When Income Effects are Large: Labor Supply Responses and the Value of Welfare Transfers

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VisitINPS Web Conference
July 9, 2020

The findings and conclusions expressed are solely those of the author and do not represent the views of INPS.

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- **Ideal experiment**: random allocation of lump sums [Cesarini et al., 2017]
- Yet, **hard to come by** $\rightarrow$ income effects assumed away or calibrated
- Quasi-experimental evidence
  - Based on **short-lived**, **modest**, **anticipated** transfers $\rightarrow$ attenuation
  - Finds overall **small income effects** on labor supply (≈ -0.10)

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- New estimates of **long-term income effect** of welfare transfers on *(i)* labor supply, *(ii)* earnings and *(iii)* total income

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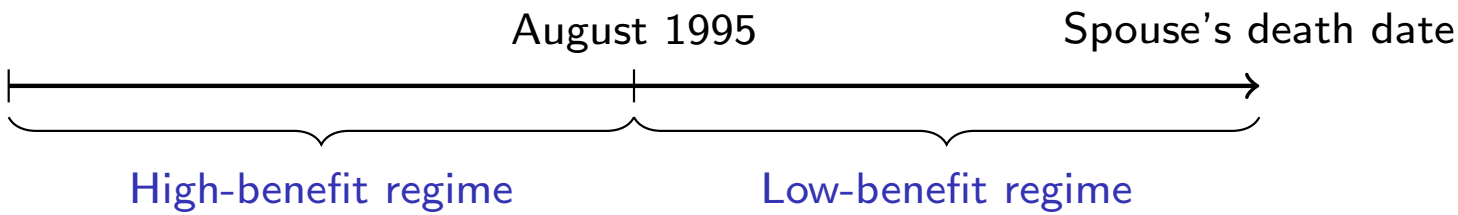

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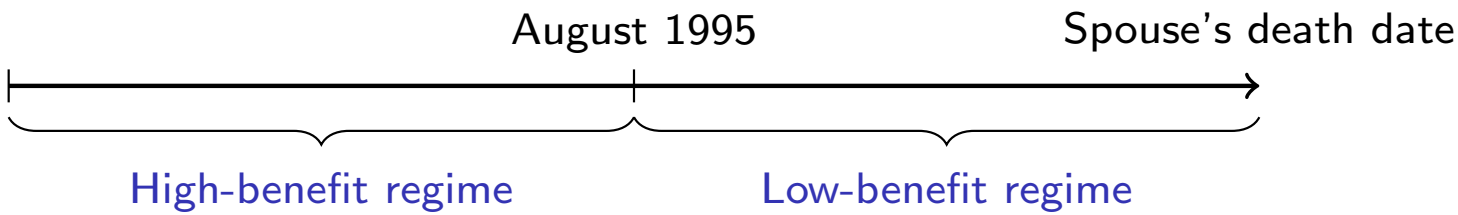

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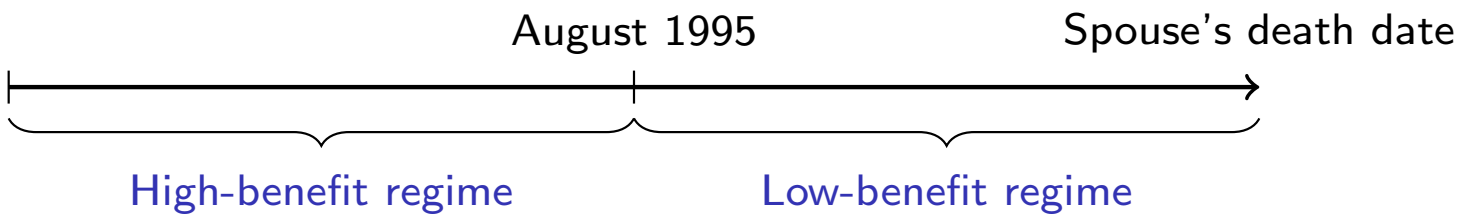

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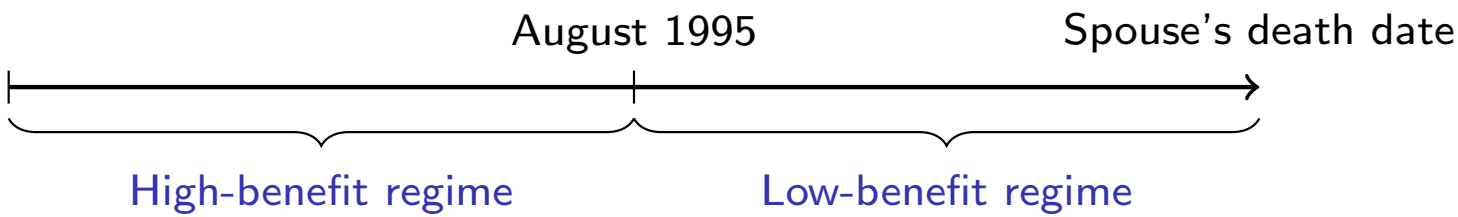

- **Strategy**: compare **long-term outcomes** of otherwise identical individuals receiving high vs. low benefits for rest of their lives
- **Data**: new **admin data** on universe of benefits and working histories
- **Size**: expected lifetime benefit $\downarrow \approx$ €100,000 or €2,000 per year ▷ Large!

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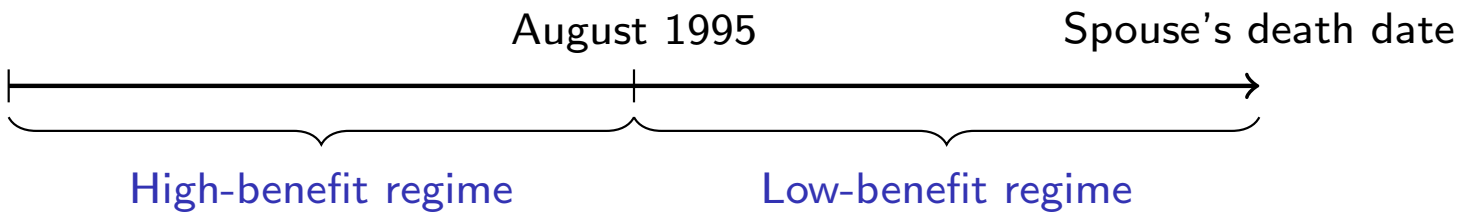

- **Strategy**: compare **long-term outcomes** of otherwise identical individuals receiving high vs. low benefits for rest of their lives

  ▷ Unique window on long-run response to benefit change

  ▷ Comparison of widow(er)s with widow(er)s

Key insights

1. Long-run **income effect** of benefit on earned income $\approx -1 \rightarrow$ **Large!**
   - Fully driven by **extensive** margin ($\uparrow$ entry and $\downarrow$ retirement)
   - No effect on **intensive** margin nor on **wage** rate
   - Large **program substitution** responses (paid family leave, UI)
   - Dynamics of LFP consistent with short-run optimization **frictions**

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   Revealed-preference model to infer value of benefit from LFP response

   Marginal $ 50% more valuable in low- vs high-benefit regime

Skip literature

Related literature and main contribution

Income effects on labor supply

- NIT (Robins, 1985; Burtless, 1986; Ashenfelter and Plant, 1990; Hum and Simpson, 1993), SSI (Deshpande, 2016), social security (Gelber et al, 2016)
- Unconditional cash transfers (Akee et al., 2010; Jones and Marinescu, 2017)
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Micro vs. macro elasticities: optimization frictions and indivisibility of labor

- Chetty (2012), Ljungqvist and Sargent (2007), Rogerson and Wallenius (2009)

Optimization methods to measure value of insurance

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- UI (Chetty, 2008; Landais, 2015; Hendren, 2017; Landais and Spinnewijn, 2019), health shocks (Fadlon and Nielsen, 2018; Dobkin et al., 2018)
  - **Revealed-preference method** to quantify **value of transfer**
  - Provide **new estimate** in context of **survivor benefits** (Fadlon et al., 2019)

Outline

1. Institutional Context, Identification Strategy and Data

2. Income Effect of Benefit on Taxable and Disposable Income

3. Mechanisms: Labor Supply and Program Substitution

4. Normative Implications of Large Income Effects
   - Evidence on Adjustment Costs: Heterogeneity Analysis
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Institutional features of Italian survivor benefit program

- Social insurance program that provides benefit to relatives of deceased retirees or workers (spouse, dependent children)

  $\rightarrow$ Focus on surviving spouses

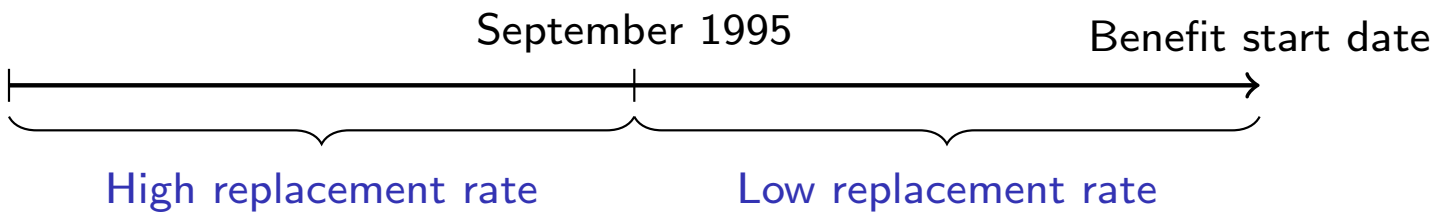
- Benefit (B) is fraction (b) of pension (P) that deceased was entitled to

$$B = b \times P$$

- Benefit starts on first day of calendar month following death event
- Entitlement ends upon remarriage or loss of dependency status

The 1995 reform of survivor benefits

- Reform reduced benefit replacement rate (b) for spouses without dependent children
- Passed on 8 Aug 1995, it applies to all benefit payments starting on or after 1 Sept 1995

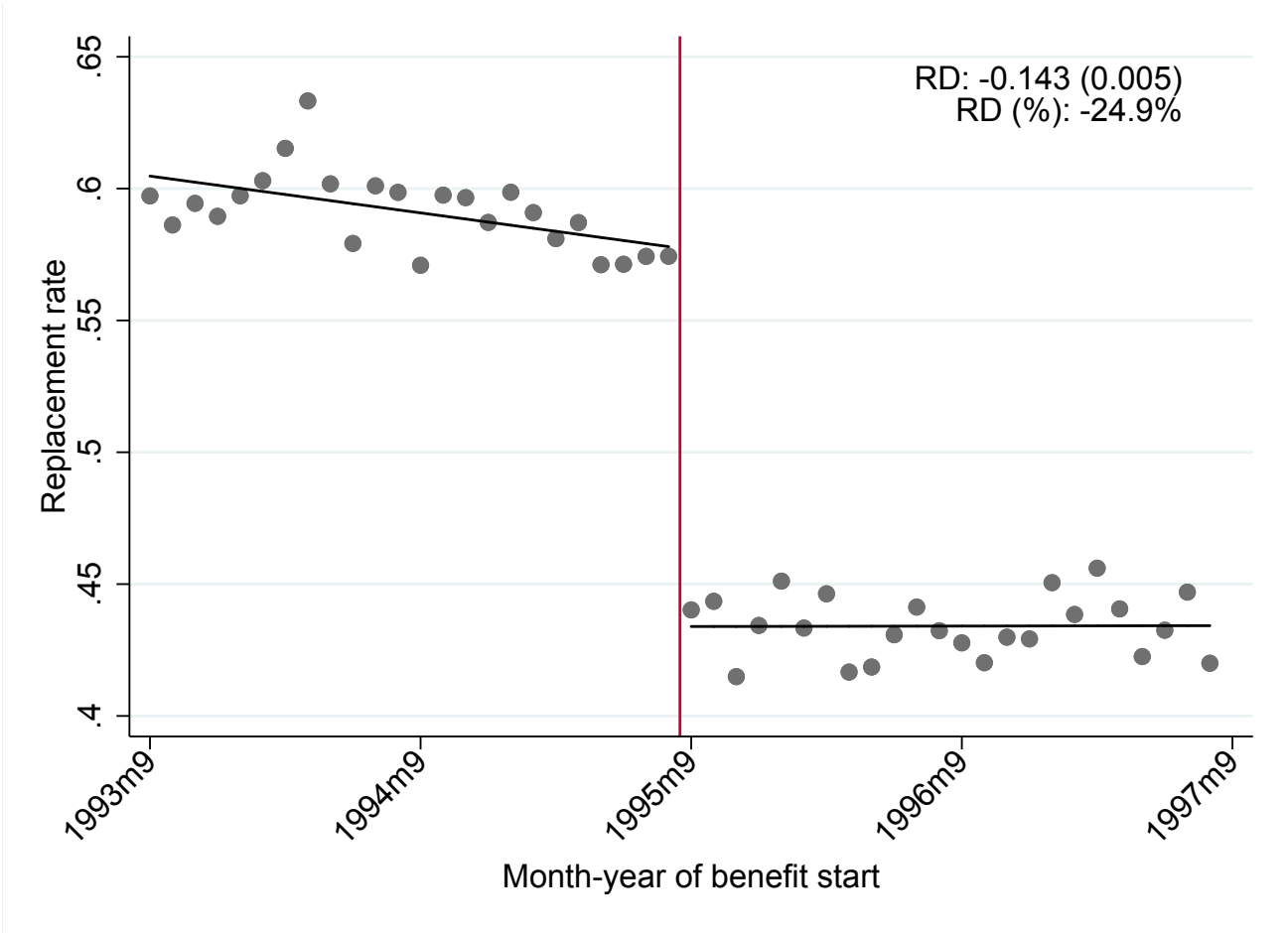


- Part of broader reform of social security system (so-called Dini Reform) $\rightarrow$ No confounding effect

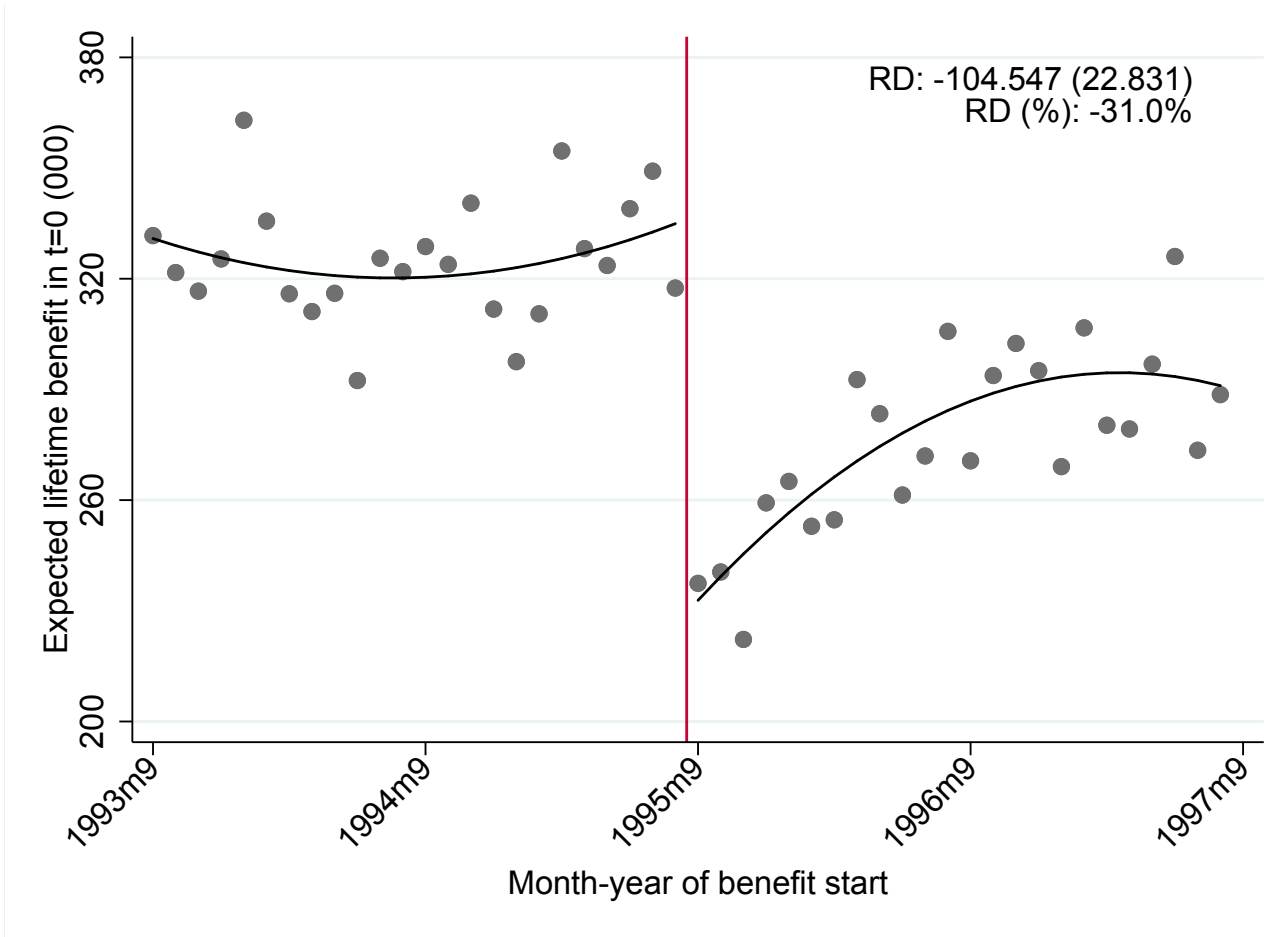
Other recipients | No anticipation | Balancing test | Pension reform

The 1995 reform of survivor benefits

Reduction in benefit replacement rate for spouses without dependent children



Large and permanent reduction in lifetime benefit



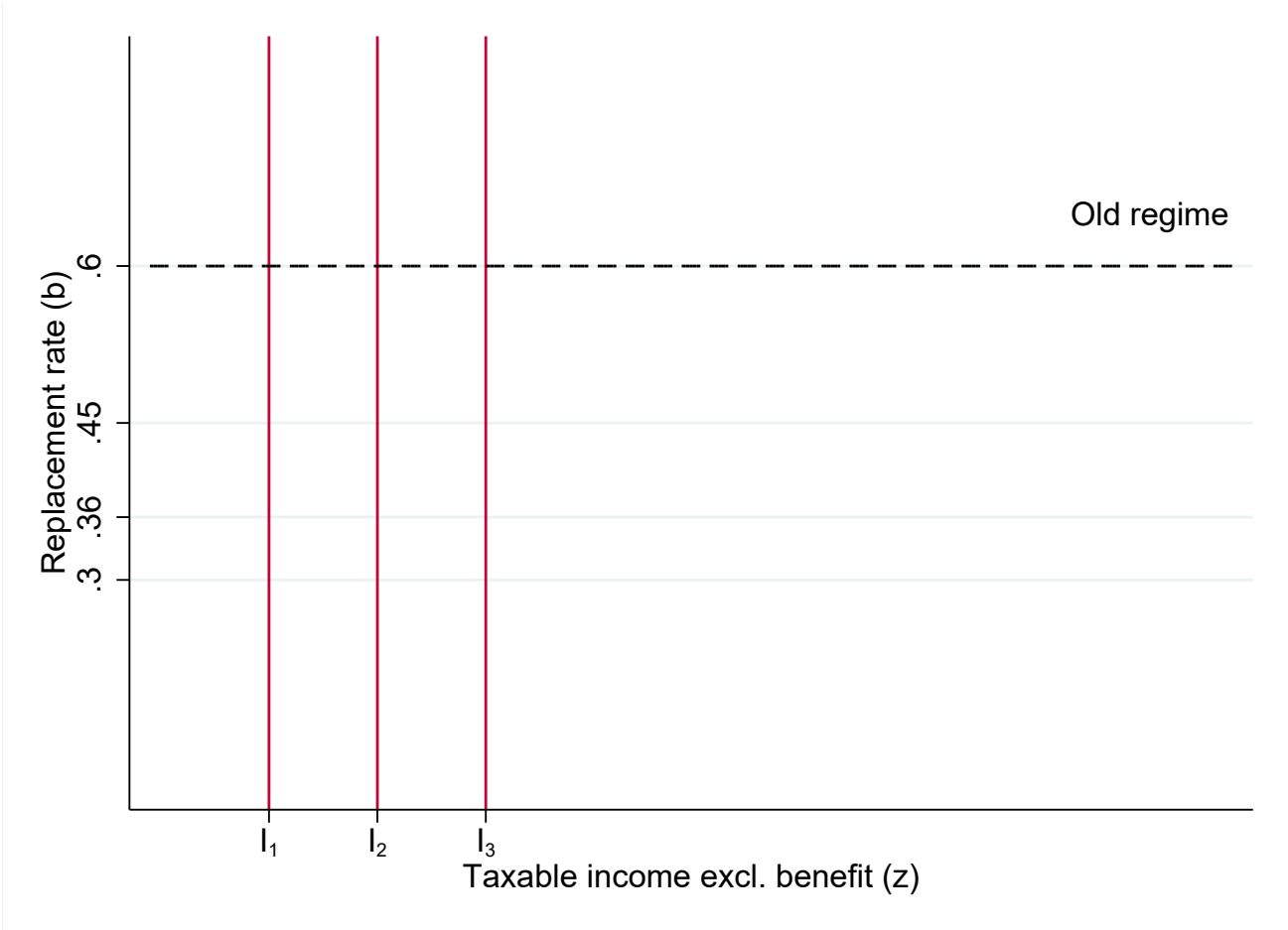
Corresponds to expected **lifetime** benefit drop of **€100,000** Regressions

Note: Surviving spouses aged 55 and younger at time of spouse's death

Go to data

The 1995 reform of survivor benefits

Benefit start date before 1.9.1995



The 1995 reform of survivor benefits

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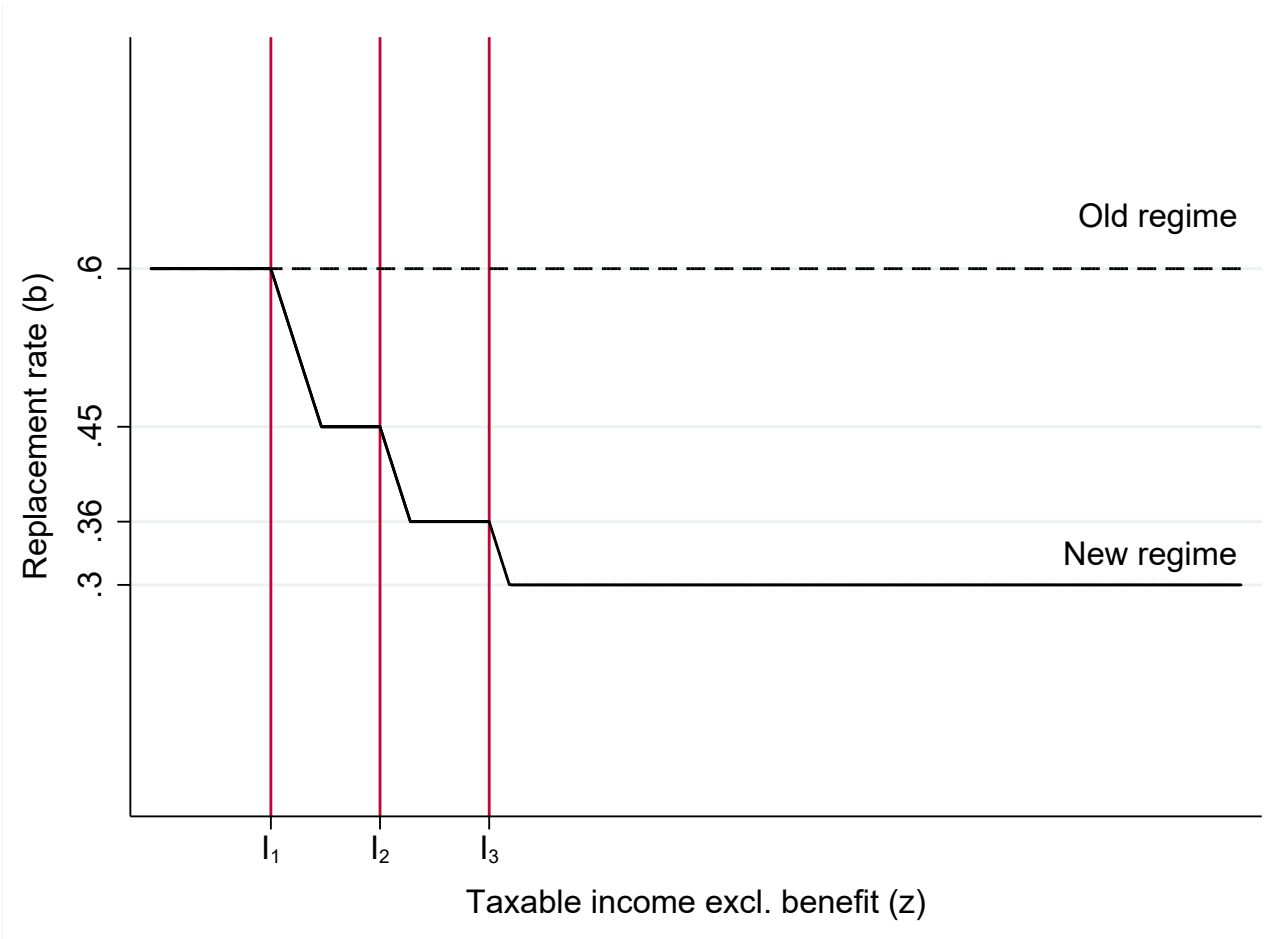
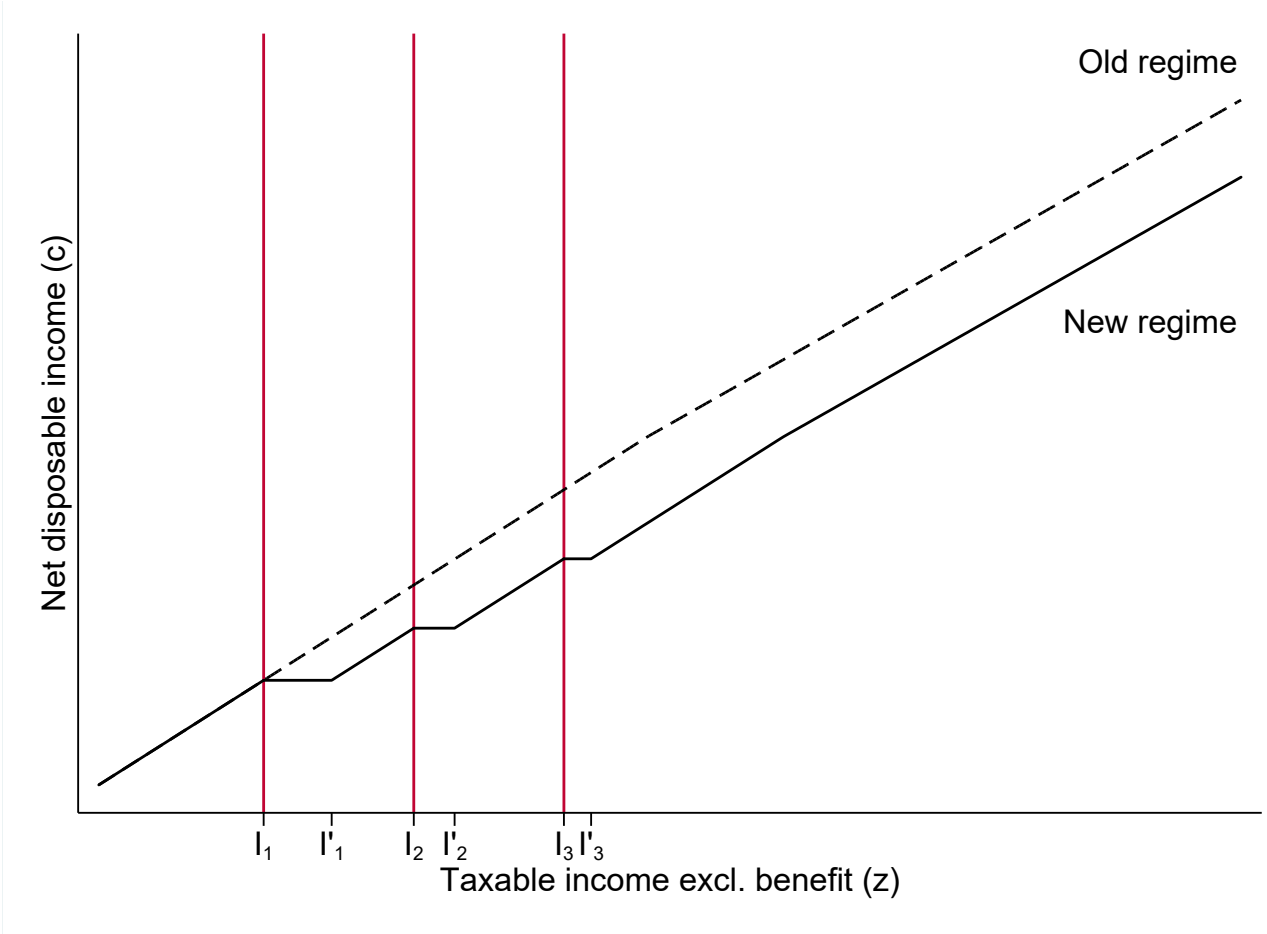


Minimum pension

Effect of 1995 reform on survivor's static budget set



Personal Income Tax | Dynamic effects

Effects of 1995 reform on survivors' labor supply

Static effects

- Income effect for $z > l_1$
- Substitution effect for $z \in [l_j, l_j']$ $\rightarrow$ Labor supply $\downarrow$

Dynamic effects

- Income effect
- Substitution effect: lower net returns to extra year of work $\rightarrow$ Lifetime LS $\downarrow$

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$\rightarrow$ Labor supply response to benefit $\downarrow$ is **lower bound** of income effect!

