The Effect of Pension Subsidies on the Retirement Timing of Older Women

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Teaching Materials

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Motivations

- Old-age poverty is an important concern for elderly women
  - Stems from lower pension benefits
    - ★ In Germany the public pension benefits of an average woman are only about half those of an average man.

- Policymakers face an important trade-off: how to provide old-age income support without further eroding incentives to work.
  - Especially salient for women
    - ★ experience low pensions partly because of low life cycle labor force participation.

- How additional pension benefits affect workers' retirement timing is understudied.(Krueger and Pischke (1992), Puhani and Tabbert (2011), Manoli and Weber(2016), Gelber, Isen, and Song (2016))

  - Difficulty of isolating exogenous variations in the parameters of the public pension system (Blundell et al. (2016), Cribb et al.(2016))

This Paper: Effect of Pension Subsidies

- I explore a pension subsidy program for low pay workers in Germany, implemented in 1992.
  - The subsidy size is predetermined.
  - The subsidy size has a kinked relationship with average wage before 1992.
  - The statutory retirement age is unchanged.

- Three main outcomes:
  - age at claiming pension, age at exiting employment and bridge activities.

- **Contributions**
  - A novel and transparent setting
    - ⋆ Isolate the impact of changes in pension benefits (no other simultaneous changes)
  - Labor supply elasticity for low-income older women (Lalive and Staubli (2015), Finkelstein et al. (2016), Gelber et al. (2016), Engels, Geyer and Haan (2017)).

Preview of Results

- Large impacts on age at claiming pension.
  - A €100 increase of monthly pension benefits ($\sim$ 17% increase) induces female recipients to claim pension 6 months earlier.
- The impact on age at exiting employment has similar magnitude but is insignificant.
- Recipients adjust labor supply by using unemployment insurance (UI) as a stepping stone to retirement and by reducing time spent in marginal employment.
- The total fiscal cost of this pension subsidy program is relatively small compared to other progressive programs.

Context: Germany Pension System

Germany has a pay-as-you-go compulsory public pension system.

- Replaces 50% of pre-retirement wage on average
- Retirement age via old age pension for women: 60
- Pension benefit level takes into account the entire earnings history. One more year of contribution at average wage will credit 1 earnings point (EP) to his/her pension account. ▸ Detailed formula
  - Workers with short contribution years or low relative wage incomes are more likely to face old age poverty.
- Information salience: letters with detailed pension information (Dolls, Döerrenberg, Peichl and Stichnoth (2018)).

Context: Pension Subsidy to Low-pay Workers

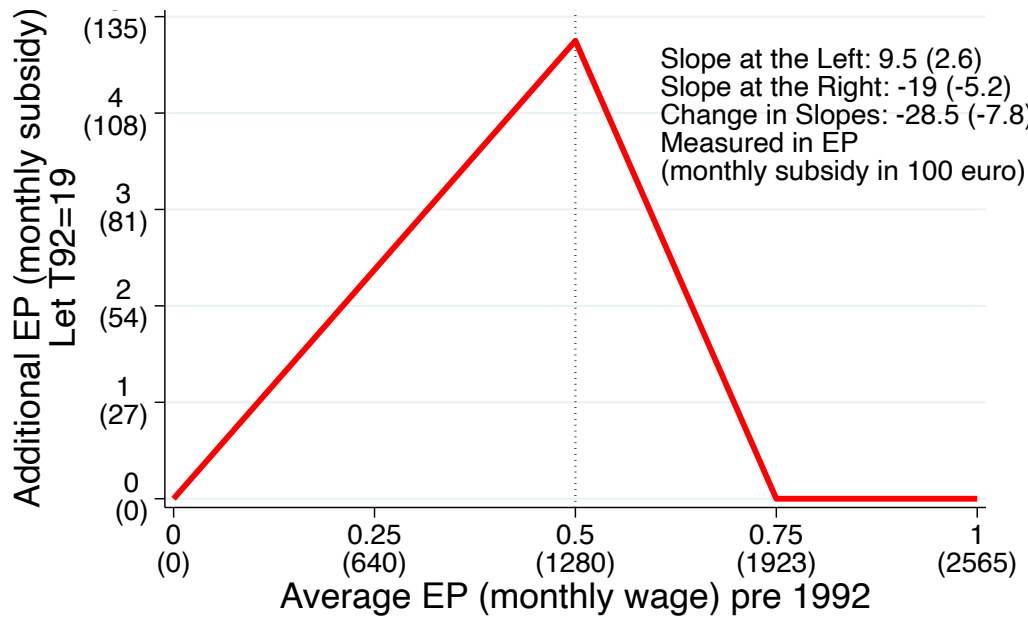
Mindestentgeltpunkte bei geringem Arbeitsentgelt (SGBVI §262)

▸ More details

$$Subsidy = min\left(0.5 * \sum_{t<92} EP_t \ , \ 0.75\,T_{pre92} - \sum_{t<92} EP_t\right)$$

The subsidy size has a kinked relationship with aep_{92}.

$$Subsidy = \begin{cases} 0.5 \times \sum_{t<92} EP_t & , aep_{92} \leq 0.5 \\ 0.75\,T_{92} - \sum_{t<92} EP_t & , 0.5 \leq aep_{92} \leq 0.75 \\ 0 & , aep_{92} > 0.75 \end{cases}$$



Context: Pension Subsidy to Low-pay Workers

Policy consideration:

- to ensure adequate old-age income
- reward people work with low income rather than people do not work at all

Eligibility criteria (I only focus on recipients in this study):

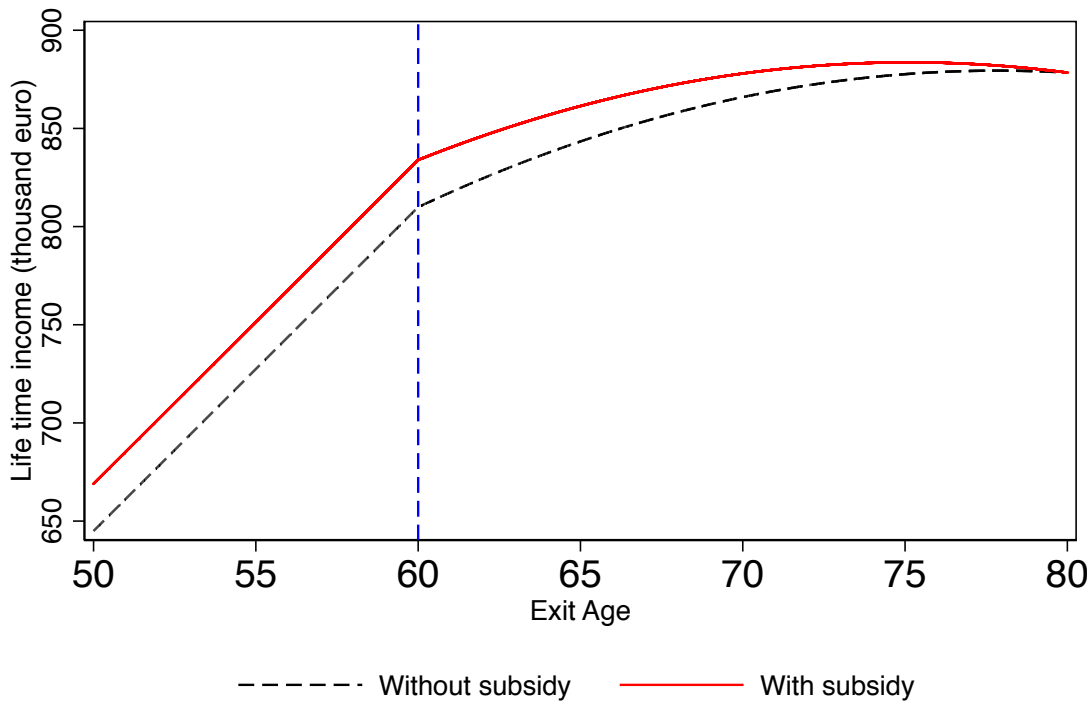
- individuals with long pension contribution history (creditable year $\geq$ 35)
- workers with low wages (at the bottom 37.5 percentile of the income distribution both at retirement and before 1992.)

Magnitude:

- Average subsidy size is around €90/month ($\sim$ 15% increase)
- Around 14% of pensioners are subsidy recipients in 2015 (4% male, 26% female)
- The total payments were approximately €3 billions in 2015

Illustration of Lifetime Budget

- Wealth effect (level up) + Substitution effect (slope change, very small) $\rightarrow$ Retire/Claim earlier



Data and Sample Selection

The Pension Insurance Account (SUFVSKT): The main dataset is assembled from 13 years of cross-sectional waves(2004 to 2017).

- 20% of all active public pension insurers in Germany.
- Each wave contains around 240,000 individuals, among which around 32,000 are subsidy recipients.
- Time-invariant information: gender, total EPs, birth month, retirement age, etc.
- Biographical information: employment status, EPs in each month, construct age at exiting employment.

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- 20% of all active public pension insurers in Germany.
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Baseline Sample:

- At least 63 years old in the sample year
- Recipients, Female, West Germans
- 30,172 individuals (covers cohorts 1935 to 1951)

Empirical Strategy: Regression Kink Design

Examines the **induced change in the slope** of the relationship between Y and the assignment variable (r) at the kink.(Nielsen et al. (2010), Landais (2015), Card et al. (2015, forthcoming))

