Social Security, Labor Supply and Health of Older Workers: Quasi-Experimental Evidence from a Large Reform

Itay Saporta-Eksten (Tel Aviv University and UCL)
Ity Shurtz (Hebrew University)
Sarit Weisburd (Tel Aviv University)

March 2018

Using the "Housewives Reform" for Studying Labor Supply and Health of the Elderly

- Aging populations force governments to continuously reform public pension systems.
- Typical reforms: Changes to retirement age, to the generosity benefits, to earnings tests...
- Often, policy reforms confound a tax reduction with wealth effect of reduced generosity.
- **Three distinctive features of the reform we analyze:**
  - Almost pure tax change.
  - Quasi-experimental setting: Clean identification.
  - Allows identification of the effect of employment on health.

Main Findings

- "Housewives Reform" approximates a large decrease in the tax on work, keeping benefits level constant.
- **Moderate to high labor supply responses:**
  - Cumulative retirement is ~6% lower on impact.
  - Implies an extensive margin elasticity of 0.45-0.6.
- **A negative effect of employment on health:**
  - Another year of work at old age implies 17% decline in survival probability to 80.
  - Effect is larger for blue-collar (zero effect for white-collar).

Agenda

- The "Housewives Reform"
- Data
- The Impact of (Implied) Income Tax on Retirement
- The Effect of Delayed Retirement on Health

AGENDA

- **The "Housewives Reform"**
- Data
- The Impact of (Implied) Income Tax on Retirement
- The Effect of Delayed Retirement on Health

Social Security Retirement Benefits in Israel

- Pay-as-you-go public Social Security pension system.
- Eligibility depends on residency, **but not on employment**.

Important exception: Pre-1996 housewives were not eligible. Instead, their husbands could collect benefits for them.

- Benefits level depends on employment history, **but not on earnings history**.

Social Security Retirement Benefits in Israel

- Pay-as-you-go public Social Security pension system.
- Eligibility depends on residency, **but not on employment**.

Important exception: Pre-1996 housewives were not eligible. Instead, their husbands could collect benefits for them.

- Benefits level depends on employment history, **but not on earnings history**.

Age cutoffs:

- *Retirement age*: eligibility **conditional on earnings test**.
- *Eligibility age*: unconditional eligibility.

	Men	Women
Retirement age (1996)	65	60
Eligibility age (1996)	70	65

- Working between *Retirement age* and *Eligibility age*: Delayed Retirement Credit of 5% per year.

THE "HOUSEWIVES REFORM"

- **Housewives**: married women w/o sufficient work history.
- Benefits between ages 65 and 70 are conditional on earnings test $\Rightarrow$ **Large reduction in the penalty on employment:**
  - **Pre-reform**: husbands claimed housewives as dependents (150% of benefits).
  - **Post-reform**: housewives claim benefits directly unconditional on husband's employment.

- Sharp eligibility cutoff: only households with housewives born 1/1/1931 or later are eligible.

Illus.

Timing

The Reform had a Large Impact on Benefit Split

- This is expected...

	1930 Cohort		1931 Cohort		Diff in Diff
	(1)	(2)	(3)	(4)	(10)
	HW	Non-Hw	HW	Non-Hw	1931 vs 1930
Average retirement benefits 2003-2007					
Wife	40.4	16677	13201.7	16889.4	12948.9***
	(666.7)	(3867.3)	(1131.4)	(4439.3)	(240.5)
Husband	30935.2	19752.5	20161.3	20216.5	-11237.9***
	(3620.3)	(4612.9)	(3969.7)	(4536.1)	(297.7)
Total	30975.6	36429.5	33363	37106	1711***
	(3636.3)	(6650)	(3954.2)	(5864.3)	(385)
Observations	714	1,633	670	1,568	
(% HW within cohort)	(30.4)		(29.9)		

- Note that the increase in overall generosity is small.

▸ Interpretation in figures

The Reform had a Large Impact on Benefit Split

- This is expected...

	1930 Cohort		1931 Cohort		Diff in Diff
	(1)	(2)	(3)	(4)	(10)
	HW	Non-Hw	HW	Non-Hw	1931 vs 1930
Average retirement benefits 2003-2007					
Wife	40.4	16677	13201.7	16889.4	12948.9***
	(666.7)	(3867.3)	(1131.4)	(4439.3)	(240.5)
Husband	30935.2	19752.5	20161.3	20216.5	-11237.9***
	(3620.3)	(4612.9)	(3969.7)	(4536.1)	(297.7)
Total	30975.6	36429.5	33363	37106	1711***
	(3636.3)	(6650)	(3954.2)	(5864.3)	(385)
Observations	714	1,633	670	1,568	
(% HW within cohort)	(30.4)		(29.9)		

- Note that the increase in overall generosity is small.

▸ Interpretation in figures

AGENDA

- The "Housewives Reform"
- **Data**
- The Impact of (Implied) Income Tax on Retirement
- The Effect of Delayed Retirement on Health

Administrative Social Security Data

- Administrative data used by the NII, combines tax and Ministry of Interior records:
  - Full employment and earnings history (1992-2015).
  - Health: Mortality, Long-term care eligibility
  - Full benefits records (currently 2003-2015).
  - HW/dependent flags.
  - Demographics.
- Sample of non-self employed husbands:
  - Married to a wife born 1929-1932.
  - Working when their wife was 62 (63 / 1993 for some of the analysis).
  - Both husband and wife still alive in 2003.
  - Refinement: Use only non-HW where wife doesn't work at 62.

The Cohorts are Well Balanced on Observables

	1930 Cohort		1931 Cohort		Diff in Diff
	(1)	(2)	(3)	(4)	(10)
	HW	Non-Hw	HW	Non-Hw	1931 vs 1930
Wife's characteristics					
Immigrant flag	0.828	0.799	0.799	0.795	-0.025
	(0.378)	(0.401)	(0.401)	(0.404)	(0.026)
Jewish	0.929	0.992	0.912	0.989	-0.014
	(0.258)	(0.089)	(0.284)	(0.104)	(0.011)
Immigration year	1951.7	1953.5	1952.4	1953.2	0.9
	(9.6)	(12.1)	(10.3)	(12.4)	(0.8)
husband's characteristics					
Husband's age	64.8	63.9	64.4	64.2	-0.6**
	(3.9)	(4.3)	(4.2)	(3.6)	(0.3)
Immigrant flag	0.863	0.831	0.843	0.811	0.001
	(0.344)	(0.375)	(0.364)	(0.392)	(0.024)
Jewish	0.927	0.991	0.912	0.989	-0.014
	(0.26)	(0.095)	(0.284)	(0.104)	(0.011)
Immigration year	1951.1	1952.5	1951.3	1952.7	0.1
	(10.7)	(12.7)	(10.5)	(12.7)	(0.8)
Average Income when wife is 64	57681.6	63811.7	59929.9	71104.7	-5044.7
	(70555.4)	(70784)	(73037)	(80857.7)	(4806.2)
Average Income when wife is 64|income>0	66426.9	68827.3	66810.3	77264.1	-8053.4
	(71778.6)	(71126.7)	(74077.1)	(81415.4)	(5126.8)
Observations	714	1,633	670	1,568	
(% HW within cohort)	(30.4)		(29.9)		

AGENDA

- The "Housewives Reform"
- Data
- **The Impact of (Implied) Income Tax on Retirement**
- The Effect of Delayed Retirement on Health

DDD Approach

Outcome: Husband's retirement indicator

Difference in Difference:

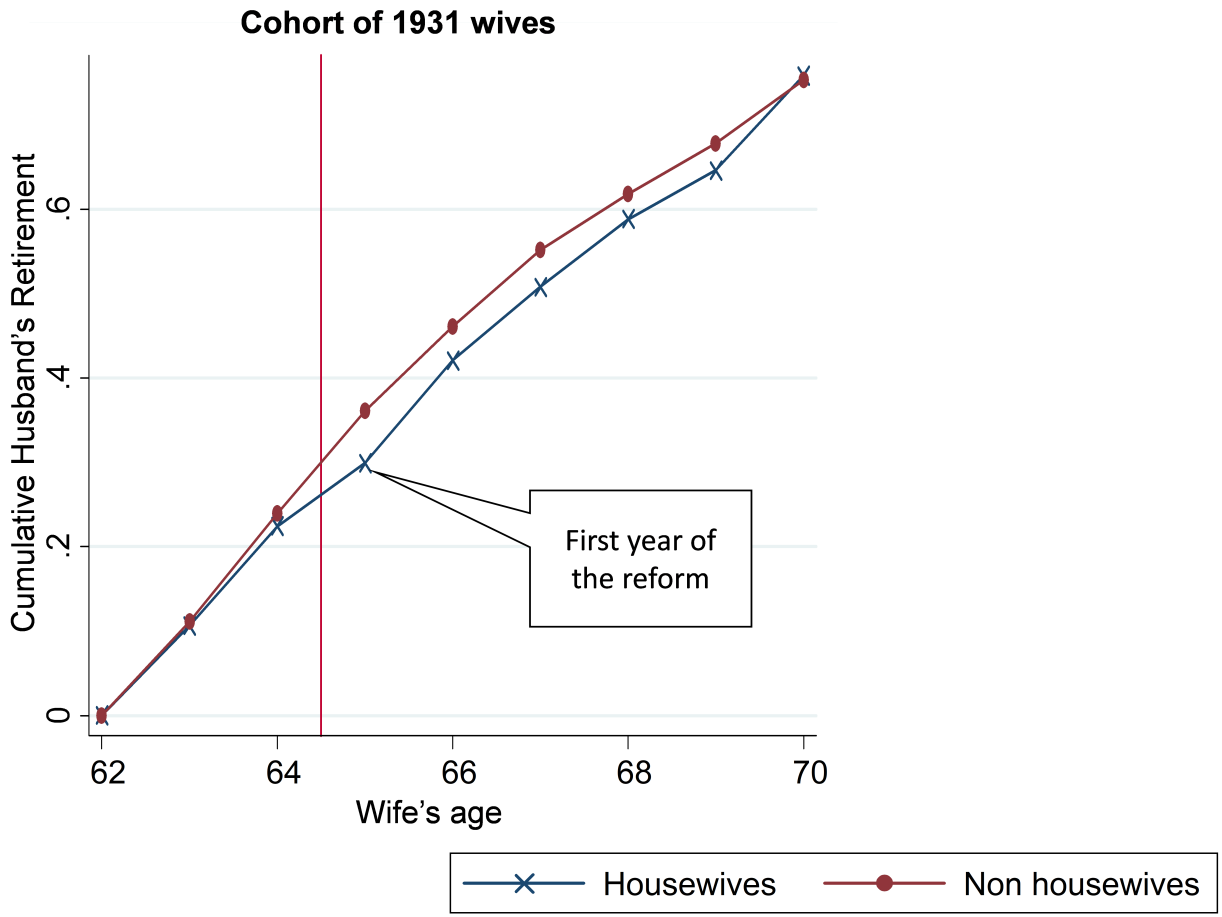
- Treatment: *HW born in 1931.*
- Control: *HW born in 1930.*
- Pre: *December 31st 1995 or earlier.*
- Post: *January 1st 1996 or later.*

Difference in Difference in Difference:

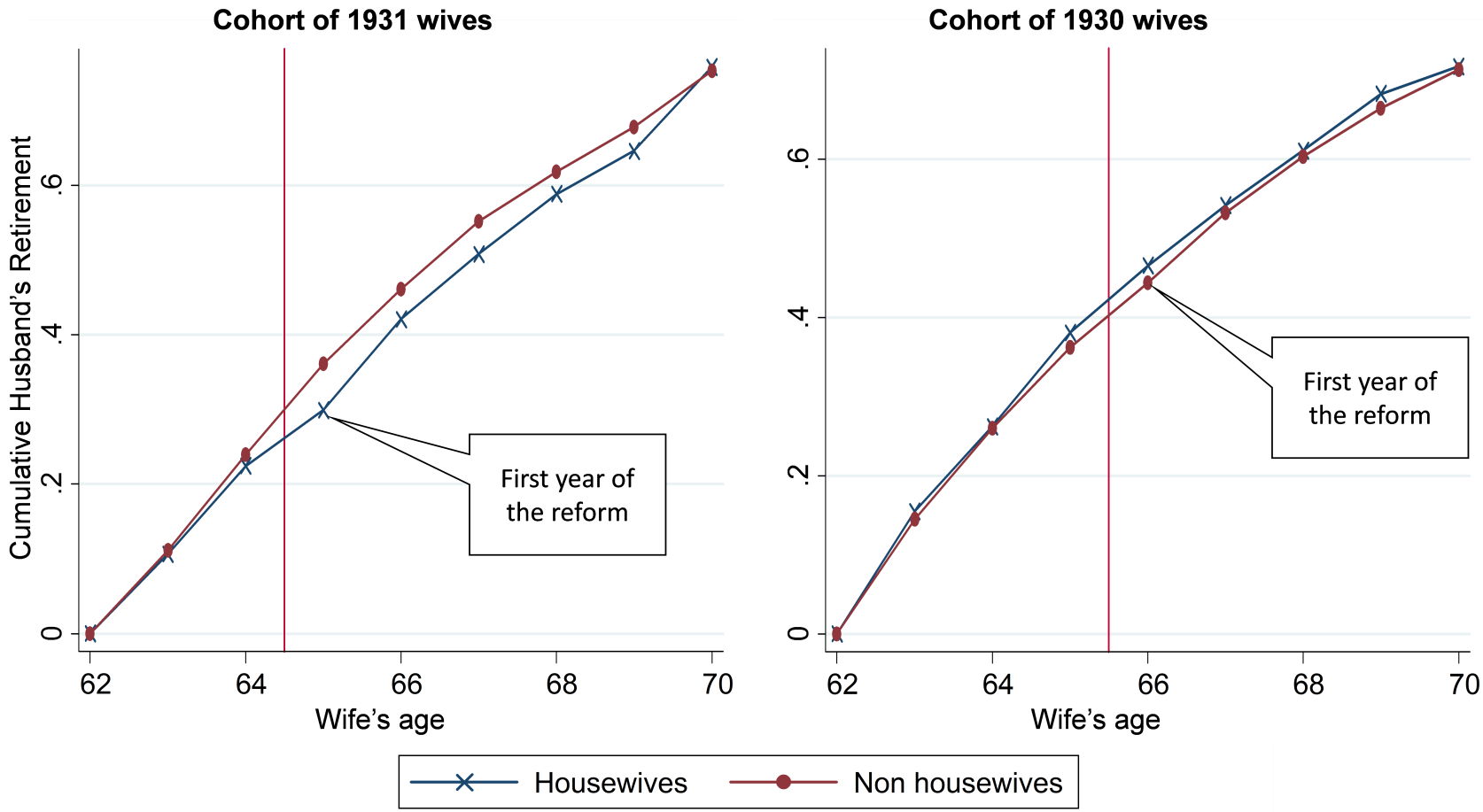
- Households with wives born 1930 vs. 1931 show slightly different pre-1996 retirement patterns.
- Use *non-HW households* to control for cohort's differences in pre-reform retirement trends.

▸ Regression Equation

Husband's to Wives Born 1931 Reduce Retirement on Impact



No Such Response for Husband's to Wives Born 1930



Overall Retirement Probability Decreases by 6%

	Differences in Differences Estimates				DDD 1930, 1931	
	1930		1931			
Coefficient	(1)	(2)	(3)	(4)	(5)	(6)
Wife age=63 X HW	0.01		-0.004		-0.015	
	(0.015)		(0.014)		(0.02)	
Wife age=64 X HW	0.002		-0.015		-0.017	
	(0.018)		(0.018)		(0.026)	
Wife age=65 X HW	0.019	0.012	-0.062***	-0.052***	-0.08***	-0.064***
	(0.02)	(0.014)	(0.02)	(0.014)	(0.029)	(0.019)
Wife age=66 X HW	0.022	0.015	-0.04*	-0.03*	-0.062**	-0.046*
	(0.021)	(0.017)	(0.022)	(0.018)	(0.03)	(0.024)
Wife age=67 X HW	0.01	0.003	-0.044**	-0.034*	-0.053*	-0.037
	(0.021)	(0.018)	(0.022)	(0.019)	(0.03)	(0.027)
Wife age=68 X HW	0.007	0.001	-0.03	-0.02	-0.037	-0.021
	(0.02)	(0.019)	(0.021)	(0.02)	(0.029)	(0.028)
Observations	21,800	21,800	19,800	19,800	41,600	41,600

Implies an extensive margin elasticity of ~0.5. ▸ Elasticities

Robustness Tests

Results are not sensitive to:

- Sample refinements
- Exact definitions of retirement
- Exact definitions of housewives (pre-reform)
- Excluding non-Jewish population

▸ Robustness Summary Table

RDD Approach

- Look very close to the age cutoff:
  - Housewives born January 1st 1931 are eligible.
  - Housewives born December 31st 1930 are ineligible.
- Formally estimate:

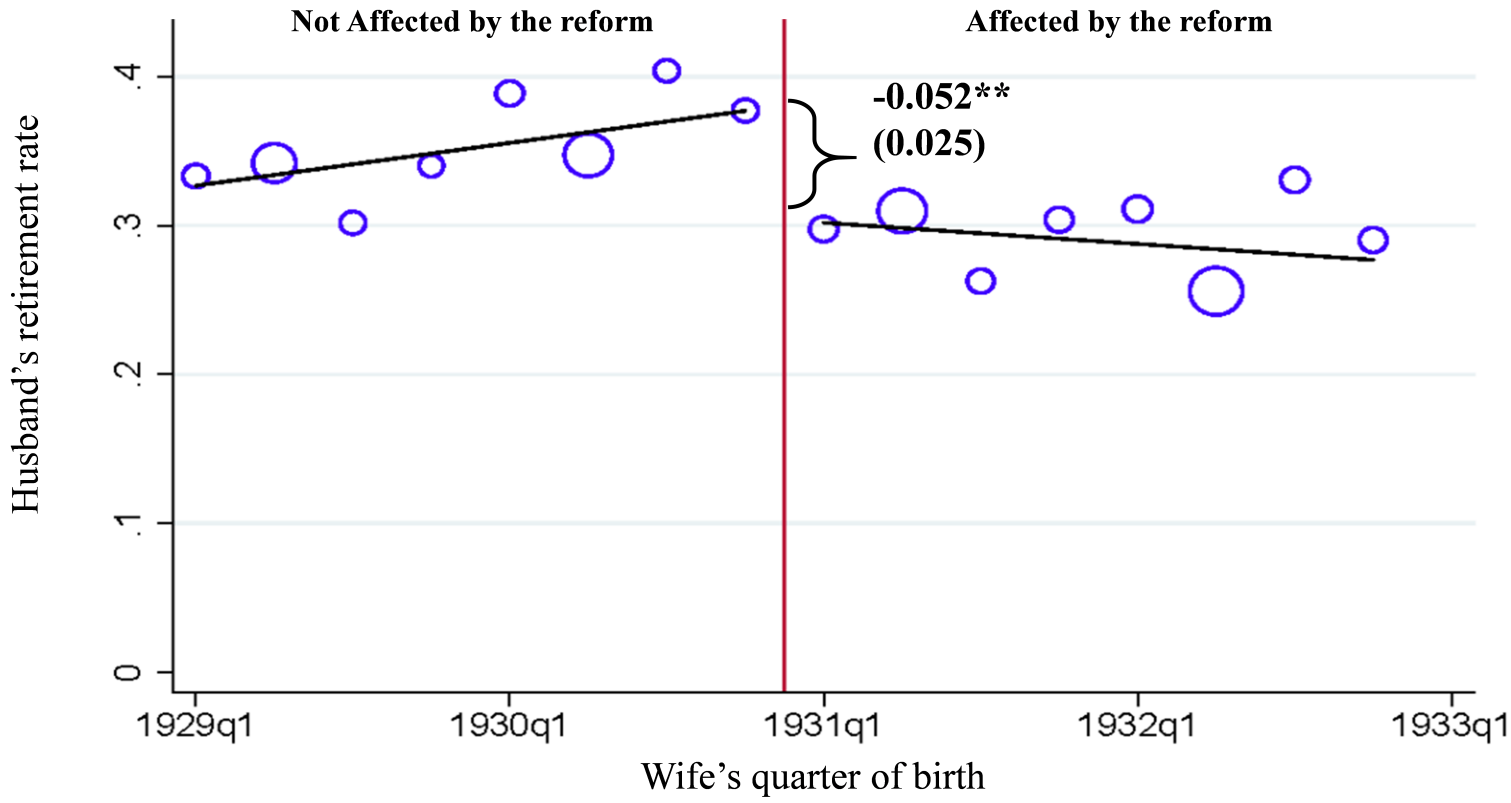
$$y_i = \alpha + \beta D_i + f(\tau) + \epsilon_i$$

where:

- y: retirement in the year 1996 (conditional on working in 1993)
- D: take the value 1 for eligible and 0 otherwise
- $f(\tau)$: flexible control function (polynomial)

RDD Results Show Similar Magnitudes

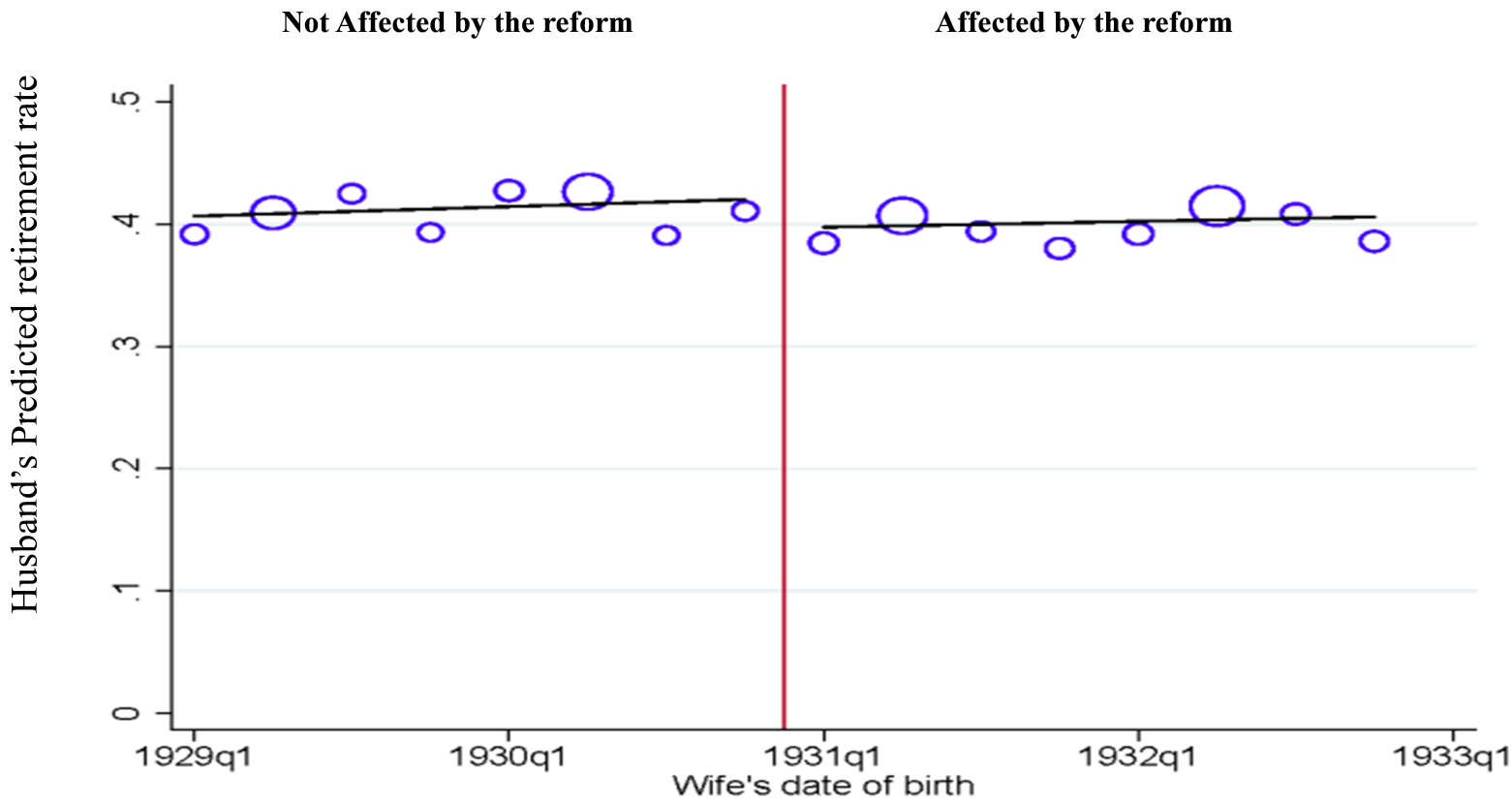
Husbands to HW: Retirement Prob by 96 Conditional on Working in 93