Identification strategy

- Identify effect of B_{it} on Y_{it} using **IV-RD** around 1.9.1995 cutoff

$$Y_{it} = \alpha + \beta \cdot B_{it} + X'_{it} \cdot \gamma + \eta_{it} \tag{1}$$

$$Y_{it} = \alpha_0 + \beta_0 \cdot \mathbb{I}[\tau_i \geq 0] + \sum_{k=1}^{K} \alpha_k \cdot \tau_i^k + \sum_{k=1}^{K} \beta_k \cdot \tau_i^k \cdot \mathbb{I}[\tau_i \geq 0] + \varepsilon_{i\tau} \tag{2}$$

τ benefit start date relative to Sept 1995, t time since death RD

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- Exploit kinks in budget set to **quantify substitution incentives** via bunching approach

Data

- Administrative data on **universe of survivor benefits** since 1990
  - Start/end date, benefit amount, taxable income, recipients and relationship to deceased
- Linked to **survivors' contributory histories** up to 2017
  - Employment spells, earnings, social insurance take-up, job characteristics
- Linked to demographic archive
- Balanced panel of surviving spouses aged ≤ 55 at time of spouse's death and observed for 15 years after death

Summary statistics | Mortality | Remarriage

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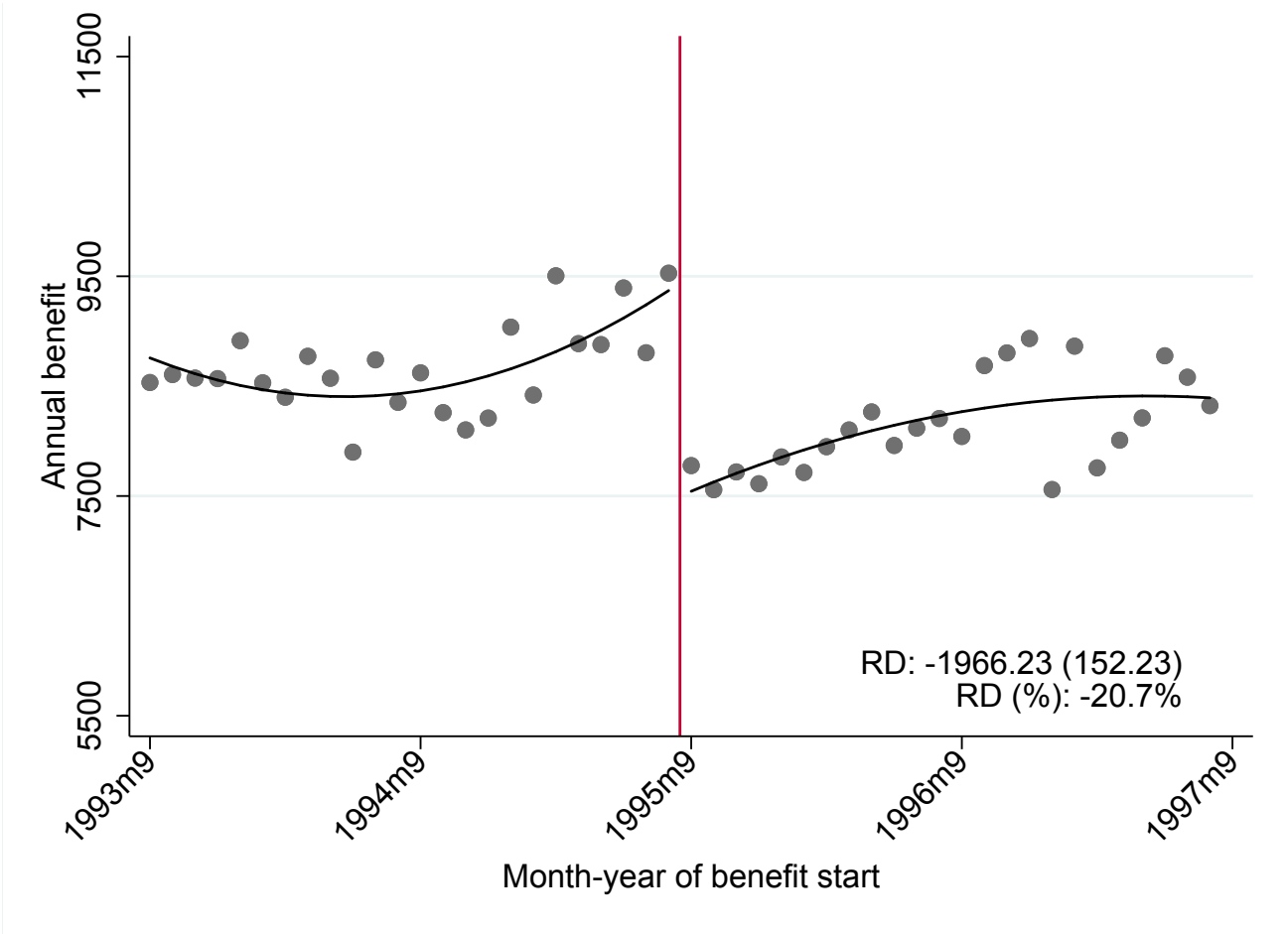
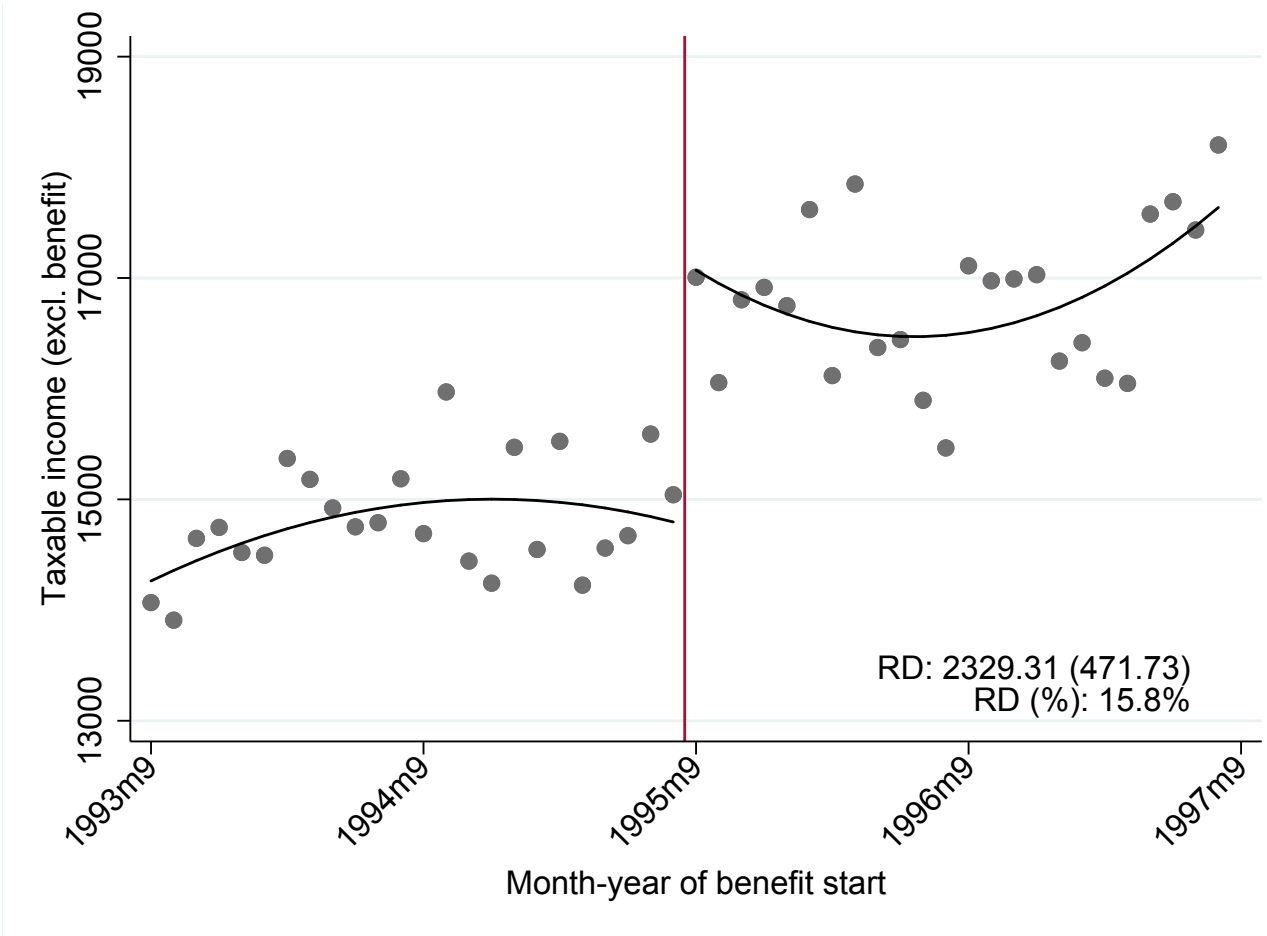
Average annual drop in benefit amount

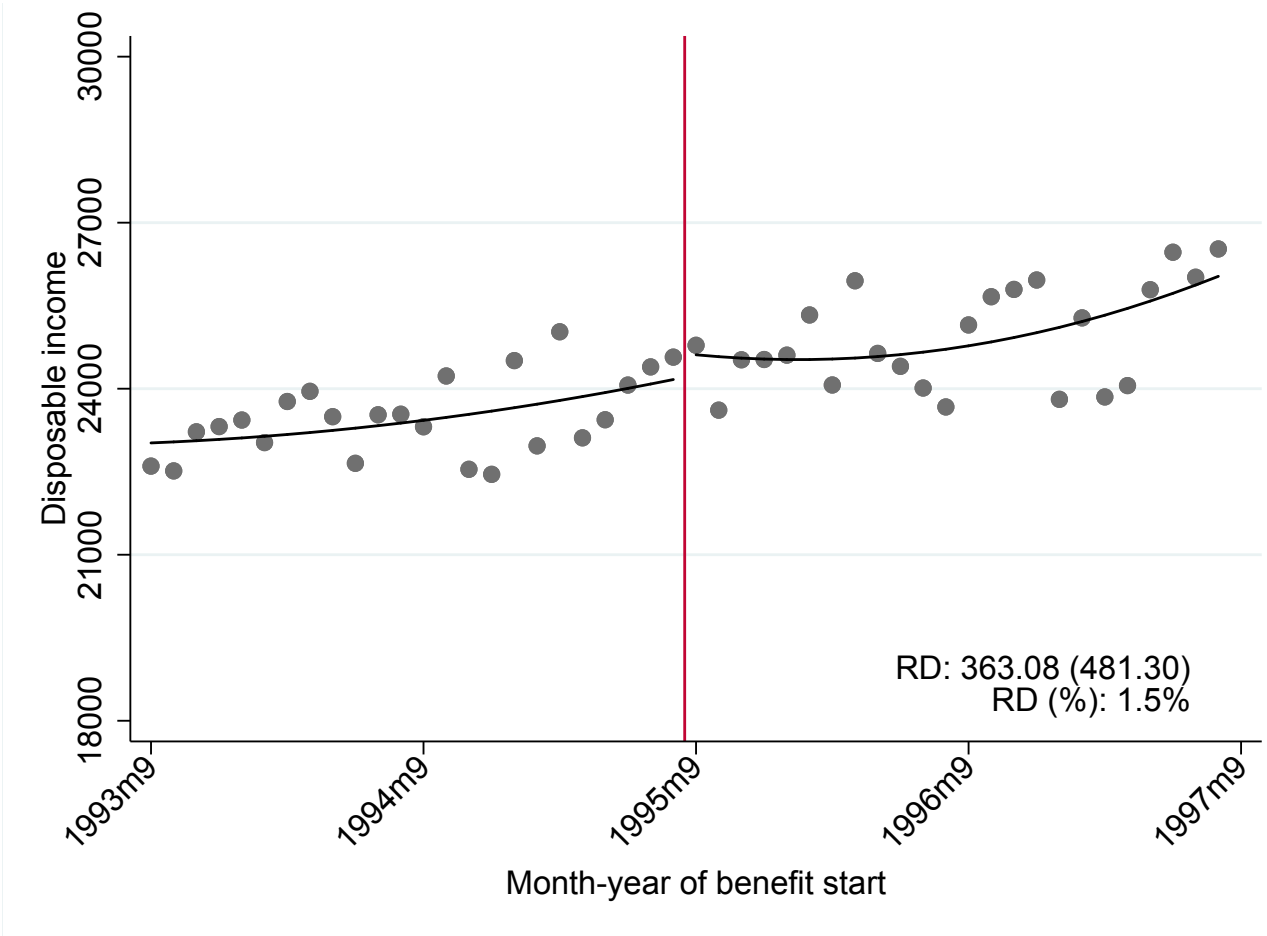


Note: Pooling event time years from $t = 0$ to $t = 15$

Average annual increase in taxable income



No effect on disposable income



Estimation of income effect

- Benefit $\downarrow \approx$€2000, taxable income $\uparrow \approx$€2000, disposable income $=$
- Marginal propensity to earn out of unearned income: MPE $\equiv \dfrac{\partial z}{\partial B}$
- IV-RD estimate of MPE ≈ -1

	Taxable income (z)	Disposable income ($z + B$)
	(1)	(2)
Benefit (B)	-1.008***	-0.008
	(0.303)	(0.303)
Obs.	216896	216896

- Rescaling by $\dfrac{\bar{B}}{\bar{z}}$, obtain income elasticity of approx. -0.6

Parametric specification | Bandwidth choice | Heterogeneity | Lower bound

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Mechanisms

Labor supply response

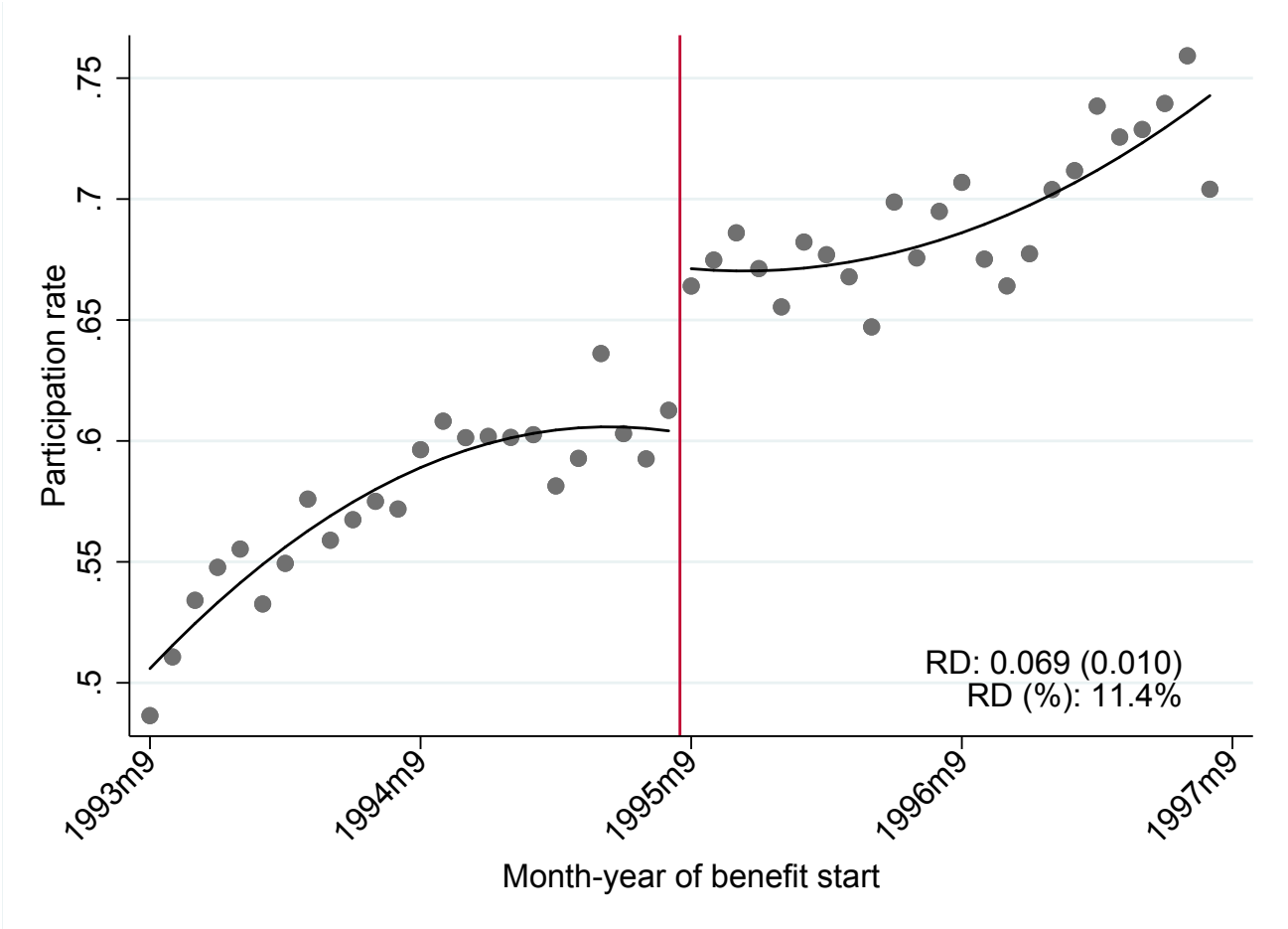
- Large extensive-margin response (↑ entry and ↓ retirement) LFP
- Dynamics of LFP reveals short-run optimization frictions LFP dynamics
- No intensive margin response Days
- No effect on wage rate, not even in long run Wage

Program substitution

- Increased take-up of paid family leave and UI Social ins.
- Extension of dependency period to delay benefit loss Dependency

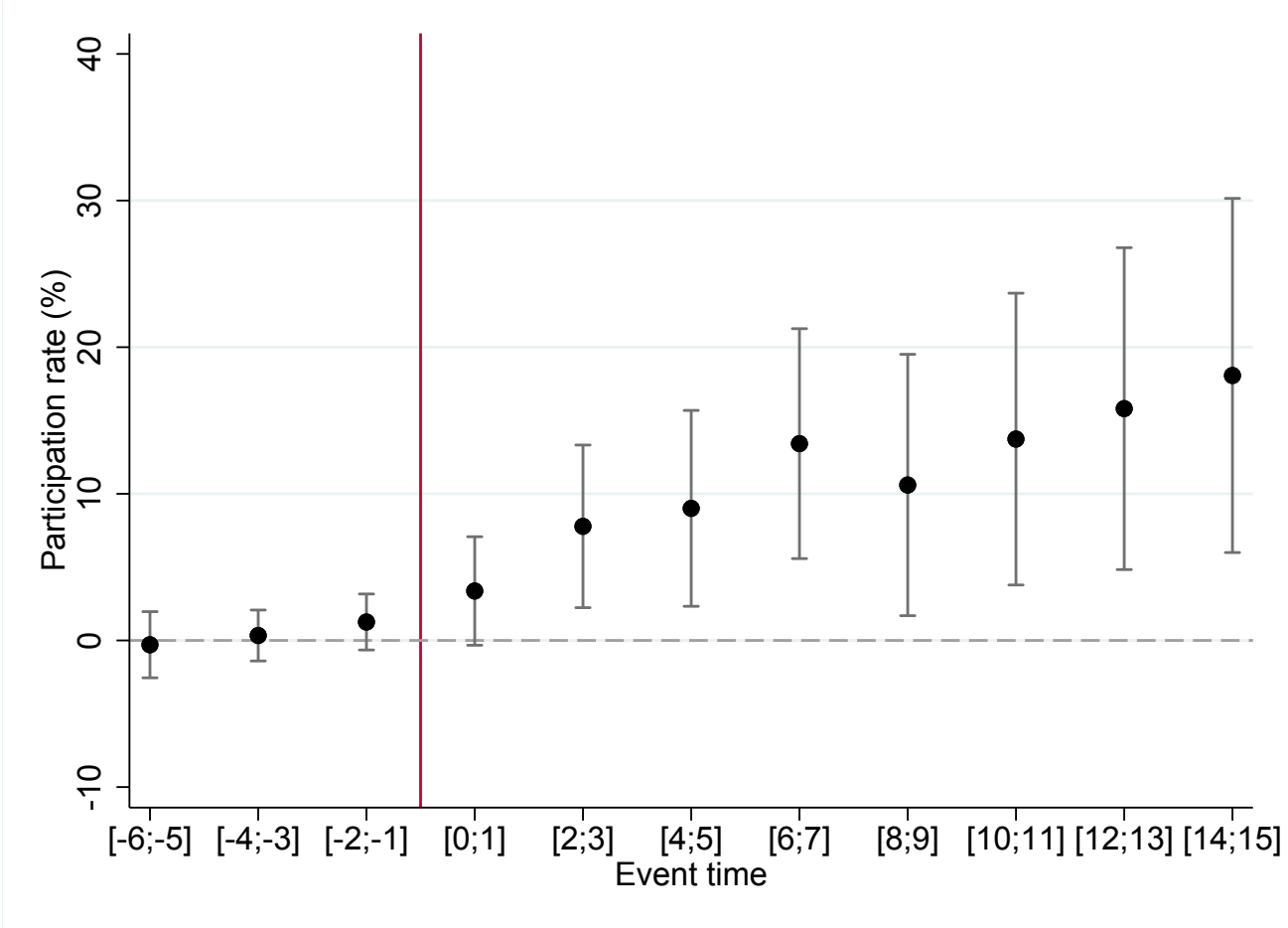
Extensions Conclusion

Sharp increase in participation rate



IV-RD ($\times$1000): -0.044 (0.007) Placebo Back

Dynamics of participation response

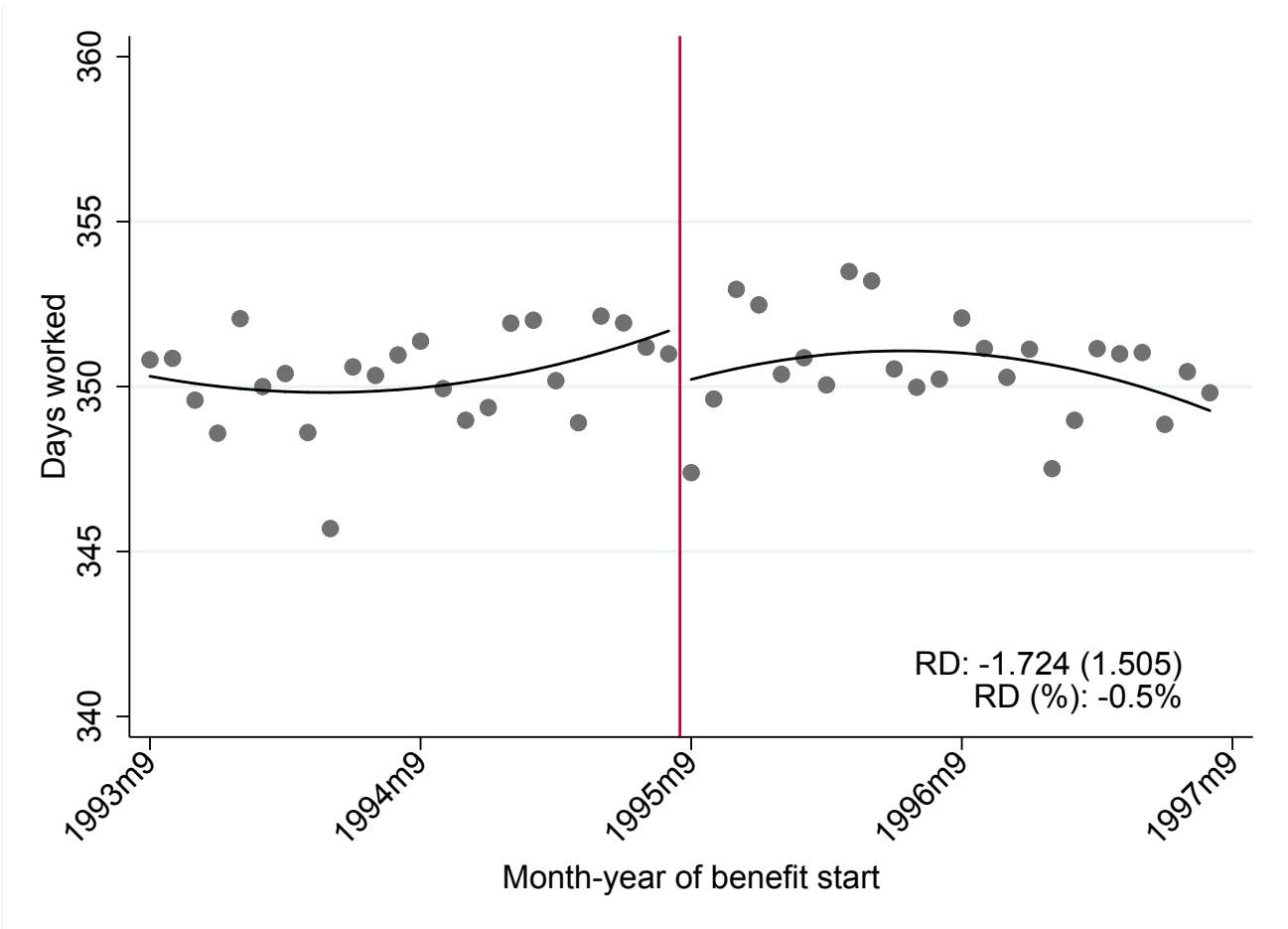


In levels | By gender | By age in $t = 0$ | By dep. children in $t = 0$ | Back

Dynamics of participation response: entry and exit

Decomposition of LFP response | Retirement rate | Age profile of entry/exit | Back

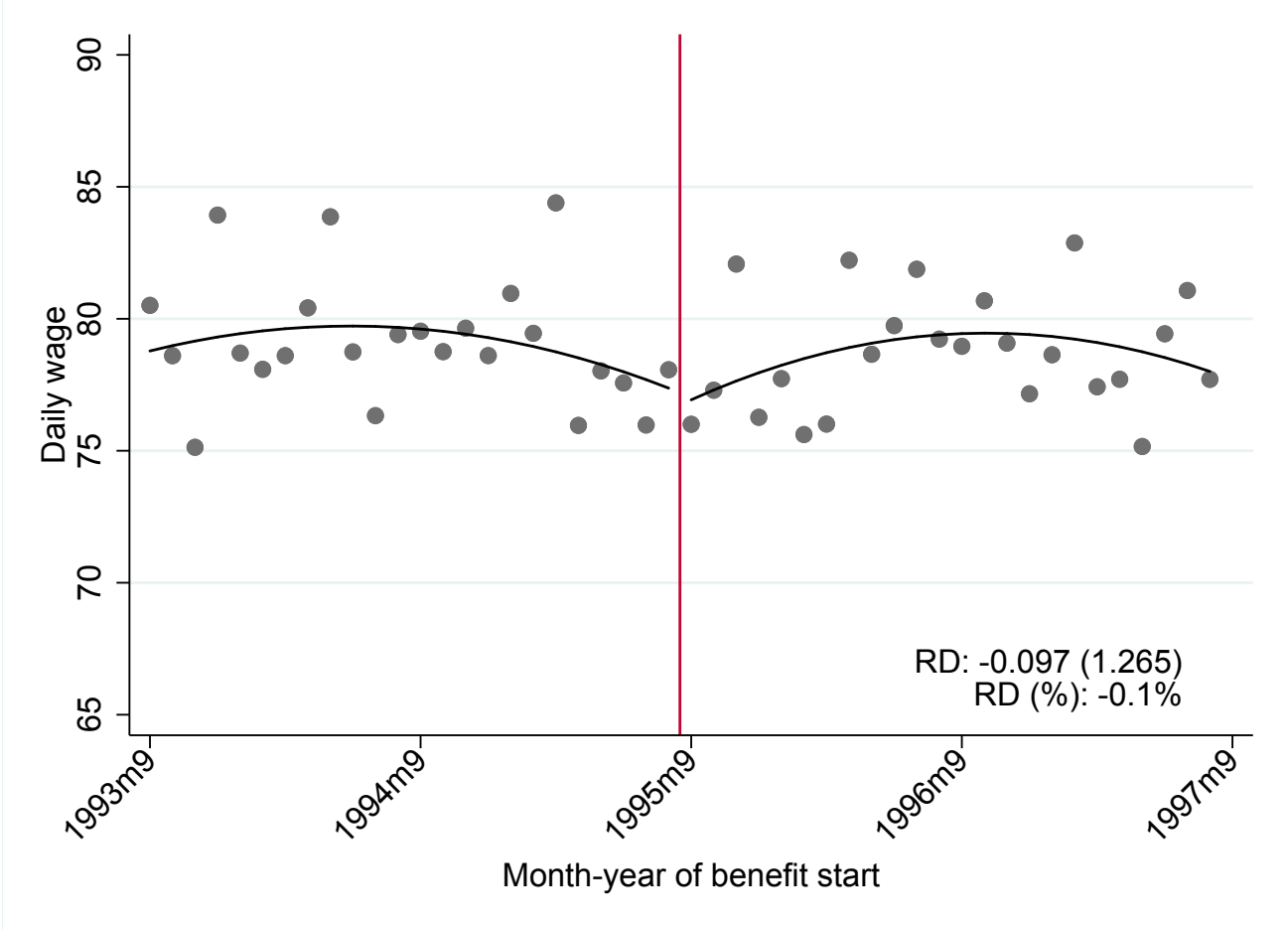
No intensive margin response



Note: Conditional on employment. Individuals employed in $t = -1$.