Fuzzy RKD

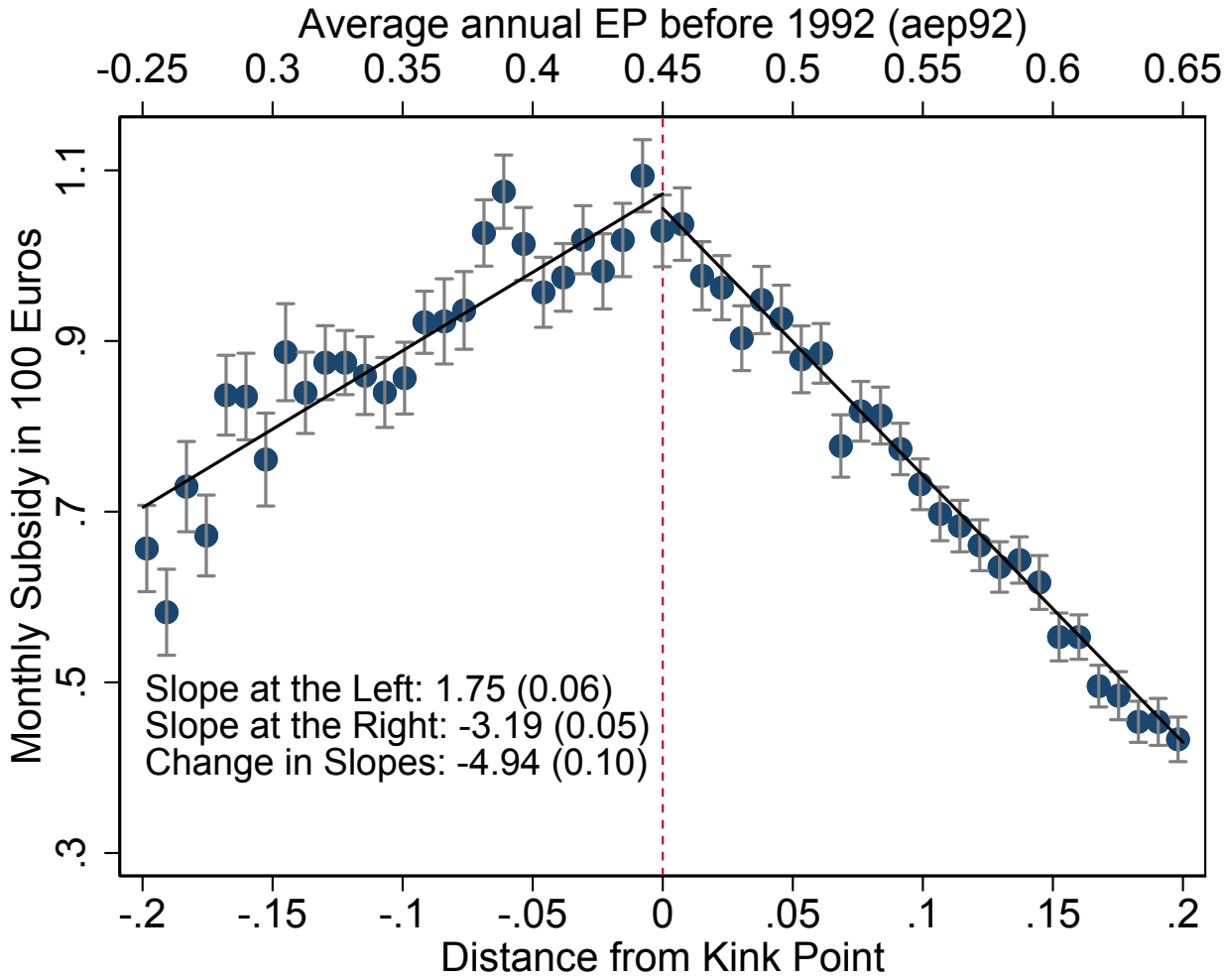
The local average treatment effect of subsidy B on Y at the kink is $\frac{dY}{dB} = \frac{\delta_Y}{\delta_B}$:

$$\begin{cases} B_i = \gamma_{b0} + \delta_B D_i * r + \gamma_{b1} r + \gamma_{b2} X_i + \epsilon_{bi} \\ Y_i = \gamma_{y0} + \delta_Y D_i * r + \gamma_{y1} r + \gamma_{y2} X_i + \epsilon_{yi} \end{cases}$$

$$\text{, where } D_i = 1 \text{ if } r > 0, r = aep_{92} - kink$$

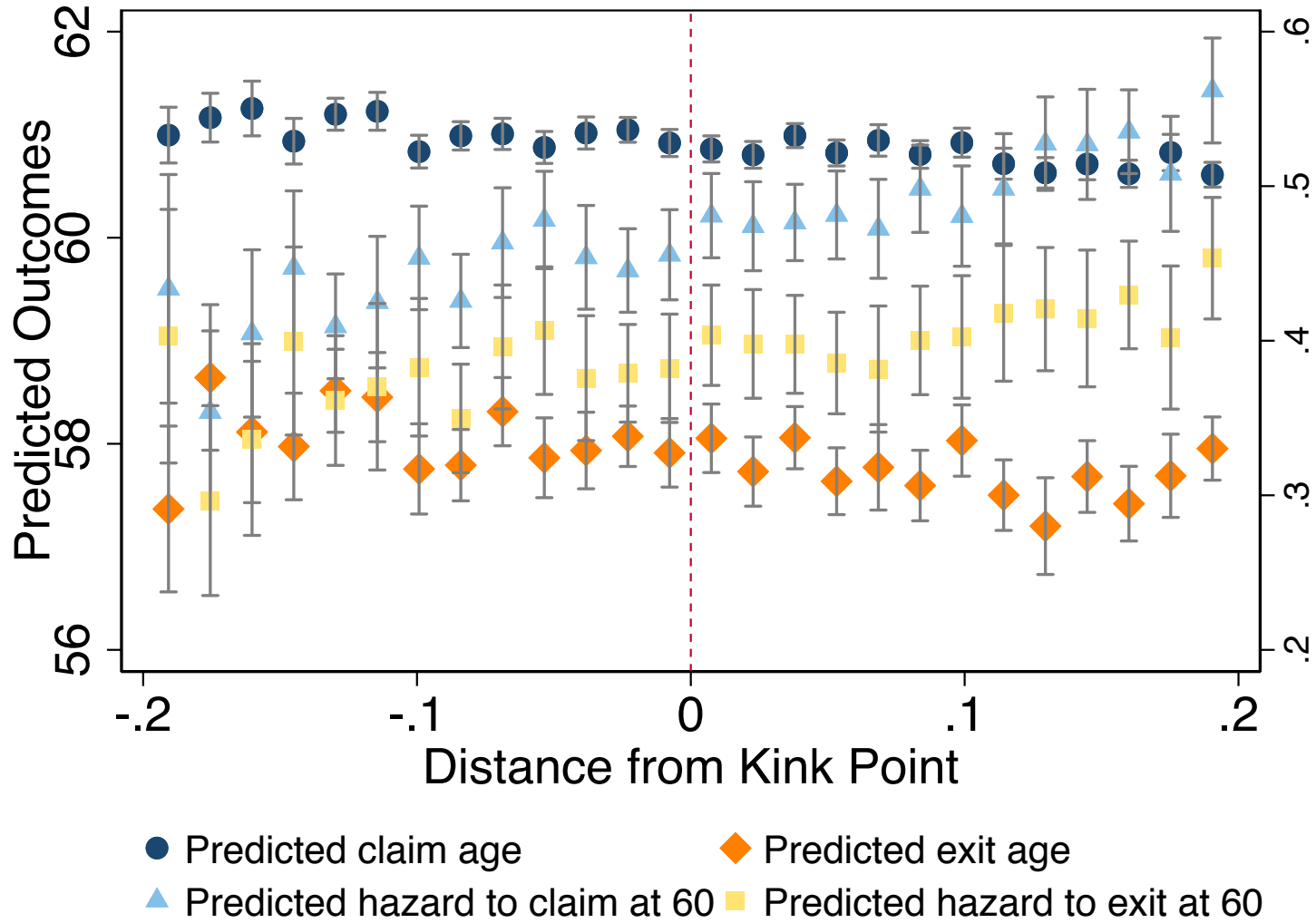
- $|r| \leq h = 0.2$, where h is the baseline bandwidth size.
- Controls for age at first birth, number of children, social economics history before 1992, cohort fixed effect, etc.

First Stage: Actual Subsidy Size (δ_B)



Bin size:0.007625 aep92 ($\sim$ 20 euros) The corresponding slope change when subsidy is measured in earnings points is -19.9, from 6.9 to -12.9

