Spillover Effects of Old-Age Pension Across Generations:

Family Labor Supply and Child Outcomes

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EEA

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Introduction

- Due to population ageing, many countries enacted pension reforms **aimed at prolonging working life**.
- Extensive literature showing direct labor supply responses (e.g. Krueger and Pischke 1992, Manoli and Weber, 2016, Blundell et al 2016) and indirect effects on spouses/partners (Hurd, 1990, Coile, 2004, Stancanelli and Van Soest, 2012, Lalive and Parrotta, 2017).

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- However, little is known about the **spillover effects across generations** of old-age pension, which might **reinforce, counteract or even offset** the direct effects.
  - Obvious implications for the cost effectiveness and the optimal design of public policies (Hendren and Sprung-Keyser, 2020).

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- Grandchildren's **education outcomes** change due to changes in childcare modes.

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- **Empirical Strategy**:
  - We explore a cohort-based pension reform in the Netherlands making use of a Regression Discontinuity Design.
    - ★ *[grandmothers]*: The reform creates a sharp discontinuous increase in labor supply for cohorts born since 1950.
    - ★ *[mothers]*: It allows us to estimate the impact of grandmother's labor supply on labor supply of mothers (adult daughters)
    - ★ *[children]*: Examine reform impact on children's education outcomes.

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    - ⋆ *[children]*: Examine reform impact on children's education outcomes.
- **Contribution**:
  - First paper to causally estimate the short- and longer-run effects of a pension reform across generations, on all family members' labor supply (including child penalty/gender gap), on children's educational performance and on underlying mechanisms.

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- **Longer-run spillover effects:**
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- **Longer-run spillover effects:**
  - Strong dynamic effects on **child penalty and the gender gap**.
  - We find **spillover effects on educational performance** of the grandchildren. Positive for 4-7 yrs old and negative for 11-12 yrs old.

Context: Dutch Pension System

- Three-pillar system: flat-rate state pensions (PAYG), occupational pensions (DB) and individual savings. ▸ more details

- Retirement before the age of 65 is only possible through the occupational pensions.
  - Sectoral early retirement schemes as parts of the collective agreements.
  - Earliest claiming age: $\sim$ 55 and 60

Context: Early Retirement Schemes and the 2006 Reform

- Before 2006, contributions to these sectoral early retirement schemes were tax deductible. (Euwals et al., 2006)

- Since January 1, 2006, the tax benefits for early retirement schemes were eliminated.
  - People, who were 55 years or older before January 1, 2005, are exempted. (cohorts born before January 1950)
  - The sharp differential treatment by date of birth was unexpected (Lindeboom and Montizaan, 2020).

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- We focus on comparing outcomes when grandmothers are **aged 60 to 64** for families with grandmothers **born in the months before versus after January 1950** using a Regression Discontinuity Design. ▸ exit age densituy

Context: Dutch Childcare Situation

- Formal childcare and education system:
  - [0 to 3 years old]: center-based childcare and informal care (6-8 euros per hour)
  - [4 to 12 years old]: primary school (free of charge, ends around 2-3 pm); out-of-school care (costs 6-7 euros per hour)
  - [13 to 18 years old]: secondary school (at age 12, most pupils take the Cito test, which is used for secondary school recommendations)
- Childcare choices of Dutch parents (LISS Survey) ▸ Childcare
  - [0 to 3 years old]: majority relies on formal care or a mix of formal and grandparental care.
  - [4 to 12 years old]: school plus **20% of families rely solely on grandparental care**.
  - [13 to 18 years old]: longer school hours and less/no need for supervision.

▸ Res By Age

Data and Method

Data: administrative data on the universe of the Dutch population

- *[Grandmothers]* - labor supply outcomes [From 1994/2006] employment history (hours, employed, monthly labor earnings), individual characteristics (residence, family composition, occupation, etc.)
- *[Mothers]* - labor supply outcomes [From 1994/2006]
- *[Children]* -education outcomes [2007-2019]: performance at the Cito exam and track recommendations, probability and hours of formal childcare

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Baseline analysis sample:

- Mothers with youngest child at primary school age (4-12 years old) when the grandmothers are aged 60 to 64 in families with grandmothers born 8 months around January 1950. [2009 - 2015] (23,497 mothers) ▸ No Selection

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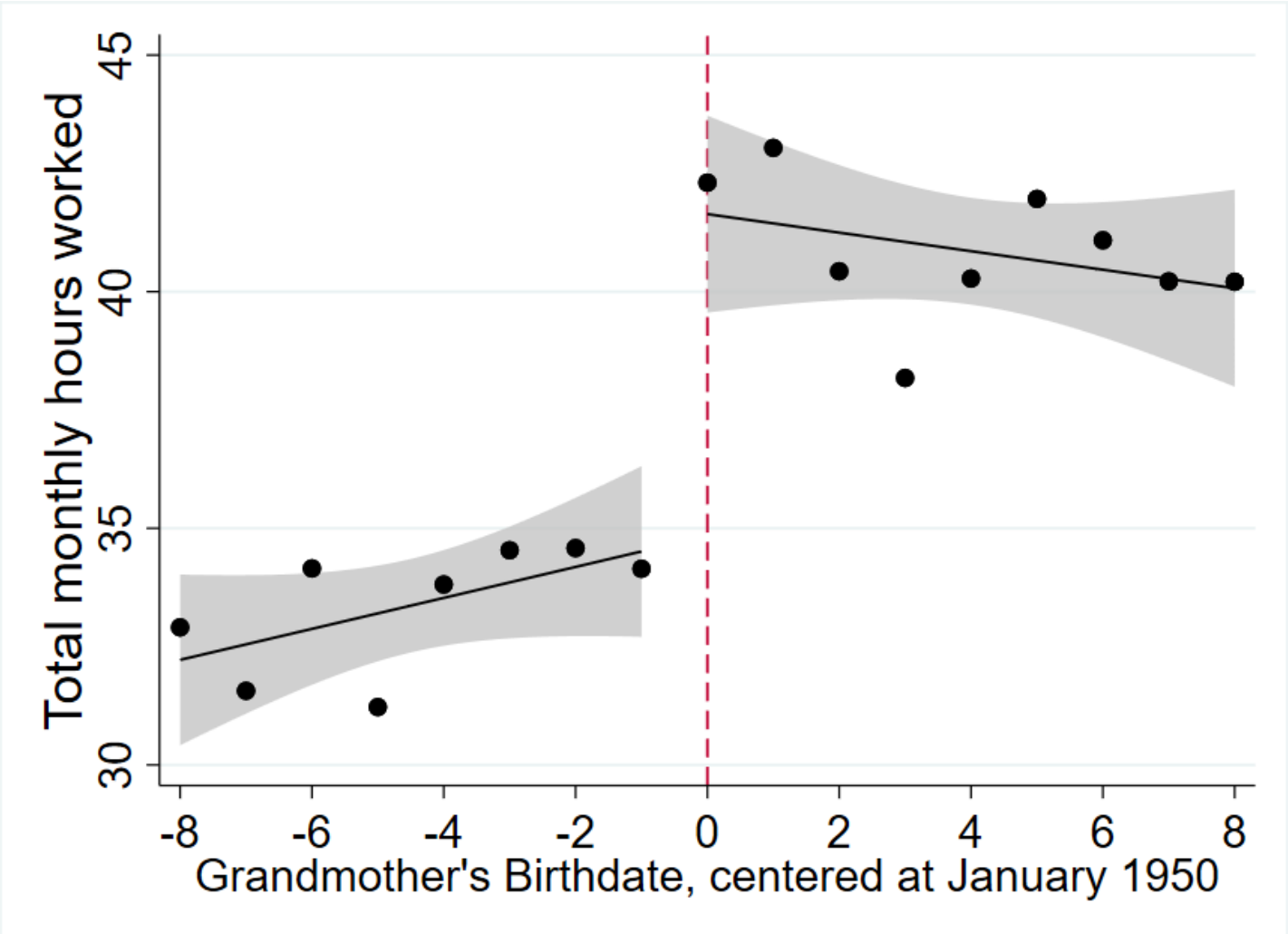
Empirical Strategy: Fuzzy RD Design: ▸ details

- Assumptions: ▸ Density ▸ Smoothness in covariates
- Baseline specification: 8 months bandwidth, linear ▸ Optimal bdw

First stage: Grandmother's Labor Supply

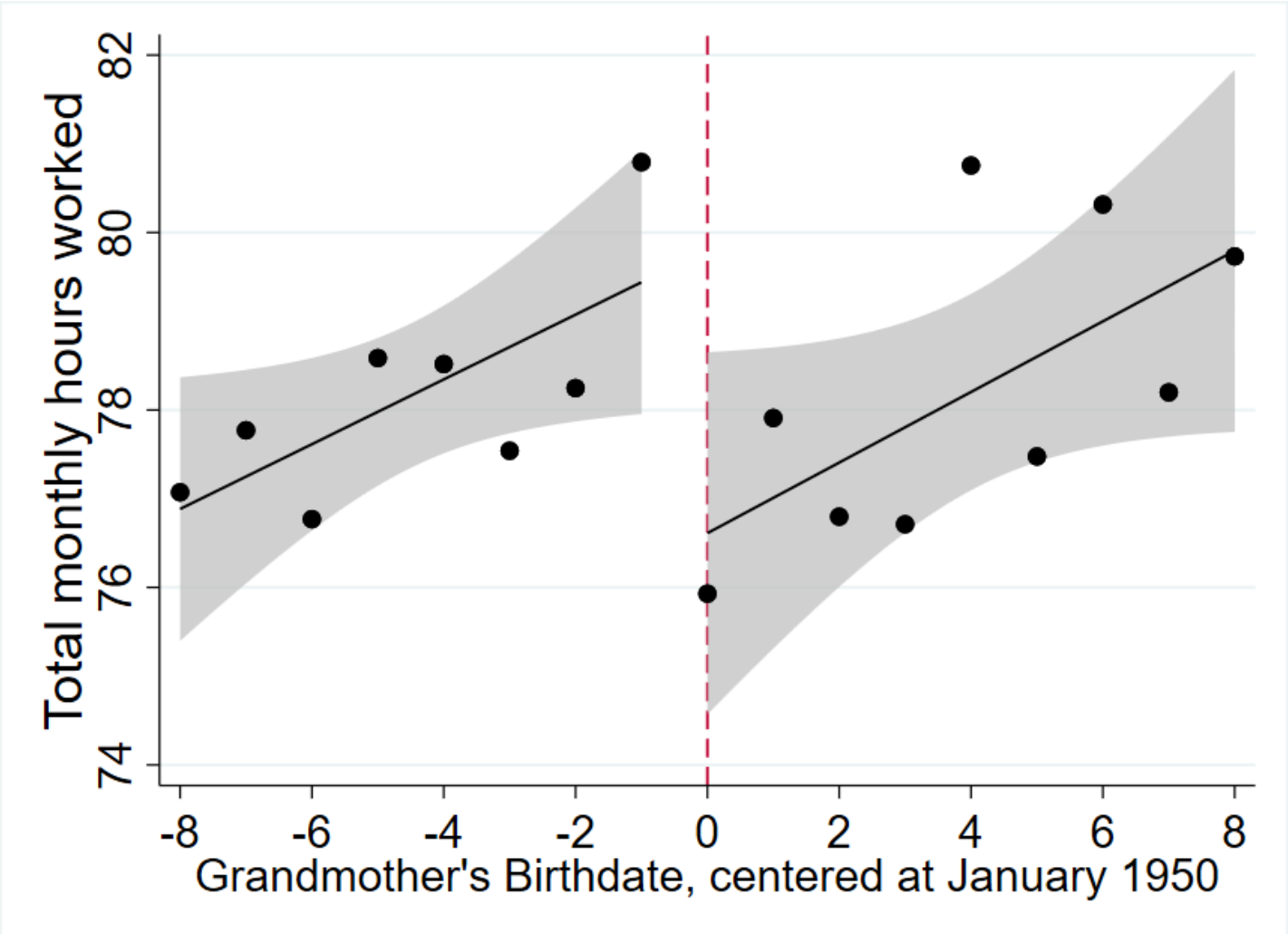
Grandmothers' monthly working hours (including zeros):



▸ labor earnings ▸ wider bandwidth ▸ regression table

Reduced Form: Spillovers on Maternal Labor Supply

Mothers' monthly working hours (including zeros):



▸ Other outcomes

Fuzzy RD Estimates: Spillovers on Maternal Labor Supply

We find that **one additional hour** worked per month by the grandmothers causes the mothers to work around **0.46 hours** less per month.