Back

No effect on the wage rate



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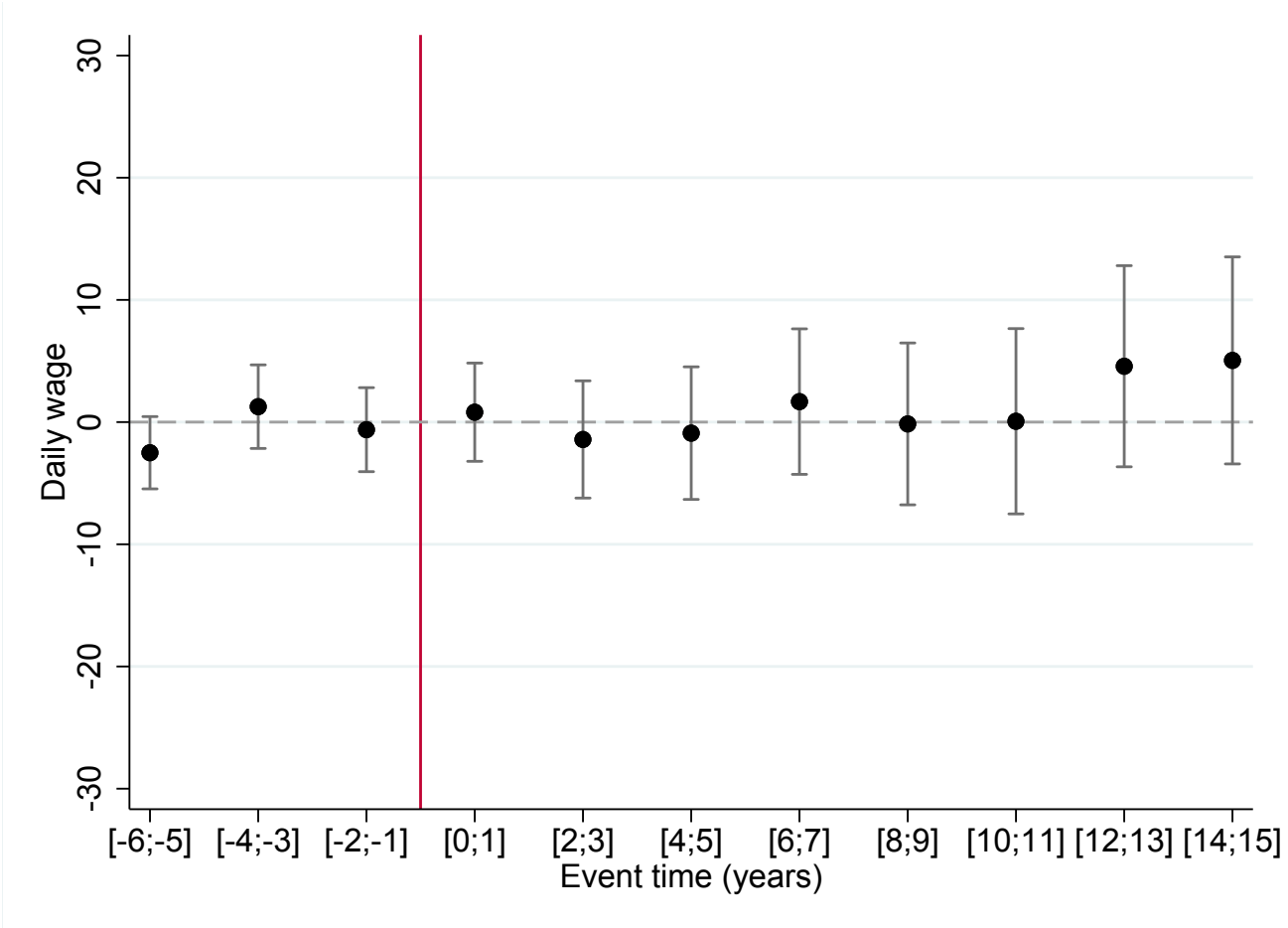
Heterogeneity Other margins of LS adjustment Back

No *long-term* effect on wage rate



→ Limited returns to experience, human capital accumulation and effort

Dynamics of intensive margin Back

Program substitution: work-related benefits

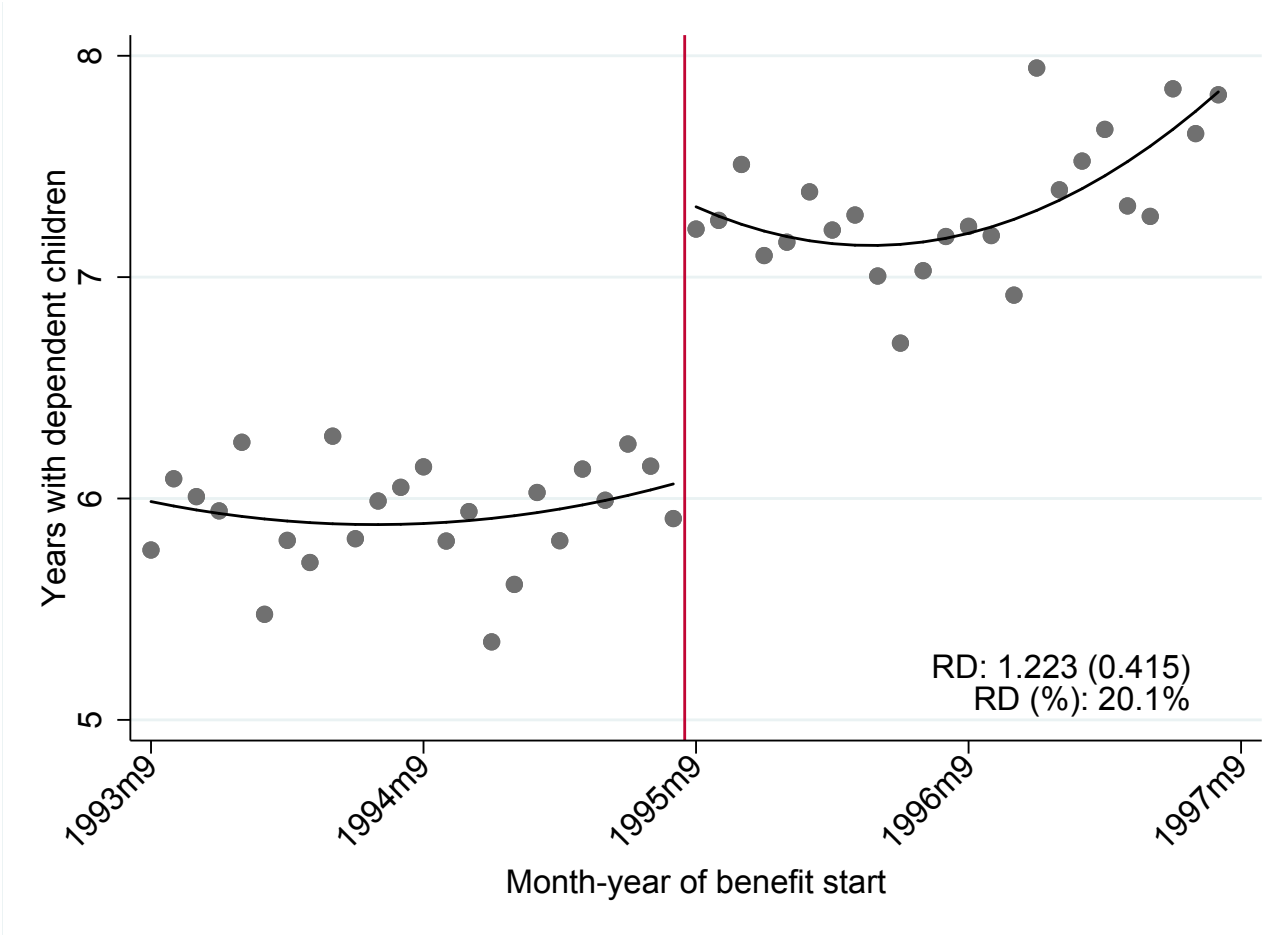
	Paid family leave (1)	Paid sick leave (2)	Unemployment benefits (3)
Benefit ($\times$ 1000)	-0.003**	-0.001	-0.013***
	(0.001)	(0.003)	(0.002)
Obs.	115137	115137	115137
Control mean	0.008	0.042	0.016

Note: Conditional on being employed in t or $t-1$. Individuals employed in $t=-1$ Back

Surviving spouses with dependent children

- Benefit replacement rate for spouse with dependent children is higher
  - 80% with 1 child, 100% with 2+ children Replacement rates
- Not affected by 1995 reform
- Incentive for treatment group to extend dependency period Benefit loss
- Dependency status
  - Up to age 18 by default
  - Up to age 26 conditional on high-school/university enrolment

Program substitution: years with dependent children



IV-RD ($\times$ 1000): -0.653 (0.272) Placebo Timing of LFP response Back

Extensions

- Normative implications Detail
- Comparison with existing estimates Detail
- Compatibility with macro-elasticity Detail
- Relationship with theoretical models of labor supply Detail
- External validity and policy relevance Detail

Conclusion

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A large income effect: why?

- Benefit losses trigger large labor supply responses
- Potential explanations
  - ▷ **High value** of transfer?
    Large income effects reveal highly curved utility, i.e. high risk aversion
  - ▷ **Low cost** of adjusting labor supply?
    For given risk aversion, lower adjustment costs imply larger responses
- Understanding which one prevails is important for **welfare** analysis

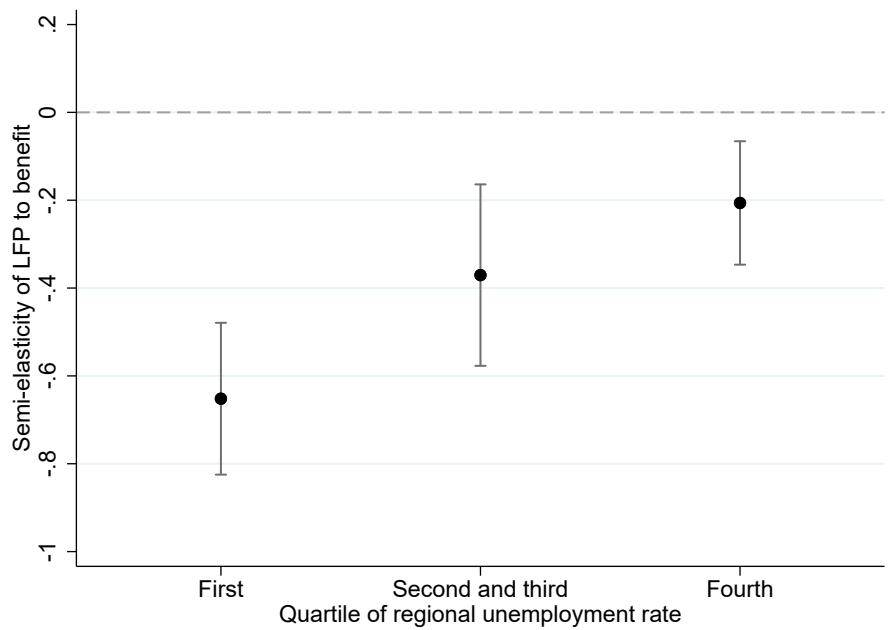
Model of LFP

Outline

1. Institutional Context, Identification Strategy and Data
2. Income Effect of Benefit on Taxable and Disposable Income
3. Mechanisms: Labor Supply and Program Substitution
4. Normative Implications of Large Income Effects
   - Evidence on Adjustment Costs: Heterogeneity Analysis
   - Value of Transfers: Revealed-Preference Approach
5. Probing the Large Income Response

Heterogeneity wrt regional unemployment rate

- Cost of adjusting labor supply likely increasing in local unemployment rate (job-search / on-the-job effort cost)
- LFP response to given % $\downarrow$ in B is smaller in regions with higher u rate



Contr. undeclared work
Entrants vs. incumbents

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Labor supply responses and the value of transfers

- Agents undertake costly actions to increase c in response to $\downarrow B$
- *Ceteris paribus*, **larger responses** $\leftrightarrow$ **larger implicit valuation** of B
- Value of marginal \$ of transfer captured by

$$MB = \frac{u'(c(0))}{u'(c(B))} - 1$$

- **Revealed-preference** approach maps labor supply response onto MB (Chetty, 2006, 2008)

A revealed-preference approach

- Model of extensive margin labor supply response (LFP rate Φ)
- Participation response (rescaled) reveals value of benefit

$$MB = \frac{\overbrace{-\left(\frac{d\Phi}{d\log B}\right)}^{\text{Income effect}}}{\underbrace{\varepsilon}_{\text{Cost of work } (-)}}$$

$\varepsilon = d\Phi/d\log z$ is semi-elasticity of labor supply to labor earnings

Proof Applicability

Quantifying the value of transfers

- Calibrate using
  - Own estimates of semi-elasticity of LFP to benefit
  - Estimates of $\varepsilon \approx 0.6$ from Blundell et al. (2016)

$$MB = \frac{0.3}{0.6} = 0.5$$

Quantifying the value of transfers

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$$MB = \frac{0.3}{0.6} = 0.5$$

- $u'(c)$ is 50% higher in low- vs high-benefit regime
- Large labor supply responses $\rightarrow$ **widowhood** is state with **high $\mathbf{u'(c)}$**

Quantifying the value of transfers

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  - Own estimates of semi-elasticity of LFP to benefit
  - Estimates of $\varepsilon \approx 0.6$ from Blundell et al. (2016)

$$MB = \frac{0.3}{0.6} = 0.5$$

- $u'(c)$ is 50% higher in low- vs high-benefit regime
- Large labor supply responses $\rightarrow$ **widowhood** is state with **high u′(c)**
- Large **welfare gains** from increased survivor insurance generosity

Back Conclusion

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   - Relationship with Theories of Labor Supply
   - External Validity and Policy Relevance

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Comparison with existing estimates

MPE ≈ -1 larger than most existing estimates, with some exceptions

Source	Context	MPE
Robins (1985), Hum and Simpson (1993)	NIT	≥ -0.2
Imbens et al. (2001), Cesarini et al. (2017)	Lottery wins	$= -0.1$
Gelber et al. (2016, 2017)	SS Notch	≤ -0.6 (M), -0.9 (F)
Deshpande (2016)	SSI	≈ -1.4

Potential explanations

- Differences in populations analyzed (risk preferences)
- Asymmetric response to gains/losses (loss aversion, sticky consumption)
- Degree of *ex-ante* insurance and size of income shock
- Fungibility (Thaler, 1990)

Back

Compatibility with macro-elasticity

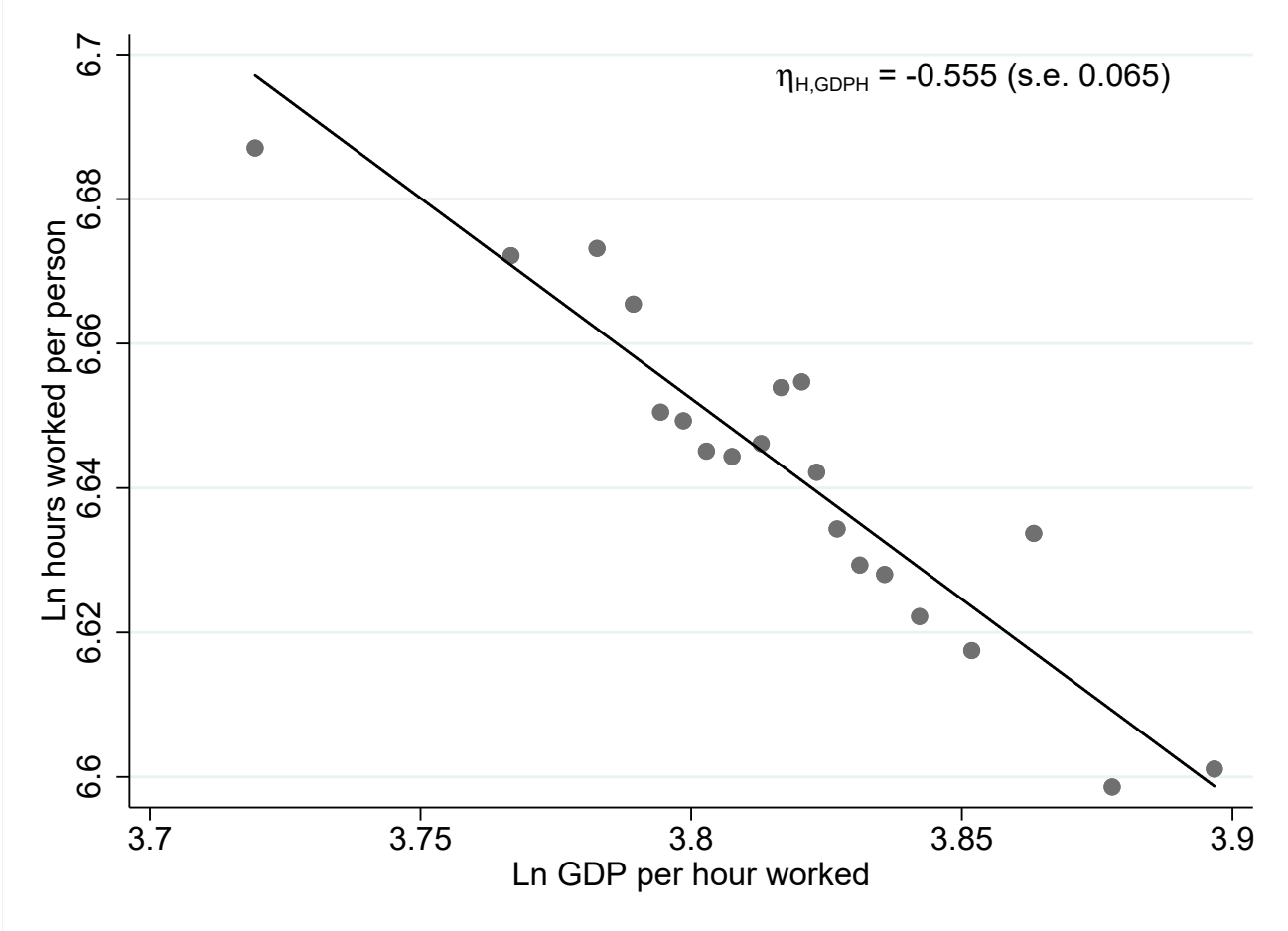
- Longstanding debate on discrepancy between micro and macro elasticities
- **Macro** estimates of steady-state elasticities **larger** than **micro** estimates

$$\varepsilon^M \gg \varepsilon^m$$

- Two factors can account for gap:
  - **Frictions** (Chetty, 2012)
  - **Indivisible labor** (Rogerson, 1988; Ljungvist and Sargent, 2006; Rogerson and Wallenius, 2009)
- Assess compatibility of estimated of long-run micro elasticity ($\hat{\eta} = -0.6$) with macro elasticity

Back

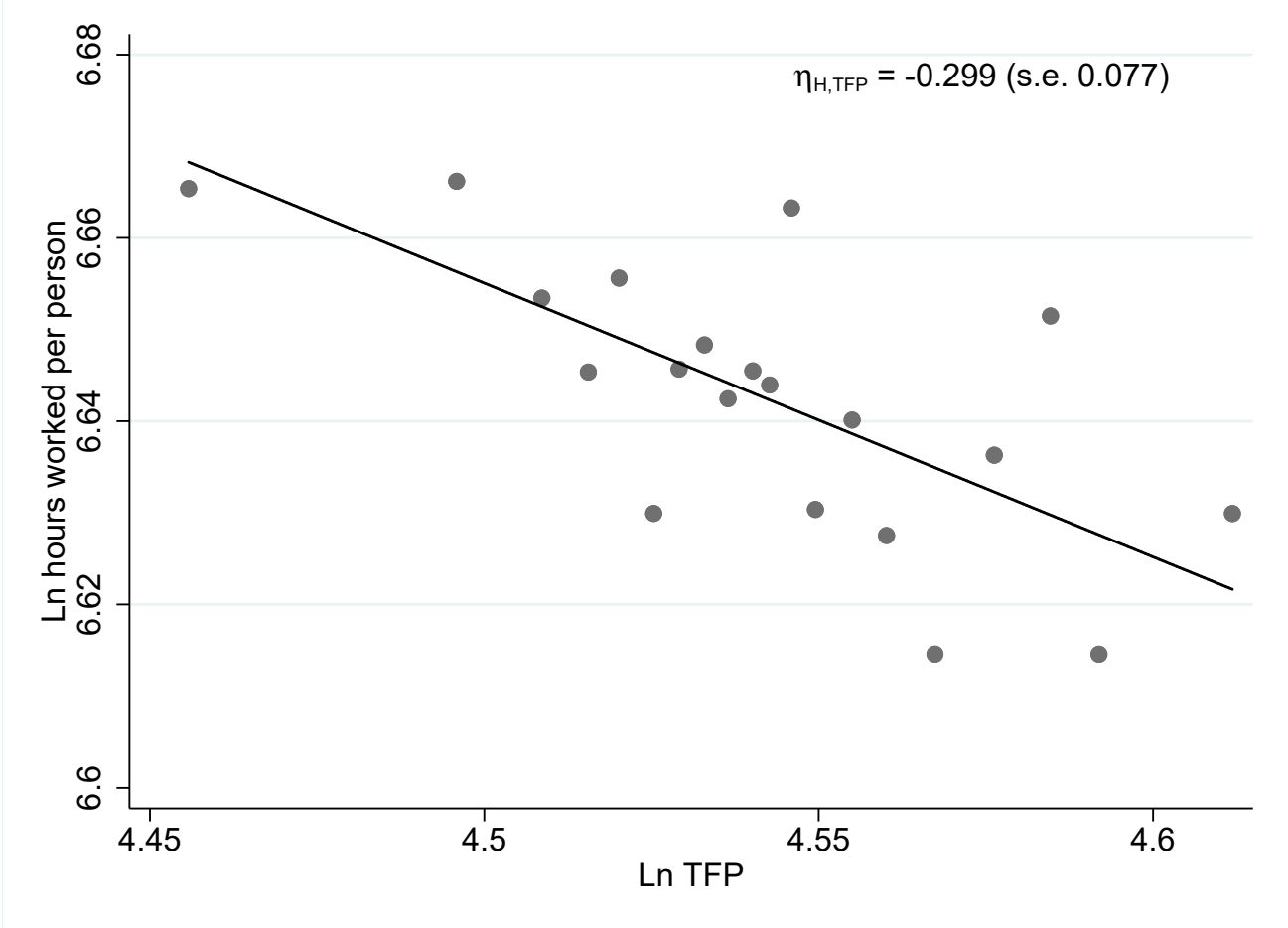
Macro-elasticity of hours per person to GDP per hour



- Data on OECD countries from 1985 to 2015
- Binned scatterplot conditional on country and year fixed effects

Back

Macro-elasticity of hours per person to TFP



- Data on OECD countries from 1985 to 2015
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Relationship with theoretical models of labor supply

- Effect of benefit loss on z and c can be rationalized in model with preferences **quasi-linear in work effort**
  - $U(c, z) = u(c) - \frac{z}{\theta}$
  - $\frac{\partial c*}{\partial B} = 0$ and $\frac{\partial z*}{\partial B} = -1$

- **Career-length model** by Ljungqvist and Sargent (2007): dynamic model with predictions consistent with my findings in reduced form
  - Life-cycle model with time-separable preferences and indivisible labor
  - Agent decides what fraction of life to devote to work
  - Model delivers large extensive margin elasticity

Back

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External validity and policy relevance

1. **Sample selection**
   - Retirement behavior and participation responses to pension reforms
   - Single parents most at risk of income insecurity and main target of welfare transfers (e.g. EITC)
   - Elasticity of labor supply may differ between marriage and widowhood (e.g. leisure complementarities, loneliness, sharing of family duties)

2. **Income shock**
   - Losing spouse at young age is low-probability, unpredictable event
   - Households likely limitedly insured against associated income shock
   - Larger responses than for predictable shocks (e.g. job loss)

Back

Conclusion

- New evidence on long-run response to permanent benefit drop
  - Combine rich **admin data** and compelling **policy variation**
  - Find **large labor supply response** to benefit loss (MPE ≈ -1)
  - Fully driven by extensive margin
- Examine normative implications
  - Large income effect $\rightarrow$ **large value** of B $\rightarrow$ welfare gains from $\uparrow B$
- Beyond labor supply effects?
  - Intergenerational outcomes
  - General eq. effects on human capital, marriage, fertility choices
  - Perception of welfare state