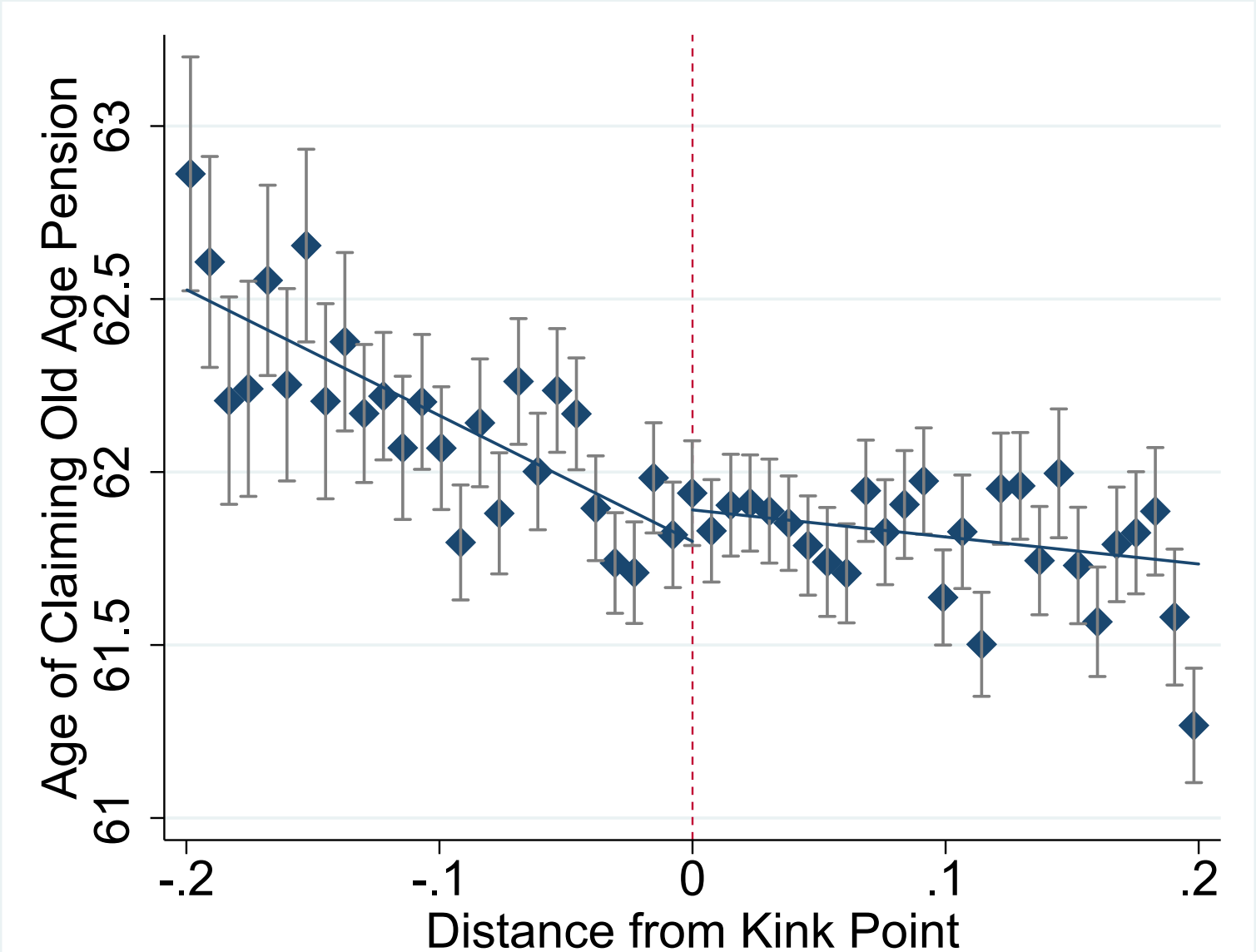
Predetermined Covariates



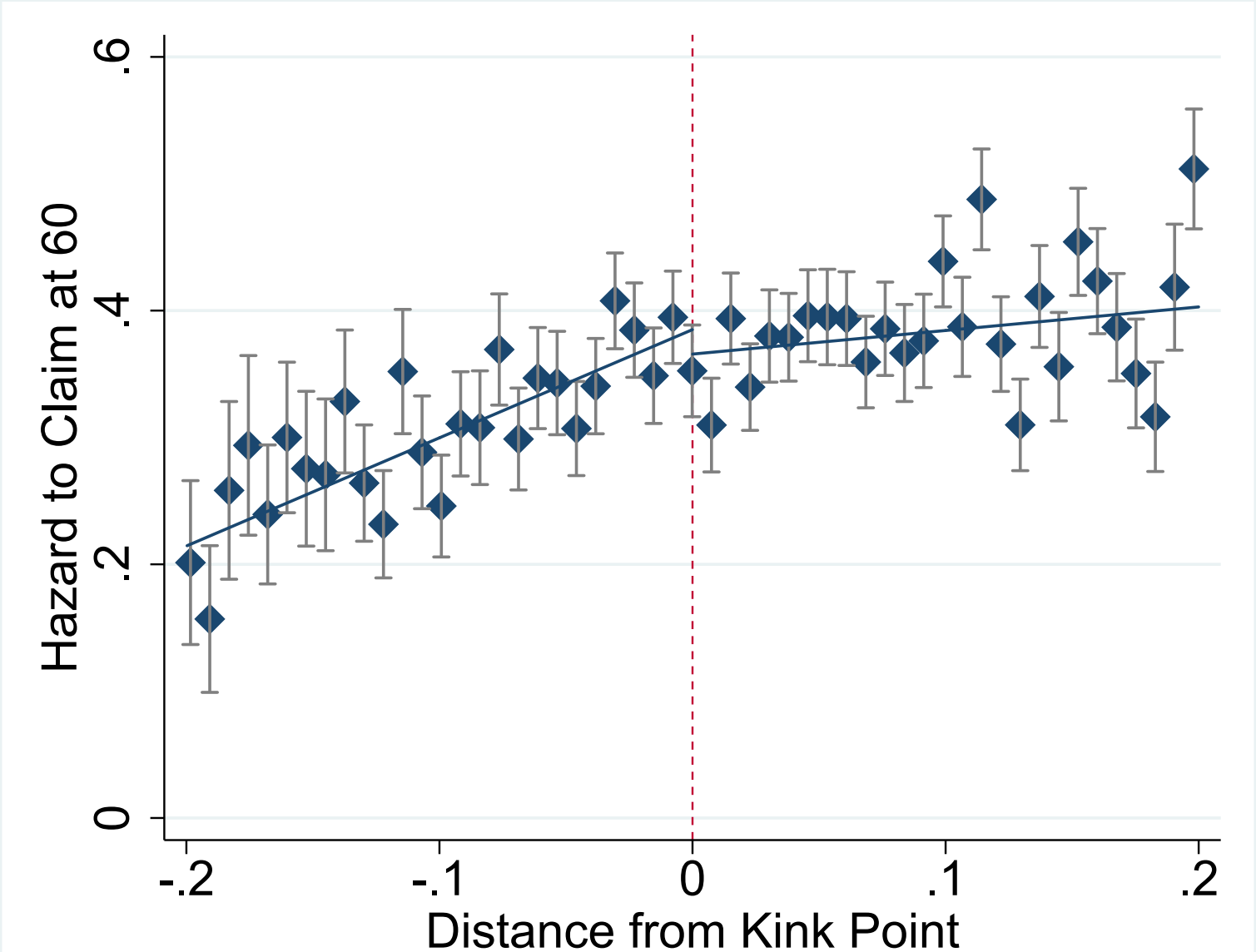
Smoothness of density at levels and in slopes

▸ Assumption I: Density ▸ Assumption II: Table

Reduced Form: Age at Claiming Pension (δ_Y)



Reduced Form: Hazard to Claim Pension at Age 60 (δ_Y)



RKD Estimates: Claim Pension ($\frac{dY}{dB} = \frac{\delta_Y}{\delta_B}$)

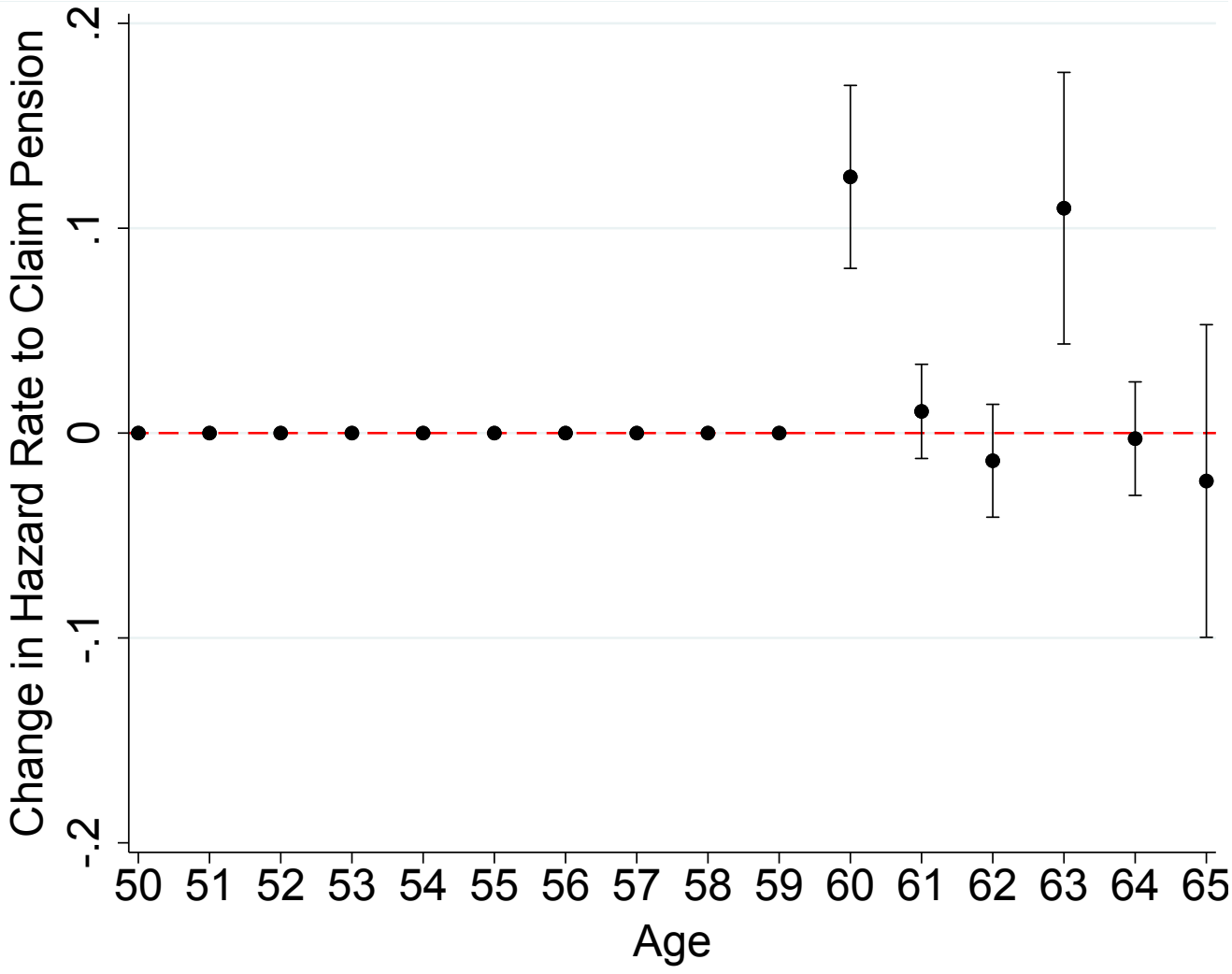
A €100 increase of monthly pension benefits induces women to claim pension **6 months** earlier, and increases the hazard rate to claim pension at age 60 by **12.5** p.p.

Change per €100 more subsidy $\Delta dY dB$	(1)	(2)	(3)	Means at the kink	Sample means	Obs.
Panel A: Claiming behavior						
Age at claiming old-age pension	-0.551**	-0.531**	-0.496**	61.90	61.92	24796
	(0.171)	(0.170)	(0.181)	(1.97)	(1.98)	
Retirement rate (age 55-65)	0.054***	0.054***	0.058***	0.355	0.352	24649
	(0.003)	(0.003)	(0.002)	(0.012)	(0.023)	
Hazard to claim at age 60	0.129**	0.127**	0.125**	0.36	0.36	24834
	(0.042)	(0.042)	(0.045)	(0.48)	(0.48)	
Hazard to claim at age 63	0.099	0.106†	0.110†	0.25	0.22	24834
	(0.060)	(0.060)	(0.066)	(0.43)	(0.42)	
Age at claiming disability pension	-1.279	-1.356	-0.748	53.42	53.64	24802
	(1.330)	(1.320)	(1.178)	(6.75)	(6.40)	
Controls	No	No	Yes			
Cohort Fixed Effect	No	Yes	Yes			

▸ First Stage and Reduced Form

Hazard Analysis: Claim Pension

The effect of €100 increase of monthly pension benefit on the hazard rate to claim pension at ages from 50 to 65.