	Fuzzy RD estimates				
	(1)	(2)	(3)	(4)	(5)
Impact on mothers' labor supply					
Total monthly hours worked	-0.469**	-0.413**	-0.465**	-0.630**	-0.405*
	[0.219]	[0.204]	[0.229]	[0.298]	[0.207]
Other labor supply measures					
Prob(employed)	-0.003*	-0.003*	-0.003*	-0.004*	-0.003*
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Prob(full-time employed)	-0.001	-0.001	-0.001	-0.001	-0.002*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
F-stat	20.75	24.09	21.22	14.62	24.69
Obs. (Mothers)	23497	23497	23497	17930	34592
Obs. (Grandmothers)	19548	19548	19548	14959	28739
Bandwidth	8	8	8	6	12
Controls	NO	YES	YES	YES	YES
Sector FE	NO	NO	YES	YES	YES

Note: *** p<0.01, ** p<0.05, * p<0.1.

▸ Fertility responses ▸ Reduced-from results ▸ First-stage table

Mechanism

- Grandmothers work more can impact maternal labor supply via changes in **time transfers** or **monetary transfers**.
- The monetary transfers channel is unlikely: Grandmothers' total gross income is unchanged. ▸ FS more outcomes
- We further show indirect evidence support the **time transfer channel**.

Mechanism: By Age of the Youngest Child

We find that mothers with young school-age child (**4-7 years old, first few years of primary school**) are most affected by grandmothers working more.

	Childcare need				
	more			no/less	
	Age of the youngest child				
	0-3	4 - 7	8-12	13 - 18	No child
	(1)	(2)	(3)	(4)	(5)
Impact on mothers' labor supply					
Total monthly hours worked	-0.004	-0.534**	-0.410	0.118	0.046
	[0.161]	[0.245]	[0.281]	[0.482]	[0.353]
Other labor supply measures					
Prob (Employed)	0.001	-0.003*	-0.004	-0.002	0.001
	[0.001]	[0.002]	[0.002]	[0.004]	[0.002]
Prob (Full-time employed)	-0.001	-0.001	-0.001	0.003	0.001
	[0.001]	[0.001]	[0.001]	[0.003]	[0.004]
F-stat	30.01	19.25	14.82	5.75	6.27
Obs. (Mothers)	25450	20540	11378	4983	12289
Obs. (Grandmothers)	20987	17519	10145	4583	10878

Note: *** p<0.01, ** p<0.05, * p<0.1.

▸ Dutch childcare ▸ Reduced-form

Mechanism: Heterogeneity

Heterogeneity by grandmothers' time availability

- Healthiness of grandmothers' partners:
  - Effects only for grandmothers with **healthy partners**.
- Grandmothers living close by or not:
  - Effects only for grandmothers living **in the same municipality**.
- Number of maternal grandchildren in relevant age range:
  - Effects only for grandmothers with **only one** maternal grandchildren in relevant age range.

▸ regression table

Mechanism: Grandfathers and Other Family Members

- Grandfathers' are also impacted by the reform, but they have **only a very limited effect on their daughters' labor supply**. ▸ Results GF

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- No impacts on sons and daughters-in-law. $\Rightarrow$ Only **maternal grandmothers** matter.
  - Consistent with evidence from LISS Survey according to which 64% grandparents providing childcare are maternal grandparents.
- In the core family with youngest child ages 4-12, we find:
  - mothers (adult daughters) works less;
  - their husbands (sons-in-law) work more;
  - household income of the core families remain unchanged.

▸ regression table

Robustness and Placebo Tests

- Robustness by bandwidth and polynomial orders
  ▸ Varying bandwidth ▸ Varying poly. orders
- Placebo cutoffs ▸ Placebo cutoffs
- Deceased grandmothers ▸ Deceased Grandmothers
- Fertility responses ▸ Fertility responses

Long-Run Spillover Effects

- Long-run effects on children
  - What are the implications in terms of children's **educational performance**?
- Dynamic effects on mothers' labor supply
  - What are the longer-run implications for mothers' labor supply?
  - What are implications for the **child penalty and the gender gap** ?

Children's Education Outcomes

Young children benefit from the reform (mothers work less, grandmothers work more), while children close to the Cito test perform worse.

RD estimates	Cito score (1)	Number of correct answers: Verbal (2)	Math (3)	Overall (4)	High track (5)	Obs. (Children)
Panel A: All youngest children						
Age between **4 - 12**	0.061	0.042	0.065*	0.072	0.007	8436
	[0.045]	[0.039]	[0.039]	[0.044]	[0.016]	
Means at cutoff	534.296	83.872	50.302	142.901	0.161	
Panel B: By age groups						
Age between **4 - 7**	0.171***	0.134***	0.198***	0.182***	0.032	5500
	[0.055]	[0.052]	[0.052]	[0.054]	[0.021]	
Means at cutoff	534.818	89.546	54.644	144.568	0.185	
Age between **8 - 10**	0.075	0.066	0.050	0.082	0.012	5585
	[0.057]	[0.048]	[0.049]	[0.056]	[0.020]	
Means at cutoff	533.693	85.384	50.227	145.841	0.158	
Age between **11 - 12**	-0.131*	-0.136**	-0.193***	-0.146*	-0.037	2868
	[0.079]	[0.065]	[0.067]	[0.076]	[0.024]	
Means at cutoff	533.114	72.298	41.286	139.104	0.116	

Note: *** p<0.01, ** p<0.05, * p<0.1. ▸ smoothness in covariates

Children's Education Outcomes by Gender

RD estimates	Cito score (1)	Number of correct answers: Verbal (2)	Number of correct answers: Math (3)	Number of correct answers: Overall (4)	High track (5)	Obs. (Children)
Age between 4 - 7						
Girls	0.200***	0.099	0.272***	0.206***	0.045	2785
	[0.076]	[0.069]	[0.073]	[0.074]	[0.029]	
Boys	0.134	0.170**	0.113	0.153*	0.014	2715
	[0.082]	[0.078]	[0.075]	[0.080]	[0.031]	
p-value	0.103	0.030	0.135	0.055	0.658	
Age between 8 - 10						
Girls	0.111	0.074	0.120*	0.122	0.044	2847
	[0.078]	[0.066]	[0.069]	[0.077]	[0.028]	
Boys	0.035	0.040	-0.008	0.038	-0.023	2738
	[0.082]	[0.069]	[0.069]	[0.080]	[0.029]	
p-value	0.6713	0.5680	0.9138	0.6377	0.4184	
Age between 11 - 12						
Girls	-0.075	-0.083	-0.103	-0.083	-0.012	1459
	[0.109]	[0.087]	[0.095]	[0.104]	[0.035]	
Boys	-0.225*	-0.277***	-0.252***	-0.247**	-0.070**	1409
	[0.116]	[0.095]	[0.098]	[0.111]	[0.036]	
p-value	0.0528	0.0034	0.0098	0.0258	0.0482	

Note: *** p<0.01, ** p<0.05, * p<0.1.

Children's Education Outcomes: Summary

- Positive effects on children aged 4-7, particularly strong positive effects on girls
  - Suggesting girls benefit in particular from the increased interaction with their mothers (Fort et al., 2020)
- Negative effects on children 11 to 12, particularly strong negative effects on boys
  - Possibility due to lack of adult supervision after school (Aizer, 2004)
    - ★ Girls generally are more conscientious, while boys have well documented attention and behavioral difficulties; more strongly affected by negative environments (Bertrand and Pan, 2013)

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    - ★ Girls generally are more conscientious, while boys have well documented attention and behavioral difficulties; more strongly affected by negative environments (Bertrand and Pan, 2013)
- Findings using childcare subsidy data suggest that
  - Decreases in care for children aged 4 to 7 $\Rightarrow$ substitution from grandmaternal care and formal daycare hours to maternal care.
  - Increase in care for children aged 11-12 $\Rightarrow$ substitution away from grandmother supervision towards after-school care (maybe not fully).

▸ Table

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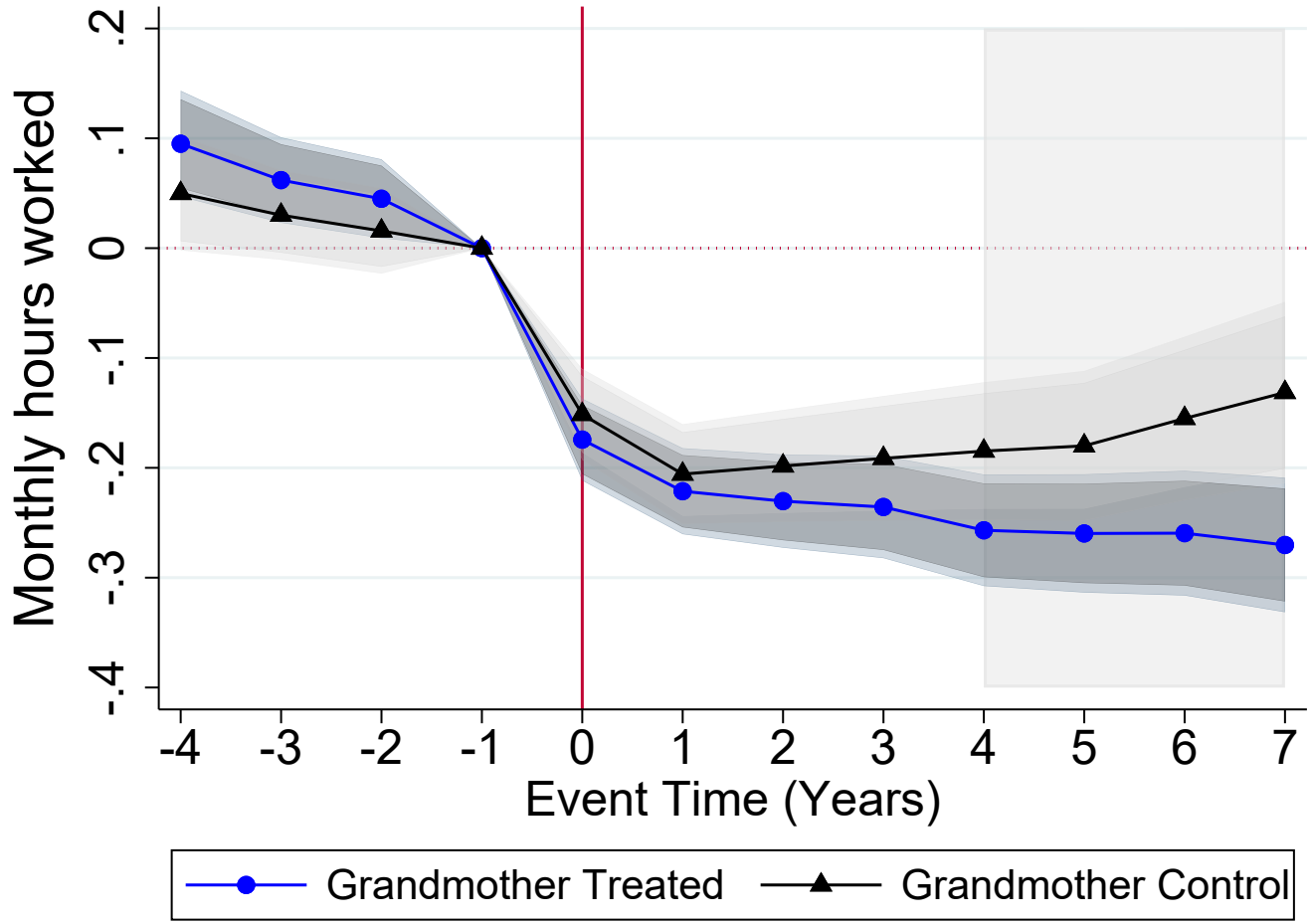
- **Dynamic effects on mothers' labor supply**
  - What are the longer-run implications for mothers' labor supply?
  - What are implications for the **child penalty and the gender gap** ?