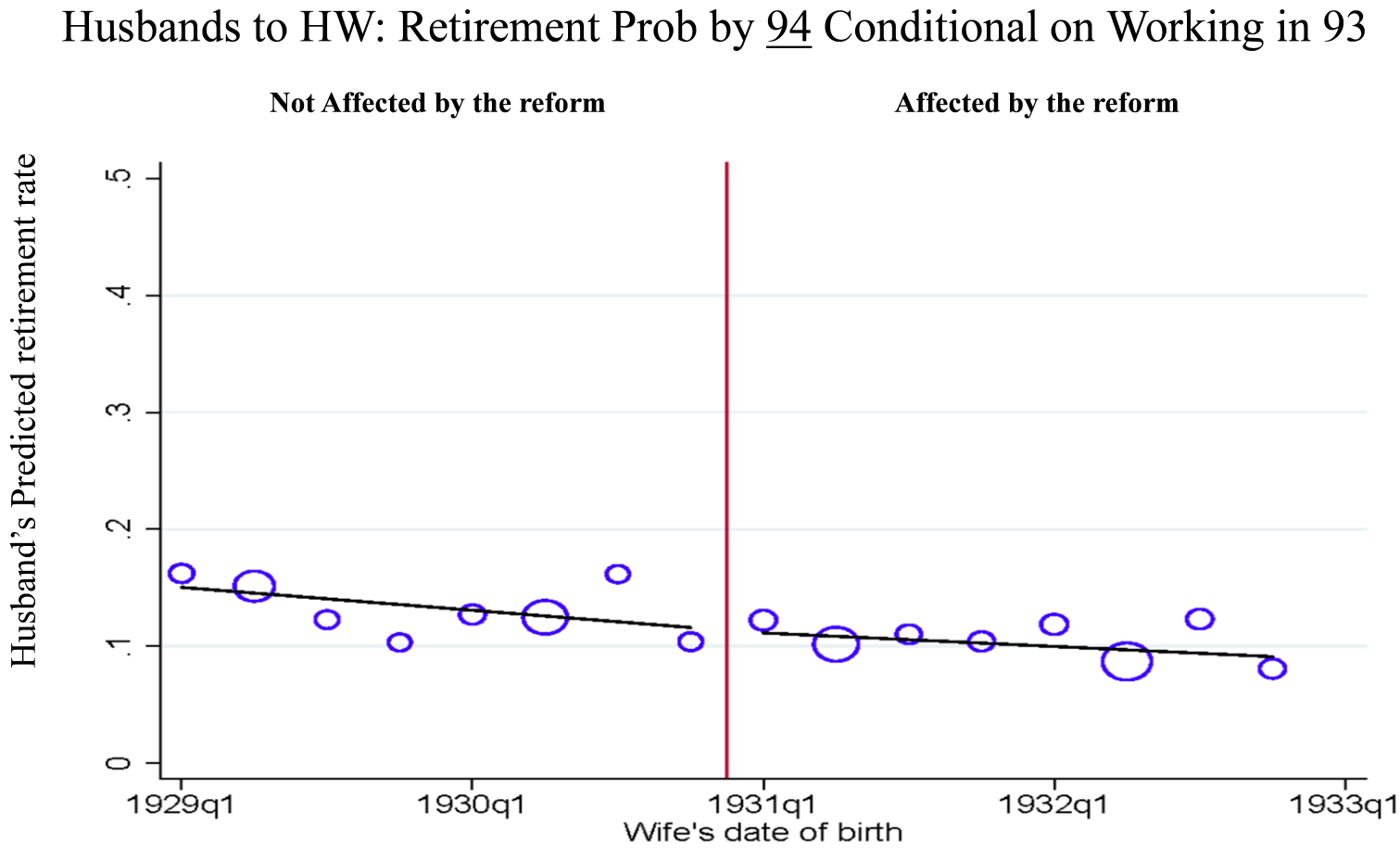
▸ RDD Tables

SMOOTH OBSERVABLES AROUND THE CUTOFF

Husbands to HW: Predicted Retirement Prob by 96 Conditional on Working in 93



PLACEBO 1: SMOOTH RETIREMENT AROUND THE CUTOFF IN 1994



▸ Placebo 2

AGENDA

- The "Housewives Reform"
- Data
- The Impact of (Implied) Income Tax on Retirement
- **The Effect of Delayed Retirement on Health**

The Reform as an Instrument for Employment

- **Does working an extra year at older age has health implications?**
- OLS estimates will be biased (omitted variables etc.).

The Reform as an Instrument for Employment

- **Does working an extra year at older age has health implications?**
- OLS estimates will be biased (omitted variables etc.).

Use the reform to instrument for employment

- Instrument validity:
  - The reform affects employment (powerful first stage).
  - (Almost) no direct effect on wealth or earnings (other than through employment).
- Estimate the effect of extra years of work after wife is 65 on:
  - Probability of survival by 80.
  - Probability of Long-Term-Care eligibility by 80.

POORER HEALTH OUTCOMES FOR TREATED

First Stage:

$$employment = \delta_1 HW + \delta_2 Treated + \delta_2 Treated * HW + \phi X + u$$

Second Stage:

$$Health = \beta_1 employment + \beta_2 HW + \beta_3 Treated + \gamma X + \epsilon$$

First stage and reduced form estimates:

	First stage		Reduced form			
independent variable	Employment		Survival Past 80		No LTC Eligibility	
	(1)	(2)	(3)	(4)	(5)	(6)
HW*post_1930	0.467***	0.438***	-0.065***	-0.053**	-0.074**	0.060*
	(0.168)	(0.169)	(0.025)	(0.025)	(0.032)	(0.031)
HH level controls	No	Yes	No	Yes	No	Yes
Observations	3,477	3,411	3,477	3,411	3,477	3,411

IV Estimation Implies Large (Marginally Significant) Negative Elasticity

independent variable	Survival Past 80				No LTC Eligibility			
	OLS		IV		OLS		IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Employment	0.007**	0.004	-0.139*	-0.120*	0.016***	0.010***	-0.159*	-0.136
	(0.003)	(0.003)	(0.075)	(0.073)	(0.003)	(0.003)	(0.093)	(0.09)
HH level controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,477	3,411	3,477	3,411	3,477	3,411	3477	3411

14 percentage point (17%) reduction in survival probability.

The Effect is Driven by Blue Collar

	Blue Collar			White Collar		
Specification	Reduced form	First stage	IV	Reduced form	First stage	IV
independent variable	Survival	employment	Survival	Survival	employment	Survival
	(1)	(2)	(3)	(4)	(5)	(6)
HW·post_1930	-0.129***	0.556**		-0.027	0.411*	
	(0.043)	(0.271)		(0.031)	(0.214)	
Employment			-0.233*			-0.066
			(0.141)			(0.083)
Observations	1,221	1,221	1,221	2,208	2,208	2,208

Conclusion

- Many countries reform their public pension systems, targeting work incentives
- Typical reforms confound a tax change with wealth and potentially liquidity effects.
- We show that the "Housewives Reform" provides a quasi-experiment for a tax change.
- We find:
  - Moderate to large responses of retirement to the tax change implied by the reform.
  - Evidence for negative effect of delaying retirement on life-expectancy of blue collar workers.

Backup slides

The Timing of the Reform

June 1994	The parliament State Control Committee requests the NII to evaluate the discrimination in the old law
February 1995	The parliament Labor and Welfare Committee initiates the discussion about a new law (involves legislators and women rights activists)
August 1995	The Ministry of Labor forms the initial draft for the law
October 1995 to January 1996	Final Law is drafted, and signed. (Most press coverage)

Back

The DDD Regression Equation

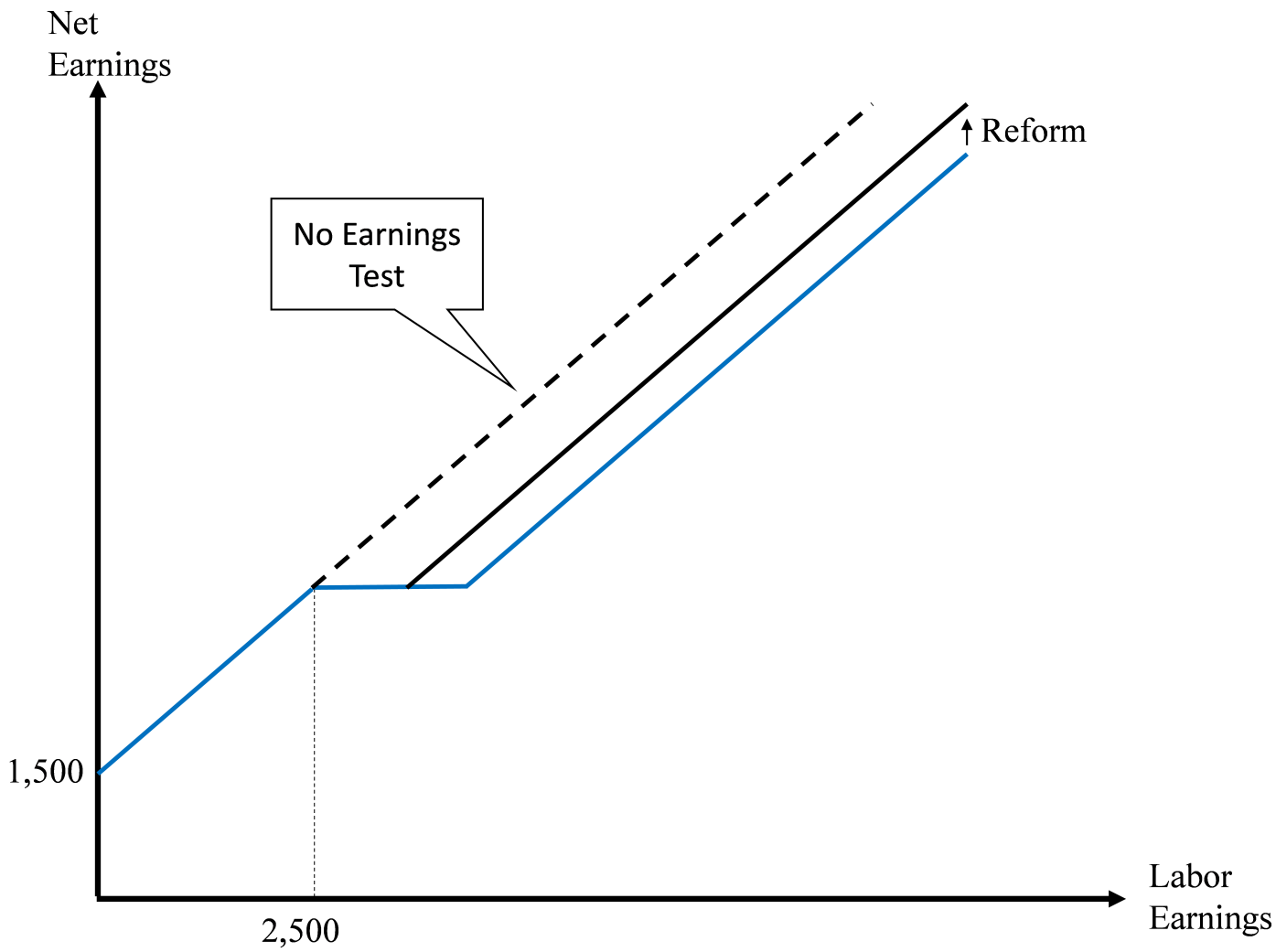
$$
\begin{aligned}
y_{ict} &= \beta_0 + \beta_1 \alpha_c + \beta_2 T_t + \beta_3 HW_i \\
&+ \beta_4 (\alpha_c \times T_t) + \beta_5 (\alpha_c \times HW_i) + \beta_6 (T_t \times HW_i) \\
&+ \beta_7 (\alpha_c \times T_t \times HW_i)
\end{aligned}
$$

where:

- α_c is a cohort of birth dummy for 1931 households
- HW_i is an indicator for a households with a housewife
- T_t are year dummies/wife age dummies
- β_7 is the vector of distributed lag coefficients that tracks the effect pre- and post-reform date

Back

The Change in within Period Budget Constraint

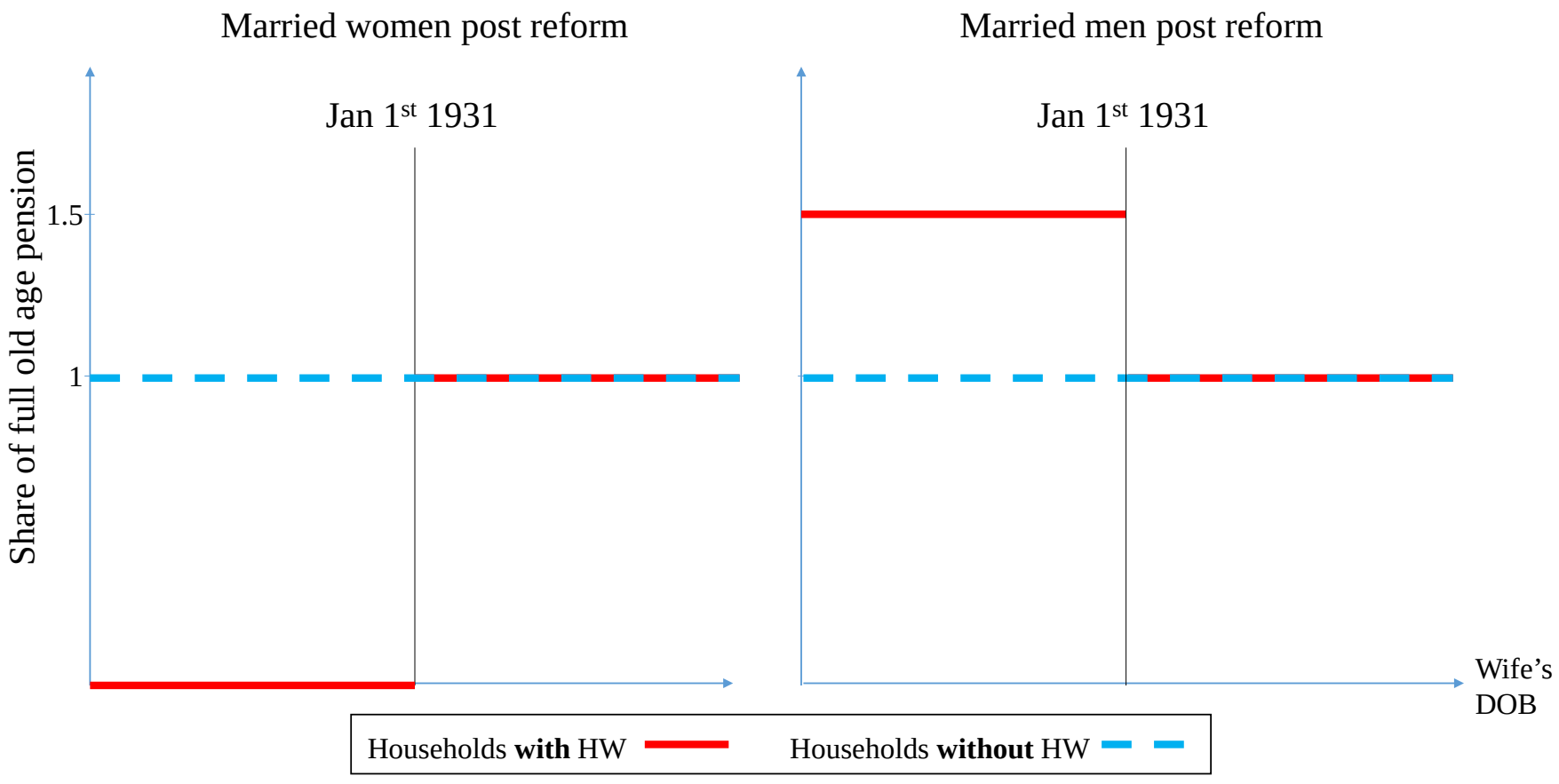


Robustness Checks

	DDD 1930, 1931						
	Nearly housewives		Less restrictive		More restrictive		Actual
Coefficient	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Wife age=63 X HW	-0.011		-0.025		-0.01		0
	(0.023)		(0.019)		(0.022)		(0.028)
Wife age=64 X HW	-0.014		-0.023		-0.031		0.04
	(0.029)		(0.025)		(0.028)		(0.032)
Wife age=65 X HW	-0.07**	-0.058***	-0.077***	-0.053***	-0.087***	-0.066***	0.089***
	(0.033)	(0.022)	(0.028)	(0.019)	(0.031)	(0.021)	(0.034)
Wife age=66 X HW	-0.043	-0.031	-0.075***	-0.051**	-0.08***	-0.06**	0.054
	(0.034)	(0.028)	(0.029)	(0.024)	(0.031)	(0.025)	(0.034)
Wife age=67 X HW	-0.035	-0.023	-0.058**	-0.034	-0.057*	-0.037	0.027
	(0.034)	(0.03)	(0.029)	(0.026)	(0.031)	(0.028)	(0.033)
Wife age=68 X HW	-0.025	-0.013	-0.031	-0.007	-0.044	-0.024	0.011
	(0.033)	(0.032)	(0.029)	(0.027)	(0.03)	(0.029)	(0.031)
Observations	27,824	27,824	43,384	43,384	38,648	38,648	33,688

Back

THE "HOUSEWIVES REFORM"



Back

A Simple Model for the Choice of Lifetime Labor Supply

- Suppose that workers draw utility from life-time consumption and disutility from work.
- Maximization life-time utility:

$$\max U(C,R) = u(C) - \phi(R)$$

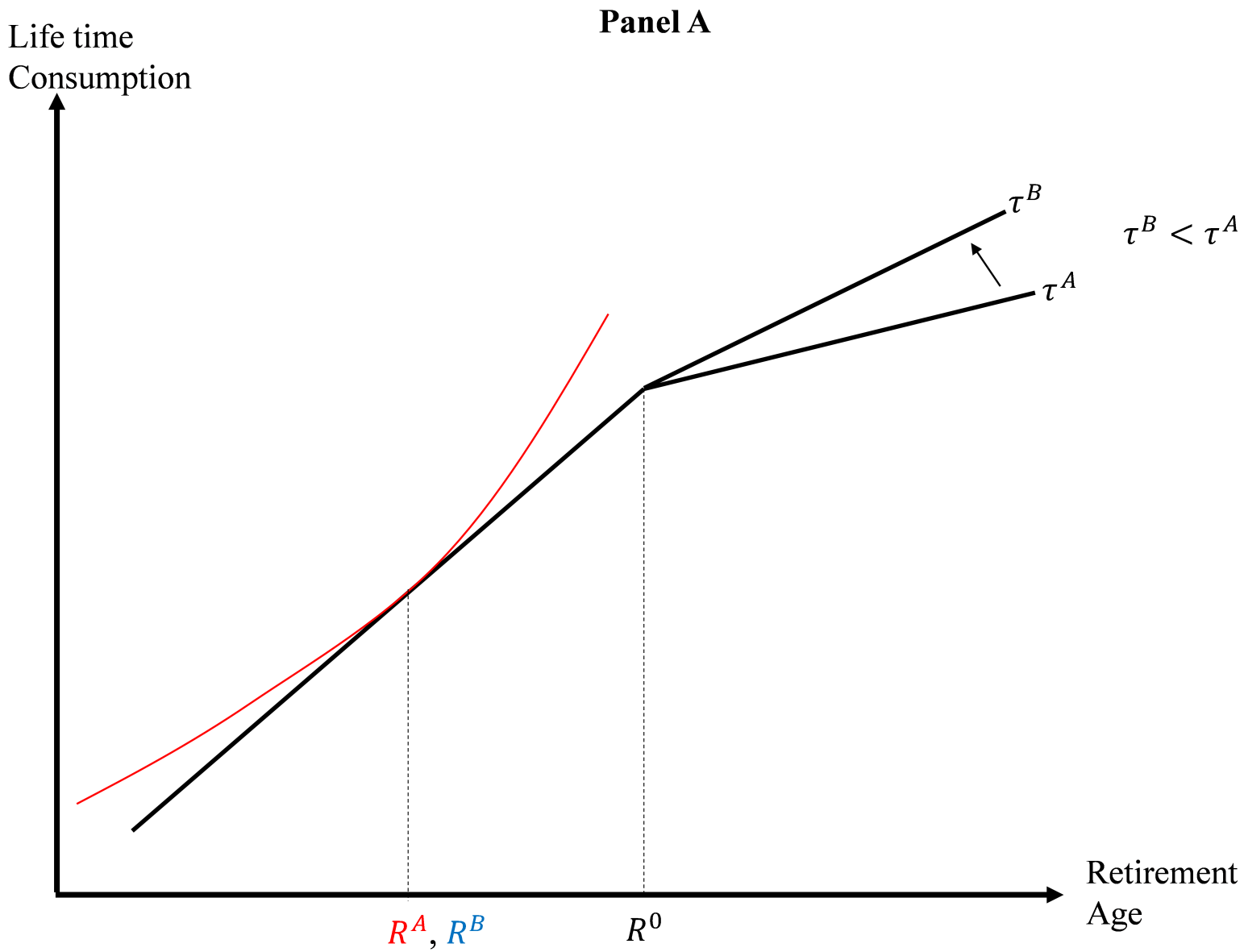
$$u' > 0, u'' < 0, \phi' > 0, \phi'' > 0$$

subject to:

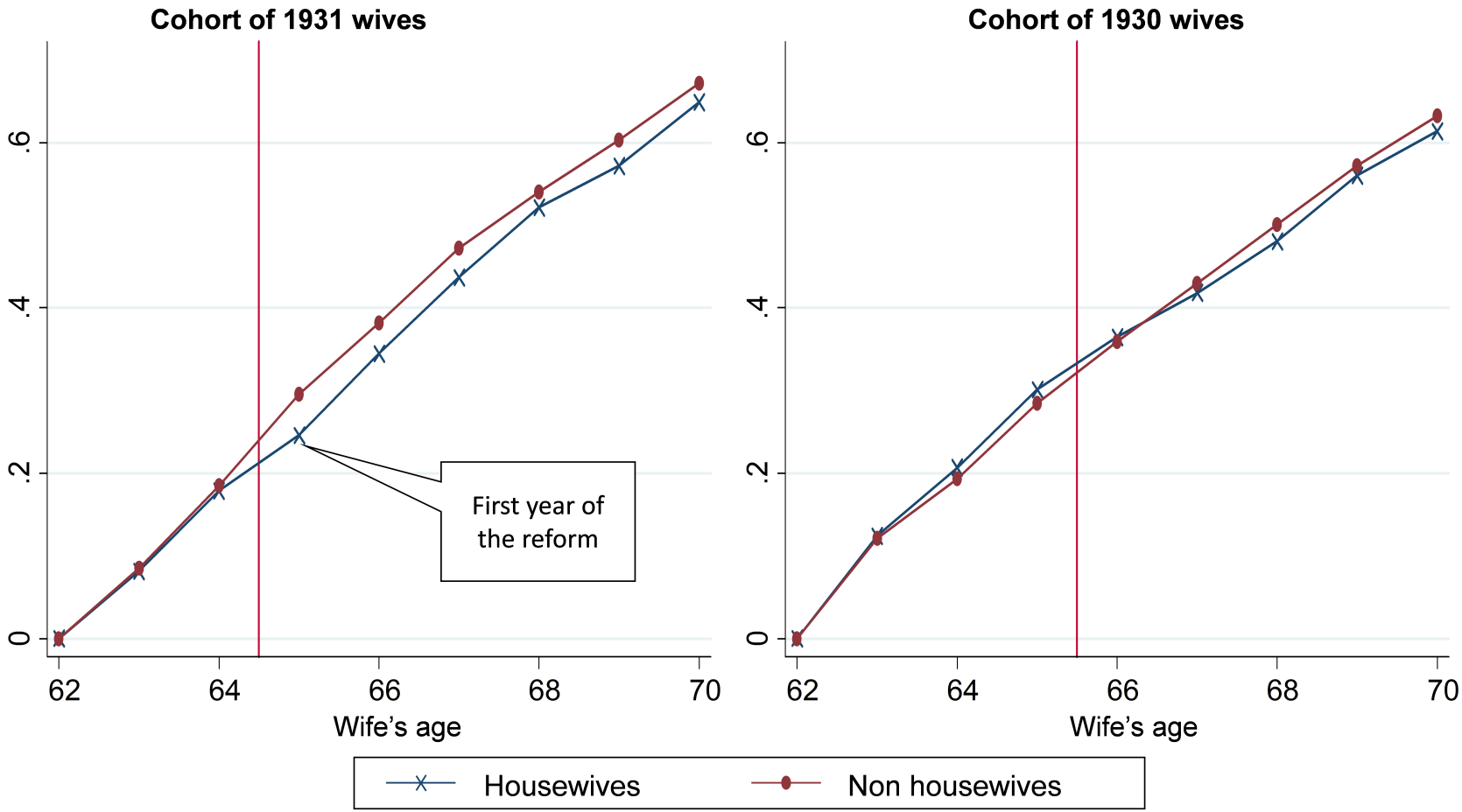
$$C = \begin{cases} wR + b\left(T - R^0\right) & \text{if } R < R^0 \\ wR + b\left(1-\tau\right)\left(R - R^0\right) + b\left(T - R\right) & \text{if } R \geq R^0 \end{cases}$$

Back

EXPECTED LABOR SUPPLY RESPONSES



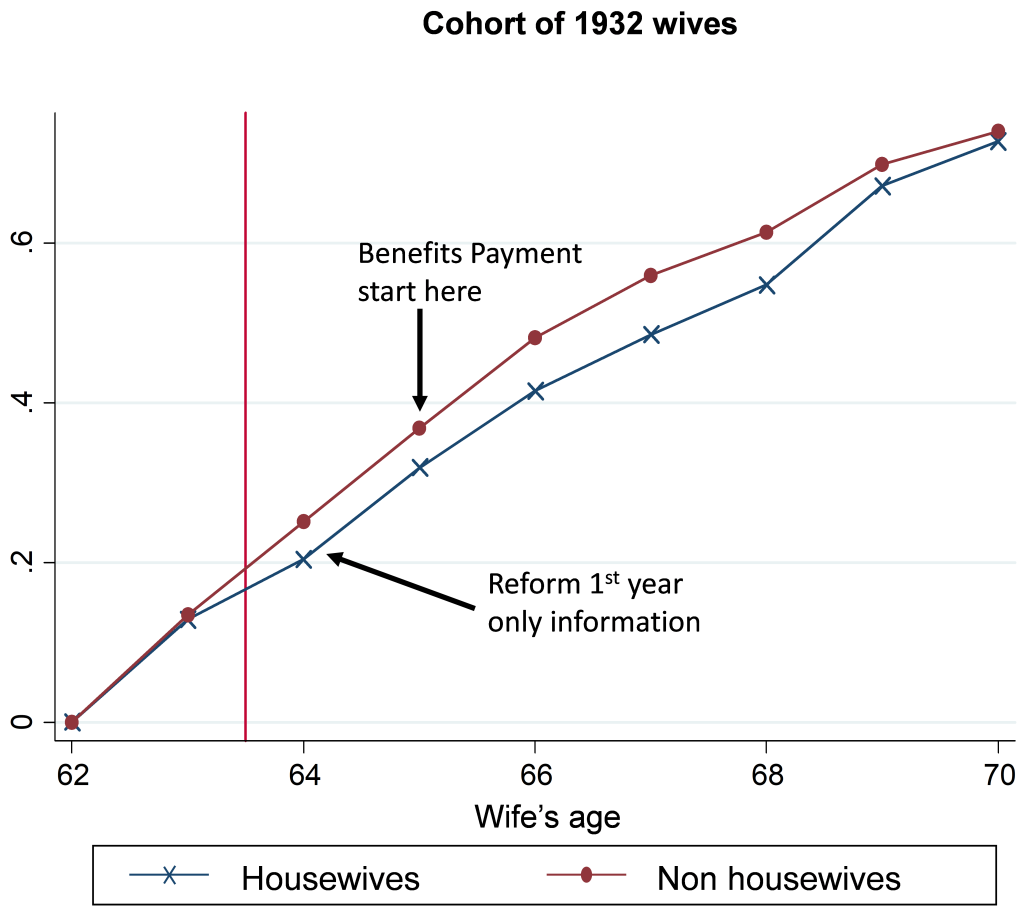
Pre-Trends are Cleaner for Refined Sample of non-HW



- Men married to housewives who were born in 1932.

Wives are *only 64* when the reform implemented ⇒ Multiple channels are different:

1932 Cohort Lasting Response Starting 1996



	DDD 1930, 1932 (3)
Wife age=63 X 1932	-0.016
	(0.021)
Wife age=64 X 1932	-0.049*
	(0.025)
Wife age=65 X 1932	-0.068**
	(0.029)
Wife age=66 X 1932	-0.088***
	(0.03)
Wife age=67 X 1932	-0.084***
	(0.03)
Wife age=68 X 1932	-0.073**
	(0.029)
	42,568

Implies Moderate to High Elasticities

- Recover the extensive margin elasticity.
- Depends on perception of financial incentives:
  - **Myopic**: do not internalize the delayed retirement credit
  - **Forward looking**: value the delayed retirement credit
  - **Credit markets**: differences in interest rates

Implies Moderate to High Elasticities

- Recover the extensive margin elasticity.
- Depends on perception of financial incentives:
  - **Myopic**: do not internalize the delayed retirement credit
  - **Forward looking**: value the delayed retirement credit
  - **Credit markets**: differences in interest rates
- Using only the 1996 response of $dEmp = 6\%$:

Assuming:	Myopic	Forward looking (high r)	Forward looking (low r)
Baseline	0.46	0.57	0.61

Notes: All calculations using the average annual earnings when wife is 64 as the wage rate. Forward looking assumed to discount the next 20 years with an interest rate of 0.06 or 0.03.