RKD Estimates: Exit Employment ($\frac{dY}{dB} = \frac{\delta_Y}{\delta_B}$)

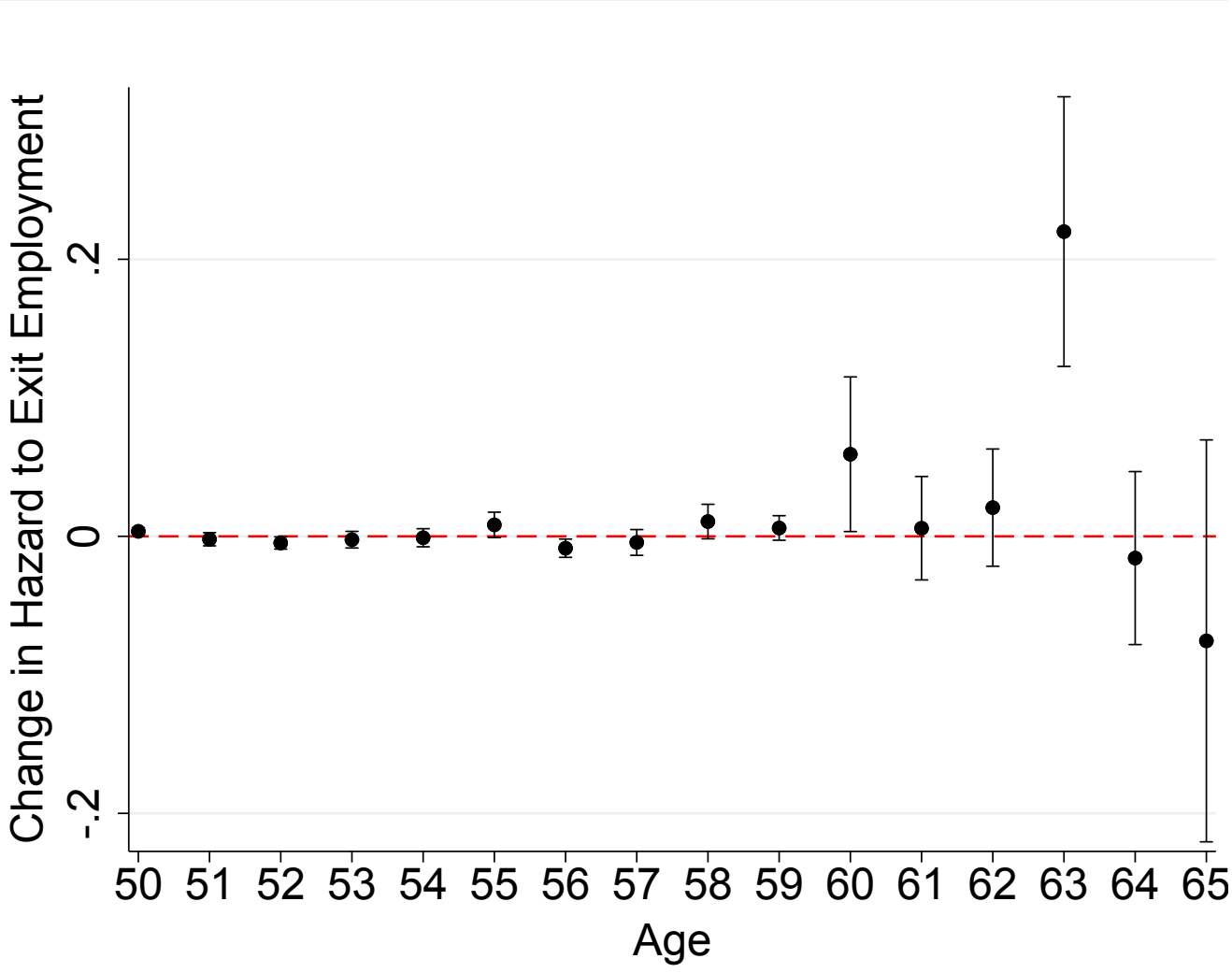
A €100 increase of monthly pension benefit increases the hazard rate to exit employment at age 63 by **20%**.

	Change per €100 more subsidy $\Delta\frac{dY}{dB}$ (1)	(2)	(3)	Means at the kink	Sample means	Obs.
Panel B: Exiting behavior						
Age at exiting employment	-0.193	-0.153	-0.530	57.65	57.63	24834
	(0.642)	(0.649)	(0.643)	(7.196)	(7.156)	
Adjusted age at exiting employment	-0.280	-0.207	-0.183	59.56	59.54	24781
	(0.336)	(0.337)	(0.336)	(3.568)	(3.595)	
Censored age at exiting employment	-0.271	-0.201	-0.178	59.56	59.54	22564
	(0.325)	(0.326)	(0.328)	(3.568)	(3.595)	
Employment rate (age 55-65)	-0.038***	-0.039***	-0.042***	0.445	0.447	24649
	(0.003)	(0.003)	(0.003)	(0.041)	(0.017)	
Hazard to exit at age 60	0.047	0.056	0.068	0.28	0.28	24704
	(0.054)	(0.053)	(0.056)	(0.45)	(0.45)	
Hazard to exit at age 63	0.207*	0.208*	0.206*	0.30	0.26	24690
	(0.090)	(0.089)	(0.098)	(0.46)	(0.44)	
Controls	No	No	Yes			
Cohort Fixed Effect	No	Yes	Yes			

▸ First Stage and Reduced Form ▸ Bin scatter plot ▸ Scatter plots for retirement rates

Hazard Analysis: Exit Employment

The effect of €100 increase of monthly pension benefit on the hazard rate to exit employment at ages from 50 to 65.



Pathways to Pension Claim

- In Germany, it is common that older workers do not transition directly from regular employment to retirement. ▸ Detailed pathways

- Two margins: duration spent (intensive margin) and pathway to retirement (extensive margin)
  - What is the impact on **duration spend in other activities during the bridge years?**
    - ★ Activities right after exit regular employment:
      40% claim pension, 32% unemp, 17% sickness, 1.8% marginal emp.
  - What is the impact on **pathways to retirement?**
    - ★ Activities right before claim pension:
      43% emp, 28% unemp, 7% marginal Emp., 3% sickness.

Activities During Bridge Years

A €100 increase of monthly pension benefit

- reduces the time spend in marginal jobs during the bridge years.
- The likelihood of entering UI increases, while time spent on unemployment prolongs by around five months.

Impacts on Bridge Activities

Outcomes	Unemp. Dur. (1)	Marginal Emp. Dur. (2)	Pr(Regular Emp.) (3)	Pr(Marginal) Emp.) (4)	Pr(Unemp.) (5)
$\frac{dY}{dB}$	**4.890†**	**-4.068†**	-0.013	-0.024	0.078
	(2.765)	(2.227)	(0.643)	(0.015)	(0.051)
Means at the kink	1.38 years	0.50 year	43.02%	7.23%	28.22%
Controls	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes
Individuals	24834	24834	5201	5201	5201

Standard errors in parentheses $*p < 0.05$, $\dagger p < 0.10$

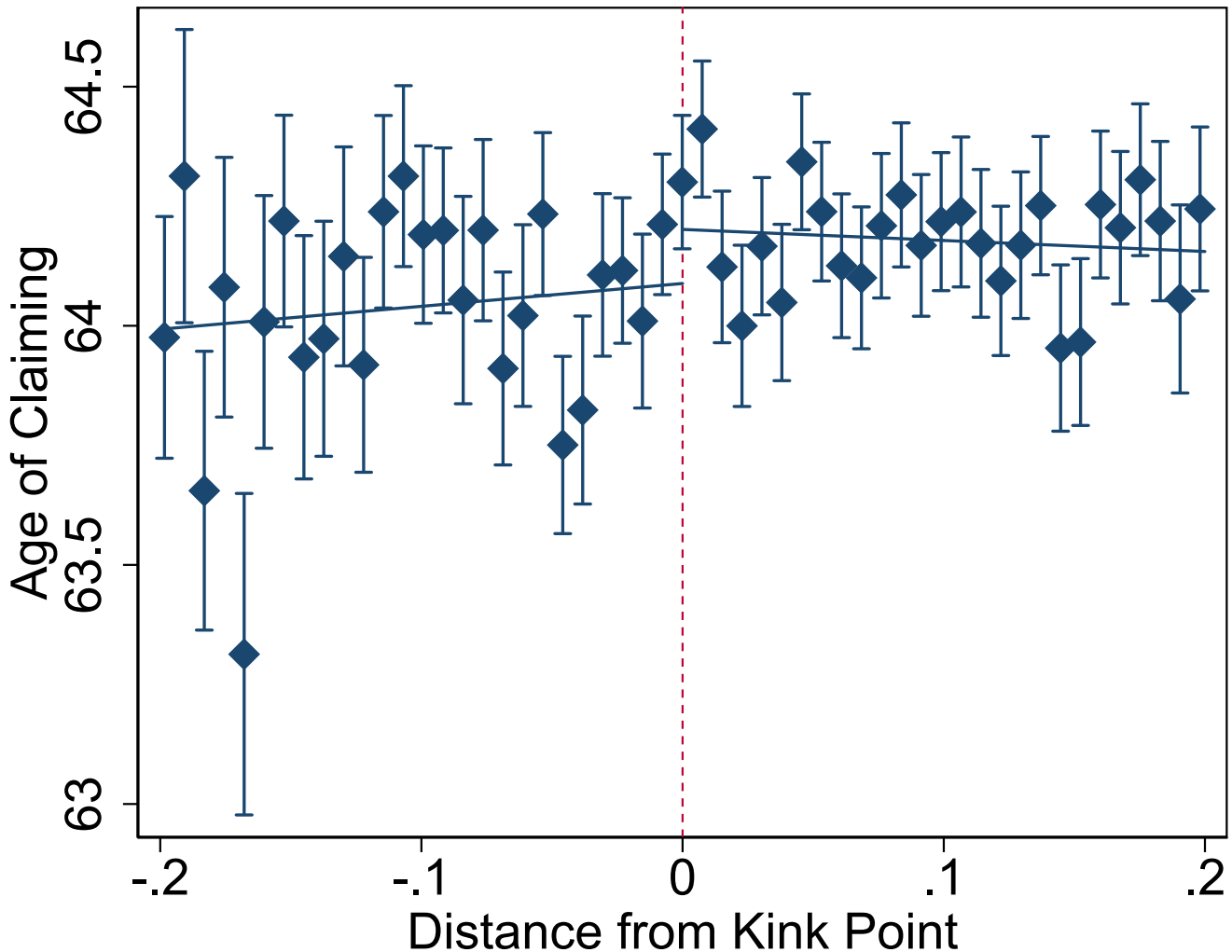
Things to worry about- Robustness

- Other pension reforms during the sample period?
  - cohort fixed effect
- A confounding nonlinear relationship at the link?
  - Ineligible Workers (less than 35 creditable years)
  - Placebo forcing variables
    - average EP 1-5 years after exiting regular employment)
    ▸ Placebo Forcing Variables
  - Placebo kinks ▸ Placebo Kinks
    - relative stable, also significant at the legal kink
  - Sensitivity to bandwidth and polynomial order ▸ bandwidth

Placebo Group: Age at Claiming Pension

Female workers with less than 35 credible years (non-recipients)