Appendix

Benefit replacement rate

	Benefit start date	
	Before Sept 1, 1995	After Sept 1, 1995
Spouse (with and without children)		
Spouse only		
Survivor's taxable income $\leq 3 \times$ minimum pension	60%	60%
Survivor's taxable income $\leq 4 \times$ minimum pension	60%	45%
Survivor's taxable income $\leq 5 \times$ minimum pension	60%	36%
Survivor's taxable income $> 5 \times$ minimum pension	60%	30%
Spouse with one child	80%	80%
Spouse with two or more children	100%	100%
Children (absent the spouse)		
One child	60%	70%
Two children	80%	80%
Three or more children	100%	100%
Parents or siblings (absent the spouse, children or grandchildren)		
Each relative	15%	15%

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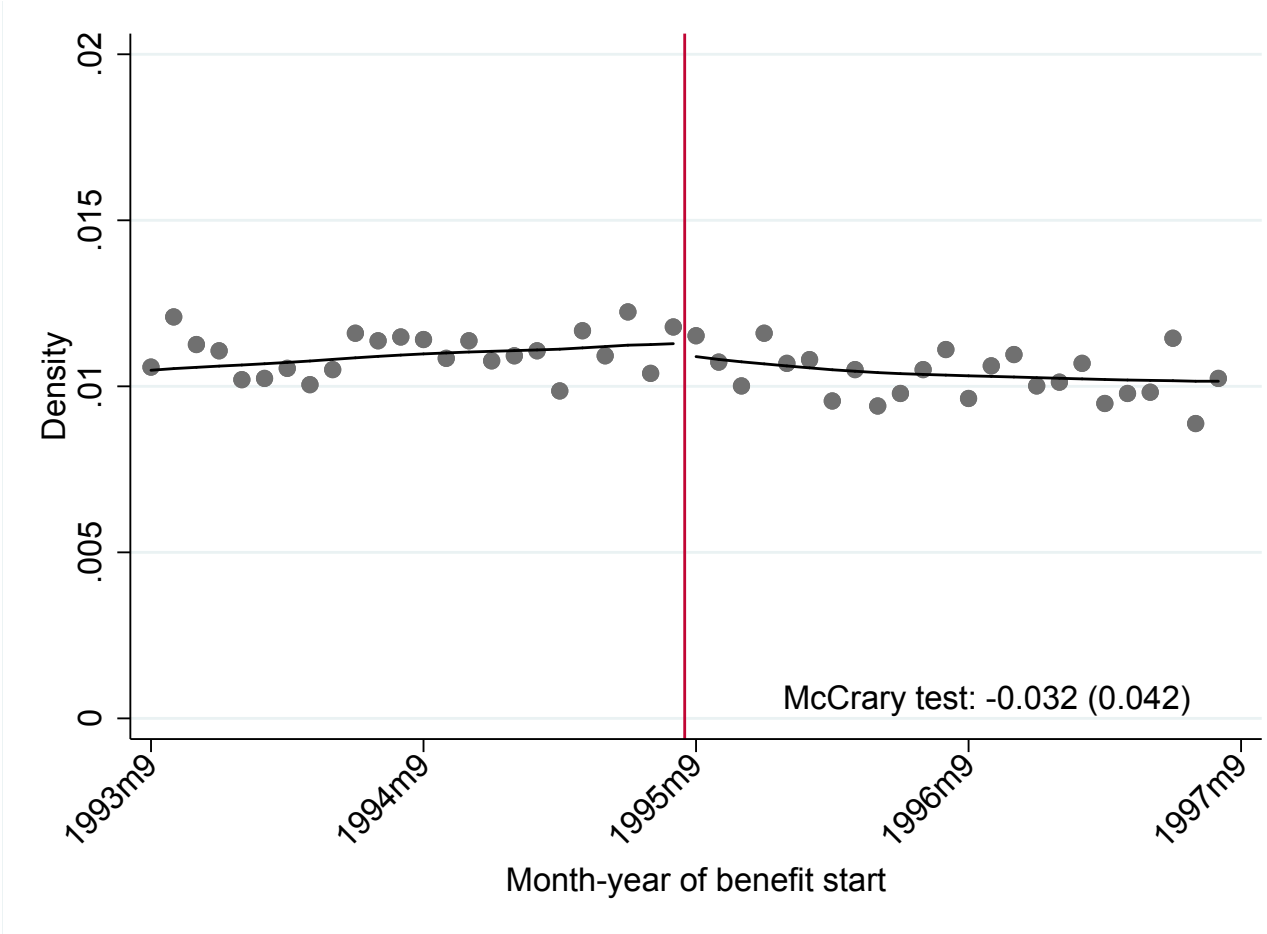
Density test



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Balancing test

	Regression discontinuity					Control
	(1)	(2)	(3)	(4)	(5)	mean
Female	0.003	0.005	0.006	-0.001	0.003	0.899
	(0.004)	(0.005)	(0.006)	(0.007)	(0.007)	
Age in $t = 0$	0.070	-0.097	-0.160	-0.216	-0.075	46.860
	(0.094)	(0.124)	(0.143)	(0.179)	(0.120)	
Experience in $t = -1$	-0.001	-0.006	-0.418*	-0.188	-0.289	14.445
	(0.143)	(0.189)	(0.216)	(0.269)	(0.123)	
Earnings in $t = -1$	-269.993*	-170.699	-140.946	-105.928	-111.621	6373.42
	(139.426)	(185.312)	(211.708)	(265.219)	(224.762)	
Prop. employed in $t = -1$	0.002	-0.005	-0.002	-0.005	0.004	0.397
	(0.006)	(0.008)	(0.010)	(0.012)	(0.011)	
Days worked in $t = -1$	-0.999	-1.181	-3.594*	-0.214	0.165	341.026
	(1.358)	(1.797)	(2.007)	(2.539)	(3.165)	
Daily wage in $t = -1$	-1.282	1.675	1.189	-0.953	-3.376	47.544
	(1.020)	(1.721)	(1.353)	(2.469)	(2.204)	
Prop. on defined benefit	-0.005	-0.013	-0.006	-0.011	-0.003	0.312
	(0.007)	(0.009)	(0.010)	(0.012)	(0.009)	
Obs.	94578	94578	94578	94578	94578	-
Month-of-benefit-start FE		×		×		-
Calendar year FE		×		×		-
Linear trend	×	×	×	×		-
Quadratic trend			×	×		-
LLR					×	-

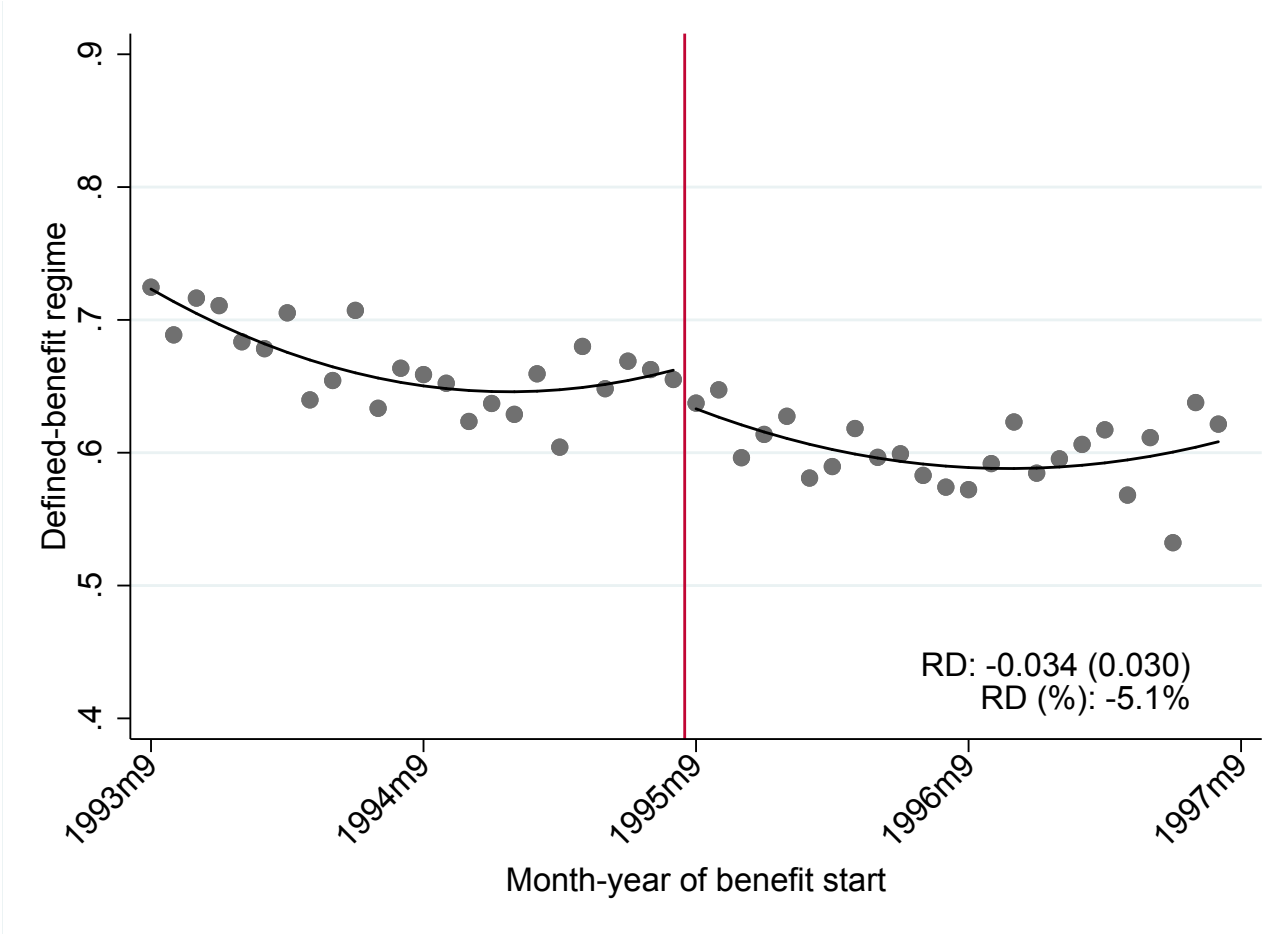
Back

Dini pension reform (Law 335/1995)

- Pension system transitioned from defined benefit to notionally defined contribution
  - $\geq$18 years of contribution on 31.12.1995 $\rightarrow$ DB
  - $<$18 years of contribution on 31.12.1995 $\rightarrow$ pro-rata DB/NDC
  - Starting to contribute on or after 1.1.1996 $\rightarrow$ NDC
- Financing remains pay-as-you-go

Back

Proportion under defined-benefit system



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First stage in $t = 0$

	Regression discontinuity				Control mean
	(1)	(2)	(3)	(4)	(5)
Benefit in $t = 0$	-1510.21***	-1684.83***	-2137.66***	-1963.66***	8494.83
	(260.413)	(296.800)	(376.689)	(407.618)	
Lifetime benefit, 000	-67.032***	-85.273***	-99.641***	-104.547***	337.387
	(13.811)	(16.691)	(20.155)	(22.831)	
Obs.	13556	13556	13556	13556	-
Benefit-start-month FE		x		x	-
Calendar year FE		x		x	-
Linear trend	x	x	x	x	-
Quadratic trend			x	x	-

Back

Annual minimum pension (EUR)

Year	Amount	× 3	× 4	× 5
1995	4,205.95	12,617.84	16,823.79	21,029.74
1996	4,433.21	13,299.64	17,732.86	22,166.07
1997	4,606.10	13,818.29	18,424.39	23,030.49
1998	4,684.32	14,052.95	18,737.26	23,421.58
1999	4,768.58	14,305.73	19,074.30	23,842.88
2000	4,844.78	14,534.34	19,379.12	24,223.89
2001	4,970.67	14,912.00	19,882.66	24,853.33
2002	5,104.97	15,314.91	20,419.88	25,524.85
2003	5,227.56	15,682.68	20,910.24	26,137.80
2004	5,358.34	16,075.02	21,433.36	26,791.70
2005	5,465.59	16,396.77	21,862.36	27,327.95
2006	5,558.54	16,675.62	22,234.16	27,792.70
2007	5,669.82	17,009.46	22,679.28	28,349.10
2008	5,760.56	17,281.68	23,042.24	28,802.80
2009	5,950.88	17,852.64	23,803.52	29,754.40
2010	5,992.61	17,977.83	23,970.44	29,963.05

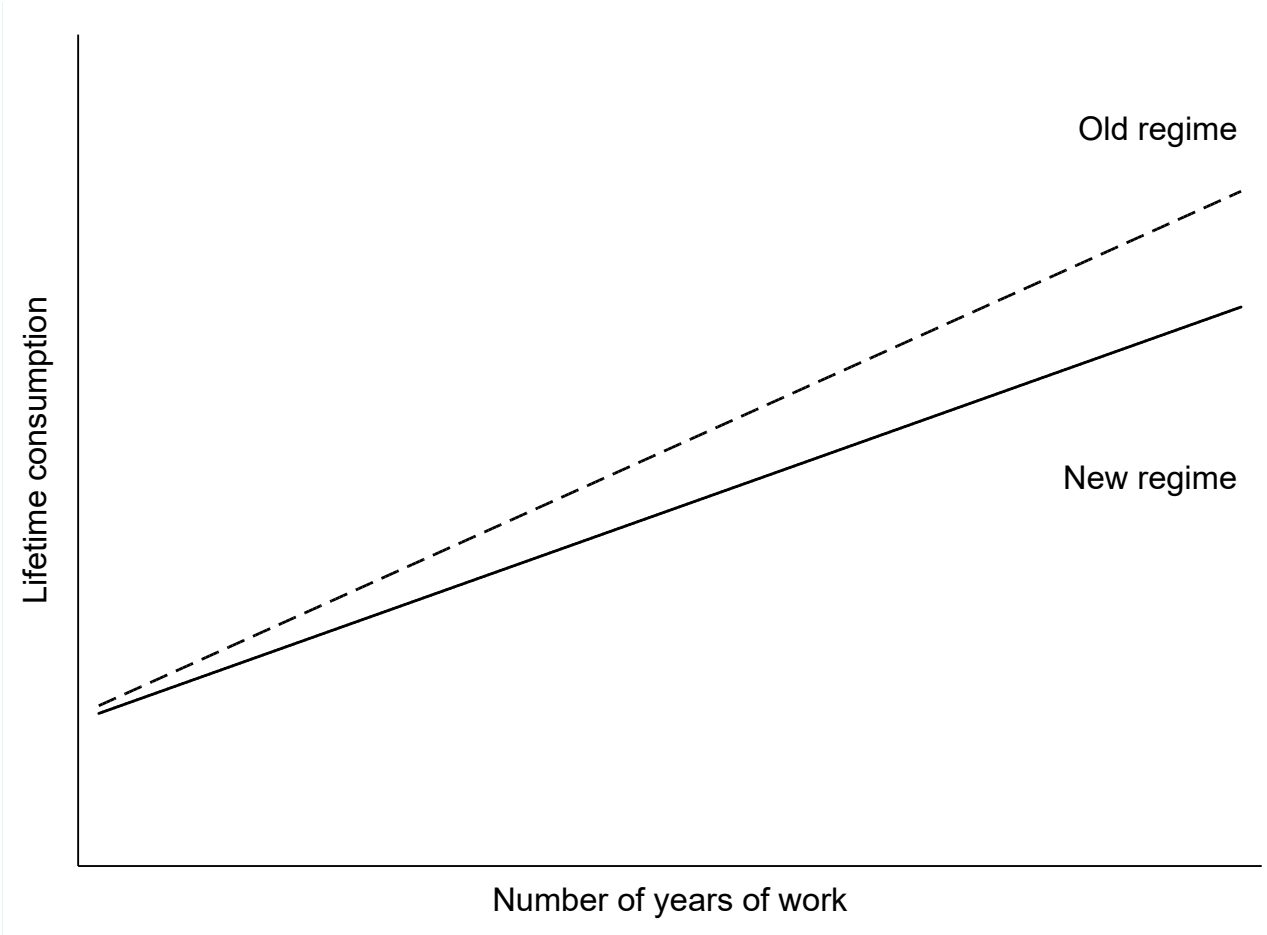
Back

Interaction with personal income tax (PIT)

- z is individual taxable income, including income from labor, retirement, pensions, capital and rents, and excluding survivor benefit B
- Both z and B are subject to personal income taxation
- Disposable income is $c = z + B - T(z + B)$
- Both new and old regimes subject to same PIT schedule
  - Income taxes may add to the wedge between old- and new-regime survivors $\rightarrow$ positive effect on LS (upper bound)
  - PIT brackets do not coincide with survivor benefit brackets

Back

Dynamic effects of 1995 reform



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Parametric RD specification

$$Y_{it} = \alpha_0 + \beta_0 \cdot \mathbb{I}[\tau_i \geq 0] + \sum_{k=1}^{K} \alpha_k \cdot \tau_i^k + \sum_{k=1}^{K} \beta_k \cdot \tau_i^k \cdot \mathbb{I}[\tau_i \geq 0] + \varepsilon_{i\tau}$$

- Y_{it} is outcome Y for individual i at event time t
- τ_i is benefit start date normalized so that $\tau = 0$ at 1.9.1995 cutoff
- Based on balancing tests, include polynomials in τ of order $K = 2$
- Coefficient of interest capturing effect at cutoff is β_0
- Estimates based on month-of-benefit-start bins and symmetric bandwidth of 24 months (MSE optimal for benefit amount)

Back

Predicting counterfactual income bracket

- Select 10 percent of individuals in the control group
- Predict income bracket at event time $t = 10$ using rich set of observables
  - Predictors include demographics and working history in $t < 0$
  - Use Lasso estimator to select subset of most relevant predictors
- Apply estimated coefficients to treatment group

Back

First stage in $t = 0$

	Regression discontinuity				Control mean
	(1)	(2)	(3)	(4)	(5)
Predicted second or higher income bracket					
Benefit in $t = 0$	-1510.21***	-1684.83***	-2137.66***	-1963.66***	8494.83
	(260.413)	(296.800)	(376.689)	(407.618)	
Lifetime benefit (000)	-67.032***	-85.273***	-99.641***	-104.547***	337.387
	(13.811)	(16.691)	(20.155)	(22.831)	
Obs.	13556	13556	13556	13556	-
Full sample					
Benefit in $t = 0$	-465.171***	-558.993***	-593.922***	-602.776***	8371.92
	(73.548)	(85.830)	(109.989)	(120.938)	
Lifetime benefit (000)	-18.917***	-24.567***	-23.623***	-25.120***	298.57
	(3.243)	(3.916)	(4.879)	(5.511)	
Observations	94578	94578	94578	94578	-

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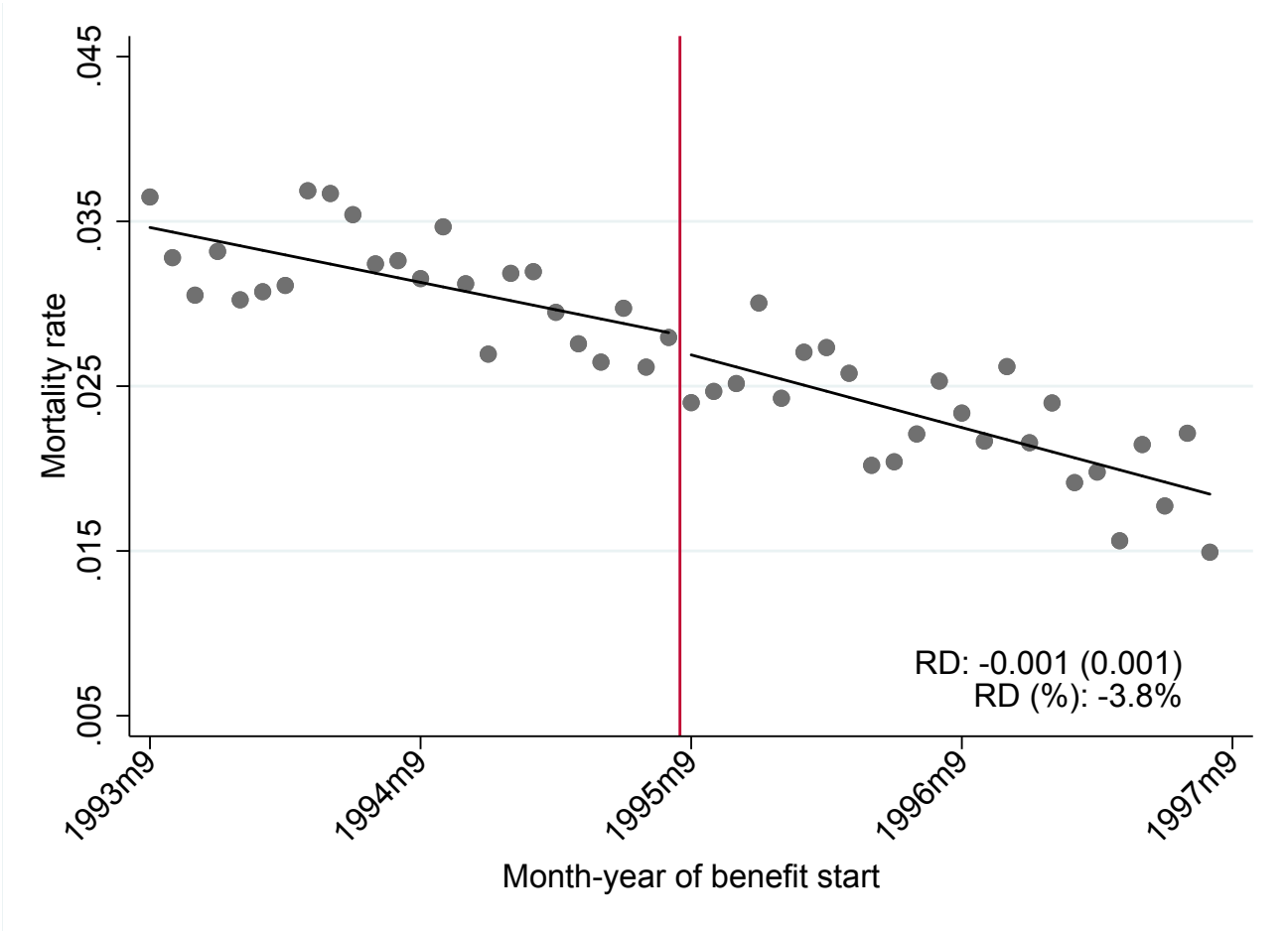
Summary statistics

	Full sample		Treatment group		Control group	
	Mean	St. Dev.	Mean	St. Dev	Mean	St. Dev.
Female	0.64	0.48	0.66	0.48	0.62	0.48
Age in $t = 0$	43.50	7.49	43.56	7.31	43.45	7.65
Prop. aged < 40 in $t = 0$	0.29	0.45	0.28	0.45	0.30	0.46
Prop. aged 40-50 in $t = 0$	0.51	0.50	0.53	0.50	0.49	0.50
Prop. aged 51-59 in $t = 0$	0.20	0.40	0.19	0.39	0.21	0.41
Prop. with dependent children in $t = 0$	0.58	0.49	0.58	0.49	0.59	0.49
Age of dependent children in $t = 0$	12.23	5.61	12.29	5.61	12.18	5.62
Prop. ever employed in $t \leq -1$	1.00	0.05	1.00	0.04	1.00	0.06
Years of experience in $t = -1$	20.81	8.85	20.83	8.75	20.78	8.94
Prop. employed in $t = -1$	0.96	0.19	0.96	0.18	0.96	0.19
Prop. empl. in private sector in $t = -1$	0.61	0.49	0.60	0.49	0.62	0.48
Prop. empl. in public sector in $t = -1$	0.14	0.35	0.15	0.36	0.14	0.34
Prop. self-employed in $t = -1$	0.17	0.38	0.17	0.38	0.17	0.38
Labor income in $t = -1$	24216.42	12681.93	24096.99	12625.93	24328.48	12734.13
Daily wage in $t = -1$	72.36	40.08	71.86	38.14	72.82	41.82
Days worked in $t = -1$	347.55	53.53	346.83	55.00	348.22	52.10
Benefit in $t = 0$	762.18	712.46	745.52	686.12	778.00	736.29
Income of deceased in $t = 0$	21361.10	21933.74	21886.54	20968.13	20589.71	23261.99
Pension of deceased in $t = 0$	14104.45	13660.71	14528.82	12980.38	13701.51	14265.97
Observations	13556		6562		6994	

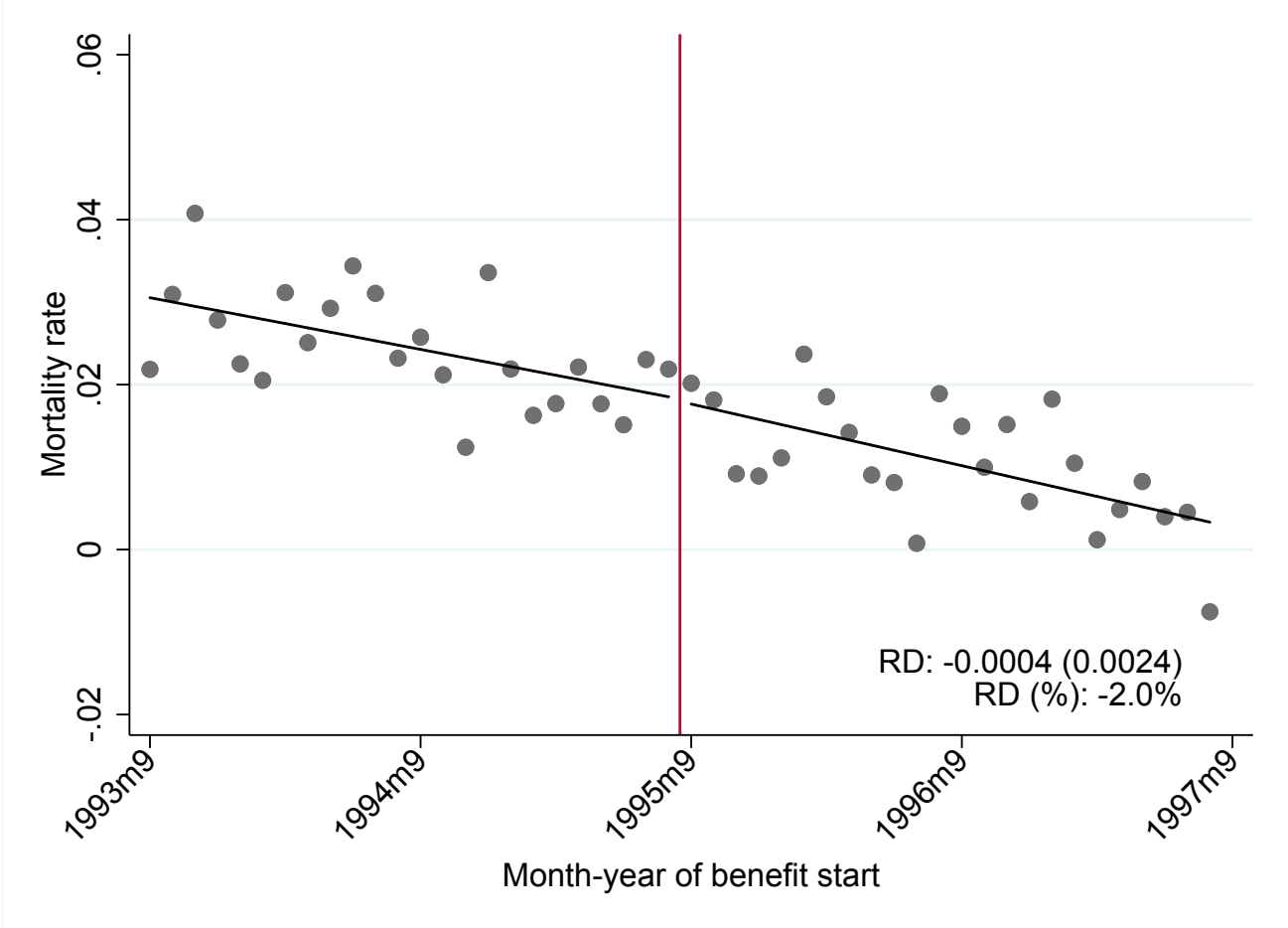
Note: (i) 24-month bandwidth, (ii) monetary quantities in 2010 prices Back