Child Penalty in Hours Worked: Women by Treatment

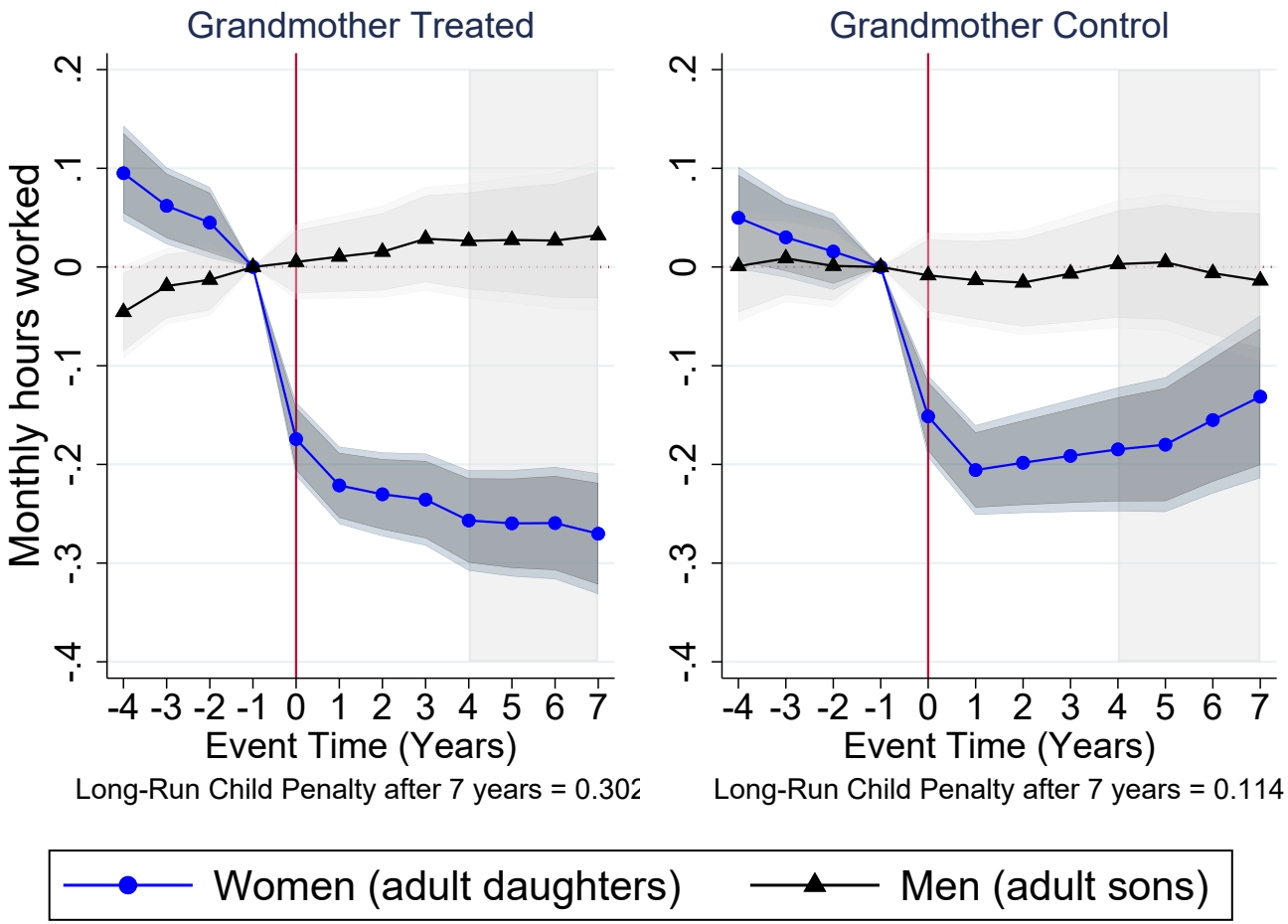
- **Child penalty:** women with treated grandmothers **recover more slowly** than do women with untreated grandmothers.



Note: We focus on women and men with only one child.

Child Penalty in Hours Worked: Gender by Treatment

- **Gender gap:** For the treatment group, the **gender gap remains wide** and the long run gap remains at 30 percent seven years after giving birth to their first child. ▸ Earnings



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Conclusions

We show **strong spillover effects across multiple generations** of a public policy by exploiting a cohort-based pension reform in the Netherlands.

- Mothers (adult daughters) work less, important dynamic impacts on child penalty $\rightarrow$ **unintended consequence**

- **Quality of care matters**
  - Children in early childhood perform better at school from having mothers at home.
  - Children in late childhood are worse off when grandparental care is not available.
  - Such high-quality childcare options can be made possible and shared by both parents through generous parental leave policies or by improving the quality of formal care choices.

Thank you

THANK YOU!

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Why the Netherlands?

- Universe of administrative data to link multiple generations.
- The Netherlands is not unique, facing the similar situation as U.S. and other developed countries.
- Large gender earnings gap
  - The monthly gender wage gap in 2014 was 41.8% (earn EUR 580 to every EUR 1 000 earned by a man).
  - In 2017, 75% Dutch women were in the labor market, among which 58.7% worked part-time. (OECD, 2019)
- Dutch grandparents are often tasked with caring for grandchildren.
  - 58% of children between 0-5 years old and 35% of children between 6 to 12 years old use informal care arrangements during a typical week (OCED,2019)
  - 60% of grandparents take care of at least one grandchild (OCED,2019)

Back

Context: Dutch Pension System (More Details) Back

- The state pension claiming age (SRA) was 65 in 2012 and is between $65 + 2m$ and $65 + 3m$ for the baseline sample. (Atav et al 2021)
  - The 2011 reform announced an increase in the SRA from 2013 onwards.
  - cohorts (12-1948 and **11-1949**) face SRA=65+2 months
  - cohorts (**11-1949** and 10-1950) face SRA=65+3 months
  - baseline sample: 04-1949 to 09-1950 (9 months before and after 01-1950)
  - sample period: (2009-2014)

- Occupational pension schemes: defined benefit type and fully funded.
  - Sector pensions are negotiated between unions and employer organizations at the sector or firm level and are usually set forth in collective agreements.

Empirical Strategy: Fuzzy RD Design

Back

The direct effect of the reform on grandmother's outcome y^{GM} :

$$y_i^{GM} = \alpha_0^{GM} + \alpha_1^{GM} D_i^{GM} + \alpha_2^{GM} r_i^{GM} + \alpha_3^{GM} D_i^{GM} \times r_i^{GM} + \delta^{GM} X_i + \epsilon_i^{GM} \quad (1)$$

The corresponding reduced form model for mother's outcome y^{M}:

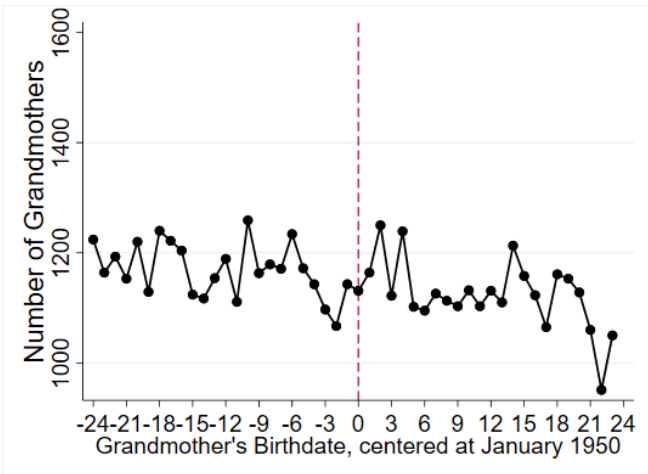
$$y_i^{M} = \alpha_0^{M} + \alpha_1^{M} D_i^{GM} + \alpha_2^{M} r_i^{GM} + \alpha_3^{M} D_i^{GM} \times r_i^{GM} + \delta^{M} X_i + \epsilon_i^{M} \quad (2)$$

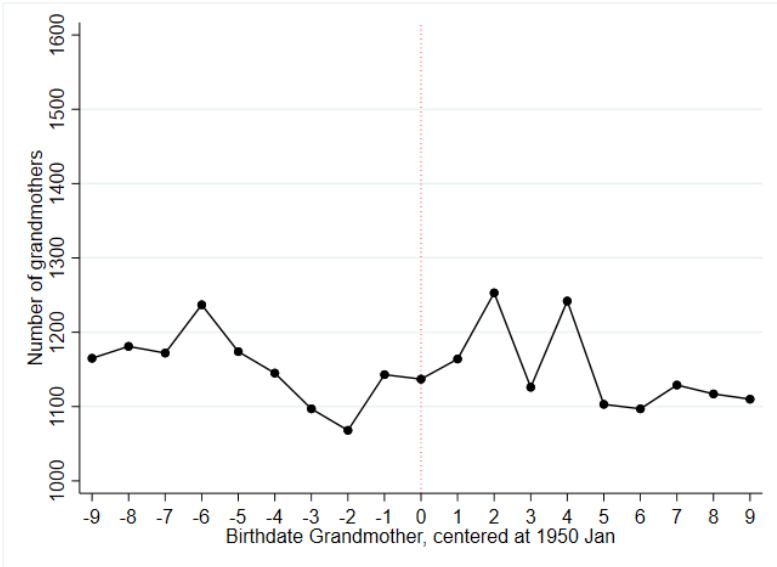
- $D_i^{GM} = 1$ if GM born since 1950; r_i^{GM}: GM's birth month centered.
- Assumptions: Density Smoothness in covariates
- Baseline specification: 8 months bandwidth, linear optimal bdw

Fuzzy RD (2SLS) : The local average effect of grandmother's labor supply on mother's labor supply is $\widehat{\beta_1} = \widehat{\alpha_1^M} \Big/ \widehat{\alpha_1^{GM}}$:

$$y_i^{M} = \beta_0 + \beta_1 \widehat{Y_i^{GM}} + \beta_2 r_i^{GM} + \beta_3 D_i^{GM} \times r_i^{GM} + \theta X_i + \eta_i \quad (3)$$

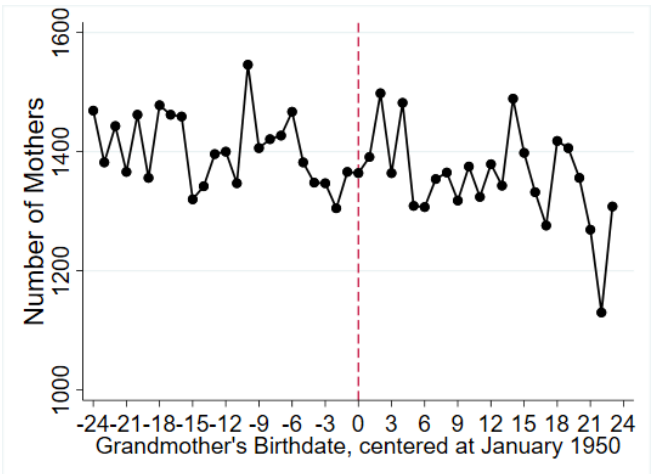
Assumption II: Density -Grandmothers

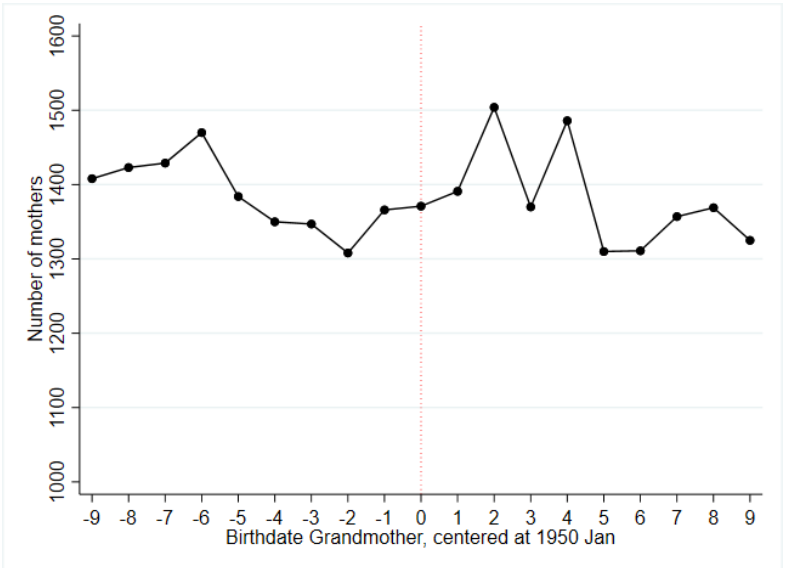




▸ Back1 ▸ Back2

Assumption II: Density- Mothers





▸ Back1 ▸ Back2

Assumption II: Covariates

Back1 Back2

	RD estimates (1)	RD estimates (2)	Mean at cutoff
Grandmothers' characteristics			
Age	0.044	0.027	62.934
	[0.031]	[0.051]	[1.144]
Number of adult children	0.055*	0.022	2.451
	[0.032]	[0.051]	[0.892]
Number of adult daughters	0.024	-0.003	1.712
	[0.027]	[0.043]	[0.761]
Prob (Employed)	-0.006	0.024	0.793
	[0.011]	[0.0174	[0.338]
Prob (Married)	-0.008	0.012	0.835
	[0.011]	[0.018]	[0.355]
Prob (Cohabit)	0.003	0.005	0.036
	[0.006]	[0.009]	[0.166]
Prob (Partner disabled)	0.016**	0.016	0.062
	[0.008]	[0.012]	[0.235]
Birthcohort of partner	0.093	-0.169	1947.50
	[0.129]	[0.214]	[3.849]
Obs. (Mothers)	23497	23497	4018
Obs. (Grandmothers)	19548	19548	
Polynomial	linear	quadratic	

Assumption II: Covariates cnt.