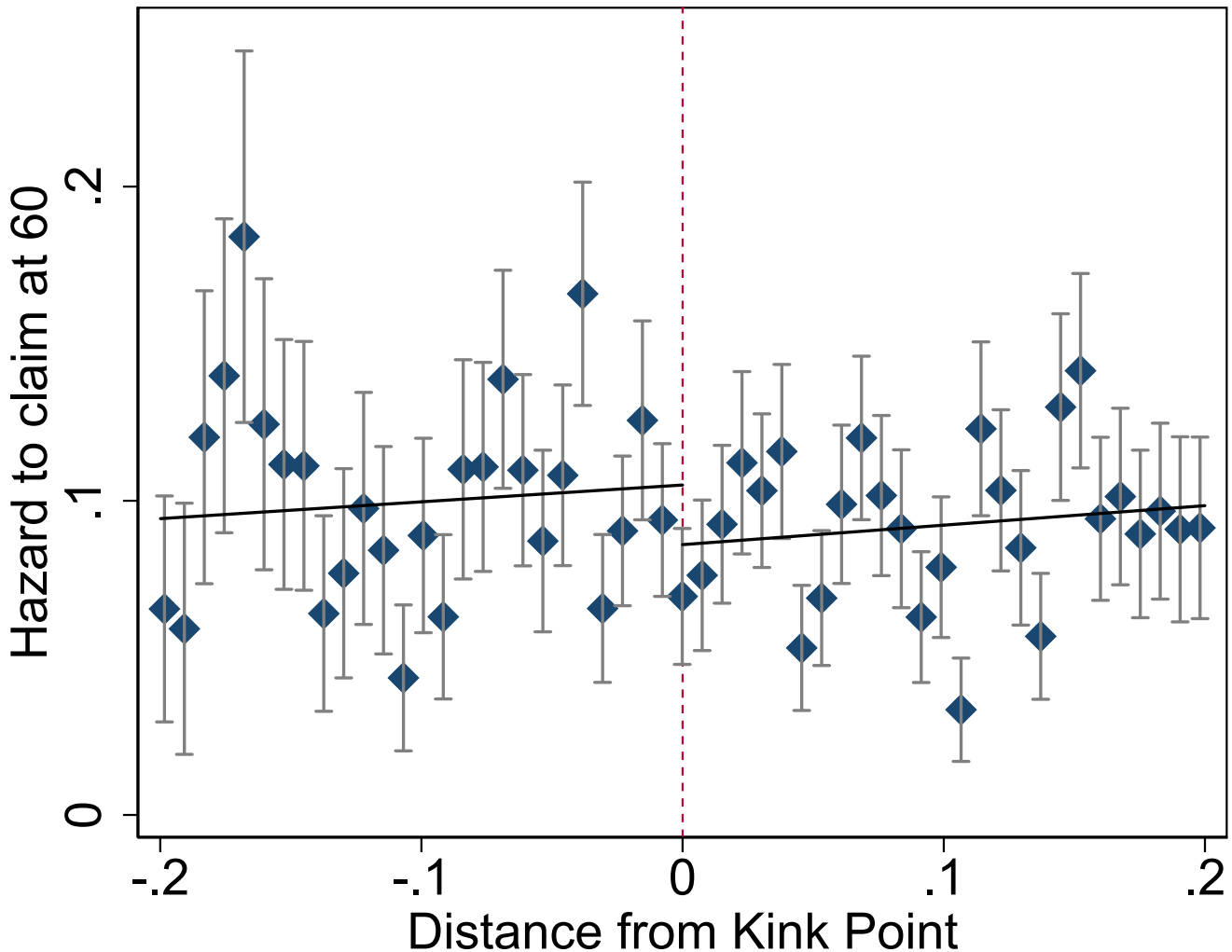
▸ Regression results



Placebo Group: Hazard to Claim at Age 60

Female workers with less than 35 credible years (non-recipients)

▸ Regression results



The Fiscal Costs

- What is the fiscal impact on public finance?
- Is the disincentive effect of this subsidy program large or small in comparison with other progressive programs?

Fiscal Externalities

Fiscal externality: the share of fiscal costs because of behavioral responses (BC/MC ratio) Schmieder and von Wachter (2017),Hendren (2016)

- Mechanical costs: constant assume no impact on moralities
- Behavioral costs: workers' adjustment in retirement age and other labor supply activities.

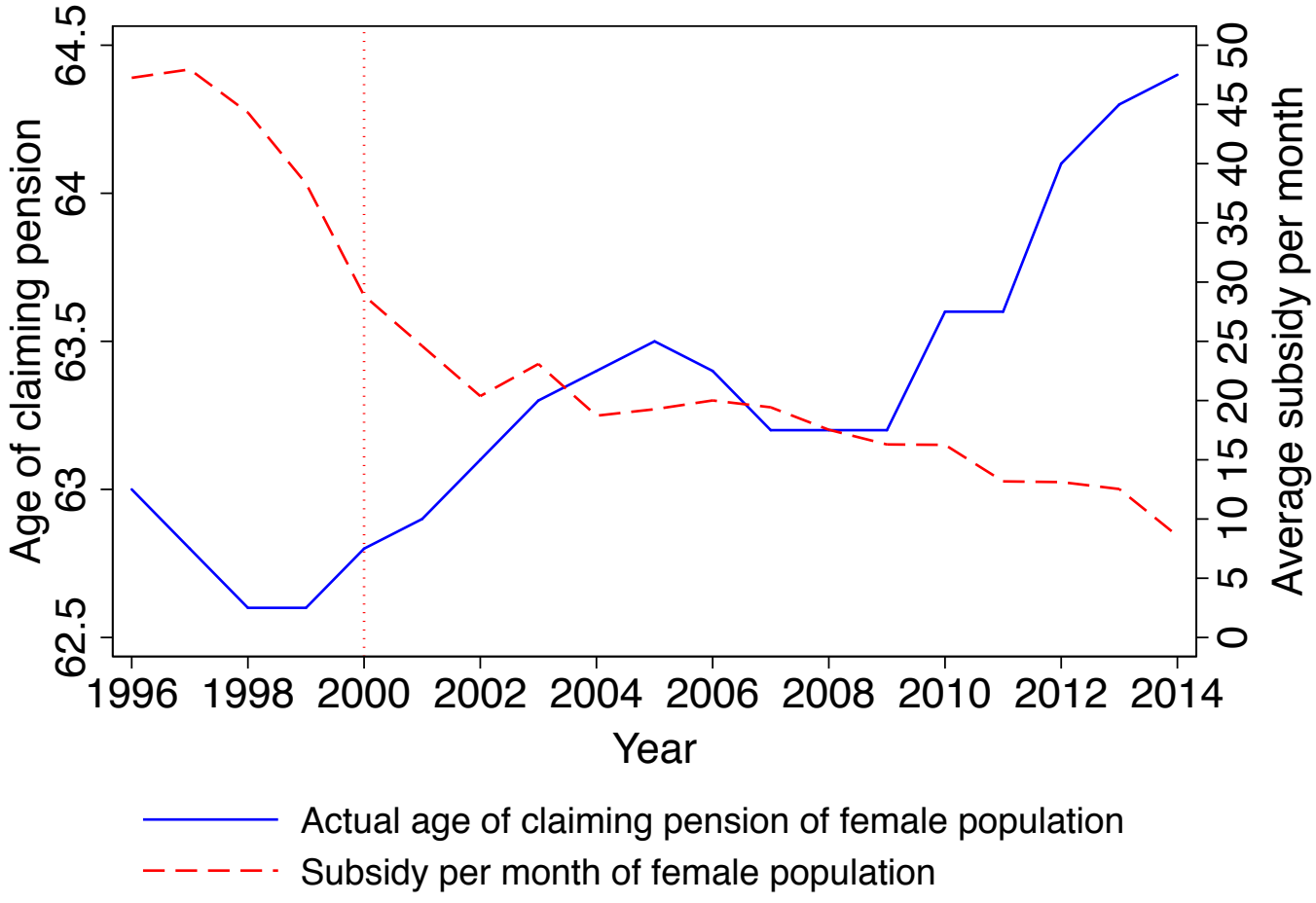
A simple back-of-the-envelopment calculation suggests:

- In order to increase the lifetime income of one low-income pensioner by €1, the government has to raise additional **€0.25**.

- The disincentive cost is relatively small compared to some progressive programs.
  - BC/MC ratio of changing unemployment insurance benefits: **1.31** (Schmieder and von Wachter (2017))
  - BC/MC ratio of raising top tax rate: **0.76** (Saez et al. (2012)).
  - BC/MC ratio of food stamps ranges from 0.53 to 0.64.(Hendren (2016)
  - BC/MC ratio of EITC program: **0.14** (Hendren (2016))
- **Smaller** than the estimated impacts of financial incentives accompanied by raising pension eligibility age. (Duggan et al. (2007), Mastrobuoni (2009), Engels, Geyer and Haan (2017))
- **Smaller** than the estimates due to largely/pure substitution effect (Hanel (2012), Manoli and Weber(2016))
- **Closer** to the estimates due to pure income effect (Atalay and Barrett (2015), Gelber et al. (2017))

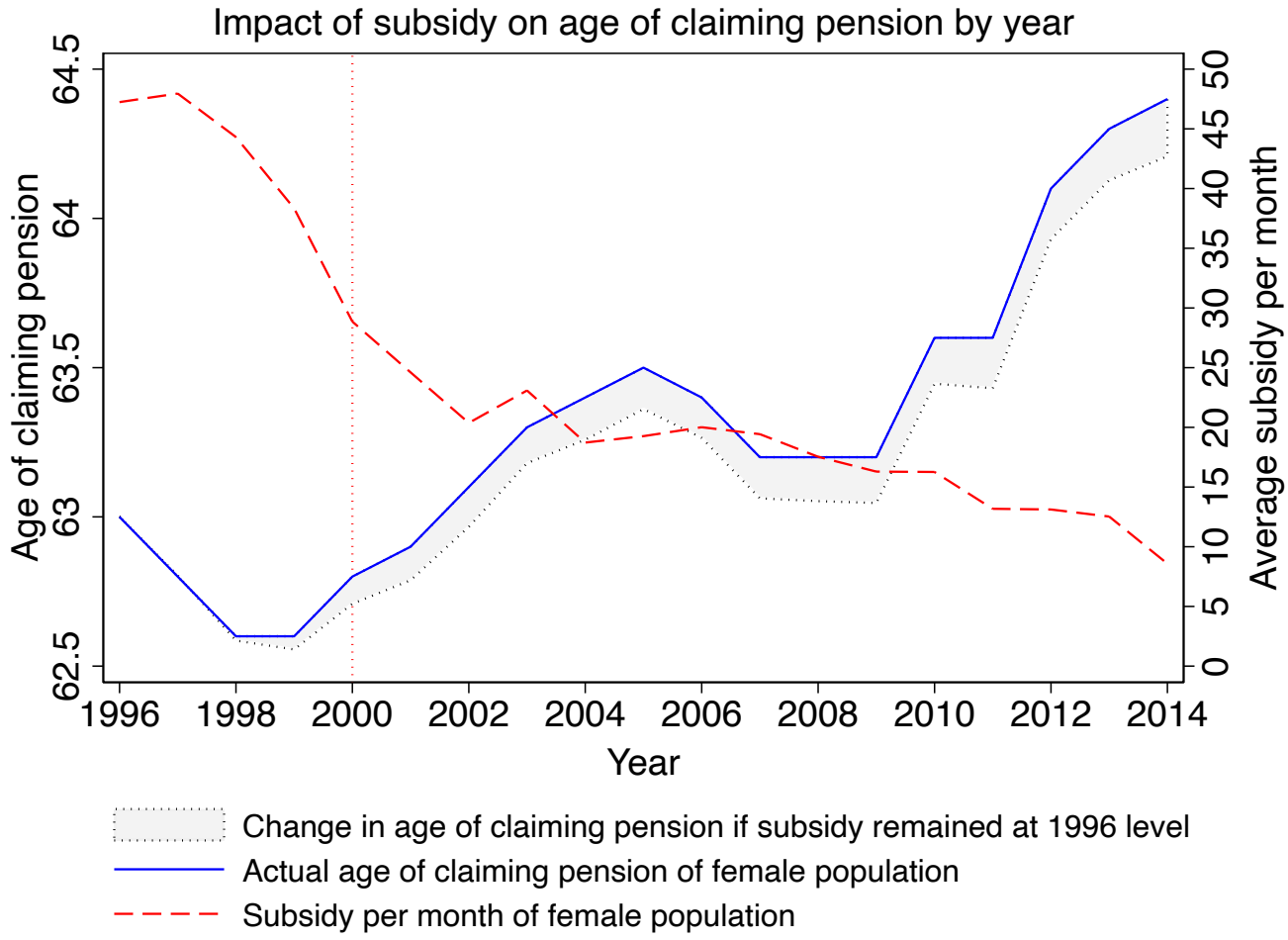
Trends of Retirement Age and Subsidy Size