Mortality



Note: Probability of having died by $t = 15$. Full sample Back

Mortality



Note: Probability of having died by $t = 19$. Conditional on predicted income bracket > 1 Back

Remarriage

	Regression discontinuity				Control mean
	(1)	(2)	(3)	(4)	(5)
Remarriage rate ($t = 15$)	-0.002	0.005	0.026	0.045*	0.056
	(0.015)	(0.017)	(0.022)	(0.024)	
Observations	13556	13556	13556	13556	-
Time to remarriage	-0.344	-0.498	-0.627	-2.540*	10.116
	(0.862)	(1.050)	(1.298)	(1.498)	
Observations	1073	1073	1073	1073	-
Benefit-start-month FE		x		x	-
Calendar year FE		x		x	-
Linear trend	x	x	x	x	-
Quadratic trend			x	x	-

Back

Robustness to parametric specification

	Regression discontinuity				Control mean
	(1)	(2)	(3)	(4)	(5)
Benefit	-1155.25***	-1306.96***	-1771.21***	-1966.23***	9462.31
	(103.033)	(110.320)	(145.140)	(152.225)	
Taxable income	1674.92***	1473.23***	2508.59***	2329.31***	14470.64
	(380.664)	(407.731)	(455.254)	(471.733)	
Disposable income	519.674	166.277	737.385	363.081	23932.95
	(386.337)	(414.151)	(464.363)	(481.298)	
MPE		-1.205***		-1.008***	
		(0.337)		(0.303)	
Observations	216896	216896	216896	216896	-
Benefit-start-month FE		x		x	-
Calendar year FE		x		x	-
Linear trend	x	x	x	x	-
Quadratic trend			x	x	-

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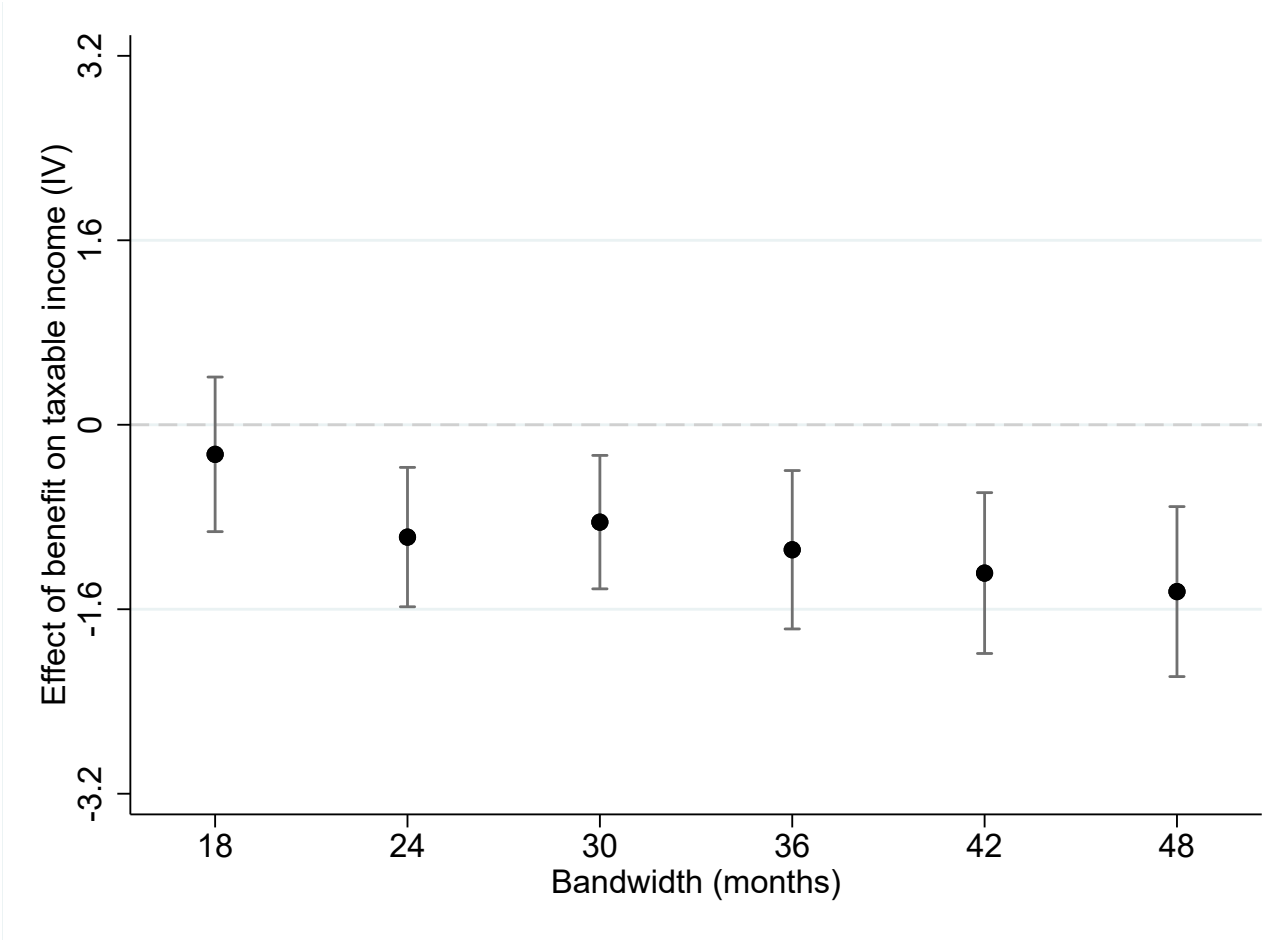
Robustness to bandwidth choice

IV-RD on taxable income



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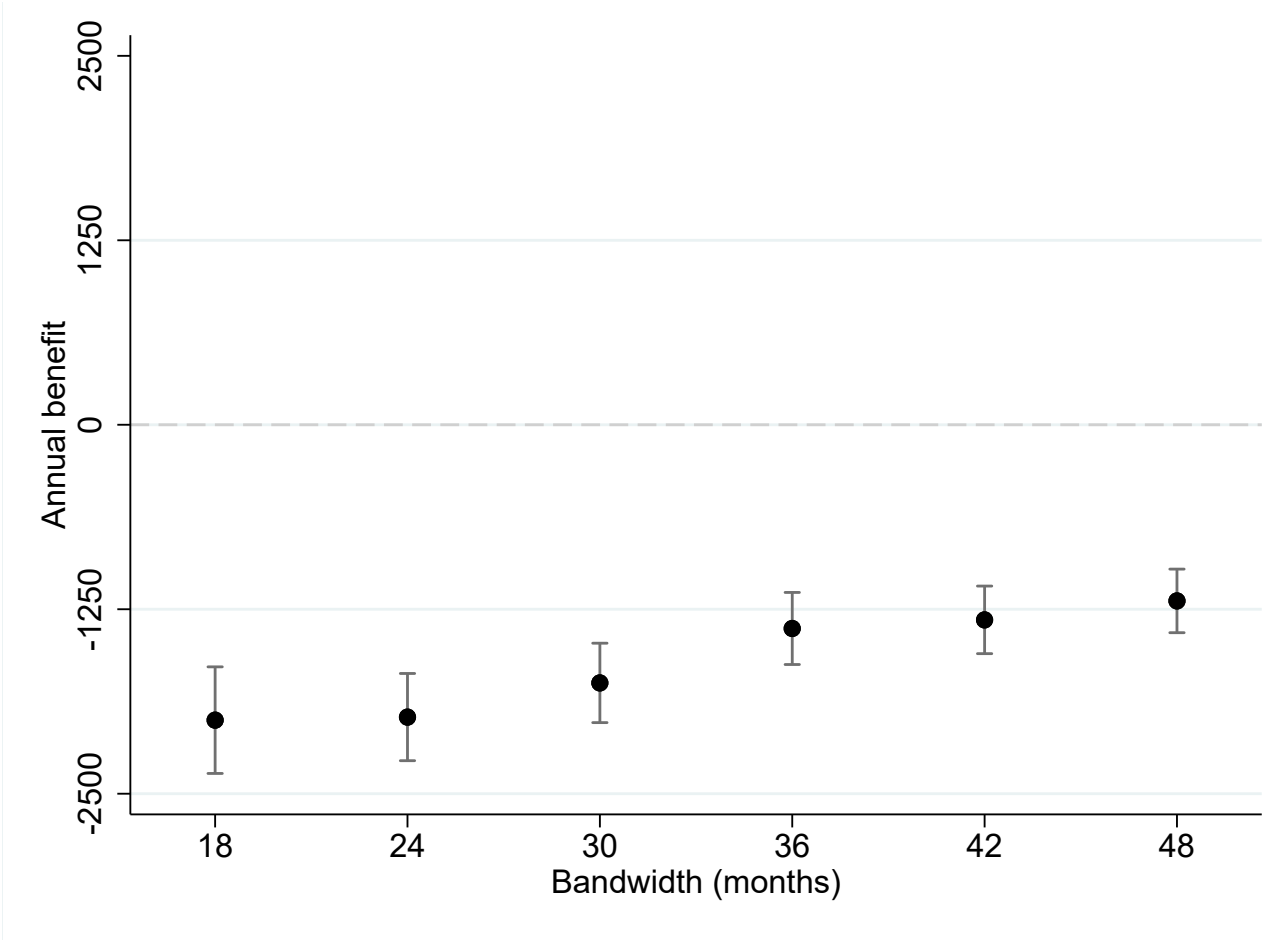
Robustness to bandwidth choice

Annual benefit



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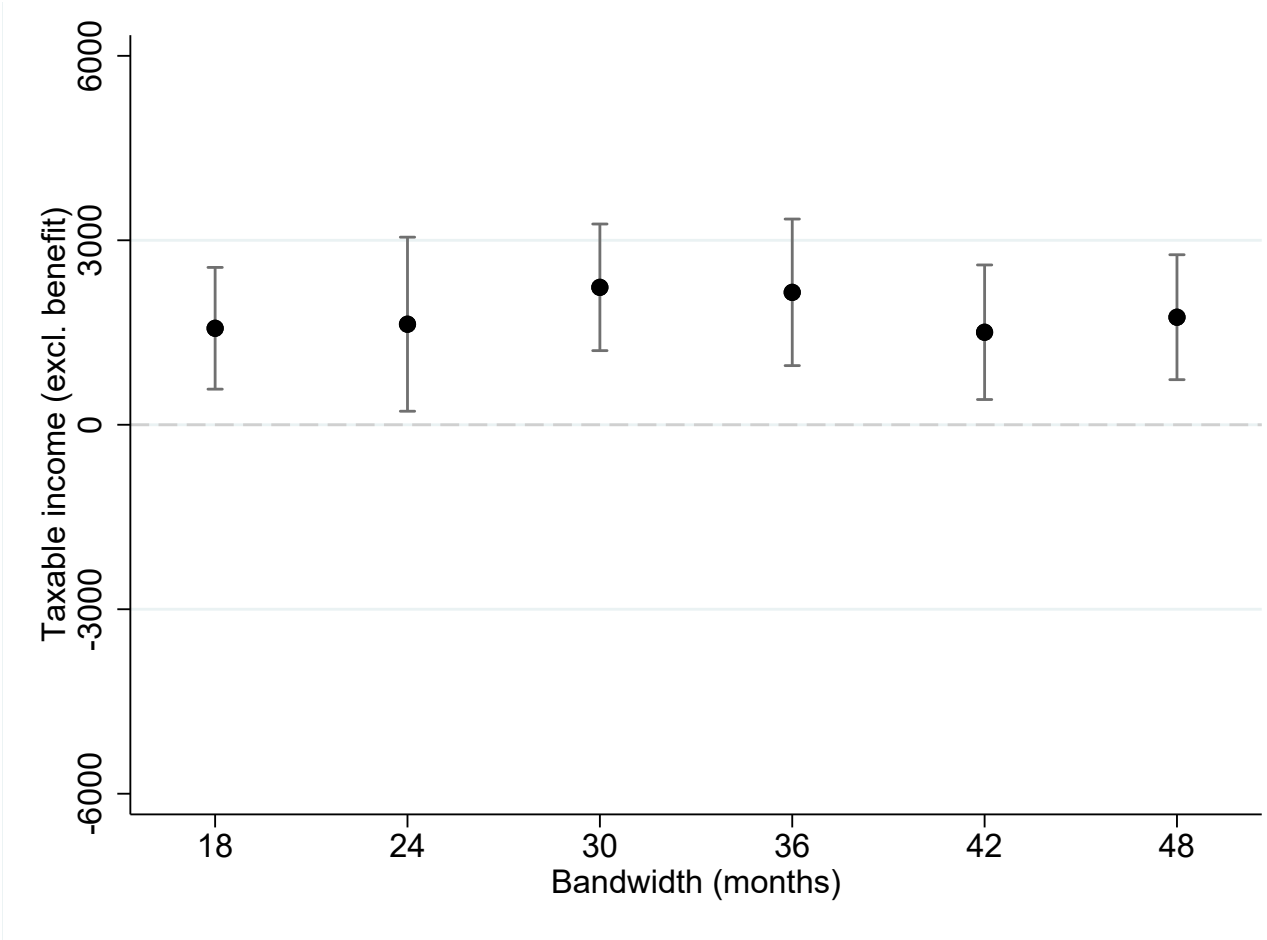
Robustness to bandwidth choice

Taxable income



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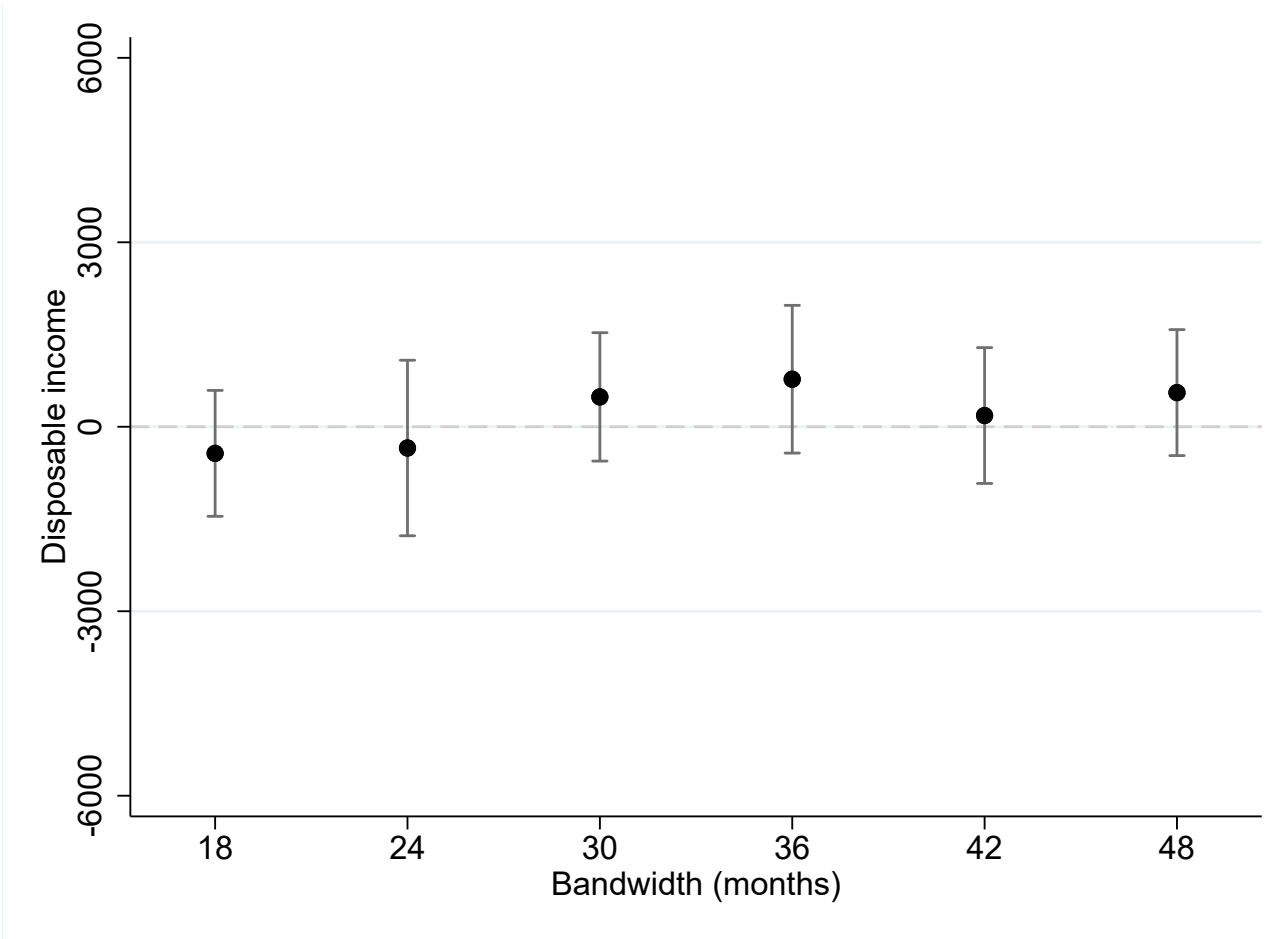
Robustness to bandwidth choice

Disposable income



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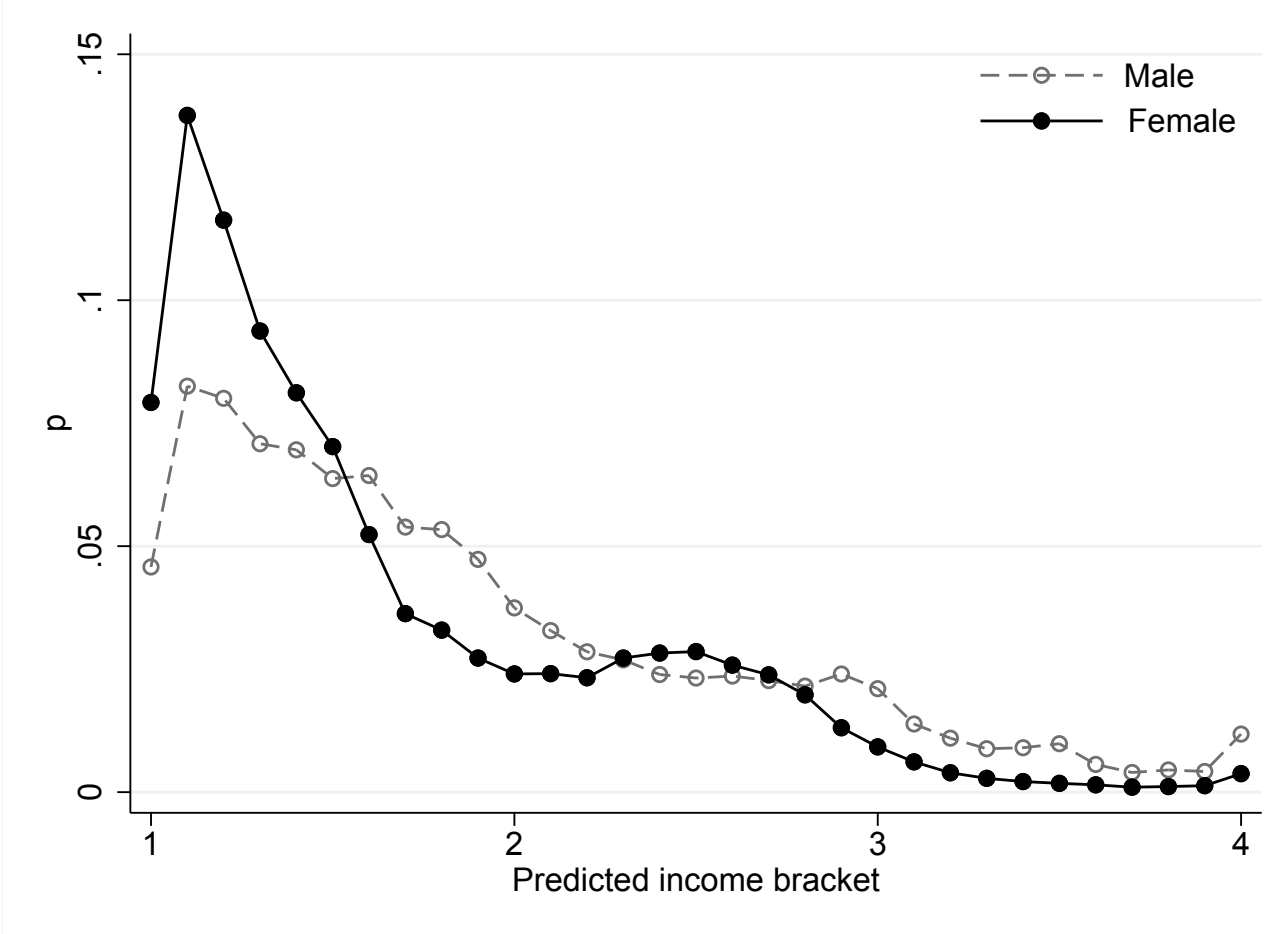
Heterogeneity by gender and age in $t = 0$

	Gender		Age in $t = 0$		
	Female	Male	20-40	41-50	51-55
	(1)	(2)	(3)	(4)	(5)
Benefit	-1984.11***	-734.45***	-2840.77***	-1194.09***	-2099.00***
	(208.525)	(89.437)	(174.841)	(245.582)	(294.558)
	[11318.84]	[7129.74]	[8842.95]	[9612.85]	[8944.35]
MPE	-1.325***	-0.106	-1.097***	-0.999	-0.451
	(0.376)	(0.772)	(0.459)	(0.644)	(0.299)
Month FE	x	x	x	x	x
Year FE	x	x	x	x	x
Linear tr.	x	x	x	x	x
Quadratic tr.	x	x	x	x	x

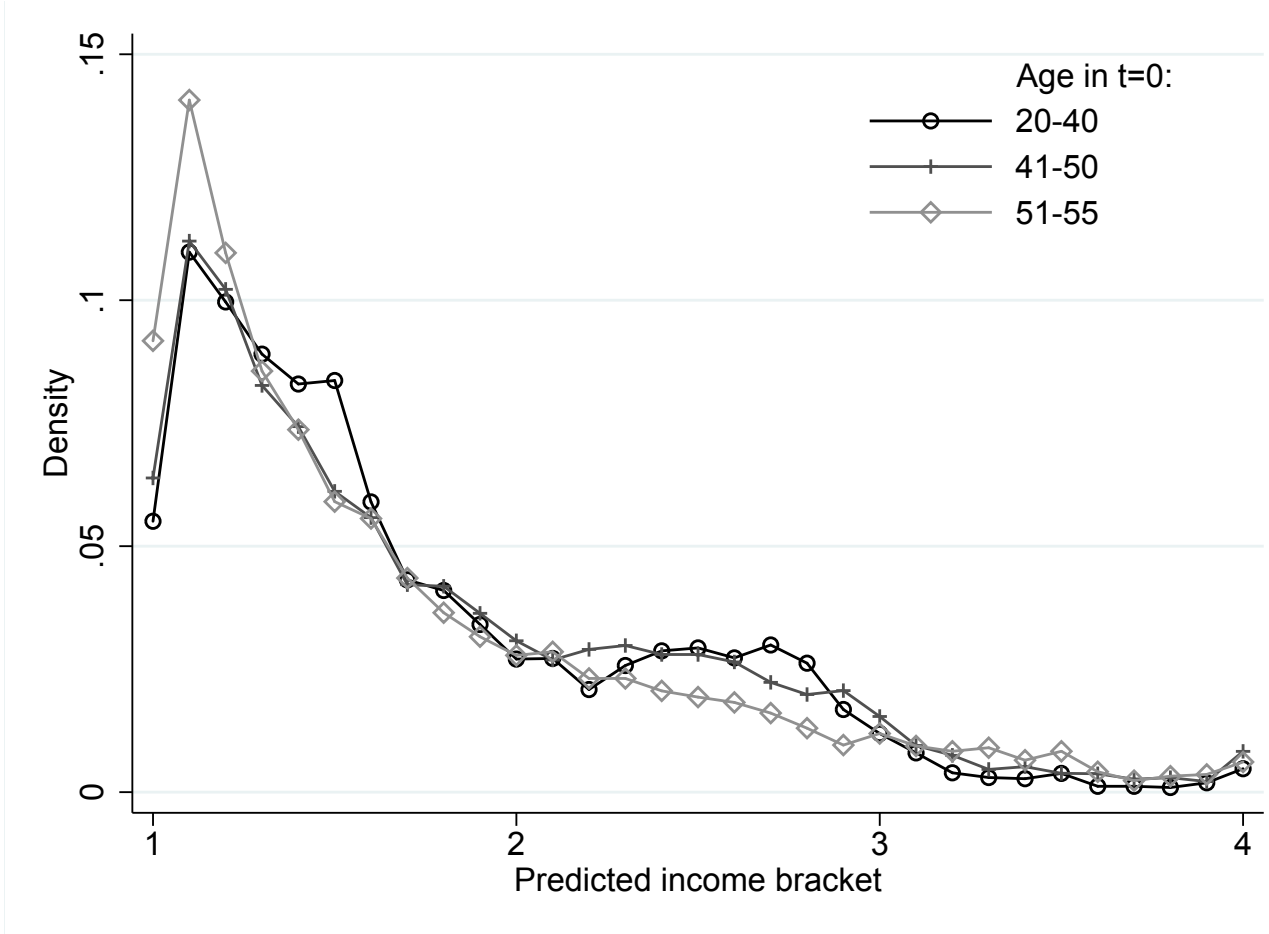
Back

Empirical density of predicted bracket by gender



Back

Empirical density of predicted bracket by age in $t = 0$



Back

Heterogeneity by presence of dependent children in $t = 0$

	With dependent children (1)	Without dependent children (2)
Benefit	-779.081***	-2039.88***
	(155.037)	(159.371)
	[10035.68]	[8128.27]
MPE	0.636	-1.757***
	(0.617)	(0.322)
Month FE	x	x
Year FE	x	x
Linear tr.	x	x
Quadratic tr.	x	x

Back

From reduced-form evidence to income effects

If **substitution incentives** matter, then

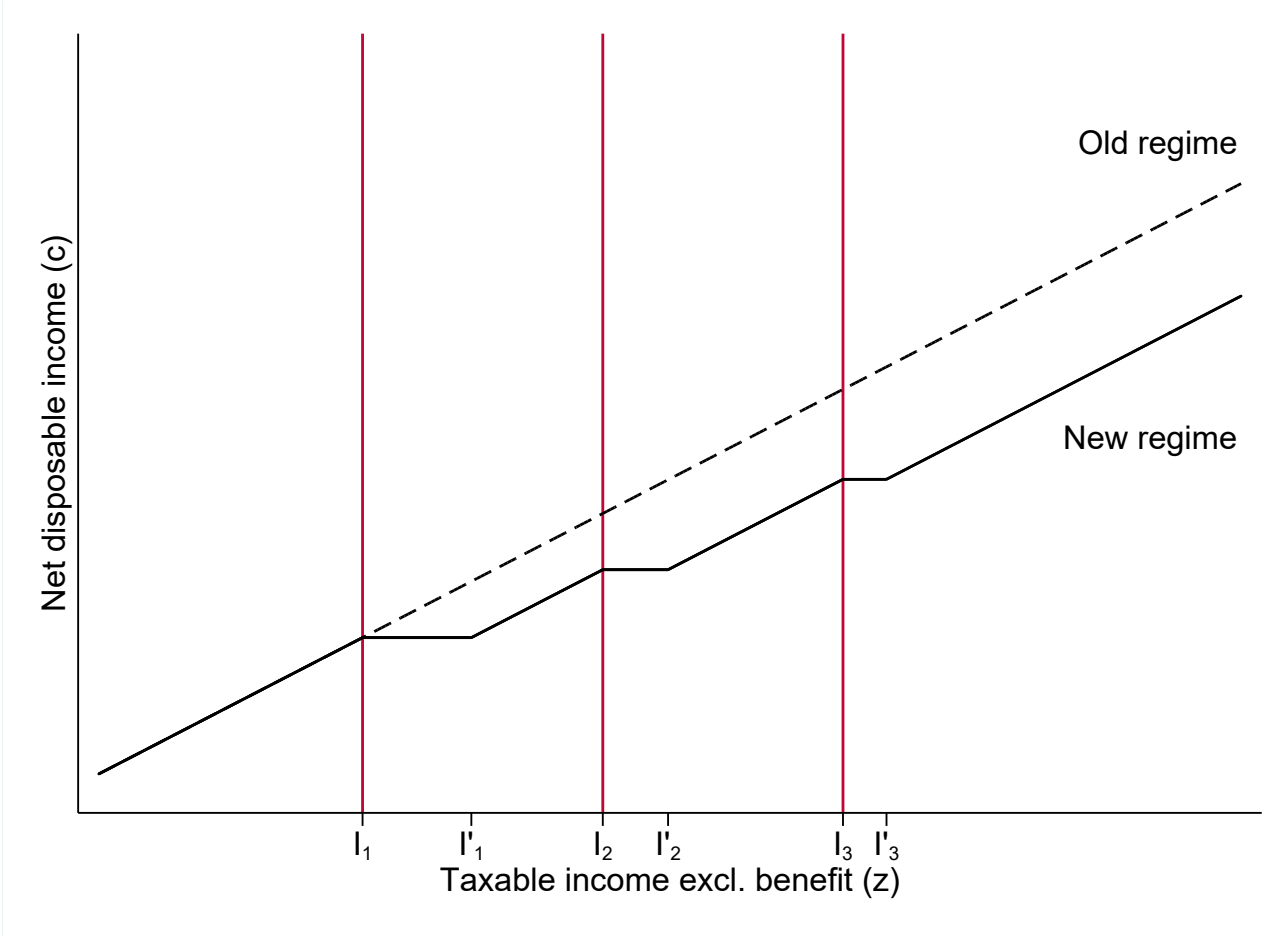
- Compensated elasticity $\varepsilon^c > 0$
- Previous estimate is **lower bound** of true income effect

How important are substitution incentives?

