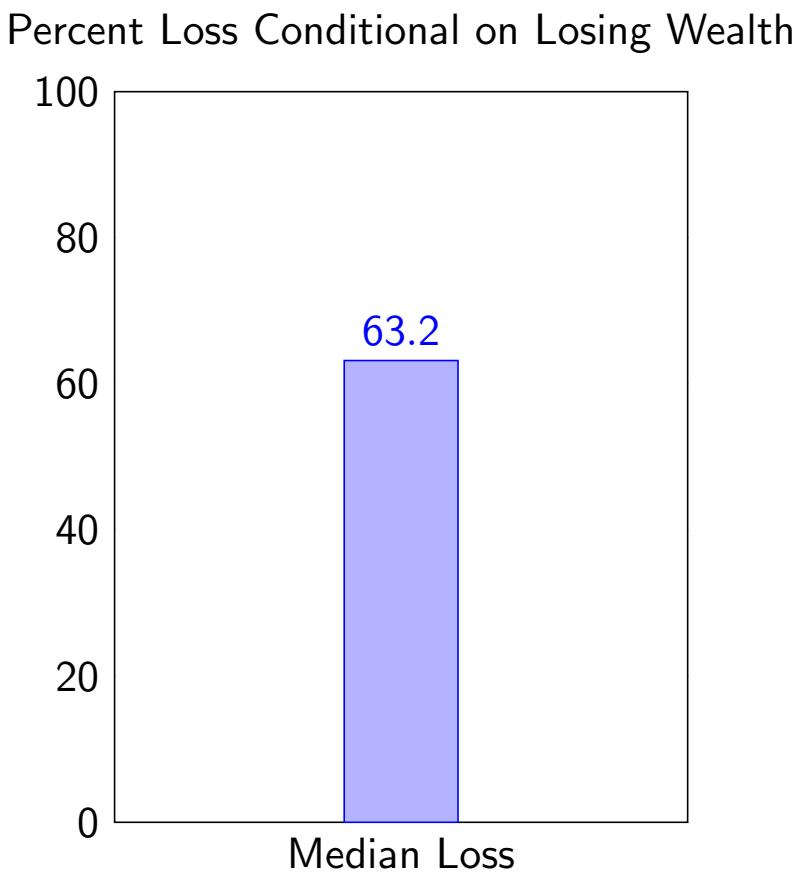
Moving and Equity Extraction

- Do households that move from owning to renting extract equity?
- Does this equity cover any losses they suffered in non-housing wealth?

Moving and Equity Extraction

Changes in Non-Housing Wealth for Homeowners who Moved to Renting





Moving and Equity Extraction

Housing Equity and Wealth Loss for Homeowners who Move to Renting – Conditional on Losing Wealth