- Average age at claiming pension increased by **1.5 years** since the 1990s.
- This subsidy program is being phased out gradually (decrease by 80%)



Retirement Age if Subsidy Stayed at 1996 level

- A one-euro increase of monthly benefits induces workers to claim 0.007161 year ($\simeq$2 days) earlier.
- The extrapolated retirement age increase by **1.25 year**.



Conclusion and Discussion

- I explore a novel pension subsidy program to isolate the causal impact of additional pension benefits on women's retirement timing.
- €100 additional monthly benefits ($\sim$ 17% increase) induce women to claim pension **6 months** earlier.
- This subsidy program is relatively **less distortionary**.
- The phase-out of the subsidy program accounts for **16 %** of the increase in retirement age for women in West Germany.
- A follow-up question is whether the reduction in labor supply due to the subsidy program leads to more poverty?
  - 90 euro additional monthly pension benefits $\rightarrow$ an increase of 15,512 euro in a discounted lifetime wealth at age 60 ; The earlier exit $\rightarrow$ a decline of 1,338 euro in lifetime wealth. Overall, lifetime wealth $\uparrow$

Conclusion and Discussion

Results may guide policy makers in designing income support programs while facing long-run solvency challenges:

- Interventions with **built-in formula** and make use of **ex-ante earnings** as eligibility condition have both limited low administrative cost and low behavior distortion.
- However, those programs will phase out by design and require policy adjustment in the future.
- Also extends to income support programs to other low-income groups.
  - Mothers with more than one child and women with less employment duration are more responsive. ▸ Heterogeneous Behaviors

Appendix Slides

Subsidy Schedule

- Subsidy schedule

$$Subsidy = min\left(0.5 * \sum_{t<92} EP_t \ , \ 0.75\,T_{pre92} - \sum_{t<92} EP_t\right)$$

$$\frac{Subsidy}{T_{92}} = \begin{cases} 0.5 aep_{92} & , aep_{92} \leq 0.5 \\ 0.75 - aep_{92} & , 0.5 \leq aep_{92} \leq 0.75 \\ 0 & , aep_{92} > 0.75 \end{cases}$$

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Context: Pension Subsidy to Low-pay Workers

Mindestentgeltpunkte bei geringem Arbeitsentgelt (SGBVI §262)

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$$PB_{it} = \Big(\underbrace{\sum_{\tau} EP_{i\tau}}_{\text{Personal Pension Base}} + \text{Subsidy}_i \Big) \times PV_t \text{ , where } EP_{i\tau} = \frac{w_{i\tau}}{\bar{w}_\tau}$$

$$Subsidy_i = min \left(0.5 \times \sum_{\tau<92} EP_{i\tau} \text{ , } 0.75\, T_{92} - \sum_{\tau<92} EP_\tau \right)$$

- $EP_{i\tau}$: An worker with average wage income accumulates 1 EP per year of contribution. $EP_{max} = 2$
- PV_t: aggregate monthly average pension value. In 2015, 1 EP is equivalent to $\sim$ 30 Euros/month.

Assumption I: Density

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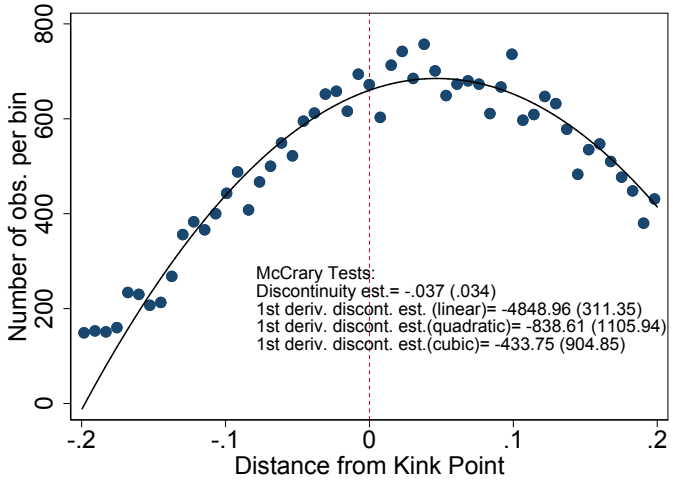
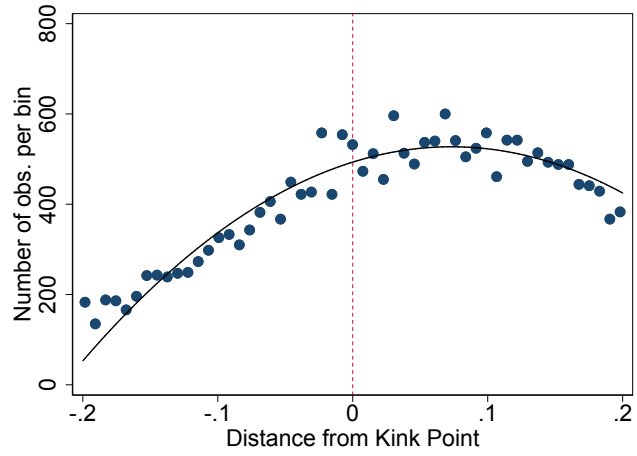
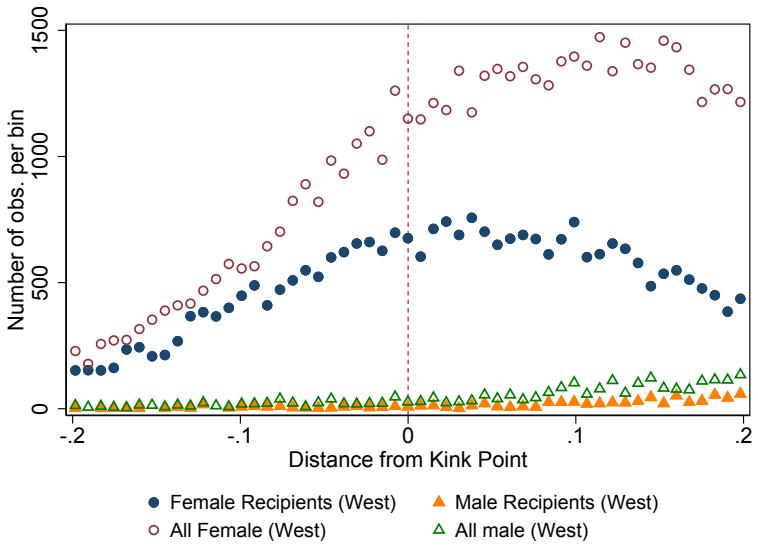


(a) Density of the recipients around the kink

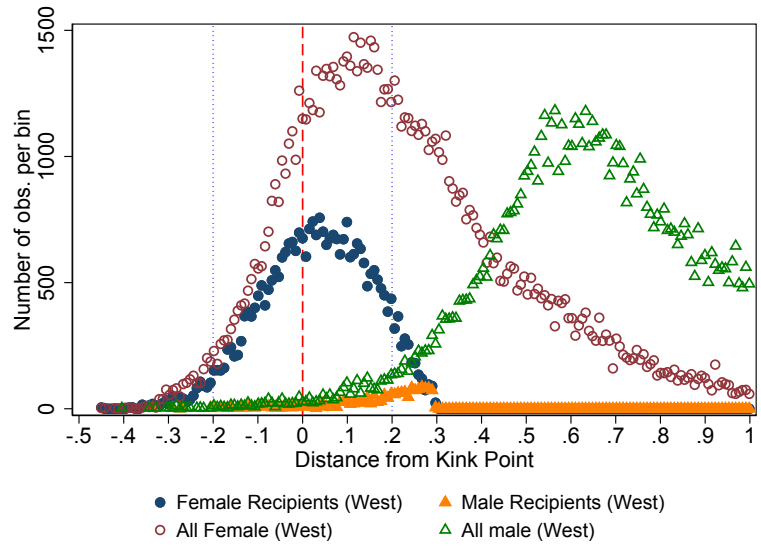


(b) Density of the non-recipients around the kink

Bin size: $\sim$ 20 euros



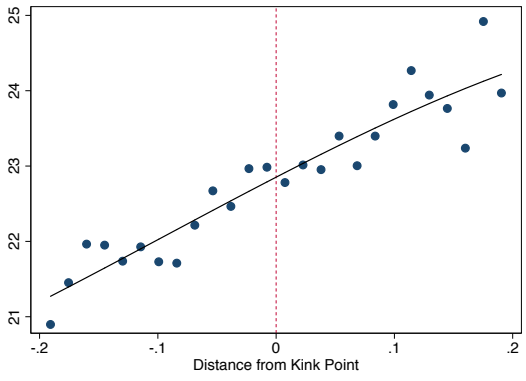
(c) Density of the all workers in West Germany around the kink



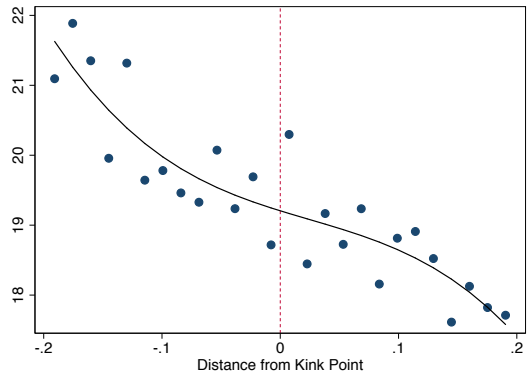
(d) Density of the all workers in West Germany around the kink (zoom out)