Implies Moderate to High Elasticities

- Recover the extensive margin elasticity.
- Depends on perception of financial incentives:
  - **Myopic**: do not internalize the delayed retirement credit
  - **Forward looking**: value the delayed retirement credit
  - **Credit markets**: differences in interest rates
- Using only the 1996 response of $dEmp = 6\%$:

Assuming:	Myopic	Forward looking (high r)	Forward looking (low r)
Baseline	0.46	0.57	0.61

Notes: All calculations using the average annual earnings when wife is 64 as the wage rate. Forward looking assumed to discount the next 20 years with an interest rate of 0.06 or 0.03.

- Another interpretation: a 10% tax reduction results in (at least) 2-4 weeks of delayed retirement.

Back

RDD - Detailed Tables

Polynomial degree	Housewives				Non-Housewives			
	One		Two		One		Two	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Wife born Jan. 1st	-0.052**	-0.040*	-0.066**	-0.055*	0.038*	0.028	0.070*	0.061*
1931 or later	(0.025)	(0.022)	(0.032)	(0.029)	(0.023)	(0.024)	(0.036)	(0.037)
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2869	2869	2869	2869	6801	6801	6801	6801

Notes: We focus on those employed in 1993, and drop families where husbands are more than 5 years older than wife. Outcome variable is retirement in 1996.

Back

RDD - No Selection on Observables

Polynomial degree	Age gap		Income		Husband immigrant		Predicted values	
	One	Two	One	Two	One	Two	One	Two
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Wife born Jan. 1st 1931 or later	-0.503	-0.512	-0.126	-0.230*	0.020	-0.017	-0.021	-0.007
	(0.390)	(0.482)	(0.129)	(0.137)	(0.023)	(0.045)	(0.013)	(0.015)
Observations	2,934	2,934	2,934	2,934	2,934	2,934	2,934	2,934

Notes: We focus on those employed in 1993, and drop families where husbands are more than 5 years older than wife. Outcome variable is retirement in 1996.

Back

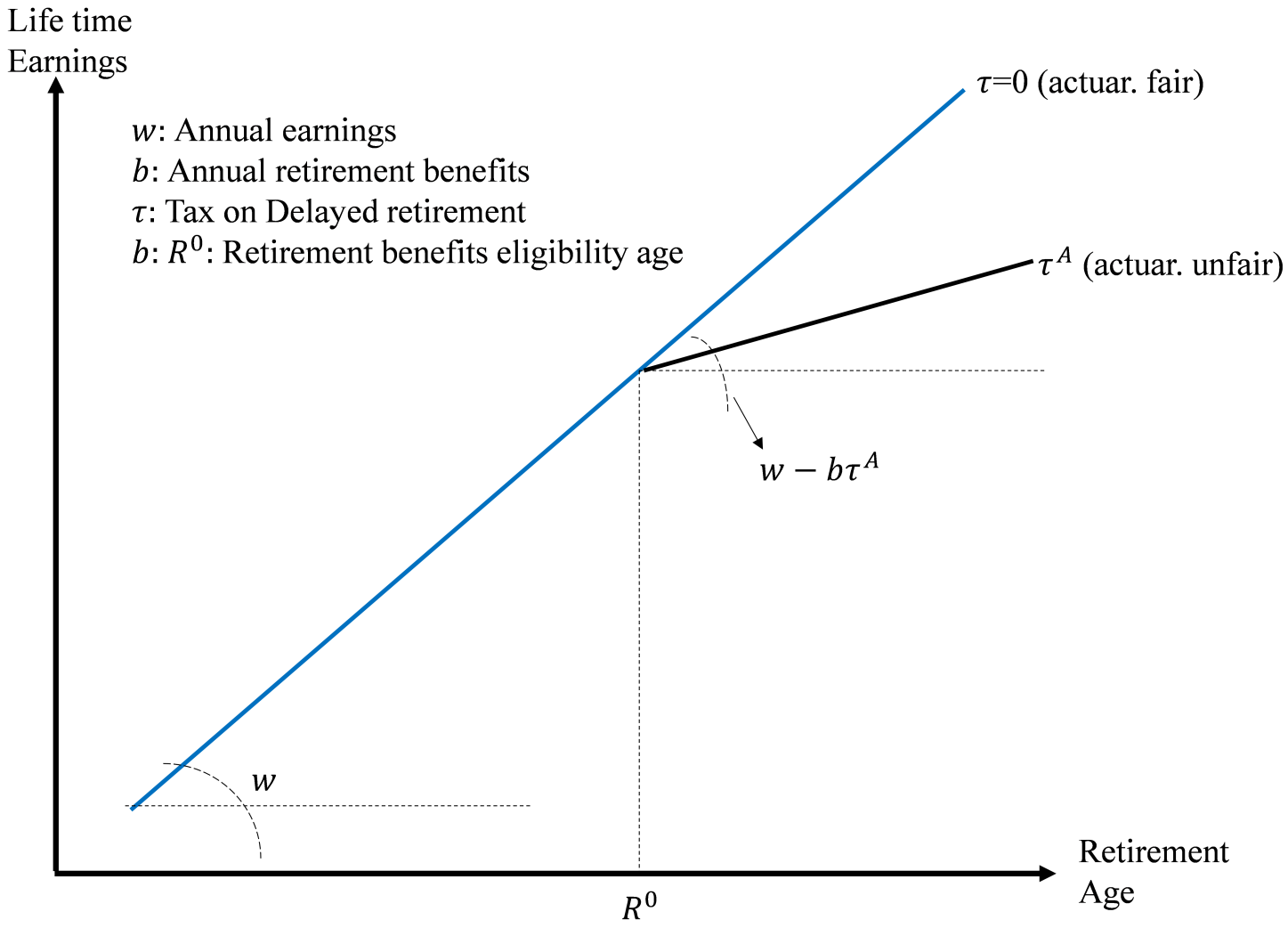
RDD - Placebo: Retirement in 1994

	Panel A: Housewives				Panel B: Non-Housewives			
Polynomial degree	One		Two		One		Two	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Wife born Jan. 1st 1931 or later	0.000	0.011	-0.021	-0.016	-0.014	-0.017	-0.015	-0.018
	(0.017)	(0.018)	(0.031)	(0.032)	(0.016)	(0.016)	(0.025)	(0.024)
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,869	2,869	2,869	2,869	6,801	6,801	6,801	6,801

Notes: We focus on those employed in 1993, and drop families where husbands are more than 5 years older than wife. Outcome variable is retirement in 1996.