Back1 Back2

	RD estimates (1)	RD estimates (2)	Mean at cutoff
Mothers' characteristics			
Age	0.124	0.091	37.867
	[0.081]	[0.132]	[2.899]
Native	0.007	0.019*	0.953
	[0.006]	[0.010]	[0.211]
Birth cohort	-0.074	-0.065	1974.45
	[0.091]	[0.147]	[3.211]
Prob (Married)	0.006	-0.000	0.369
	[0.012]	[0.020]	[0.434]
Prob (Employed)	-0.005	-0.008	0.772
	[0.009]	[0.015]	[0.333]
Live in same municipality as GM	0.003	0.037*	0.552
	[0.013]	[0.021]	[0.461]
Age at first child birth	0.080	0.123	28.268
	[0.010]	[0.160]	[3.609]
Age of youngest child	-0.042	0.084	2.059
	[0.071]	[0.111]	[2.022]
Age of oldest child	-0.083	-0.086	3.790
	[0.117]	[0.190]	[3.164]
Number of children	0.002	-0.025	0.842
	[0.027]	[0.044]	[0.969]
Age of first employment	0.060	0.032	24.891
	[0.105]	[0.173]	[3.809]
Obs. (Mothers)	23497	23497	4018
Obs. (Grandmothers)	19548	19548	
Polynomial	linear	quadratic	

First stage: Grandmother's Labor Supply

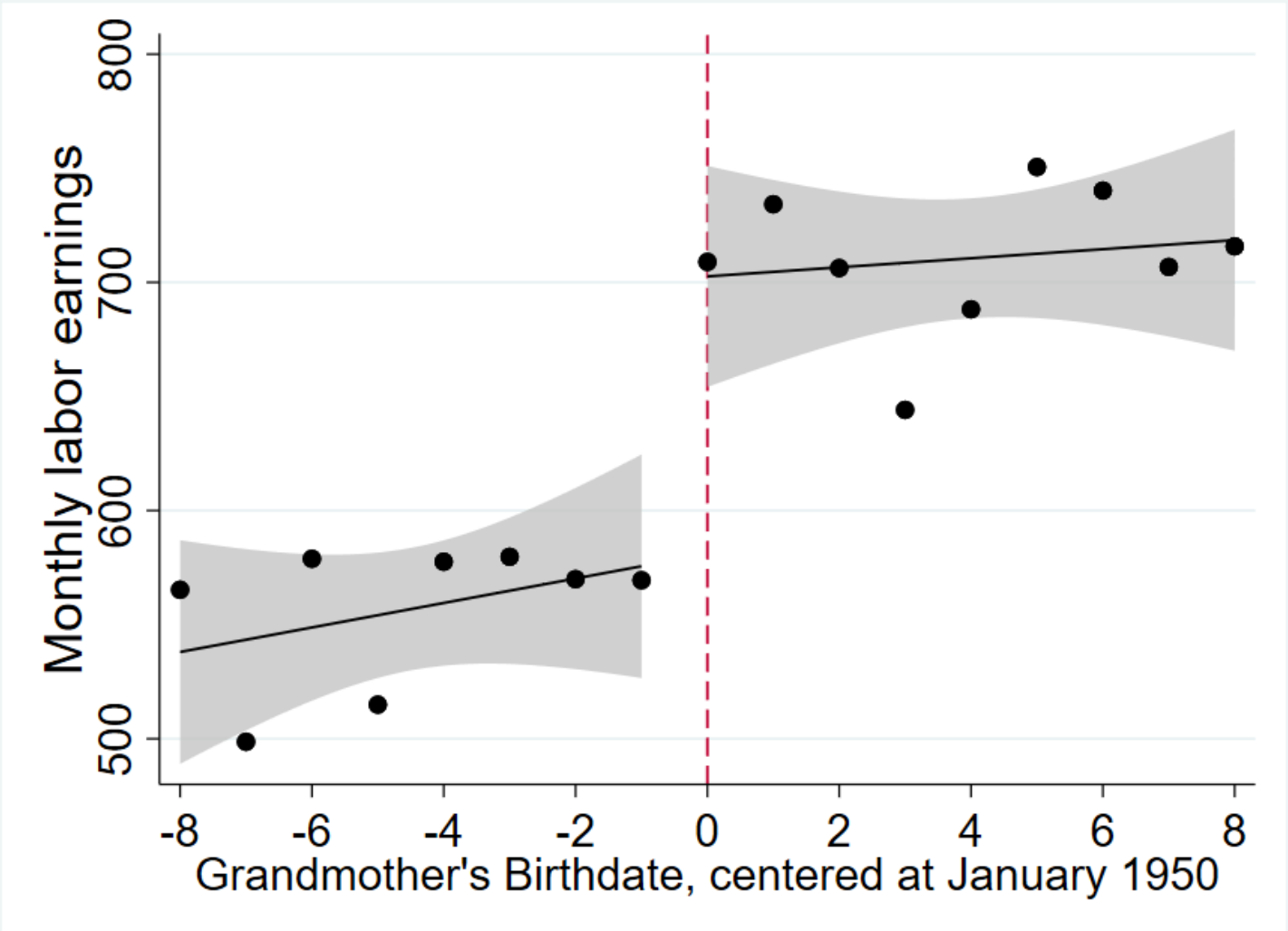
The reform induces grandmothers born after Jan. 1950 to work $\sim$ **6 hours** more per month between age 60 and 64.

	RD estimates (1)	(2)	(3)	Means at cutoff
First-Stage RD estimates				
Total monthly hours worked	6.801***	6.831***	6.174***	34.418
	[1.493]	[1.392]	[1.340]	[47.608]
Other labor supply measures:				
Prob (Employed)	0.063***	0.063***	0.054***	0.387
	[0.014]	[0.013]	[0.012]	[0.438]
Prob (Full-time employed)	0.007	0.006	0.007	0.054
	[0.006]	[0.006]	[0.006]	[0.202]
Obs. (Mothers)	23497	23497	23497	4005
Obs. (Grandmothers)	19548	19548	19548	
Controls	NO	YES	YES	
Sector FE	NO	NO	YES	

Note: *** p<0.01, ** p<0.05, * p<0.1.

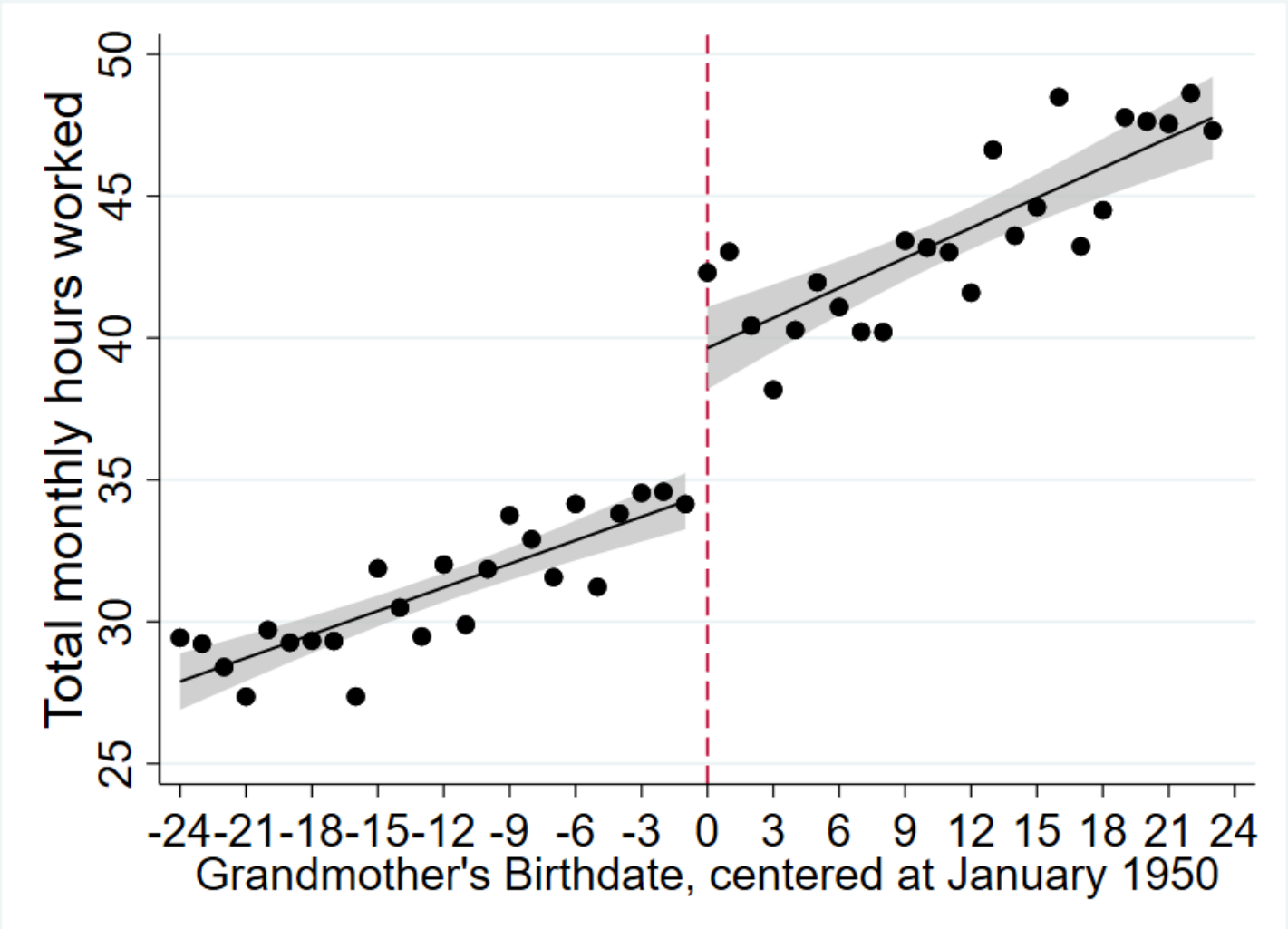
▸ More outcomes ▸ Back figure ▸ Main table

First stage: Grandmother's Monthly Labor Earnings



▸ Back

First stage: Grandmother's Monthly Hours Worked (24m)



▸ Back

First Stage: Grandmothers, More Outcomes

	RD estimates			Means at cutoff
	(1)	(2)	(3)	
First-Stage RD estimates				
Total monthly hours worked	6.801***	6.831***	6.174***	34.418
	[1.493]	[1.392]	[1.340]	[47.608]
Other labor supply measures:				
Prob (Employed)	0.063***	0.063***	0.054***	0.387
	[0.014]	[0.013]	[0.012]	[0.438]
Prob (Full-time employed)	0.007	0.006	0.007	0.054
	[0.006]	[0.006]	[0.006]	[0.202]
Other income measures:				
Monthly labor earnings	121.767***	123.340***	106.286***	573.065
	[27.798]	[26.076]	[24.961]	[887.669]
Monthly HH labor earnings	126.754**	142.272***	122.952**	1211.88
	[50.983]	[50.071]	[49.318]	[1647.46]
Monthly gross income	64.678	66.114*	45.148	1361.66
	[40.259]	[36.270]	[34.101]	[1304.62]
Monthly gross HH income	15.901	49.140	28.525	4082.91
	[66.725]	[64.097]	[62.482]	[2144.97]
Obs. (Mothers)	23497	23497	23497	4005
Obs. (Grandmothers)	19548	19548	19548	
Controls	NO	YES	YES	
Sector FE	NO	NO	YES	

Note: *** p<0.01, ** p<0.05, * p<0.1.