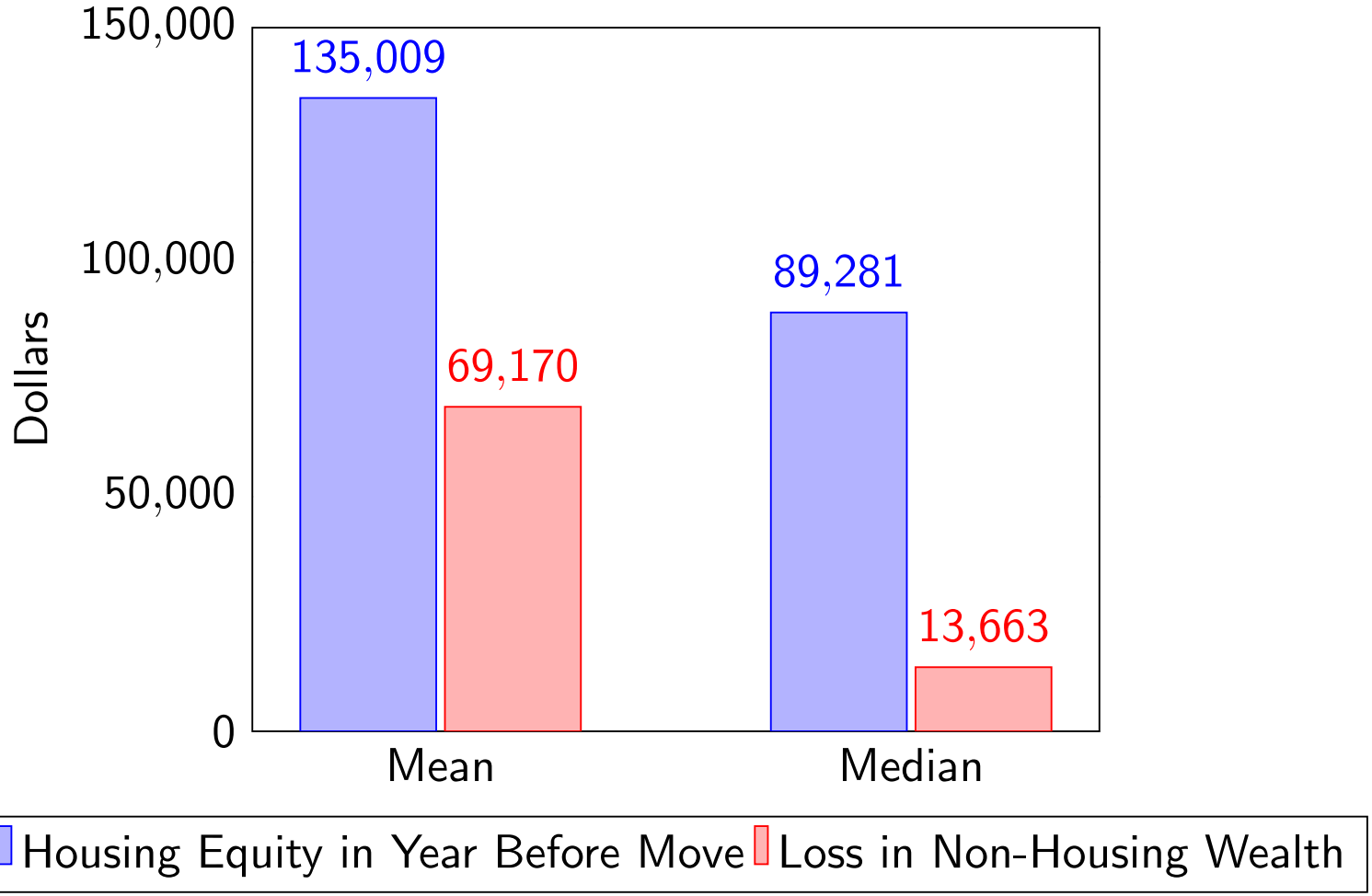


Table of Contents

Conclusions

- Households with DC Plans were 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan

Conclusions

- Households with DC Plans were 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan
  - Effect is strong for urban households

Conclusions

- Households with DC Plans were 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan
  - Effect is strong for urban households
  - Questions about impact on Rural Households

Conclusions

- Households with DC Plans were 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan
  - Effect is strong for urban households
  - Questions about impact on Rural Households
- On average, homeowners that lost wealth and moved to renting were able to offset those losses with housing equity

Conclusions

- Households with DC Plans were 9-10% less likely to own a home after the Great Recession relative to households with a DB Plan
  - Effect is strong for urban households
  - Questions about impact on Rural Households
- On average, homeowners that lost wealth and moved to renting were able to offset those losses with housing equity
- Vast majority of retirees still own a home, regardless of pension status

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed
- Households likely will be living longer while facing greater amounts of risk

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed
- Households likely will be living longer while facing greater amounts of risk
  - Decline in DB Plans

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed
- Households likely will be living longer while facing greater amounts of risk
  - Decline in DB Plans
  - Is housing a risky asset?

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed
- Households likely will be living longer while facing greater amounts of risk
  - Decline in DB Plans
  - Is housing a risky asset?
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed
- Households likely will be living longer while facing greater amounts of risk
  - Decline in DB Plans
  - Is housing a risky asset?
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)
- Most households still have high levels of housing equity the could use in retirement, but don't

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed
- Households likely will be living longer while facing greater amounts of risk
  - Decline in DB Plans
  - Is housing a risky asset?
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)
- Most households still have high levels of housing equity the could use in retirement, but don't
  - Few households use reverse mortgages, possible solution?

Going Forward

- Current and future retirees will have different financial portfolios than what has historically be observed
- Households likely will be living longer while facing greater amounts of risk
  - Decline in DB Plans
  - Is housing a risky asset?
- Most homeowners want to remain in their home throughout retirement (Munnel et al., 2007; Venti and Wise, 2004; AARP, 1996)
- Most households still have high levels of housing equity the could use in retirement, but don't
  - Few households use reverse mortgages, possible solution?
- Will Millenial's and Gen Z have same patterns with homeownership as Baby Boomers and earlier generations?

Thank You!

Questions and Comments

Propensity Score Density Plots