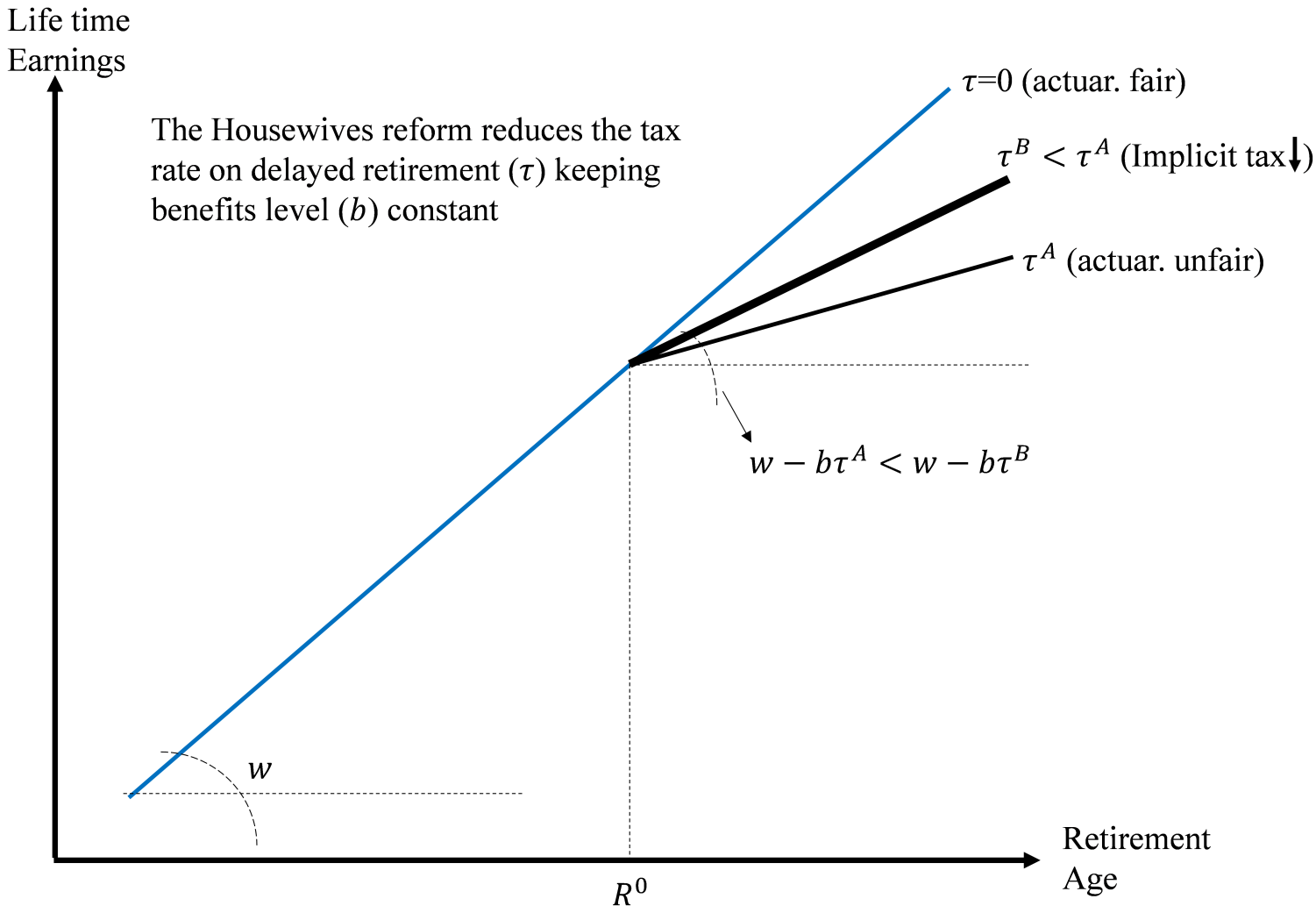
Back

THE INTERPRETATION OF THE POLICY CHANGE



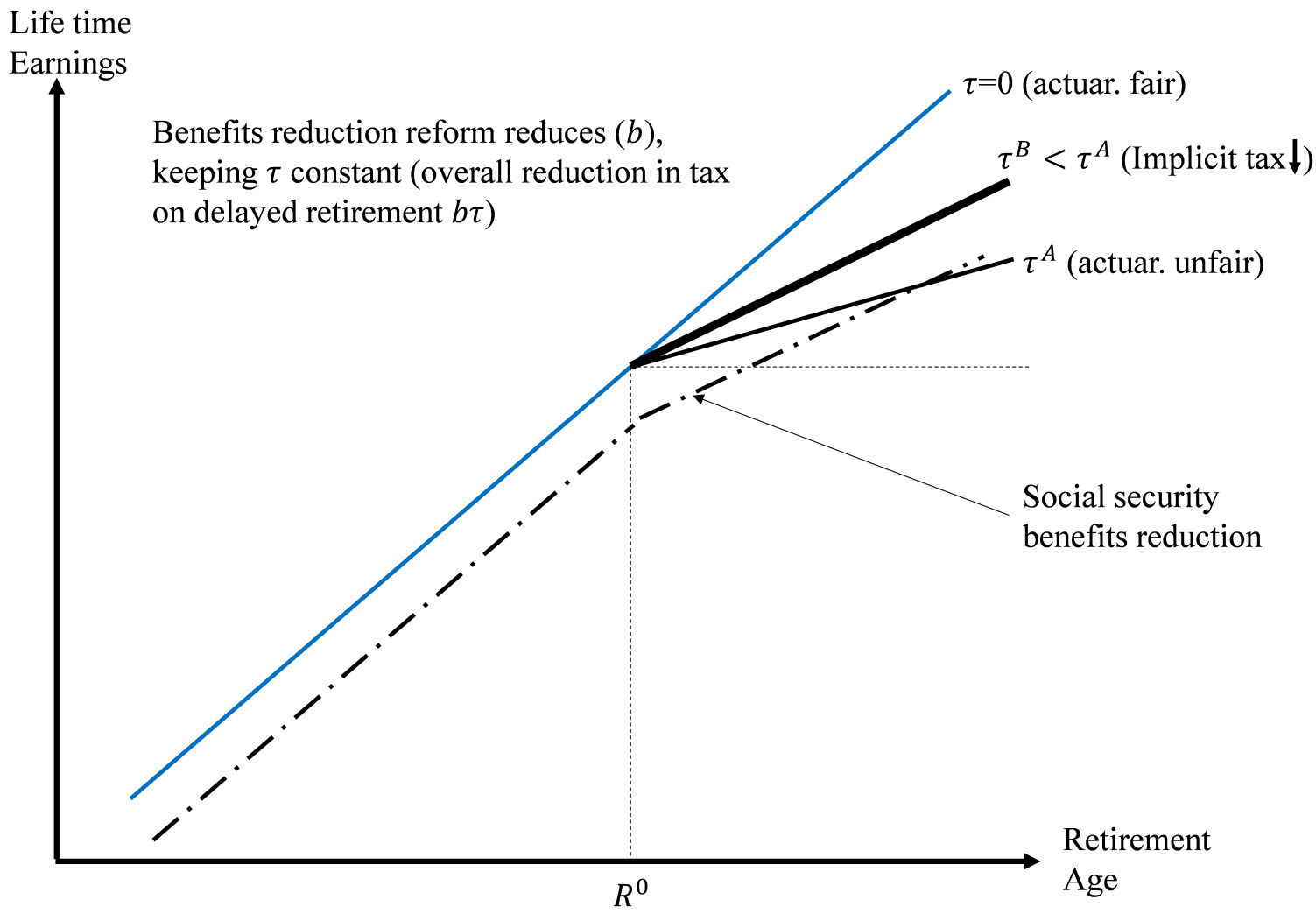
Back

The Interpretation of the Policy Change



Back

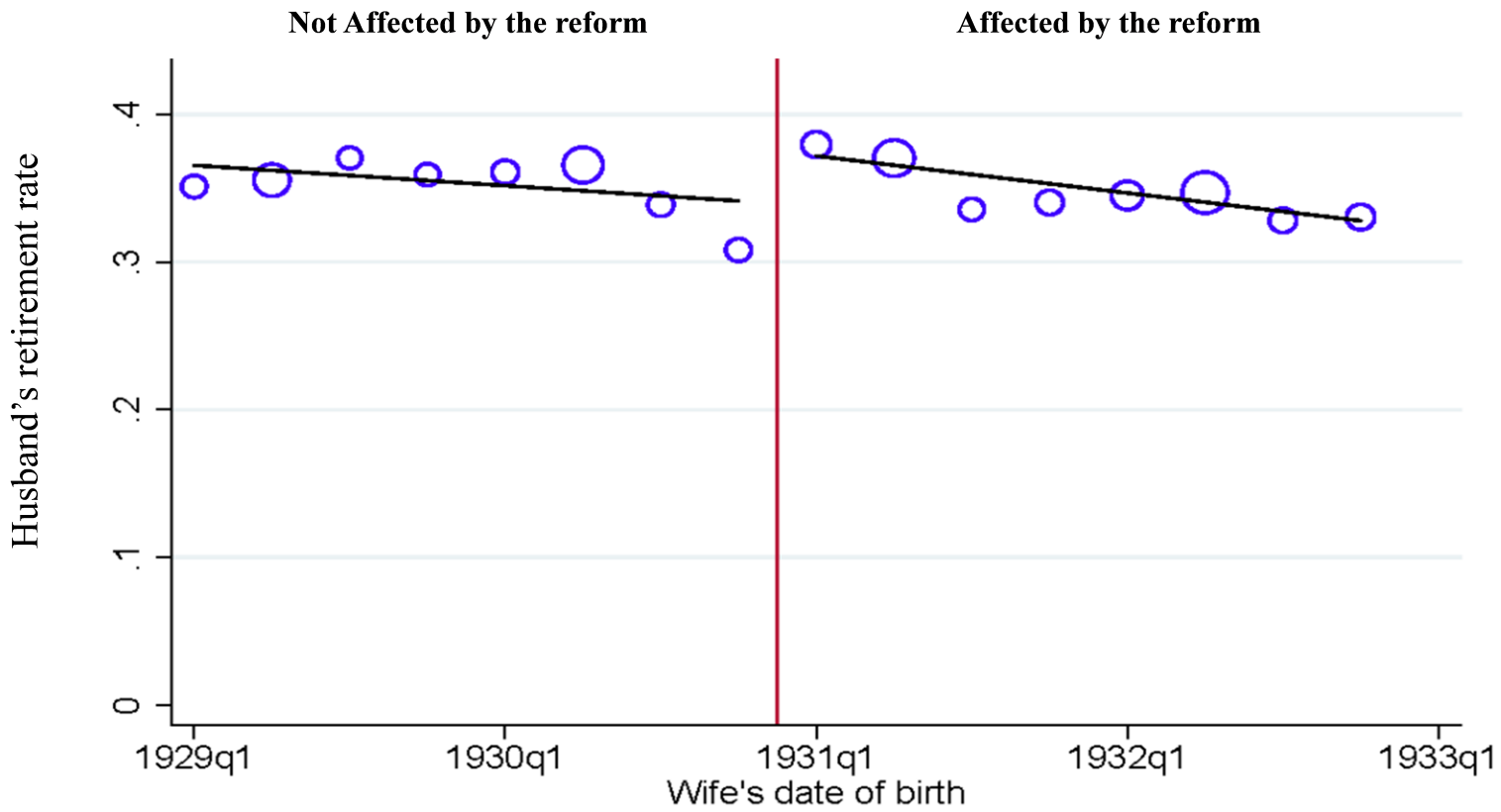
THE INTERPRETATION OF THE POLICY CHANGE



Back

PLACEBO 2: NO SIMILAR RESULT FOR NON-HOUSEWIVES

Husbands to non-HW: Retirement Prob by 96 Conditional on Working in 93



Back