▸ Back FS ▸ Back Mech

First Stage: Grandfathers

	RD estimates (1)	(2)	(3)	Means at cutoff
First-Stage RD estimates				
Total monthly hours worked	28.058***	28.276***	26.233***	58.951
	[2.052]	[2.025]	[1.932]	[64.226]
Other labor supply measures:				
Prob (Employed)	0.151***	0.153***	0.137***	0.430
	[0.013]	[0.013]	[0.012]	[0.422]
Prob (Full-time employed)	0.144***	0.145***	0.137***	0.267
	[0.012]	[0.012]	[0.012]	[0.373]
Other income measures:				
Monthly labor earnings	728.209***	731.704***	683.573***	1303.44
	[54.897]	[54.178]	[52.019]	[1666.96]
Monthly gross income	388.721***	382.745***	355.081***	3826.74
	[60.231]	[59.366]	[55.937]	[1831.90]
Obs. (Grandfathers)	23609	23609	23609	4026
Controls	NO	YES	YES	
Sector FE	NO	NO	YES	

Note: *** p<0.01, ** p<0.05, * p<0.1.

Back

Mechanism: Grandfathers

Back

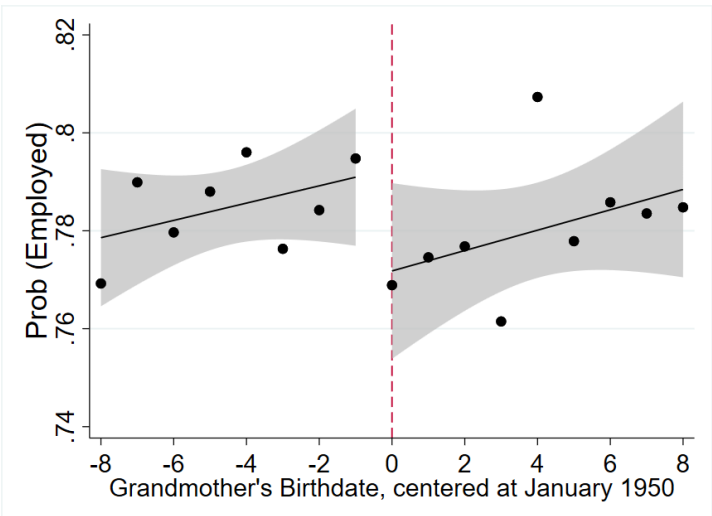
- Grandfather's labor supply is also impacted by the reform. first-stage
- Do adult daughters respond differently to grandfathers?
  - Previous studies show that grandmothers are more likely than grandfathers to be engaged in childcare activities (Jappens and Van Bavel, 2012; Janta, 2014)).
  - Grandfathers have **limited impacts** on daughters' labor supply.

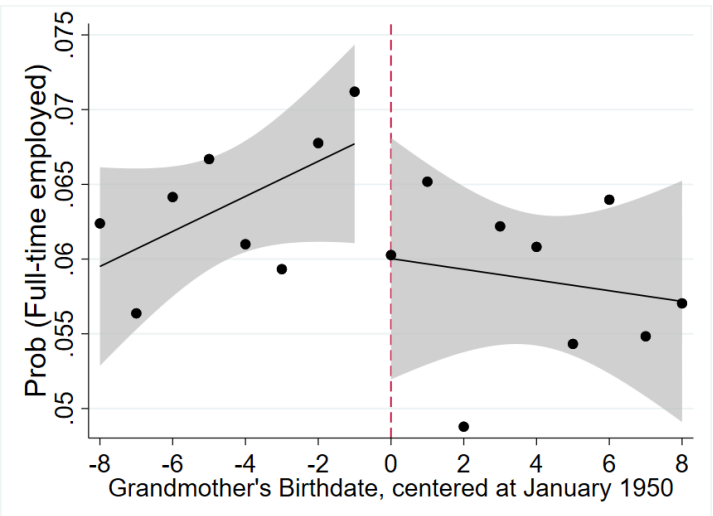
	Grandfathers'		Grandmothers'	
Family member	Partner	Daughter	Partner	Daughter
	(1)	(2)	(3)	(4)
Impact of grandparent's total monthly hours worked on family members' labor supply				
Total monthly hours worked	0.039	-0.066	-0.148	-0.465**
	[0.053]	[0.048]	[0.279]	[0.229]
Other labor supply measures:				
Prob (Employed)	0.000	-0.001**	-0.003	-0.003*
	[0.000]	[0.000]	[0.002]	[0.002]
Prob (Full-time employed)	0.000*	0.000	0.001	-0.001
	[0.000]	[0.000]	[0.002]	[0.001]
F-stat	172.10	184.31	20.40	21.22
Obs. (Partners/ Daughters)	19840	23609	16224	23497
Obs. (Grandparents)	19753	19766	16182	19548

Note: *** p<0.01, ** p<0.05, * p<0.1.

Reduced Form: Maternal Labor Supply

Back





Reduced-form: Mothers

Back

	RD estimates (1)	(2)	(3)	Means at cutoff
Mothers' labor supply outcomes				
Total monthly hours worked	-3.193**	-2.818**	-2.871**	78.876
	[1.300]	[1.259]	[1.259]	[47.744]
Other labor supply measures:				
Prob (Employed)	-0.021**	-0.019*	-0.020*	0.785
	[0.010]	[0.010]	[0.010]	[0.378]
Prob (Full-time employed)	-0.009	-0.009	-0.009	0.066
	[0.006]	[0.006]	[0.006]	[0.214]
N Mothers	23497	23497	23497	4018
N Grandmothers	19548	19548	19548	
Controls	NO	YES	YES	
Sect FE	NO	NO	YES	

Note: *** p<0.01, ** p<0.05, * p<0.1.

Reduced-form: Mothers by Age of the Youngest Child

Back

	Childcare need: more					none/ less	
	age of youngest child						
	0-3	4-7	8-10	11-12	8-12	13-18	no child
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A:	**First-stage: reform effects on Grandmothers**						
Total monthly hours worked	7.299***	6.386***	8.823***	6.377***	7.233***	6.429**	4.667**
	[1.332]	[1.455]	[2.003]	[2.372]	[1.879]	[2.682]	[1.863]
F-stat	30.01	19.25	19.40	7.23	14.82	5.75	6.27
Panel B:	**Impact on mothers' labor supply (reduced-form)**						
Total monthly hours worked	-0.026	-3.412**	-1.477	-2.4968	-2.966	0.757	0.213
	[1.1753]	[1.337]	[1.96]	[2.474]	[1.876]	[3.088]	[1.649]
Other labor supply measures							
Prob(Employed)	0.005	-0.022**	-0.017	-0.031	-0.025	-0.013	0.004
	[0.0088]	[0.011]	[0.016]	[0.020]	[0.015]	[0.024]	[0.009]
Prob(Full-time employed)	-0.009	-0.008	0.006	-0.009	-0.006	0.019	0.0055
	[0.007]	[0.006]	[0.009]	[0.011]	[0.008]	[0.015]	[0.016]
N Mothers	25450	20540	10343	6999	11378	4984	12289
N Grandmothers	20987	17519	9348	6476	10145	4584	10878

Note: *** p<0.01, ** p<0.05, * p<0.1.

Mechanism: Heterogeneity (Table)

Back

Subgroups	Grandmother's partner is		Grandmother's residence municipality is		Number of maternal grandchildren aged 4-7	
	unhealthy	healthy	different	same	only one	more or none
	(1)	(2)	(3)	(4)	(5)	(6)
Impact on mothers' labor supply						
Total monthly hours worked	-0.051	-0.535**	-0.162	-0.820**	-0.829*	-0.321
	[0.499]	[0.257]	[0.251]	[0.413]	[0.459]	[0.259]
test p-value	0.386		0.170		0.335	
Other labor supply measures:						
Prob (Employed)	0.003	-0.004**	-0.000	-0.007**	-0.007*	-0.001
	[0.005]	[0.002]	[0.002]	[0.003]	[0.004]	[0.002]
test p-value	0.160		0.082		0.183	
Prob (Full-time employed)	-0.004	-0.001	-0.000	-0.002	-0.001	-0.002
	[0.003]	[0.001]	[0.001]	[0.002]	[0.002]	[0.001]
test p-value	0.438		0.281		0.818	
F-stat	3.34	17.45	15.48	9.63	7.90	13.75
Obs. (Mothers)	1761	21734	10385	13112	7452	16045

Note: *** p<0.01, ** p<0.05, * p<0.1.

Mechanism: Other Family Members

Back

	Youngest child aged 4-12			
Grandmothers' family member:	Daughters	Sons-in-law	Sons	Daughters-in-law
	(1)	(2)	(3)	(4)
Impact on family members' labor supply				
Total monthly hours worked	-0.465**	0.648**	0.581	-0.038
	[0.229]	[0.310]	[0.407]	[0.290]
Other labor supply measures:				
Prob (Employed)	-0.003*	0.004**	0.002	-0.001
	[0.002]	[0.002]	[0.002]	[0.002]
Prob (Full-time employed)	-0.001	0.002	0.002	-0.000
	[0.001]	[0.002]	[0.003]	[0.001]
HH labor income	14.491		14.886	
	[11.685]		[14.154]	
F-stat	21.22	22.09	10.87	11.59
Obs. (Family members)	23497	21530	16773	16531
Obs. (Grandmothers)	19548	18128	14374	14192

Mechanism: Sons-in-law by Age of the Youngest Child

Back

		Youngest child aged		
	No child	0-3	4 - 12	12 - 18
	(1)	(2)	(3)	(4)
Impact of GM's total monthly hours worked				
Total monthly hours worked	-1.0609	0.4438*	0.7832**	0.0527
	[1.0189]	[0.2649]	[0.3150]	[0.4016]
Other labor supply measures:				
Prob(employed)	-0.0059	0.0028*	0.0048***	0.0005
	[0.0056]	[0.0015]	[0.0018]	[0.0022]
Prob(full-time employed)	-0.0043	0.0016	0.0028	0.0001
	[0.0059]	[0.0018]	[0.0019]	[0.0025]
Monthly labor earnings	21.4635	22.610**	24.1912**	-2.7890
	[25.9720]	[9.5936]	[10.3881]	[11.8668]
Hourly wage rate	0.2509	0.1731***	0.1393**	-0.0096
	[0.2158]	[0.0636]	[0.0641]	[0.0749]
Monthly HH labor income	27.8880	21.4635**	14.4906	-2.7842
	[24.1605]	[9.6967]	[11.6851]	[18.1212]
F-stat	4.5961	29.0689	22.0845	8.1715
Obs. Sons-in-law	11041	24582	21530	4094
Obs. Grandmothers	9882	20352	18128	3812

Fertility Outcomes

▸ Back Main ▸ Back Rob

Fertility decisions are not affected by grandmothers' retirement incentive.