1. Estimate based on sample with predicted income in affected range
   - Robust to excluding observations around kinks Excluding obs. kinks
2. Exploit variation in marginal tax rate at convex kinks to quantify ε^c
   - No bunching at convex kinks consistent with $\varepsilon^c = 0$

Bunching Back

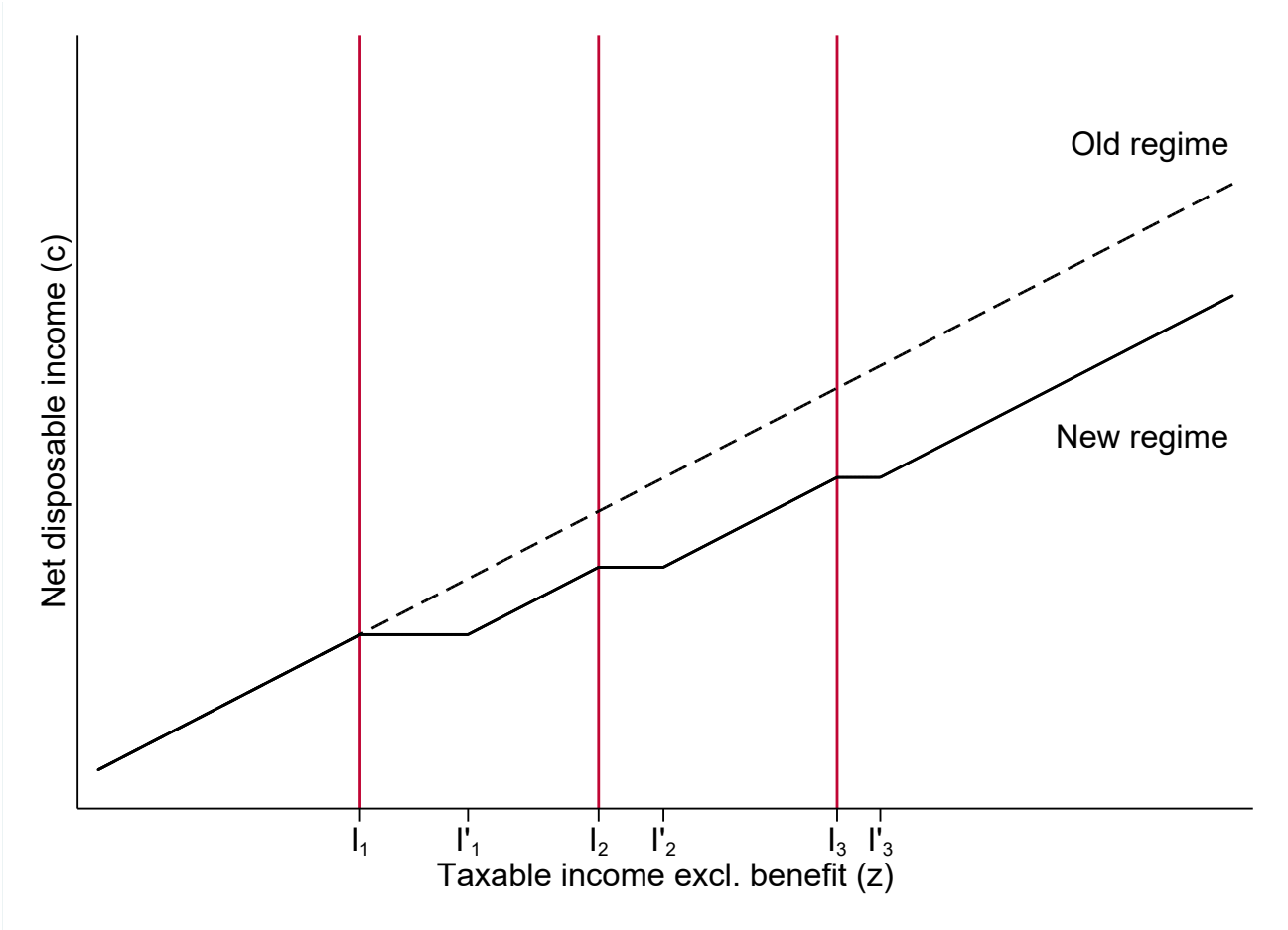
Reform creates three convex kinks in budget set



- Reform creates discontinuity in marginal tax rate at $z = I_j$

Theory

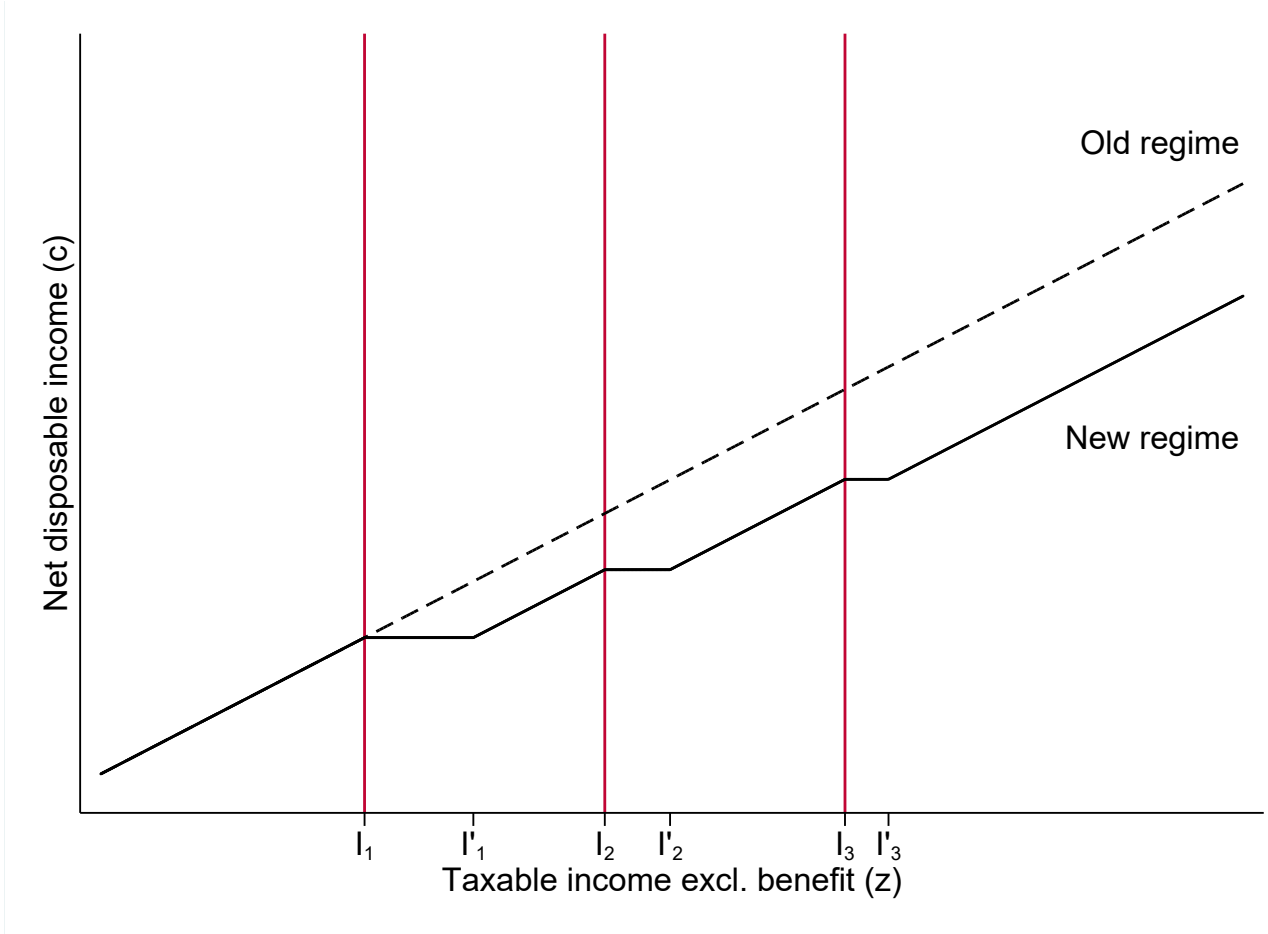
Reform creates three convex kinks in budget set



- Treated individuals with $z \in [l_j, l'_j]$ have incentive to bunch at l_j

Theory

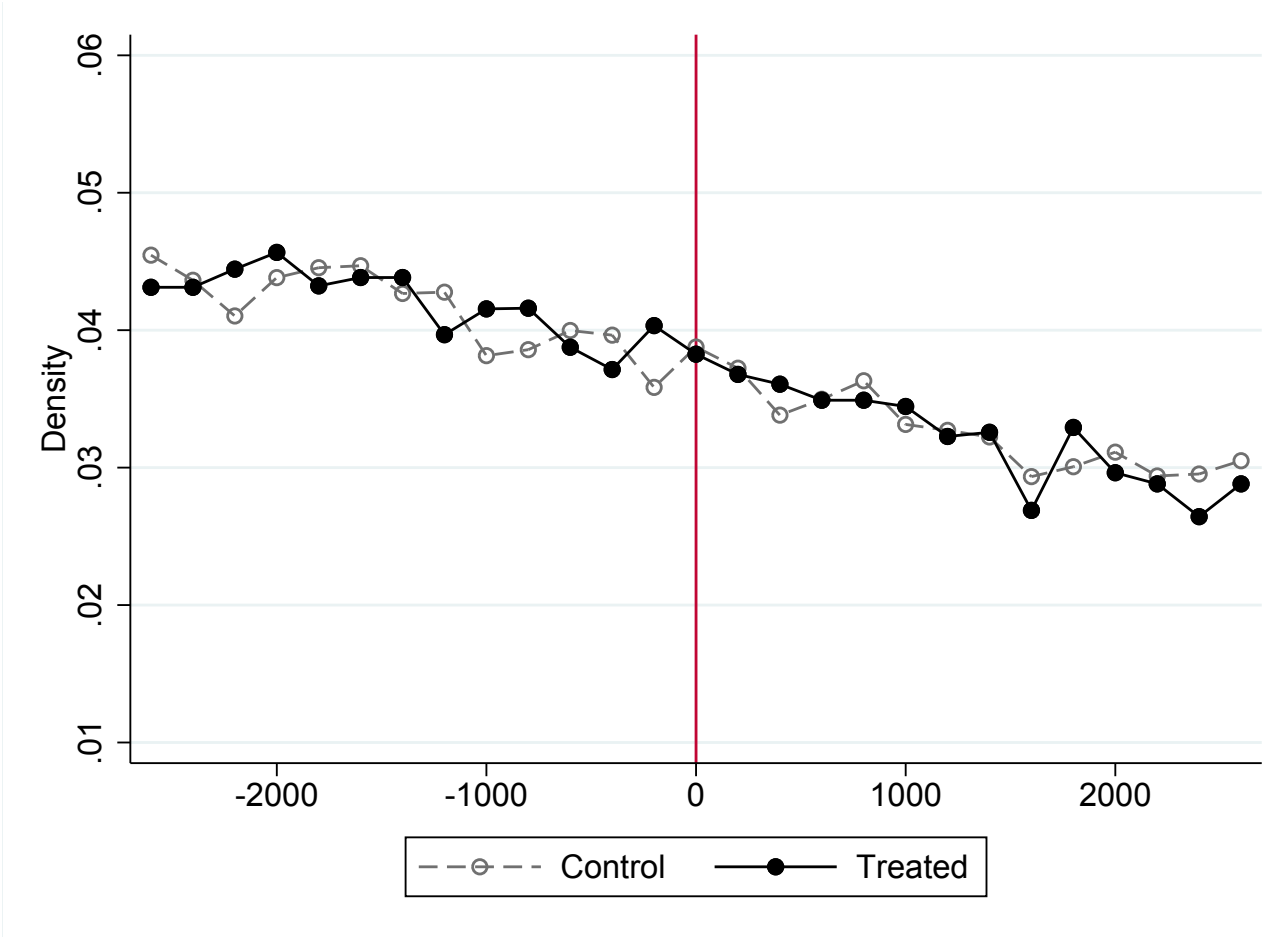
Reform creates three convex kinks in budget set



- Amount of excess bunching at I_j is proportional to ε^c (Saez, 2010)

Theory

No long-run excess bunching at convex kinks



- Not even among self-employed Self-employment
- Consistent with $\varepsilon^c = 0$

Back

Excluding observations around kinks

	Taxable income (1)	Disposable income (2)	Taxable income (3)	Disposable income (4)
Benefit	-0.943**	0.057	-0.847**	0.153
	(0.450)	(0.450)	(0.419)	(0.419)
Observations	73783	73783	73783	73783
Linear trend	x	x	x	x
Quadratic trend			x	x

Back

Bunching approach

- Let utility be defined over disposable income and taxable income

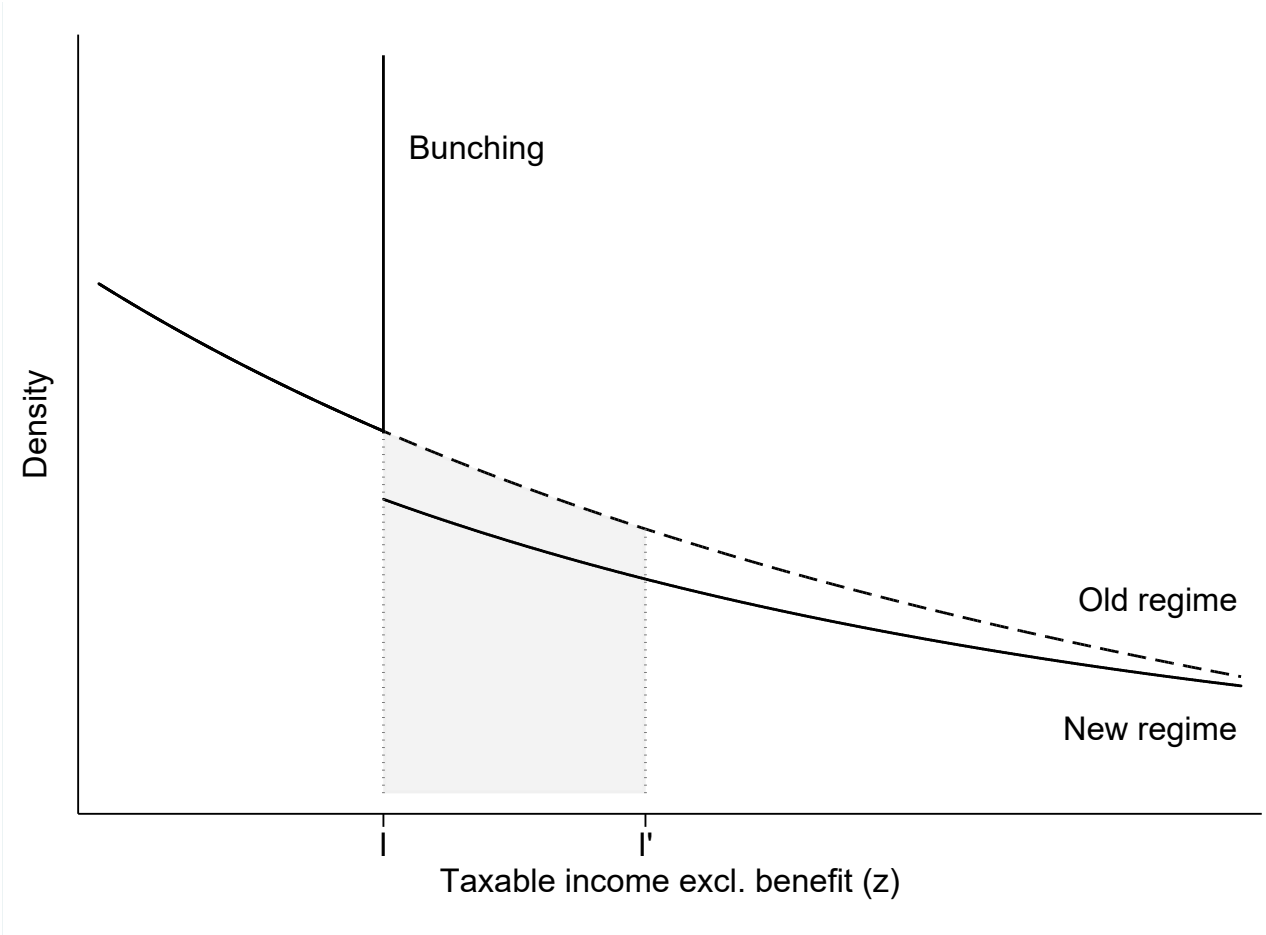
$$U = u(z - T(z), z/\theta)$$

  where $\theta \sim F(\theta)$ is income generating ability and $T(\cdot)$ tax/benefit schedule

- Linear $T(\cdot)$ + smooth $F(\theta) \Rightarrow$ distribution of z smooth
- Reform introduces discontinuity in marginal tax rate at $z = I$ creating *convex kink* in budget constraint of treatment group
- Treated individuals in $[I, I']$ have incentive to bunch at I
  - $\rightarrow$ Excess bunching at I
  - $\rightarrow$ Left-shift of density above I
- Amount of excess bunching in I is proportional to ε^c (Saez, 2010)

Back

Density of taxable income z



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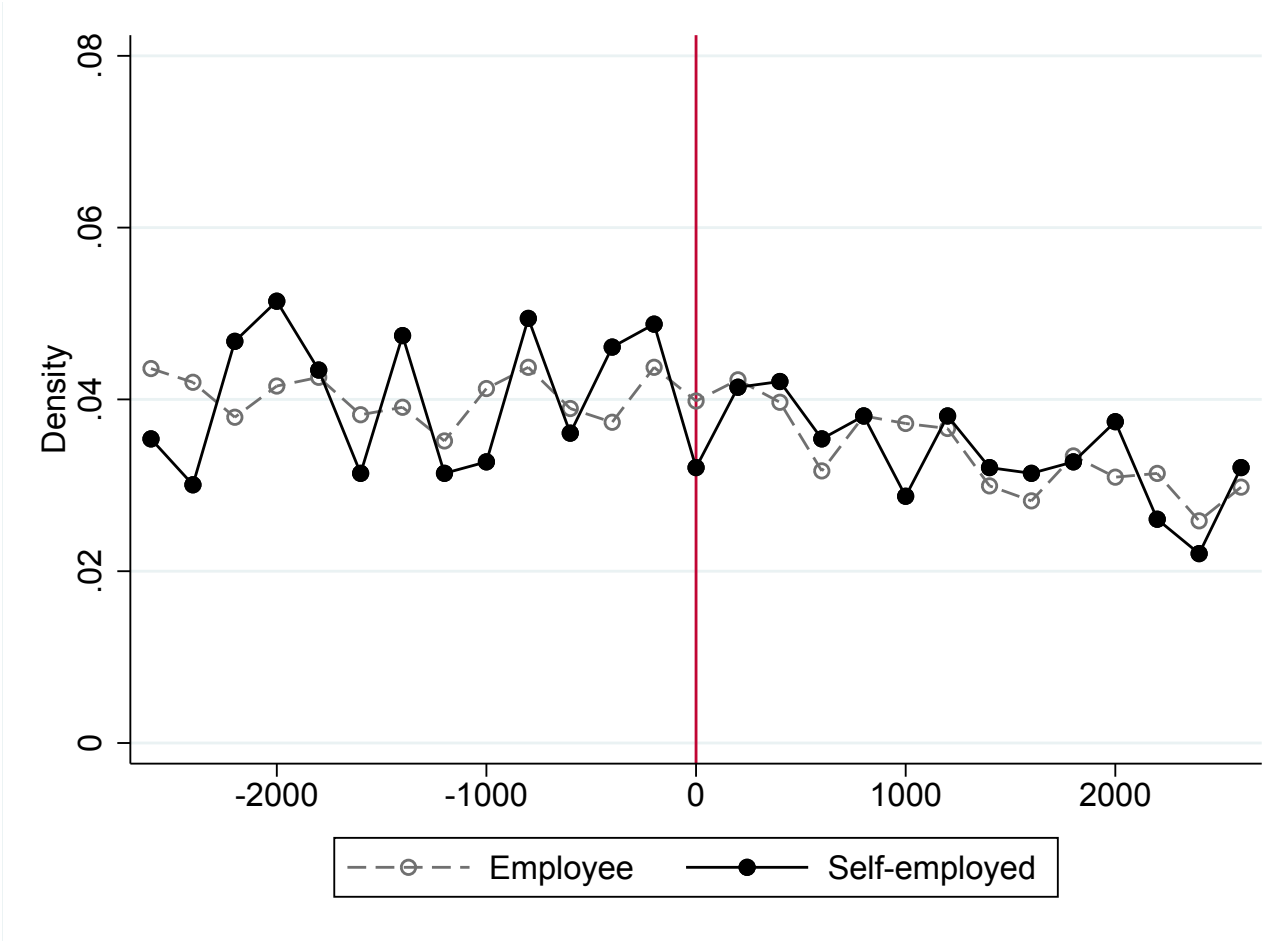
Empirical density of taxable income by employment status

Treatment group



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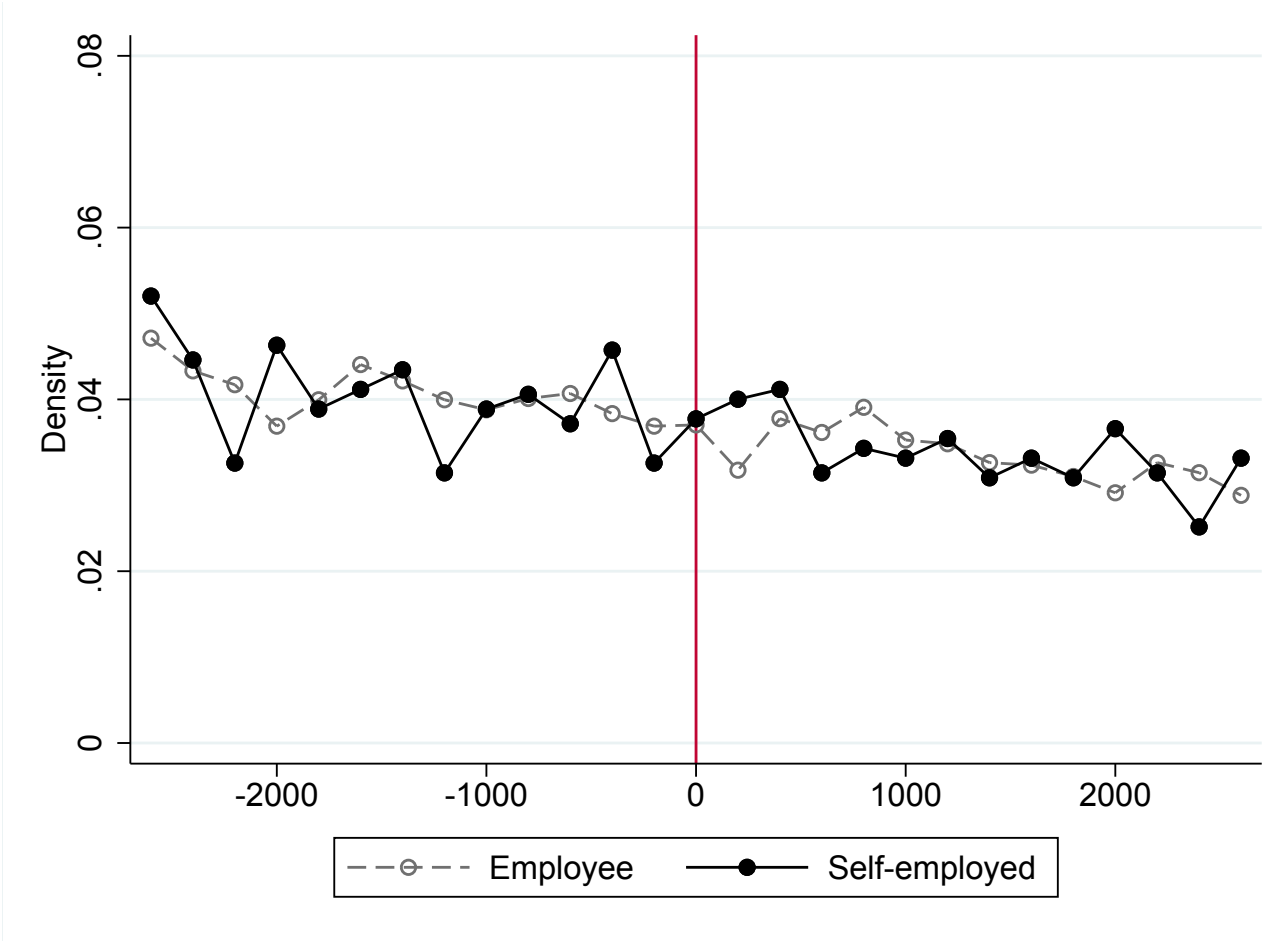
Empirical density of taxable income by employment status