Assumption II: Controls

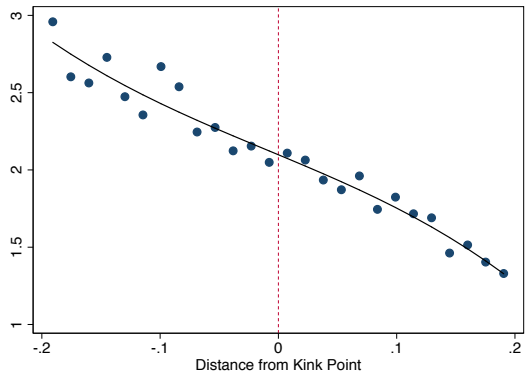
It is important to check the changes in slopes of the predetermined covariates ▸ p-values ▸ Back



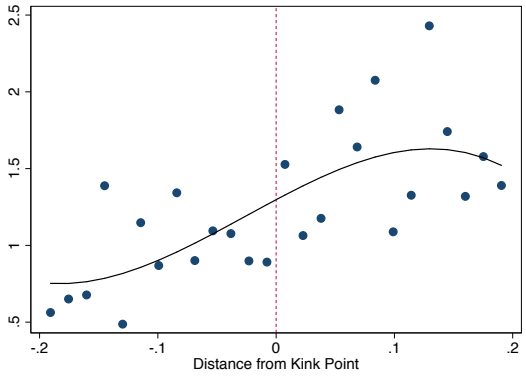
(e) Age at first birth



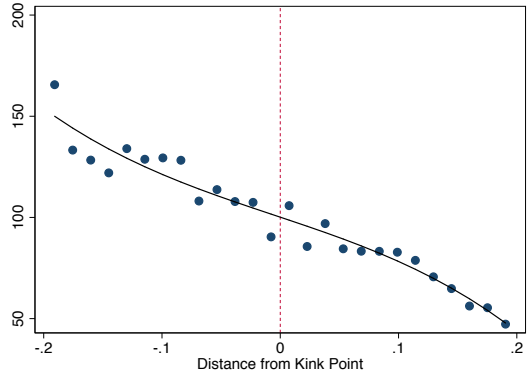
(f) Age at first employment



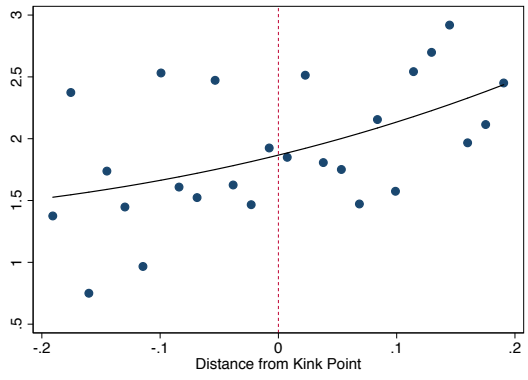
(g) Number of children



(h) Months of UI pre92



(i) Month of childcare pre92



(j) Month of sickness pre92

Assumption II: Controls

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Table 2: Smoothness of the density and covariates around the kink

Covariates	Polynomial minimizing AICc	Coeffi.	s.d.	sample mean	s.d.
Fixed Characteristics					
Number of children	2	1.619	(1.273)	1.94	(1.04)
Age when having 1^{st} child	2	-13.434*	(5.362)	22.76	(3.77)
Age when having last child	1	0.295	(2.084)	27	(4.94)
Age at first employment	3	-13.330	(9.527)	18.51	(5.04)
Pension years	1	-2.510	(2.136)	41.96	(3.93)
Total EPs without the subsidies	1	2.583	(2.280)	21.38	(6.84)
Duration of SES before 1992					
Months of UI	1	0.467	(1.666)	1.31	(3.97)
Months of UA	1	8.237	(6.995)	5.4	(12.72)
Months of childcare	2	195.928	(103.241)	89.78	(61.59)
Months of sickness	1	0.333	(1.973)	1.67	(4.44)
As a share of total years before 1992					
Share on UI	1	0.001	(0.005)	0.004	(0.011)
Share on UA	1	0.020	(0.019)	0.015	(0.035)
Share on childcare	2	0.525†	(0.275)	0.241	(0.168)
Share on sickness	1	0.000	(0.005)	0.004	(0.012)

First Stage and Second Stage

Back

Table A1: Estimated impacts on labor supply (reduced-form)

	Estimated changes in slope (1)	(2)	(3)	Means at the kink	Sample means	Obs.
First-stage $\Delta \frac{dB}{dr}$						
Monthly subsidies (€100)	-4.943***	-4.893***	-4.623***	98.64	83.27	24796
	(0.197)	(0.187)	(0.100)	(53.79)	(48.59)	
Reduced-Form $\Delta \frac{dY}{dr}$						
Age at claiming old-age pension	2.724***	2.596***	2.291***	61.90	61.92	24796
	(0.856)	(0.842)	(0.838)	(1.97)	(1.98)	
Hazard to claim at age 60	-0.640**	-0.623**	-0.578**	0.36	0.36	24834
	(0.212)	(0.208)	(0.208)	(0.48)	(0.48)	
Hazard to claim at age 63	-0.487†	-0.520†	-0.509†	0.25	0.22	24834
	(0.297)	(0.294)	(0.303)	(0.43)	(0.42)	
Age at claiming disability pension	6.322	6.636	3.460	53.42	53.64	24802
	(6.555)	(6.439)	(5.436)	(6.75)	(6.40)	
Controls	No	No	Yes			
Cohort Fixed Effect	No	Yes	Yes			

First Stage and Second Stage

Back

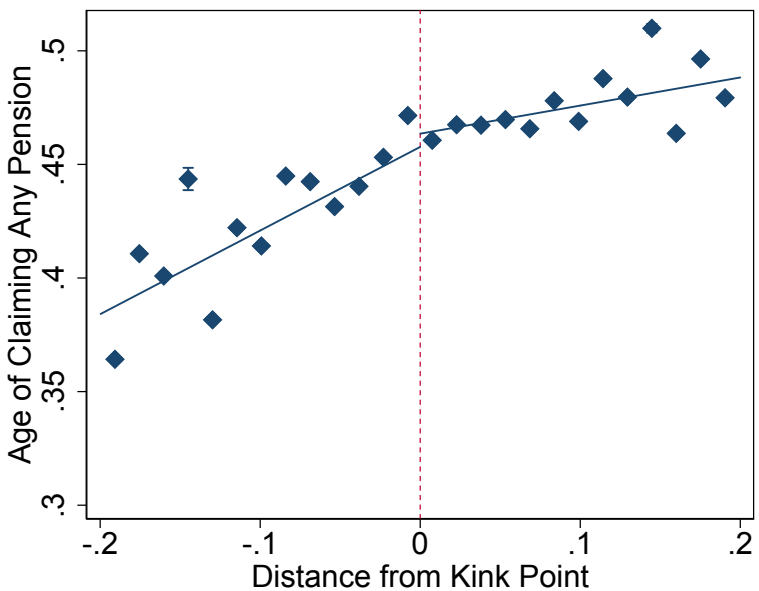
Table A1: Estimated impacts on labor supply (reduced-form)

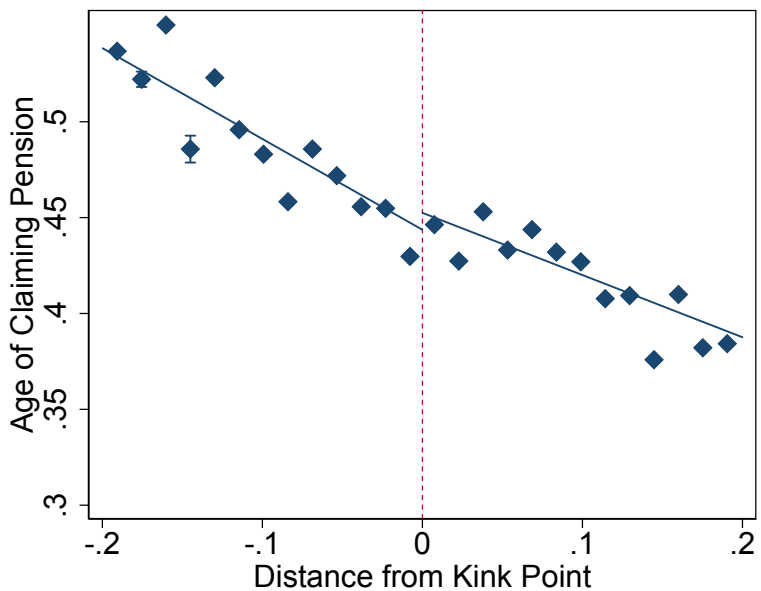
	Estimated changes in slope (1)	(2)	(3)	Means at the kink	Sample means	Obs.
First-stage $\Delta \frac{dB}{dr}$						
Monthly subsidies (€100)	-4.943***	-4.893***	-4.623***	98.64	83.27	24796
	(0.197)	(0.187)	(0.100)	(53.79)	(48.59)	
Reduced-Form $\Delta \frac{dY}{dr}$						
Age at exiting employment	0.952	0.750	2.449	57.65	57.63	24834
	(3.168)	(3.171)	(2.966)	(7.20)	(7.16)	
Adjusted/Censored Age	1.382	1.012	0.844	59.56	59.54	24781
at exiting employment	(1.666)	(1.649)	(1.554)	(3.568)	(3.595)	
Hazard to exit at age 60	-0.232	-0.274	-0.313	0.28	0.28	24704
	(0.269)	(0.261)	(0.257)	(0.45)	(0.45)	
Hazard to exit at age 63	-1.026*	-1.017*	-0.951*	0.30	0.26	24690
	(0.444)	(0.435)	(0.453)	(0.46)	(0.44)	
Controls	No	No	Yes			
Cohort Fixed Effect	No	Yes	Yes			

Retirement Rate and Employment Rate ($\frac{dY}{dB} = \frac{\delta_Y}{\delta_B}$)

Back

A 100 euros increases the average retirement rate from age 55 to 65 by 5.8 p.p, decreases the average employment rate from age 55 to 65 by 4.2 p.p.