	RD estimates (1)	RD estimates (2)	Mean at cutoff
Mothers' fertility outcomes			
Prob (Ever child)	0.002	0.004	0.768
	[0.006]	[0.009]	[0.422]
Prob (At least 2 children)	-0.007	-0.007	0.611
	[0.007]	[0.011]	[0.488]
Total number of children	-0.003	-0.002	1.610
	[0.016]	[0.026]	[1.147]
Age at first birth	0.018	-0.052	29.309
	[0.072]	[0.117]	[4.430]
Age at last birth	-0.052	-0.104	32.685
	[0.063]	[0.103]	[4.059]
Average agegap of children	-0.023	0.020	3.092
	[0.030]	[0.050]	[1.763]
Average agegap after GM age 55	-0.060	0.000	3.264
	[0.040]	[0.065]	[2.045]
Prob (First child after GM age 55)	-0.001	-0.004	0.470
	[0.007]	[0.011]	[0.499]
Obs. (Mothers)	100369	100369	16923
Obs. (Grandmothers)	69628	69628	
Polynomial	linear	quadratic	

Robustness: Varying Polynomial Orders

Back

Outcomes	poly	estimates	AIC	BIC	AICc	Obs
Impact of GM's total monthly hours worked						
Total monthly hours worked	1	-0.4649**	251525	251638	251526	23497
		[0.2292]				
	2	-0.8500*	259250	259379	259250	23497
		[0.4729]				
Other labor supply measures:						
Prob(employed)	1	-0.0032*	23495	23608	23495	23497
		[0.0018]				
	2	-0.0042	25453	25582	25453	23497
		[0.0032]				
Prob(full-time employed)	1	-0.0014	-5550	-5437	-5550	23497
		[0.0010]				
	2	-0.0020	-3550	-3421	-3550	23497
		[0.0018]				

Robustness: Varying Bandwidth Choices

Back

	Bandwidth					
	6 months	9 months	12 months	15 months	18 months	24 months
Impact of GM' monthly total working hours						
Monthly hours worked	-0.6433**	-0.4205**	-0.4098**	-0.2782	-0.2420	-0.2584*
	[0.2985]	[0.2130]	[0.2073]	[0.2123]	[0.1852]	[0.1397]
Other labor supply measures:						
Prob(employed)	-0.0037*	-0.0029*	-0.0032*	-0.0021	-0.0019	-0.0020*
	[0.0022]	[0.0017]	[0.0016]	[0.0017]	[0.0015]	[0.0011]
Prob(Fulltime)	-0.0015	-0.0014	-0.0017*	-0.0013	-0.0011	-0.0010
	[0.0012]	[0.0009]	[0.0009]	[0.0010]	[0.0008]	[0.0006]
Fstat	14.5767	23.3649	24.6139	20.8755	26.6658	43.9668
N Mothers	17930	26221	34592	42880	51305	66252

Optimal Bandwidth Choices

Back1 Back2

Outcomes	Poly	estimates	s.e.	optimal BW	Obs
Impact of GM's total monthly hours worked on mothers' labor supply					
Total monthly hours worked	1	-0.645**	[0.285]	7.252	20711
	2	-0.822**	[0.404]	9.986	26221
Other labor supply measures:					
Prob (Employed)	1	-0.004*	[0.002]	7.698	20711
	2	-0.004*	[0.003]	10.942	29142
Prob (Full-time employed)	1	-0.002	[0.001]	8.780	23497
	2	-0.002	[0.002]	10.091	29142
			Average of optimal BW	9.1248	
			Average of optimal BW (linear)	7.9099	
			Average of optimal BW (quadratic)	10.3398	

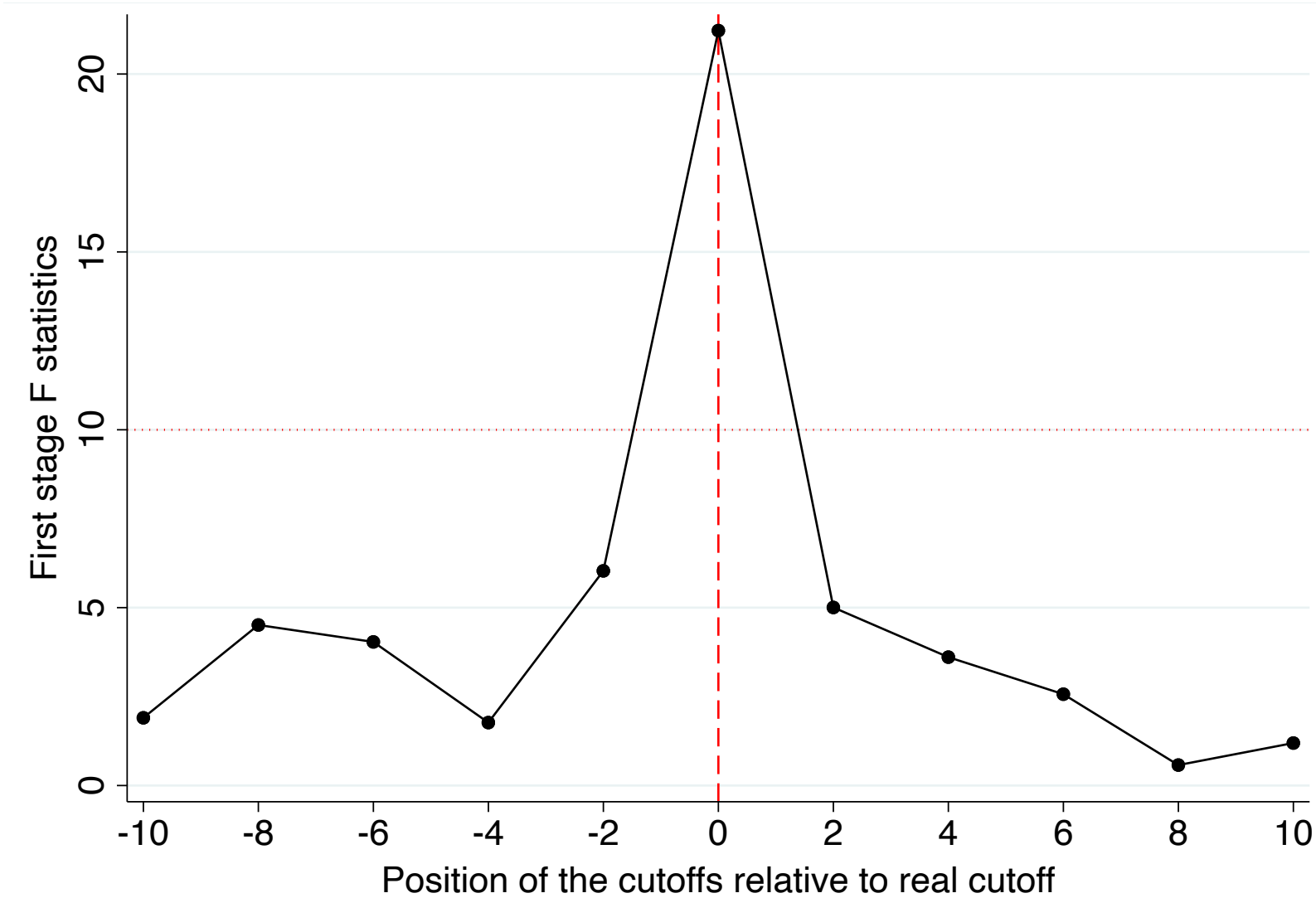
Placebo Cutoffs

Back

Distance to actual cutoff	-10 (1)	-8 (2)	-6 (3)	-4 (4)	-2 (5)	0 (6)	2 (7)	4 (8)	6 (9)	8 (10)	10 (11)
Mothers' labor supply outcomes											
Total monthly hours worked	0.774	-0.357	0.305	0.088	1.139	-2.871**	-0.84	1.670	1.581	-0.156	-0.594
	[1.243]	[1.235]	[1.234]	[1.245]	[1.253]	[1.259]	[1.247]	[1.255]	[1.266]	[1.285]	[1.284]
Other labor supply measures:											
Prob (Employed)	0.007	0.001	0.005	-0.003	0.001	-0.020*	0.002	0.021	0.005	-0.005	-0.002
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
Prob (Full-time employed)	0.004	0.002	0.007	-0.001	0.006	-0.009	-0.011	-0.0000	0.009	0.006	-0.003
	[0.005]	[0.006]	[0.005]	[0.006]	[0.006]	[0.006]	[0.005]	[0.005]	[0.005]	[0.006]	[0.006]
Obs. (Mothers)	23853	23643	23753	23861	23730	23497	23342	23196	23333	23392	23331

Placebo Cutoffs F-stats

Back



Placebo Tests: Deceased Grandmothers

Back

	RD estimates (1)	(2)	Mean at cutoff
Mothers' labor supply outcomes			
Total monthly hours worked	0.415	0.161	68.467
	[4.923]	[4.827]	[49.236]
Other labor supply measures:			
Prob (Employed)	-0.001	-0.005	0.699
	[0.042]	[0.041]	[0.421]
Prob (Full-time employed)	0.006	0.005	0.055
	[0.019]	[0.019]	[0.193]
N Mothers	1858	1858	312
Controls	NO	YES	