Control group



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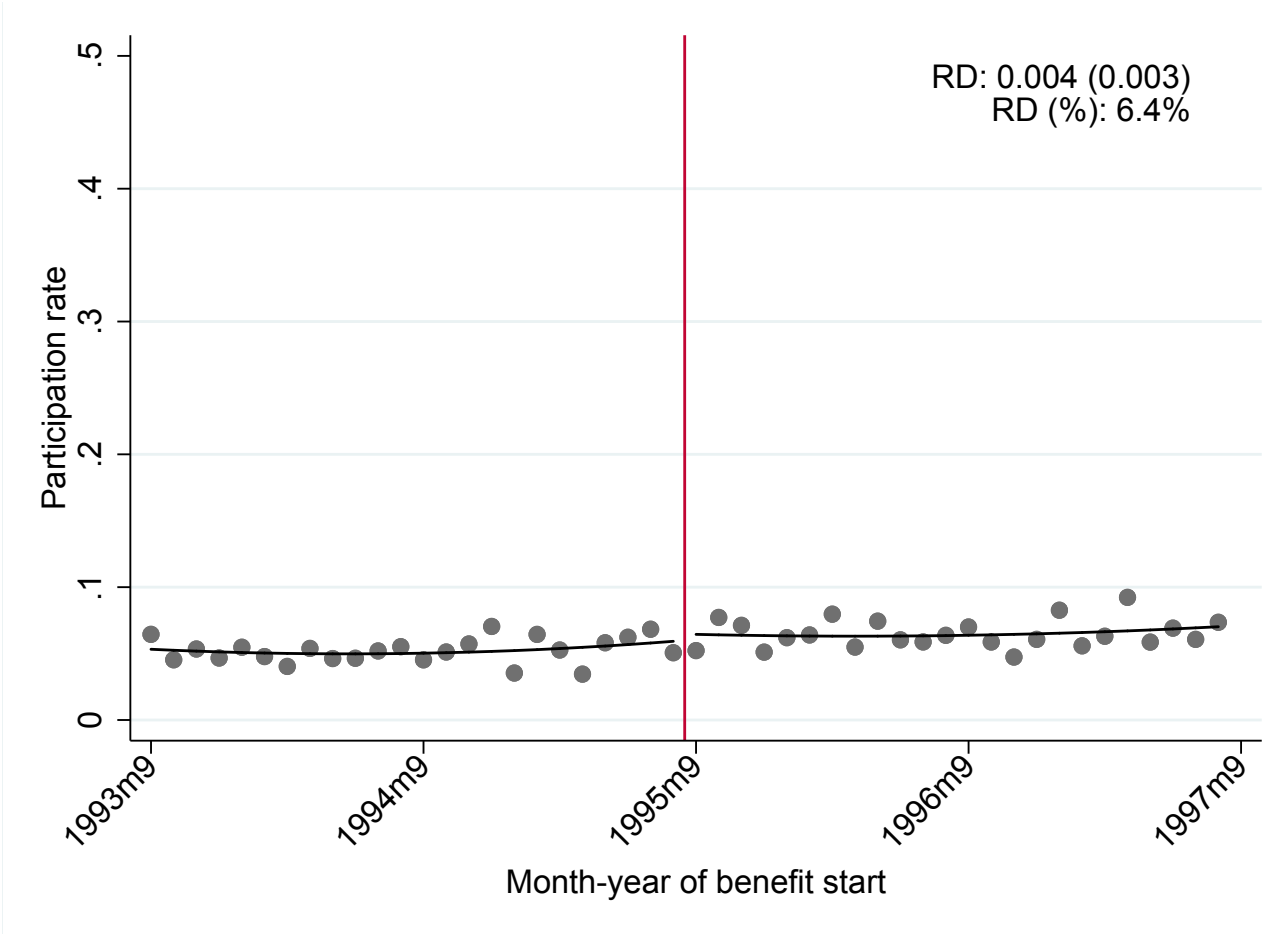
Placebo effect on participation



Note: Conditional on first predicted income bracket and not working in $t = -1$

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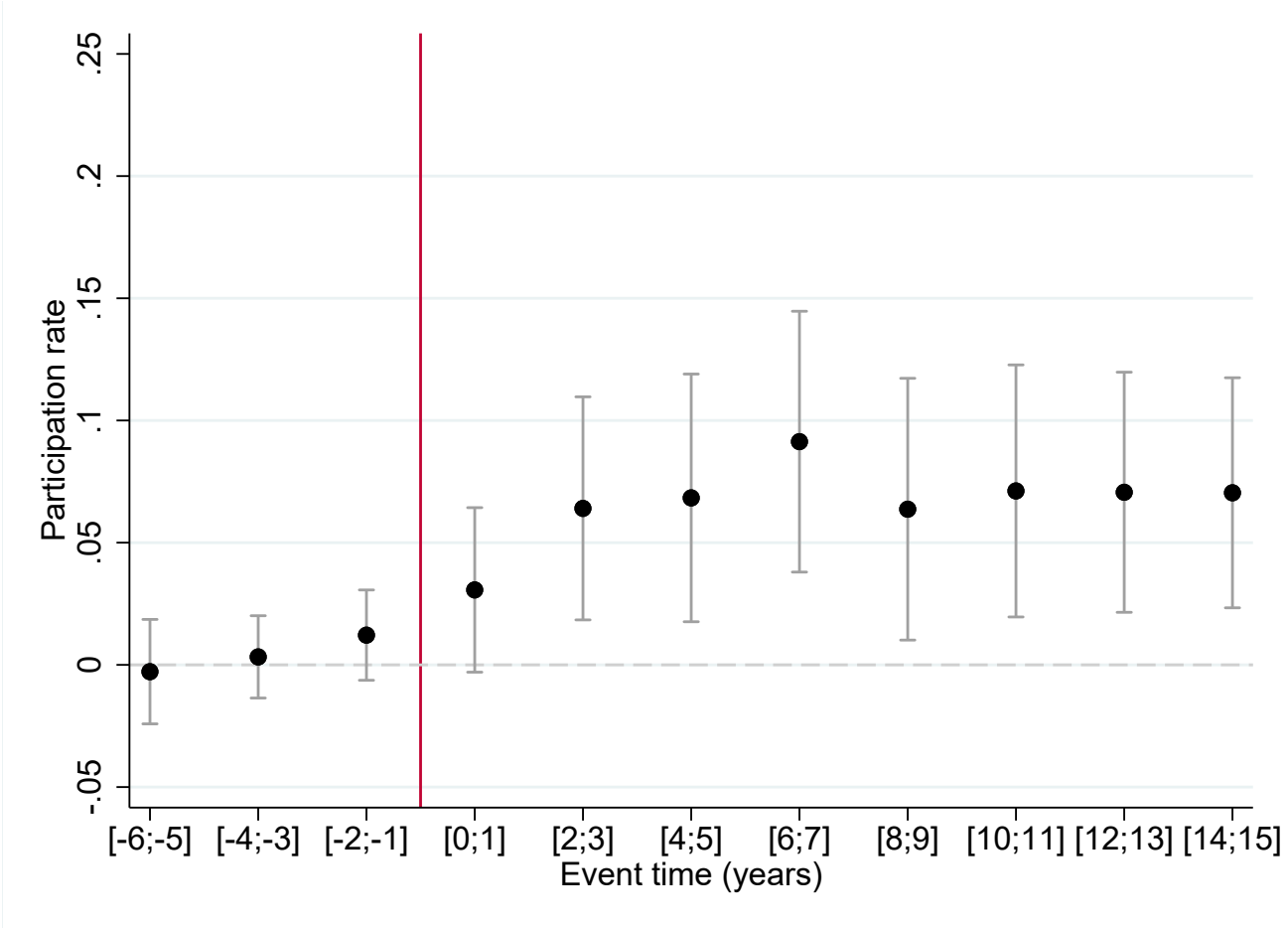
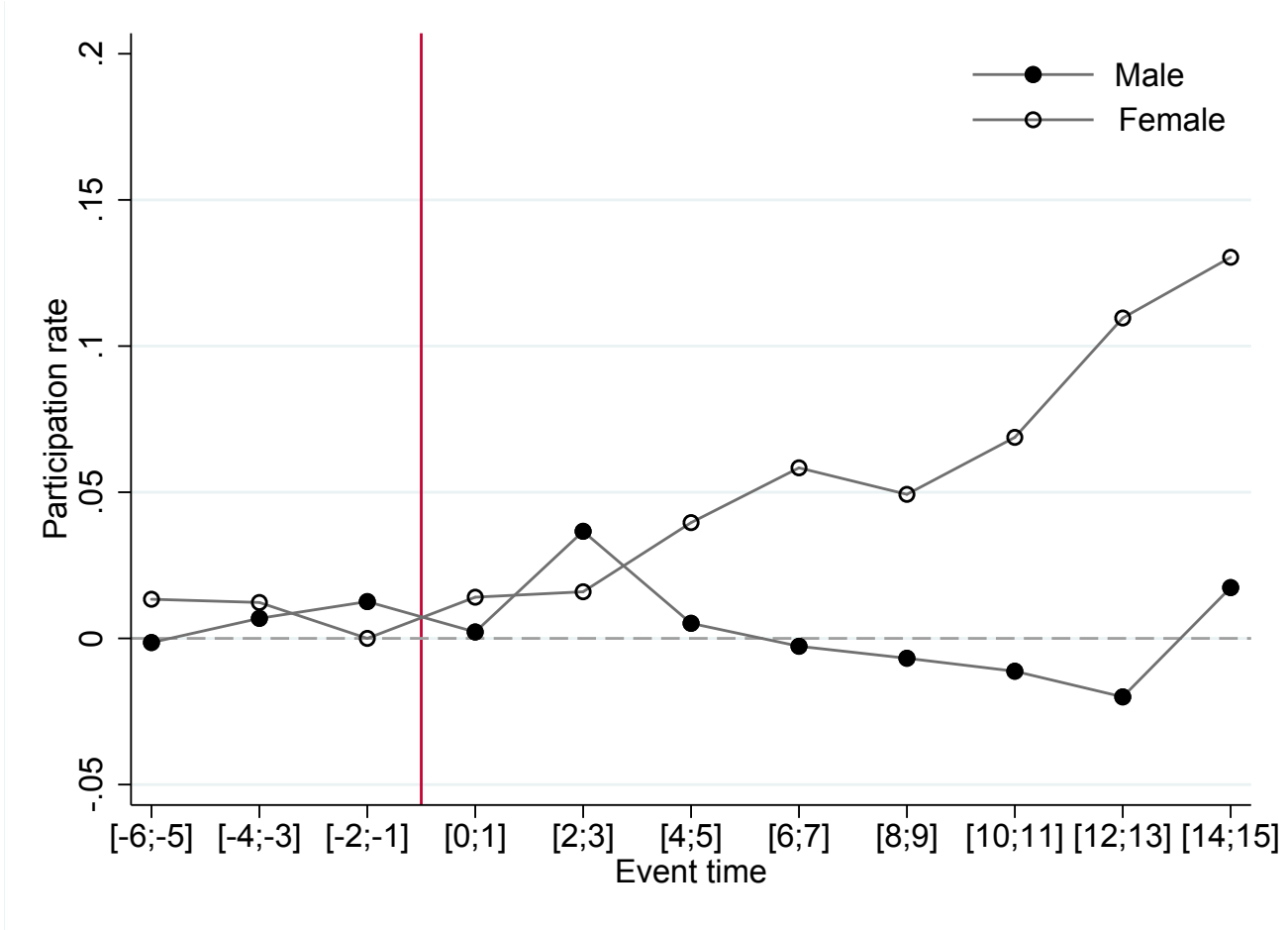
Dynamics of participation response



Back

Dynamics of participation response by gender



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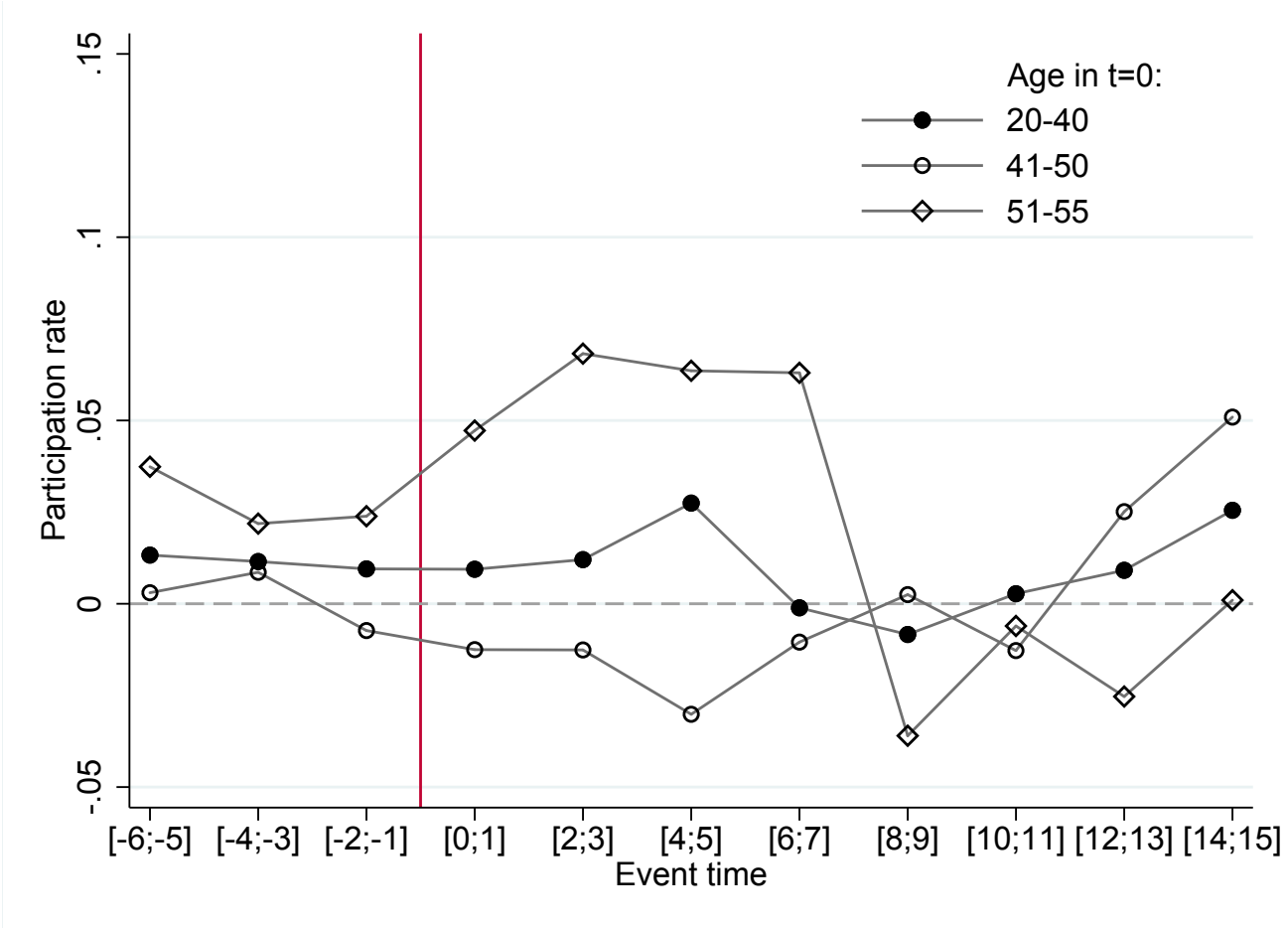
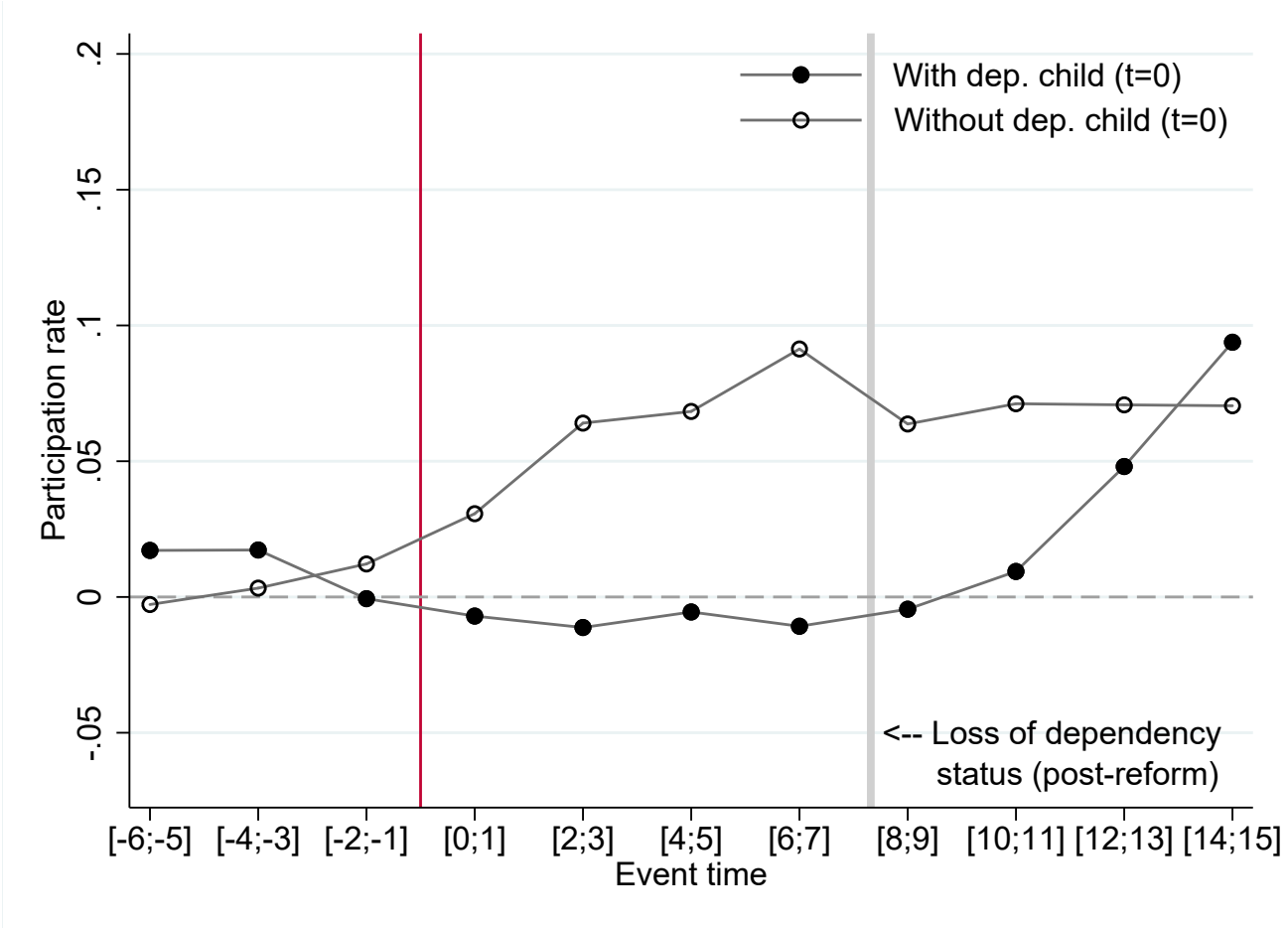
Dynamics of participation response by age in $t = 0$



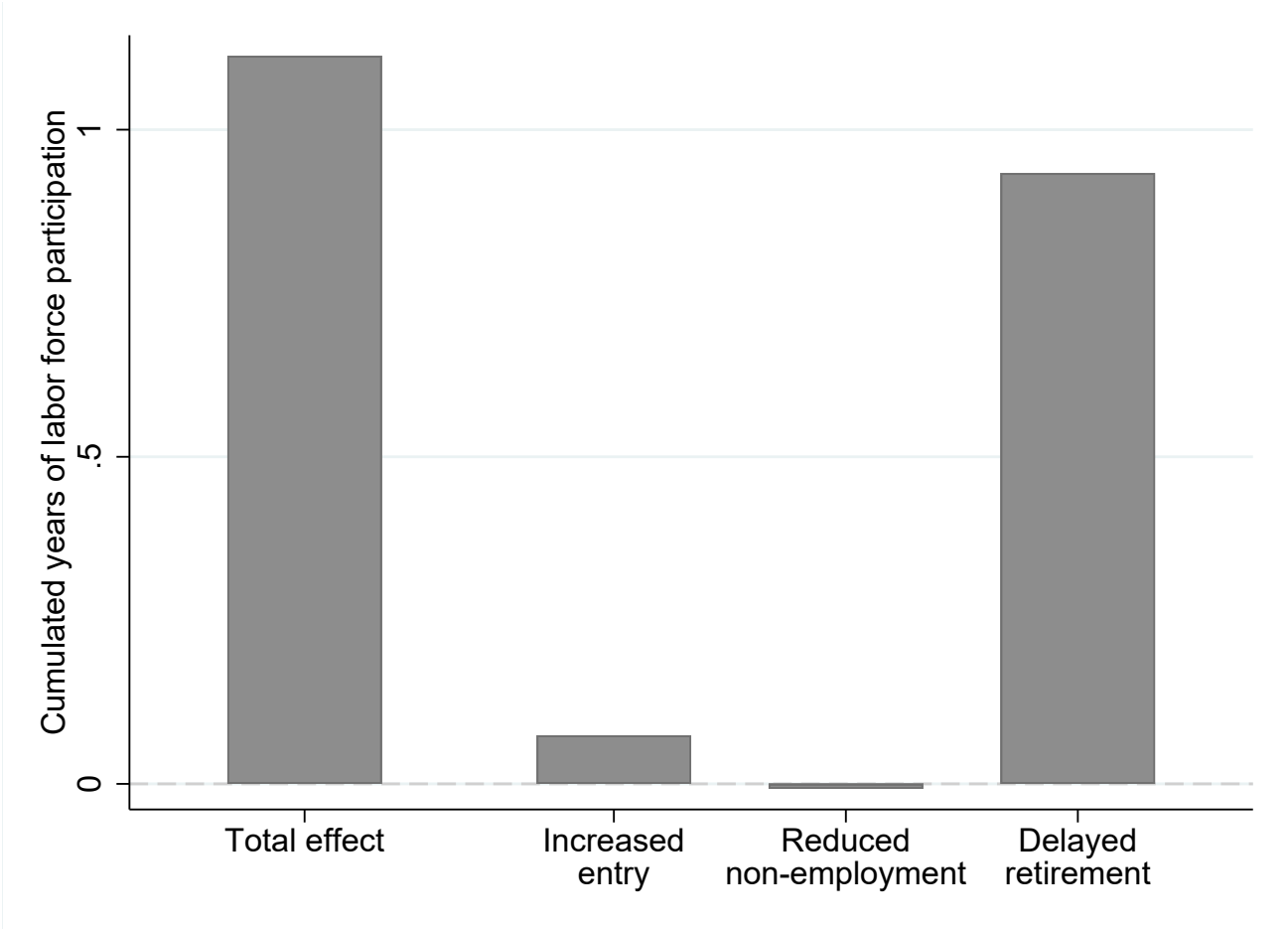
Back

Dynamics of participation response: dep. children in $t = 0$



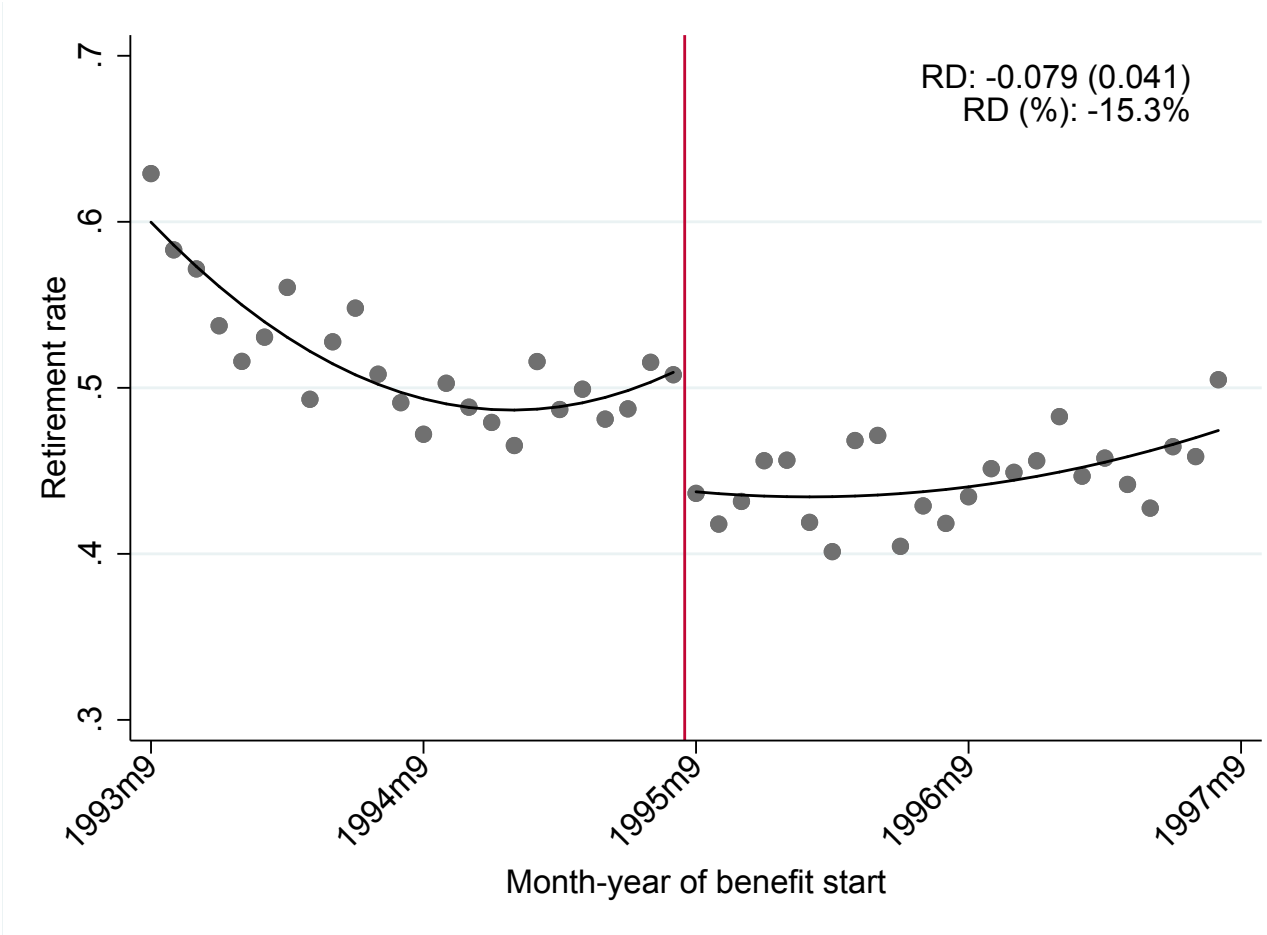
Back

Decomposition of LFP response



Retirement rate is 15.3% (8 p.p.) lower in $t = 15$ Retirement rate Back

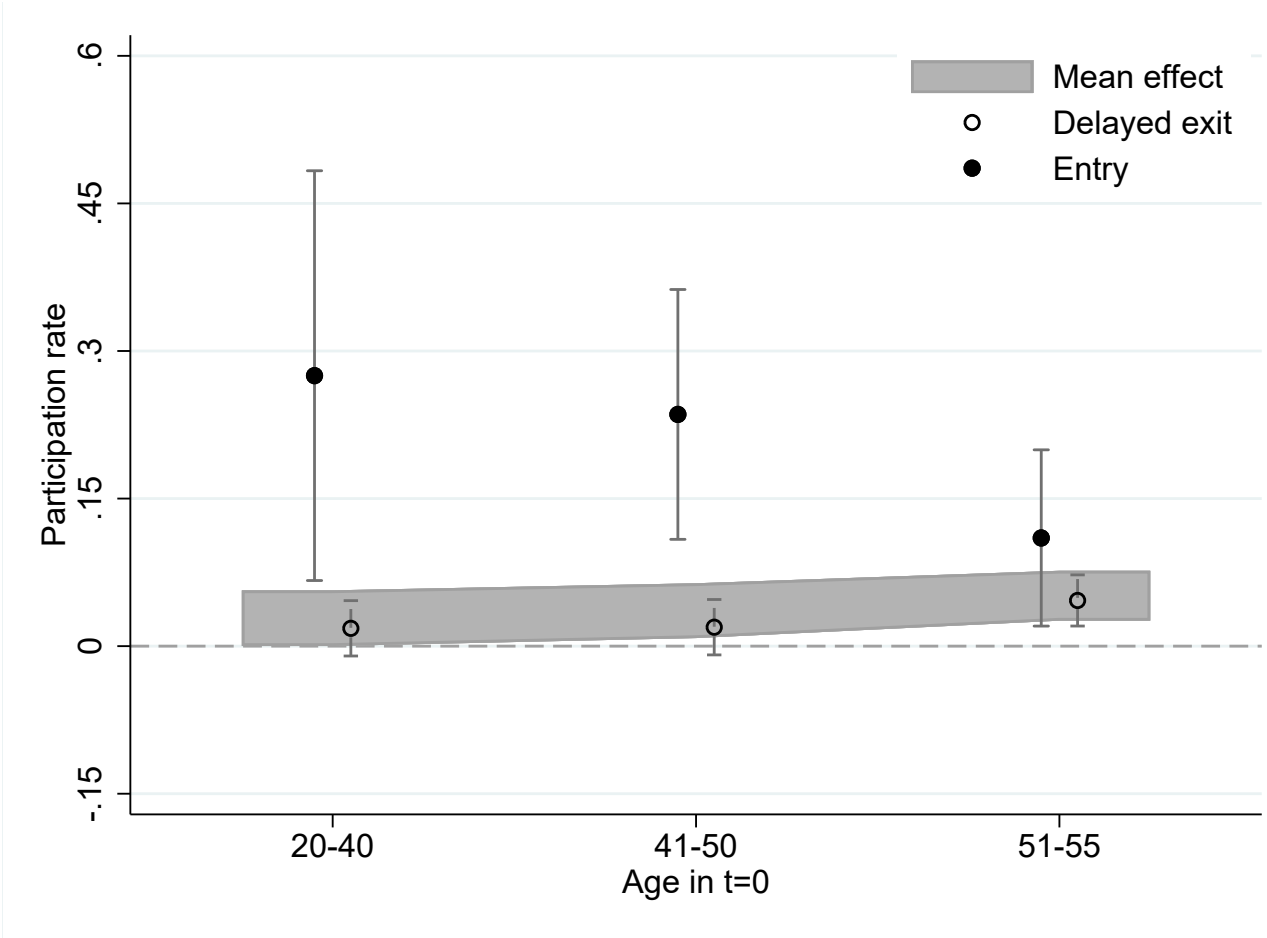
Retirement rate in $t = 15$



IV-RD ($\times$ 1000): 0.100 (0.047) Back

Age profile of participation response

↓ exit at older ages, ↑ entry at young ages



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Gender and age profile of labor supply response