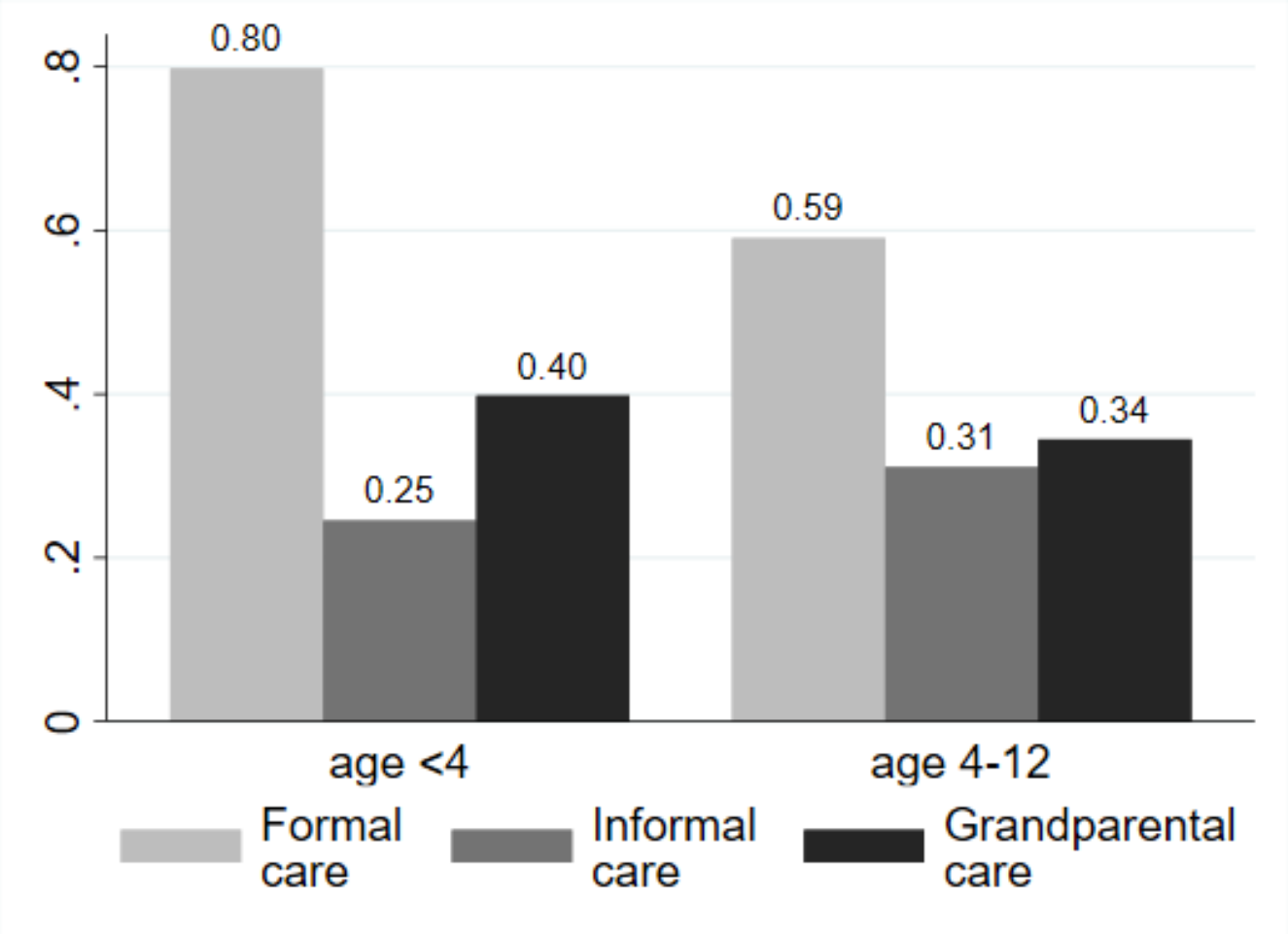
Sample Selection

Back

Restrictions by Grandmothers' characteristics			
Step 1: reform relevance			
Exit labor force before age 50	-0.000	0.001	0.385
	[0.009]	[0.015]	[0.487]
Obs. Mothers	72924	72924	12307
Obs. Grandmothers	54912	54912	
Step 2: alive during treatment period			
Dead before age 65	0.001	0.002	0.023
	[0.004]	[0.006]	[0.148]
Obs. Mothers	44903	44903	7564
Obs. Grandmothers	34085	34085	
Step 3: health status/ relevance for care responsibility			
Claim disability before age 55	0.001	-0.001	0.081
	[0.007]	[0.011]	[0.272]
Obs. Mothers	43810	43810	7394
Obs. Grandmothers	33253	33253	
Restrictions by Mothers' characteristics			
Step 4: Keep by family situation of mother			
Have a family	-0.002	-0.003	0.923
	[0.005]	[0.008]	[0.216]
Obs. Mothers	40160	40160	6799
Obs. Grandmothers	30447	30447	
Step 5: Keep by relevance of child care			
Youngest 4-12 sample	-0.011	0.005	0.603
	[0.011]	[0.018]	[0.489]
Obs. Mothers	39293	39293	6663
Obs. Grandmothers	29921	29921	
Baseline Sample			
Obs. Mothers		23497	
Obs. Grandmothers		19548	
Polynomial	linear	quadratic	

Child care modes

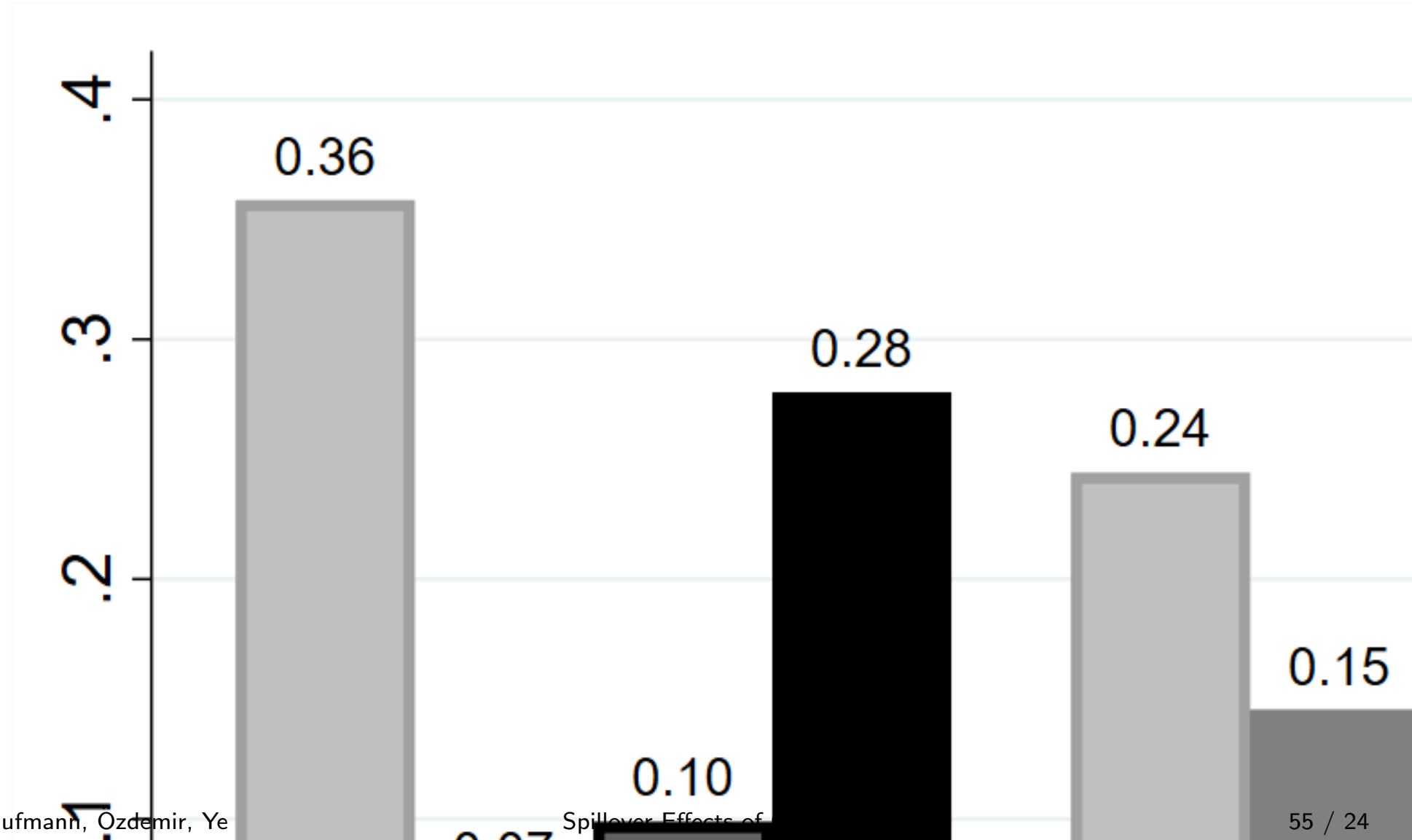
Child care modes of parents in LISS (Wave I, 2008)



▸ back

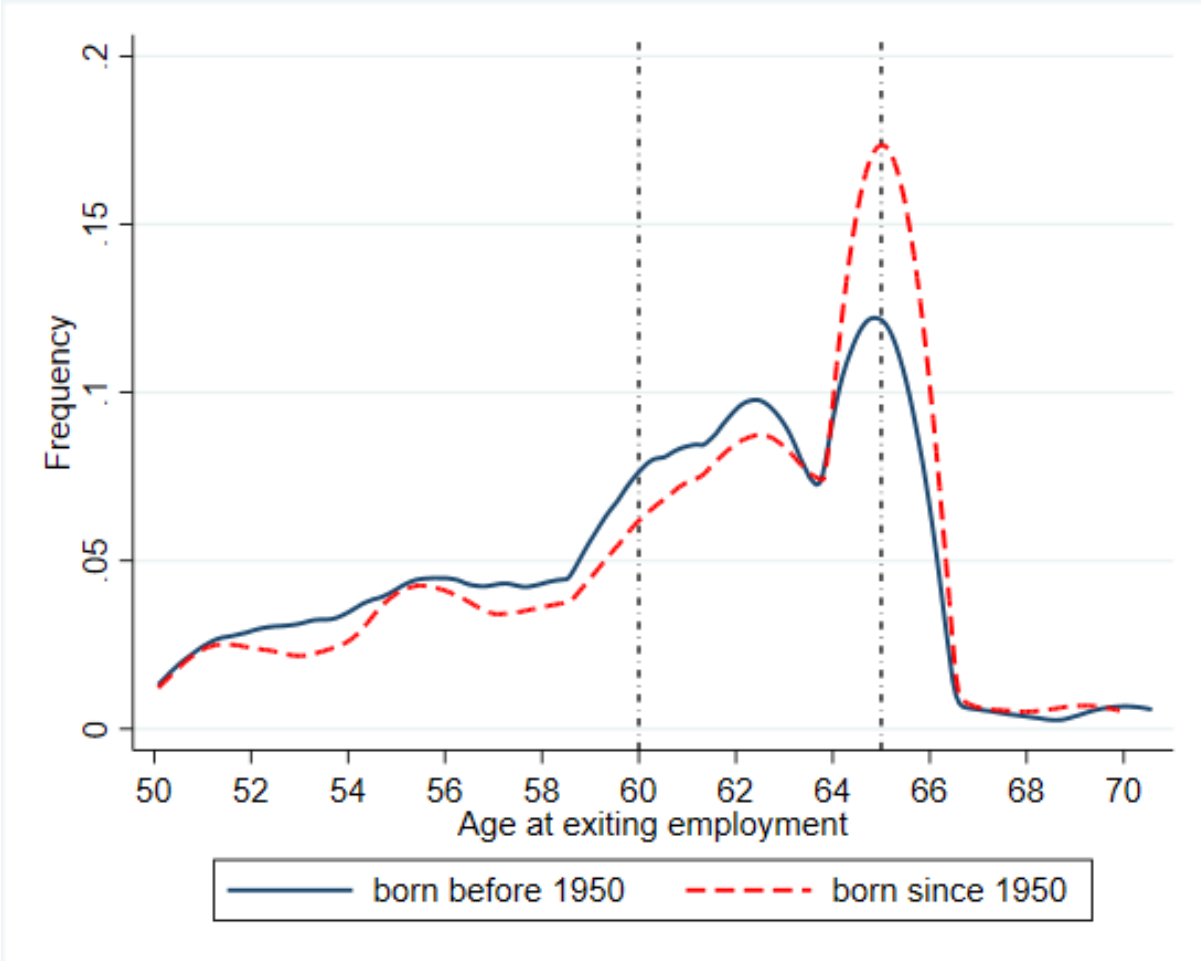
Child care modes

Child care modes of parents in LISS (Wave I, 2008)



Distribution of age at exiting employment for women by treatment status

Back



Notes: Figure A1 shows the distribution of age at exiting employment for the cohorts born before and since 1950 in baseline sample (i.e., 8 months around the cutoff). We can clearly see a shift towards later retirement for the treated cohorts.
Source: Authors' calculations from the CBS data.

Assumption Children: Covariates

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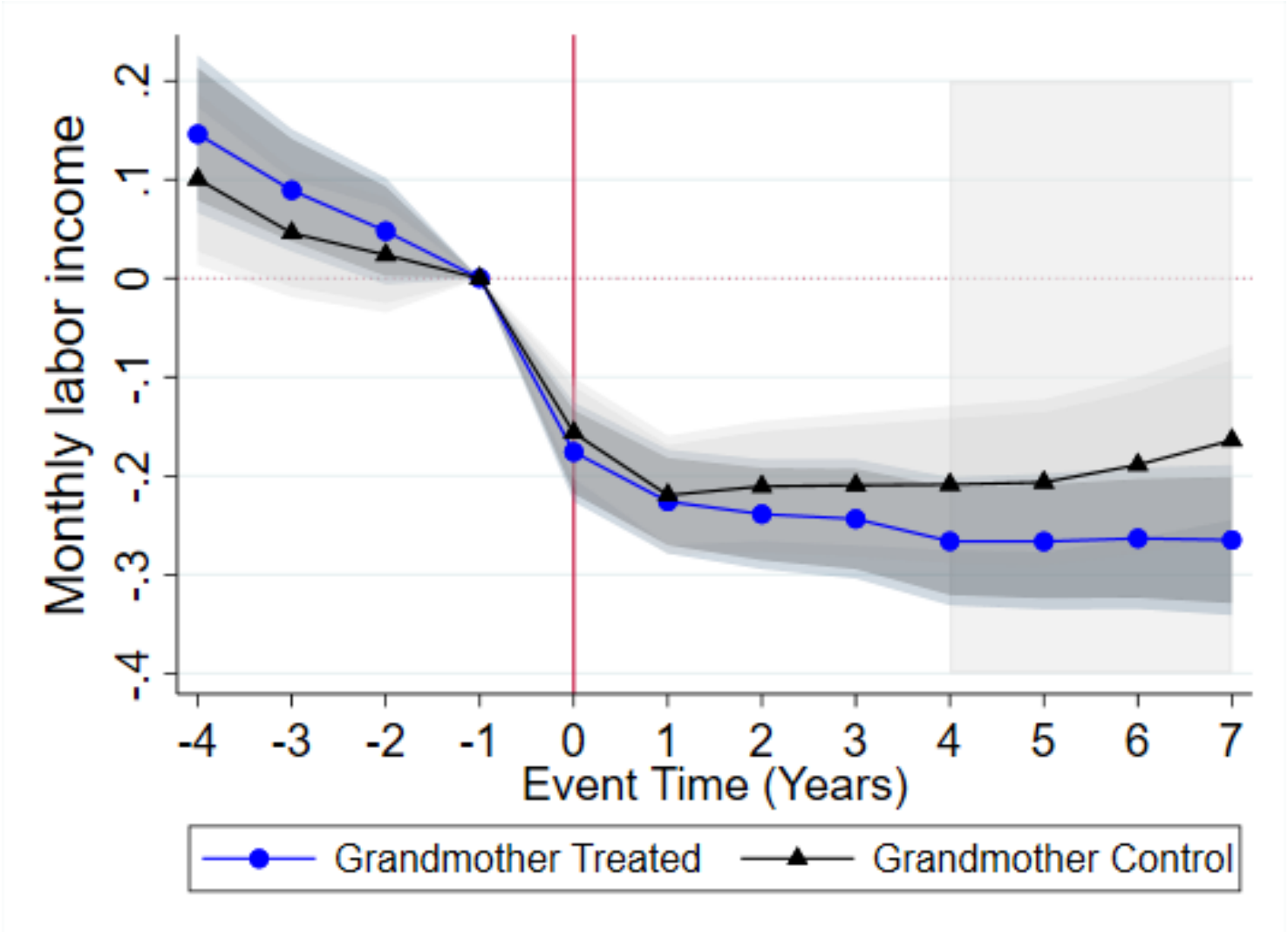
	RD estimates (1)	RD estimates (2)	Mean at cutoff
Birth month	0.026	0.130	6.565
	[0.156]	[0.250]	[3.375]
Birth year	-0.062	-0.003	2003.35
	[0.113]	[0.186]	[2.437]
Girl	0.028	0.008	0.500
	[0.023]	[0.037]	[0.500]
Children in Household	-0.030	-0.039	2.029
	[0.035]	[0.058]	[0.736]
Birthorder	-0.036	-0.064	1.978
	[0.033]	[0.054]	[0.707]
Prob (First-born child)	0.018	0.044	0.231
	[0.019]	[0.030]	[0.422]
Prob (Parents married)	0.003	-0.041	0.540
	[0.020]	[0.034]	[0.445]
Live is same municipality as GM	-0.002	-0.004	0.554
	[0.021]	[0.034]	[0.467]
Parents' age difference	-0.279	-0.196	2.954
	[0.183]	[0.293]	[3.794]
High SES (disp. income GM)	-0.035	-0.005	0.403
	[0.022]	[0.036]	[0.491]
Age of mother (when GM aged 60-64)	0.075	0.014	38.391
	[0.125]	[0.205]	[2.755]
Native mother	0.013	0.049***	0.945
	[0.010]	[0.017]	[0.227]
Number of aunts and uncles	0.054	-0.065	2.441
	[0.044]	[0.069]	[0.896]
Number of aunts	0.053	-0.076	1.702
	[0.037]	[0.056]	[0.769]
Mother's age first child	0.183	0.350	27.312
	[0.152]	[0.243]	[3.449]
Obs. Children	8436	8436	1521
Obs. Mothers	8221	8221	
fit	linear	quadratic	

Dynamic Effects on Earnings: Treatment by Gender



Child Penalty in Earnings: Gender by Treatment

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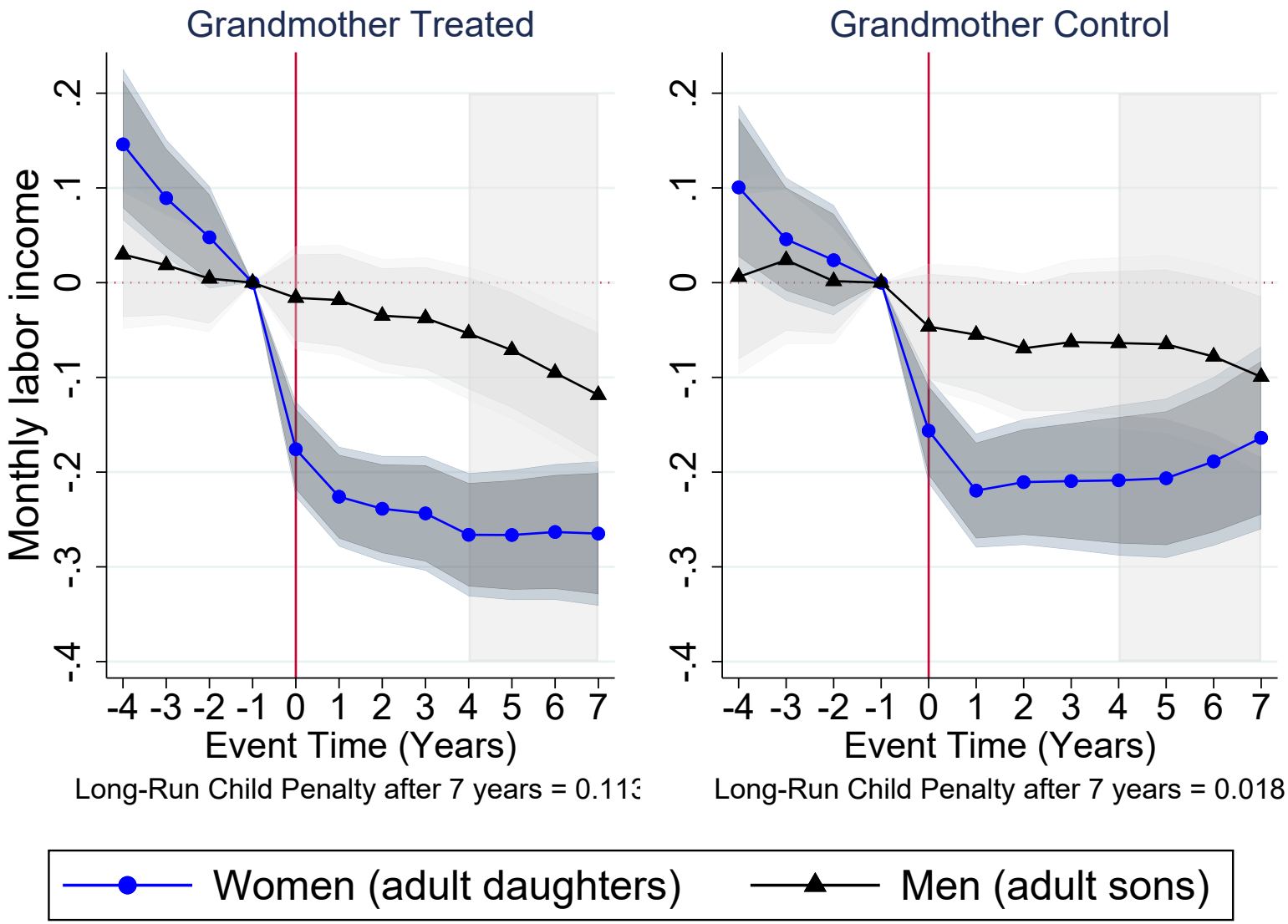

Dynamic Effects on Hours Worked: Treatment by Gender

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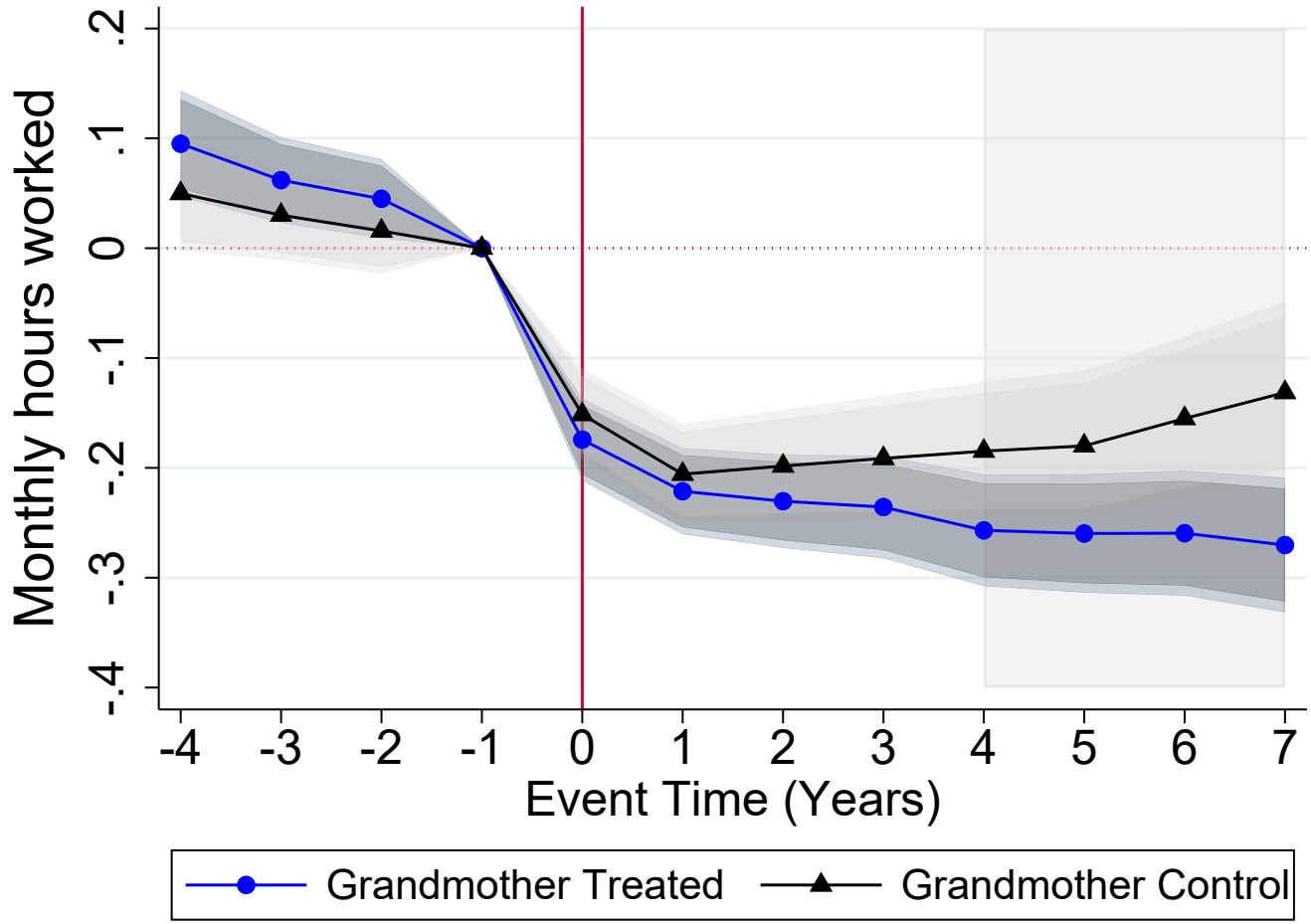
Women with treated grandmothers recover more slowly than do women with untreated grandmothers.



Note: We focus on women and men with only one child.

Children's Outcomes: Childcare Takeup

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- Decreases in care for children aged 4 to 7 $\Rightarrow$ substitution from grandmaternal care and formal daycare hours to maternal care.
- Increase in care for children aged 11-12 $\Rightarrow$ substitution away from grandmother supervision towards after-school care (maybe not fully).

RD estimates	Daycare		Out-of-school care		N
	Prob. (1)	Hours (2)	Prob. (3)	Hours (4)	(mothers)
Age between 4-7	-0.007	-5.934*	-0.009	1.301	18683
	[0.006]	[3.051]	[0.014]	[6.807]	
Means at cutoff	0.092	38.847	0.321	122.516	
Age between 8-10	-	-	0.014	10.677	10243
			[0.015]	[7.193]	
Means at cutoff	-	-	0.180	66.916	
Age between 11-12	-	-	0.021*	8.850*	5292
			[0.011]	[4.931]	
Means at cutoff	-	-	0.048	16.114	