	Gender		Age in $t = 0$		
	Female	Male	20-40	41-50	51-55
	(1)	(2)	(3)	(4)	(5)
Participation rate	0.101***	0.045***	0.028**	0.036***	0.051***
	(0.012)	(0.017)	(0.014)	(0.014)	(0.013)
	[0.639]	[0.553]	[0.883]	[0.585]	[0.212]
Days worked	1.084	1.084	5.279*	-4.031	5.926
	(2.641)	(3.863)	(2.792)	(3.502)	(5.835)
	[341.62]	[338.91]	[348.28]	[336.77]	[326.57]
Daily wage	1.271	-4.394*	1.049	1.508	-0.747
	(1.430)	(2.509)	(1.868)	(1.884)	(3.412)
	[74.507]	[83.966]	[73.886]	[80.890]	[80.507]
Benefit-start-month FE	x	x	x	x	x
Calendar year FE	x	x	x	x	x
Linear trend	x	x	x	x	x
Quadratic trend	x	x	x	x	x

Back

Heterogeneity of labor supply response by presence of dependent children in $t = 0$

	With dependent children (1)	Without dependent children (2)
Participation rate	0.036***	0.076***
	(0.011)	(0.010)
	[0.719]	[0.457]
Days worked	-2.794**	-1.478
	(1.317)	(1.587)
	[353.03]	[349.78]
Daily wage	-2.412**	0.252
	(1.226)	(1.324)
	[78.218]	[74.908]
Benefit-start-month FE	x	x
Calendar year FE	x	x
Linear trend	x	x
Quadratic trend	x	x

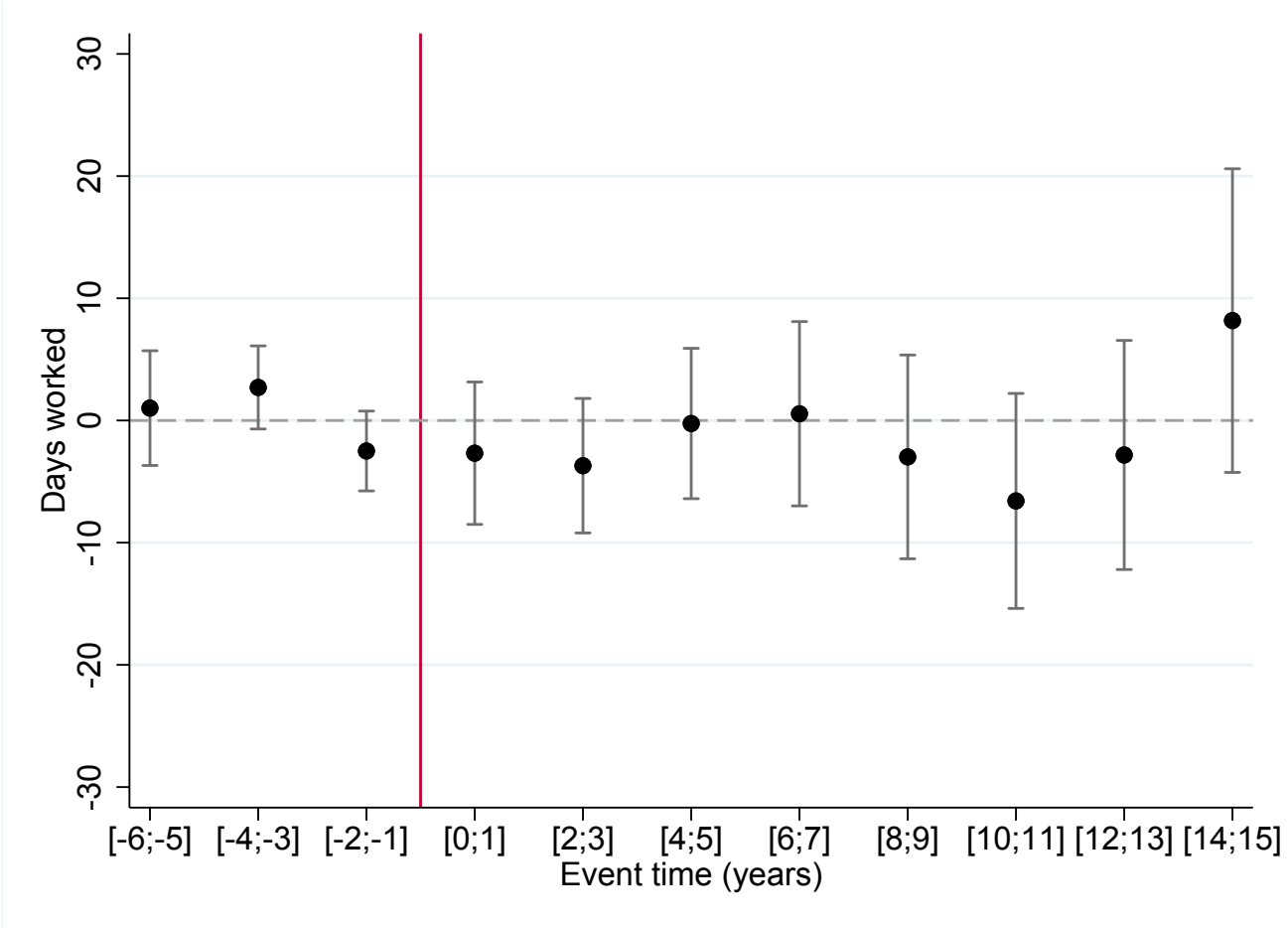
Back

Other margins of adjustment of labor supply

	Benefit ($\times$ 1,000)	Control mean	Observations
Full-time job	0.010*	0.891	68253
	(0.005)		
Change firm	-0.004	0.082	68253
	(0.005)		
Change industry	-0.002	0.029	68253
	(0.003)		
Change province	-0.000	0.025	68253
	(0.003)		

Note: Conditional on work experience in $t = 0$. Subsample of workers employed in private sector. Back

No *long-term* effect on intensive margin



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Benefit replacement rate

	Benefit start date	
	Before Sept 1, 1995	After Sept 1, 1995
Spouse (with and without children)		
Spouse only		
Survivor's taxable income $\leq 3 \times$ minimum pension	60%	60%
Survivor's taxable income $\leq 4 \times$ minimum pension	60%	45%
Survivor's taxable income $\leq 5 \times$ minimum pension	60%	36%
Survivor's taxable income $> 5 \times$ minimum pension	60%	30%
Spouse with one child	80%	80%
Spouse with two or more children	100%	100%

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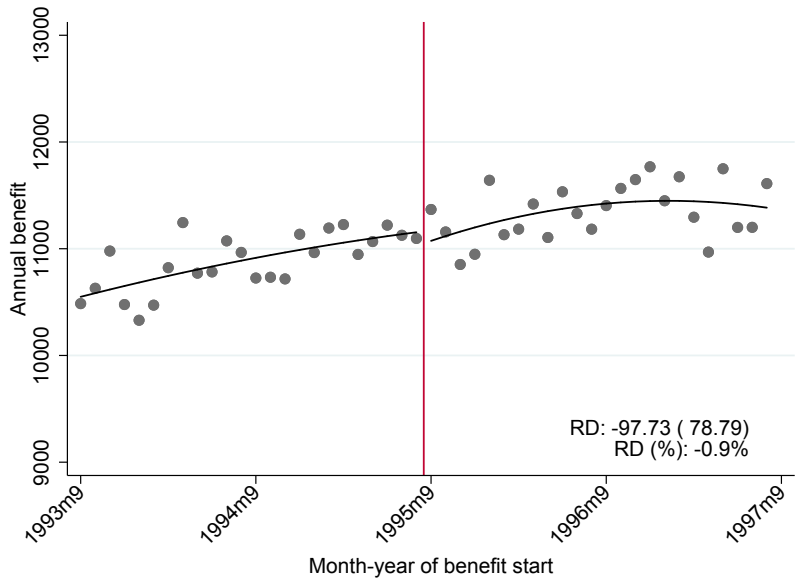
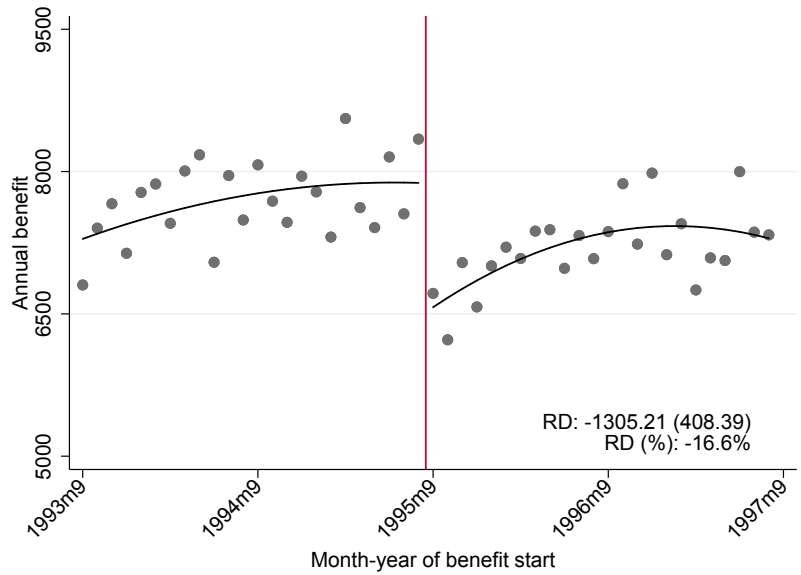
Benefit before and after loss of child dependency

With dependent children



Upon loss of child dependency



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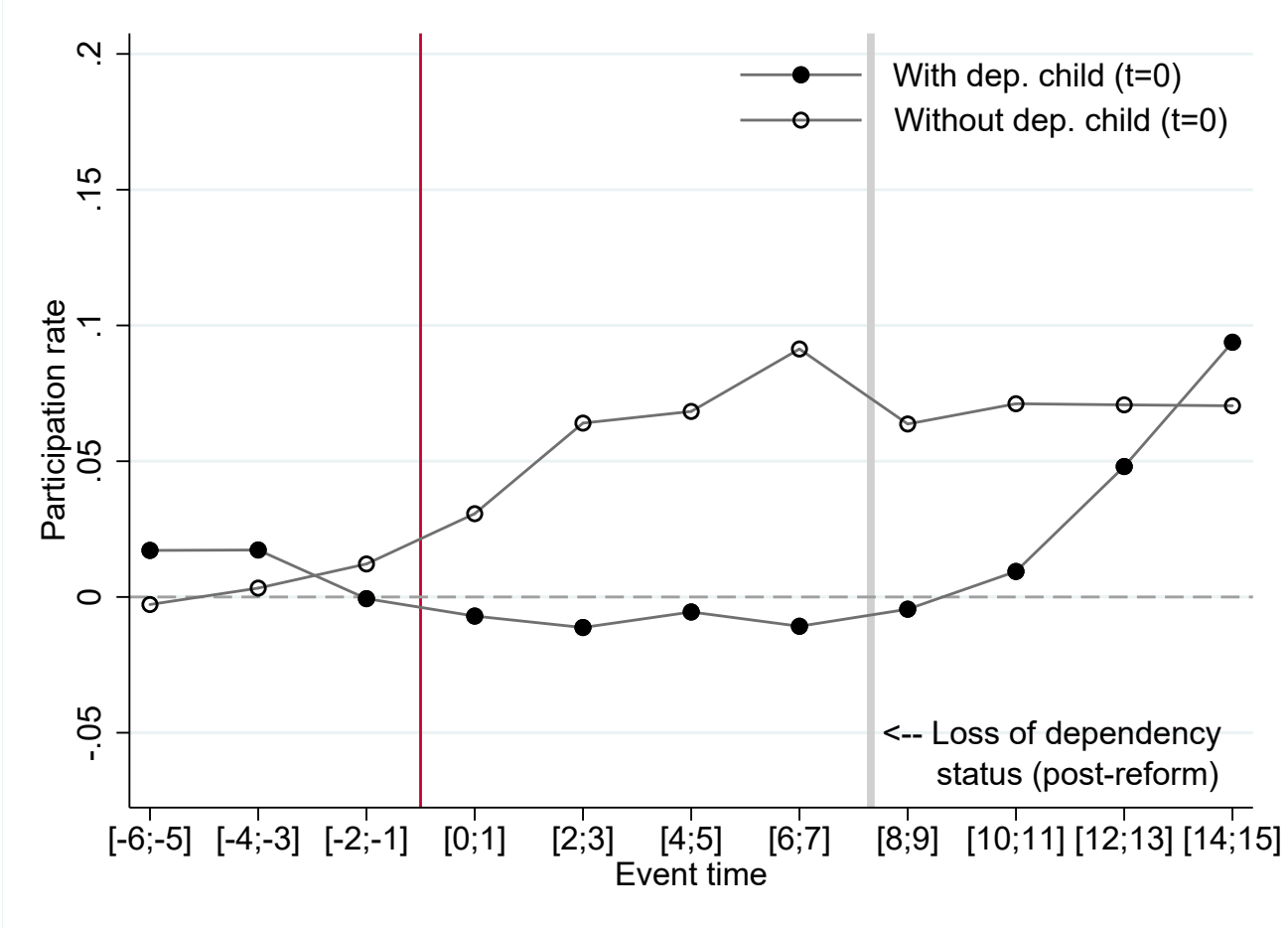
Placebo

	Number of years with dependent children
Placebo threshold	
September 1992	-0.404
	(0.568)
September 1993	0.757
	(0.423)
September 1994	-1.317***
	(0.413)
September 1995	1.223***
	(0.415)
September 1996	-0.345
	(0.421)
September 1997	0.390
	(0.416)
September 1998	-0.502
	(0.540)

Note: 24-month bandwidth Back

Dynamics of participation response: dep. children in $t = 0$



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A model of LFP decision

Model setup

- $\max u(c) - \mathbb{I}\{l = 1\}\phi$, $u(\cdot)$ concave
- s.t. $c = \mathbb{I}\{l = 1\}z + B$
- $\phi \sim F(\phi)$ is disutility of work, $F(\cdot)$ extreme value distribution $\rightarrow f'(\cdot) < 0$

Participation decision

- Let $V(z, l, B)$ be indirect utility function
- Work iff $V(z, 1, B) - V(0, 0, B) \geq \phi \iff \phi \leq \overline{\phi}(z, B)$
- LFP rate is $\Phi(z, B) = F(\overline{\phi}(z, B))$

High value or low cost?

LFP response to benefit change:

$$\frac{d\Phi}{dB} = -\overbrace{\underbrace{\frac{d\Phi}{dz}}}^{\text{Wage elasticity}} \cdot \overbrace{\underbrace{\gamma}}^{\text{Risk aversion}} \cdot \frac{z}{B}$$

$\underbrace{\phantom{\frac{d\Phi}{dz}}}$ Cost of work (−) $\quad$ $\underbrace{}$ Utility value (+)

- $|d\Phi/dB|$ increasing in γ, i.e. if utility over consumption is strongly curved and $u'(c)$ rises sharply when B falls
- $|d\Phi/dB|$ increasing in $d\Phi/dz$, which is negative function of work disutility

Back

Derivation

- LFP rate $\Phi(z, B) = F(\bar{\phi}(z, B))$
- Income effect of B on LFP rate

$$\frac{d\Phi}{dB} = f(\overline{\phi}) \cdot \left[\frac{\partial V(z, 1, B)}{\partial B} - \frac{\partial V(0, 0, B)}{\partial B} \right] \approx f(\overline{\phi}) \cdot u''(c(B)) \cdot z$$

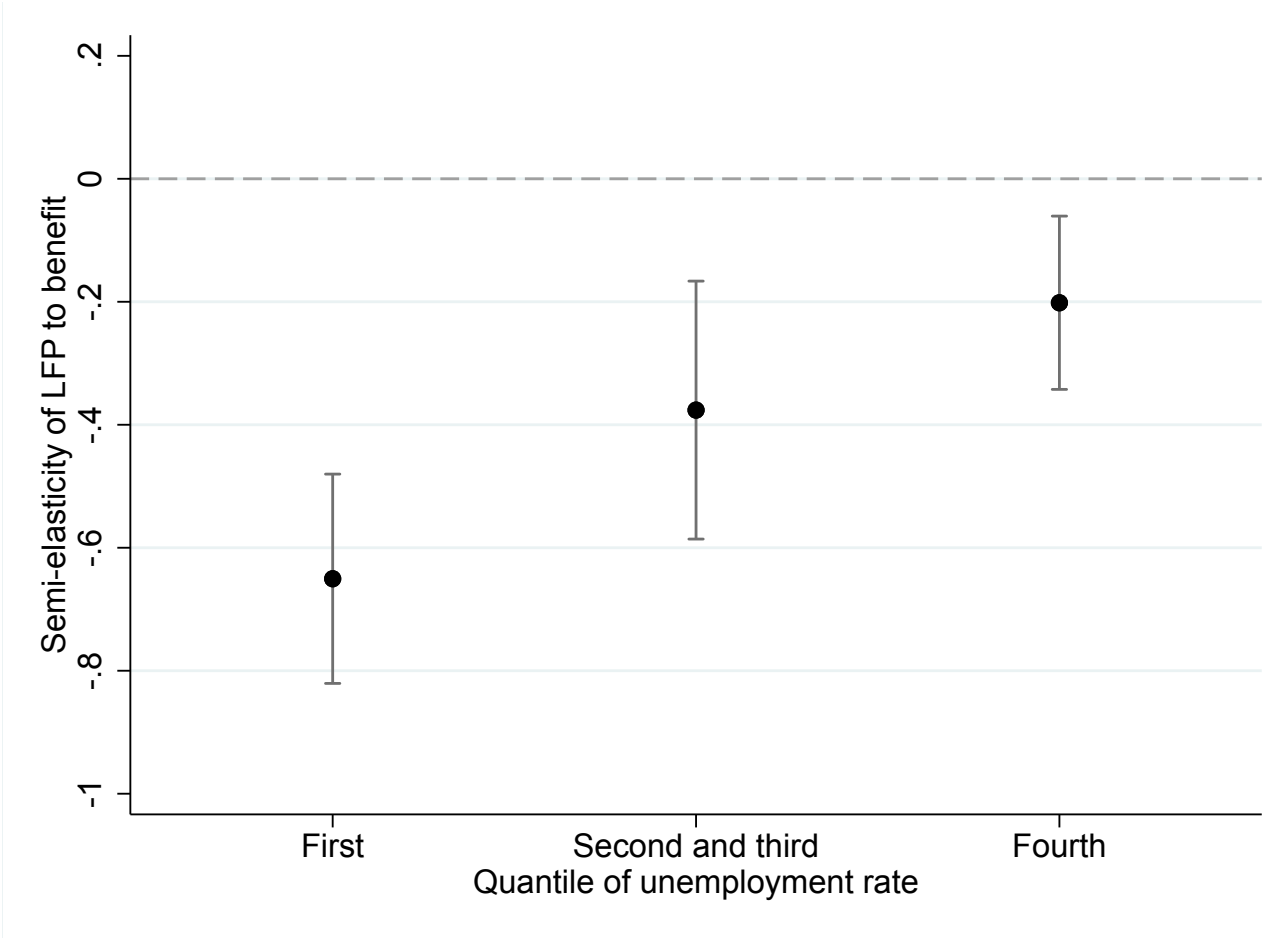
- Elasticity of LFP to earnings $\frac{d\Phi}{dz} = f(\overline{\phi}) \cdot u'(c(B))$
- Sub in for $f(\overline{\phi})$

$$\frac{d\Phi}{dB} \approx \frac{d\Phi}{dz} \cdot \frac{u''(c(B))}{u'(c(B))} \cdot z = -\frac{d\Phi}{dz} \cdot \gamma \cdot \frac{z}{B}$$

Back

Heterogeneity wrt regional unemployment rate

Controlling for rate of undeclared work



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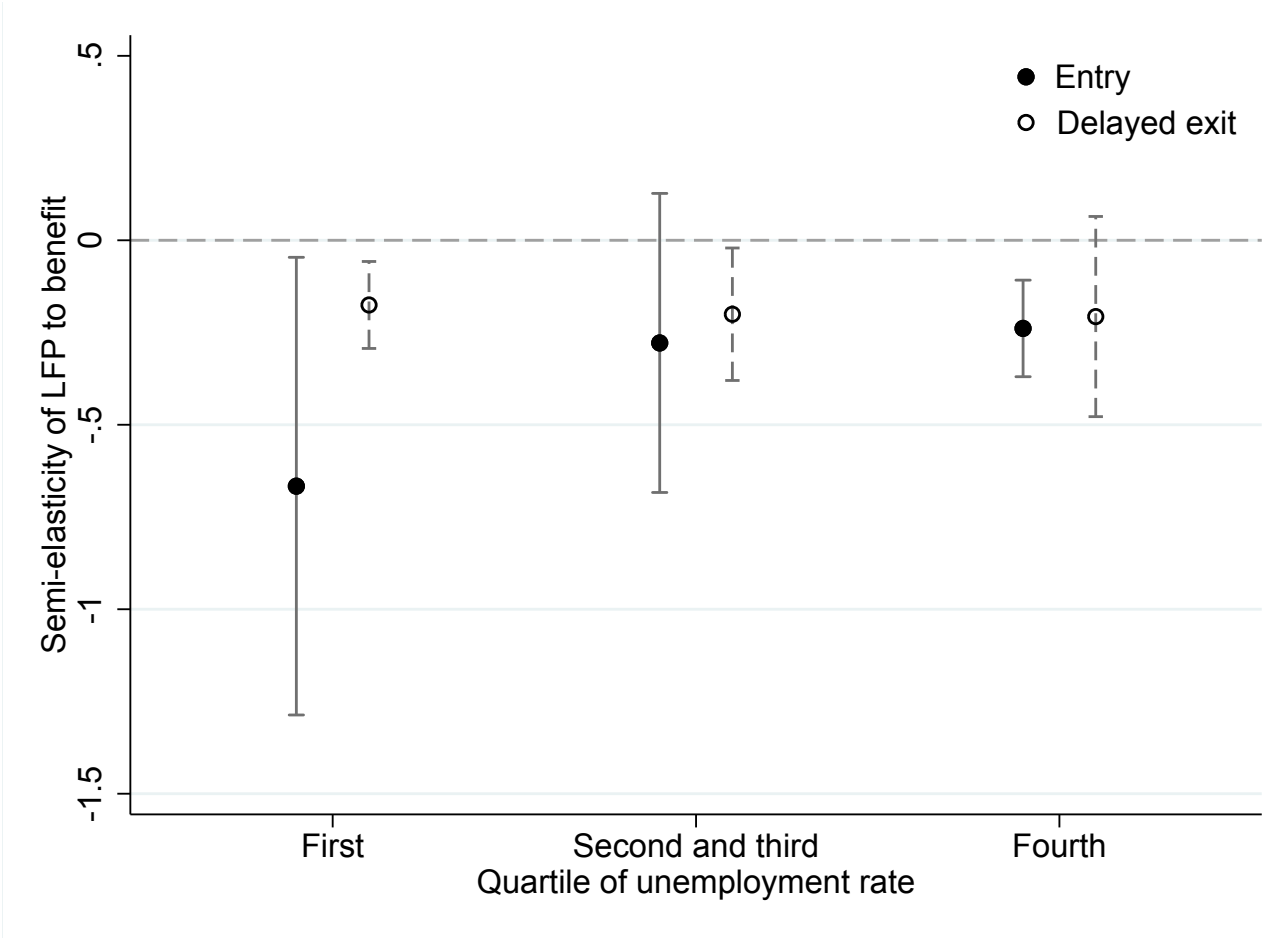
Heterogeneity wrt regional unemployment rate

New entrants vs. incumbents



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Proof

Model setup

- $\max u(c) - \mathbb{I}\{l = 1\}\phi$
- s.t. $c = \mathbb{I}\{l = 1\}z + B$
- $\phi \sim F(\phi)$ is disutility of work

Participation decision

- Let $V(z, l, B)$ be indirect utility function
- Work iff $V(z, 1, B) - V(0, 0, B) \geq \phi \iff \phi \leq \overline{\phi}(z, B)$
- LFP rate is $\Phi(z, B) = F(\overline{\phi}(z, B))$

Proof (cont.)

Participation response and value of benefit

- Semi-elasticity of LFP to benefit

$$\frac{d\Phi}{d\log B} = f(\overline{\phi}) \cdot \frac{\partial \overline{\phi}}{\partial B} \cdot B = f(\overline{\phi}) \cdot \left[\frac{\partial V(z,1,B)}{\partial B} - \frac{\partial V(0,0,B)}{\partial B} \right] \cdot B$$
$$\approx f(\overline{\phi}) \cdot \frac{\partial^2 V}{\partial z \partial B} \cdot z \cdot B = f(\overline{\phi}) \cdot u''(c(B)) \cdot z \cdot B$$

- Semi-elasticity of LFP to earnings $\varepsilon = \dfrac{d\Phi}{d\log z} = f(\overline{\phi}) \cdot u'(c(B)) \cdot z$

- Rescaling $d\Phi/d\log B$ by ε

$$\frac{\left[\dfrac{d\Phi}{d\log B} \right]}{\varepsilon} \approx \frac{u''(c(B)) \cdot B}{u'(c(B))} \approx \frac{u'(c(B)) - u'(c(0))}{u'(c(B))}$$

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RP approach: applicability and limitations

- Application of Chetty [2008] and Landais [2015] to *within*-state valuation of unconditional transfer
- Robust to state-dependent utility
- Based on labor supply data and within-state policy variation
  - Wide applicability
  - Avoids limitations of consumption-based implementation approaches
- Assumption of optimizing behavior: no frictions, absence or separability of other margins of adjustment
- Can be extended to two-state setting to evaluate value of insurance

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