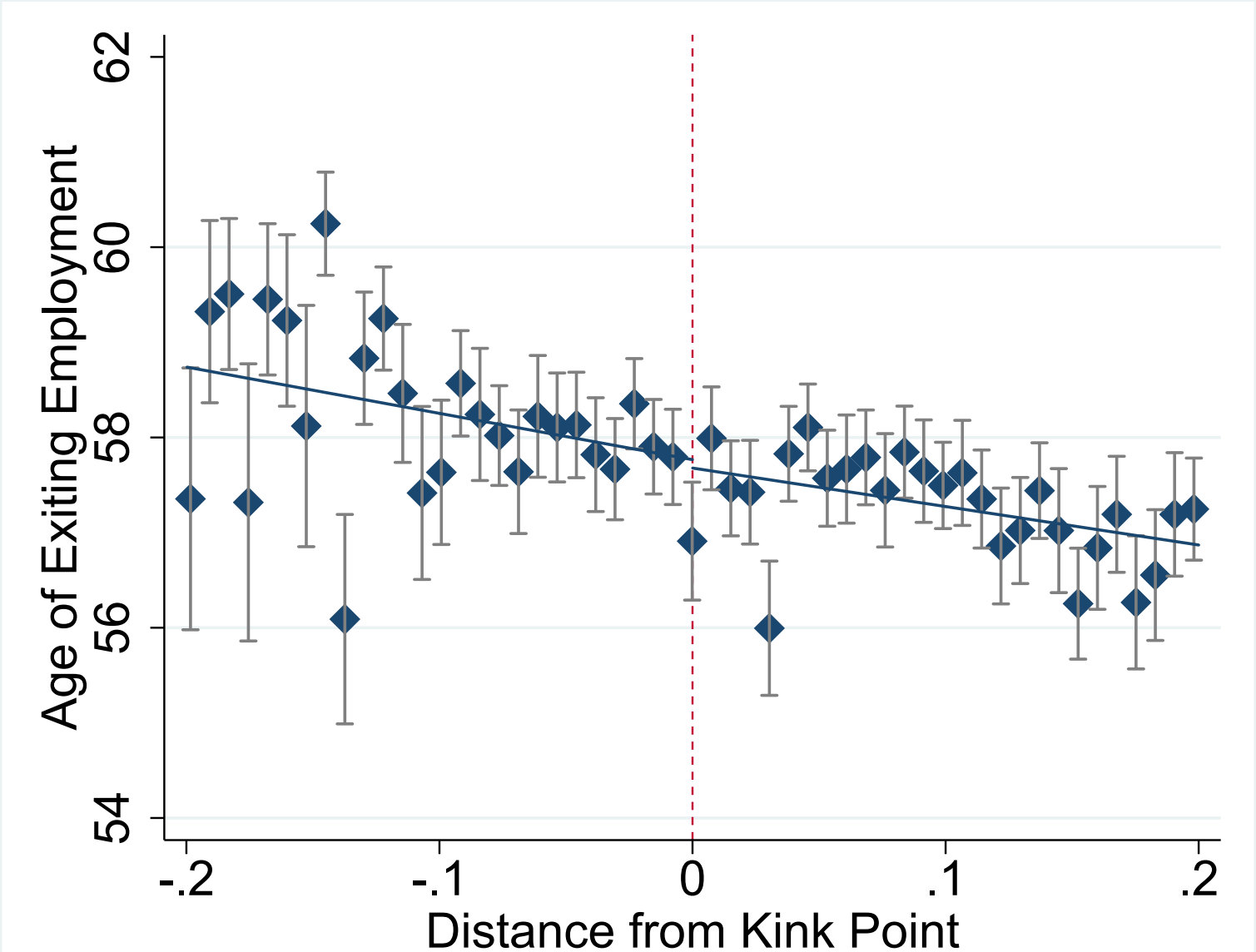




The estimated elasticity of the retirement rate from age 55 to 65 is 0.97, and the elasticity of the employment rate from age 55 to 65 is -0.56.

Reduced Form: Age at Exiting Employment(δ_Y)

Back



Heterogeneity

- Pension Subsidy Size
- Health Status
  - Months of sick leave before age 50
- Number of Children
  - Mothers with more than one child

Back

Outcome variables		Age at claiming pension		Hazard to claim at age 60		Hazard to exit at age 63		
$\Delta B = €100$		$\frac{dY}{dB}$	p-value	$\frac{dY}{dB}$	p-value	$\frac{dY}{dB}$	p-value	Obs.
Subgroups								
Subsidy Size	High	-0.6964**	0.0028	0.1263*	0.3200	0.3344**	0.0004	12285
		(0.2365)		(0.0613)		(0.1321)		
	Low	-0.5079		0.2440†		0.0489		12549
		(0.6329)		(0.1449)		(0.3030)		
T_{92}	More	-0.3100†	0.5134	0.1171*	0.2195	0.3426***	0.0000	11546
		(0.1832)		(0.0482)		(0.1039)		
	Less	-1.4222*		0.2855**		0.0757		13262
		(0.5703)		(0.1348)		(0.2847)		
Older than	Yes	-0.1576	0.0546	0.1253†	0.3639	-0.1672	0.0012	7269
age 50		(0.2497)		(0.0671)		(0.1946)		
in 1992	No	-0.6670**		0.1191*		0.3030**		17565
		(0.2461)		(0.0599)		(0.1170)		
Sick period	Yes	-0.3228	0.1535	0.1839†	0.0819	0.5834**	0.0000	9944
before age 50		(0.2231)		(0.0755)		(0.1870)		
	No	-0.6077**		0.0983*		0.0526		14890
		(0.3158)		(0.0570)		(0.1127)		
More than	Yes	-0.7221**	0.1277	0.1802**	0.0028	0.2854*	0.2938	18175
1 child		(0.2334)		(0.0568)		(0.1265)		
	No	-0.1793		-0.0006		0.0788		6659
		(0.2304)		(0.0579)		(0.1135)		
Weak labor	Yes	-1.3830**	0.0244	0.2877**	0.1625	0.3939	0.7469	12621
market		(0.4547)		(0.1086)		(0.2567)		
attachment	No	-0.2617		0.0728		0.1364		12212
		(0.1705)		(0.0447)		(0.0904)		
Cohort F.E.		Yes		Yes		Yes		
Controls.		Yes		Yes		Yes		

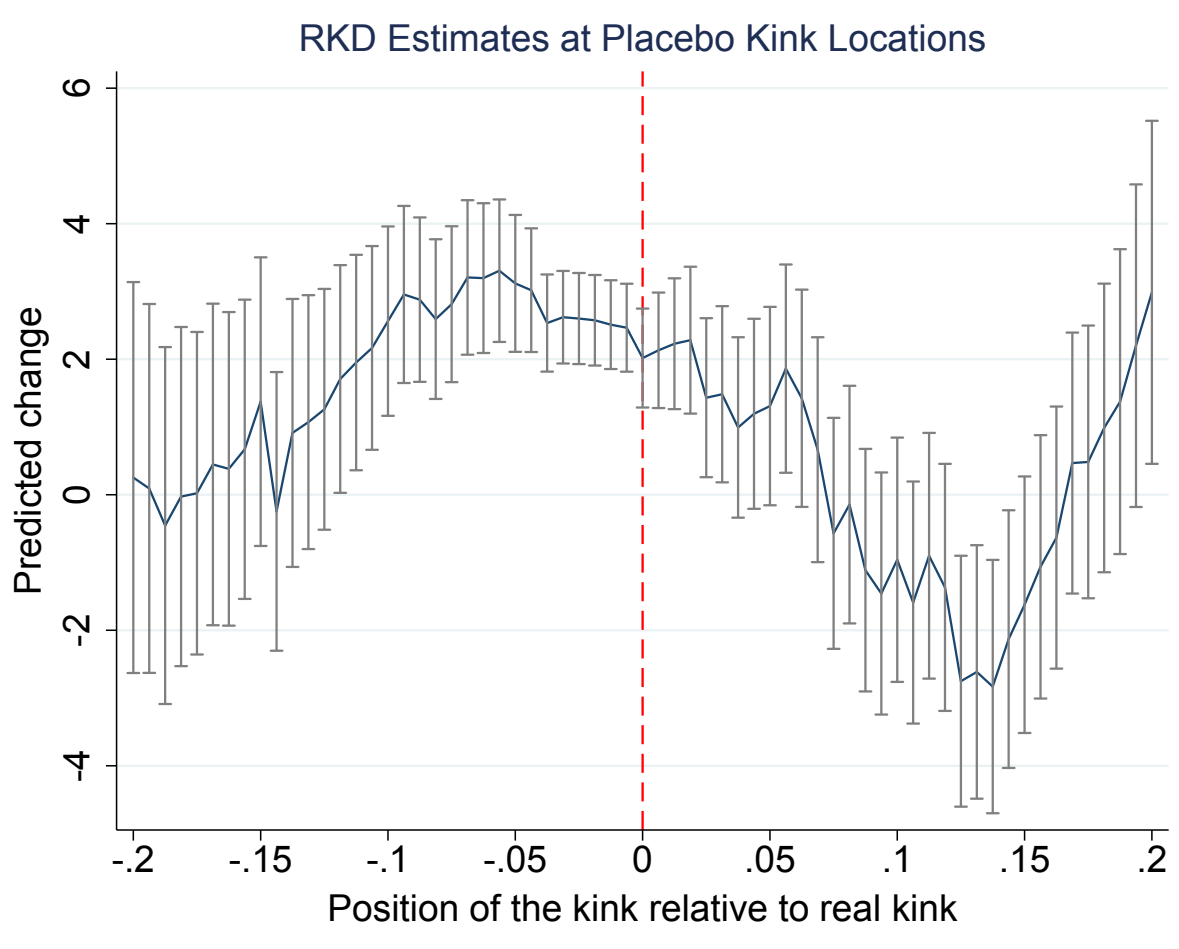
Placebo Test: Ineligible Workers

Back

	Estimated changes in slope (1)	(2)	(3)	Means at the kink	Sample means	Obs.
Reduce form $\Delta\frac{dY}{dr}$						
Age at claiming old-age pension	-0.850	-0.694	-0.558	64.12	64.13	20028
	(0.886)	(0.883)	(0.752)	(1.81)	(1.81)	
Retirement rate (age 55-65)	6.784	6.631	-9.735	0.149	0.148	19993
	(15.014)	(14.453)	(25.705)	(0.016)	(0.015)	
Hazard to claim at age 60	0.032	0.014	0.070	0.10	0.10	20040
	(0.148)	(0.147)	(0.140)	(0.30)	(0.29)	
Hazard to claim at age 63	-0.050	-0.028	-0.053	0.022	0.022	20040
	(0.077)	(0.076)	(0.075)	(0.15)	(0.15)	
Age at claiming disability pension	7.102	6.922	10.914	53.79	53.98	19911
	(8.115)	(7.892)	(6.244)	(5.94)	(5.68)	
Age at exiting employment	-8.550	-8.567	-9.475	49.27	48.68	20040
	(6.346)	(6.324)	(5.970)	(15.14)	(15.46)	
Employment rate (age 55-65)	0.952	0.914	-1.421	0.331	0.325	19993
	(2.278)	(2.166)	(4.000)	(0.027)	(0.039)	
Hazard to exit at age 60	-0.197	-0.228	-0.165	0.107	0.101	19930
	(0.249)	(0.248)	(0.240)	(0.31)	(0.30)	
Hazard to exit at age 63	-0.043	-0.003	-0.048	0.04	0.05	19916
	(0.205)	(0.202)	(0.192)	(0.19)	(0.21)	
Controls	No	No	Yes			
Cohort Fixed Effect	No	Yes	Yes			

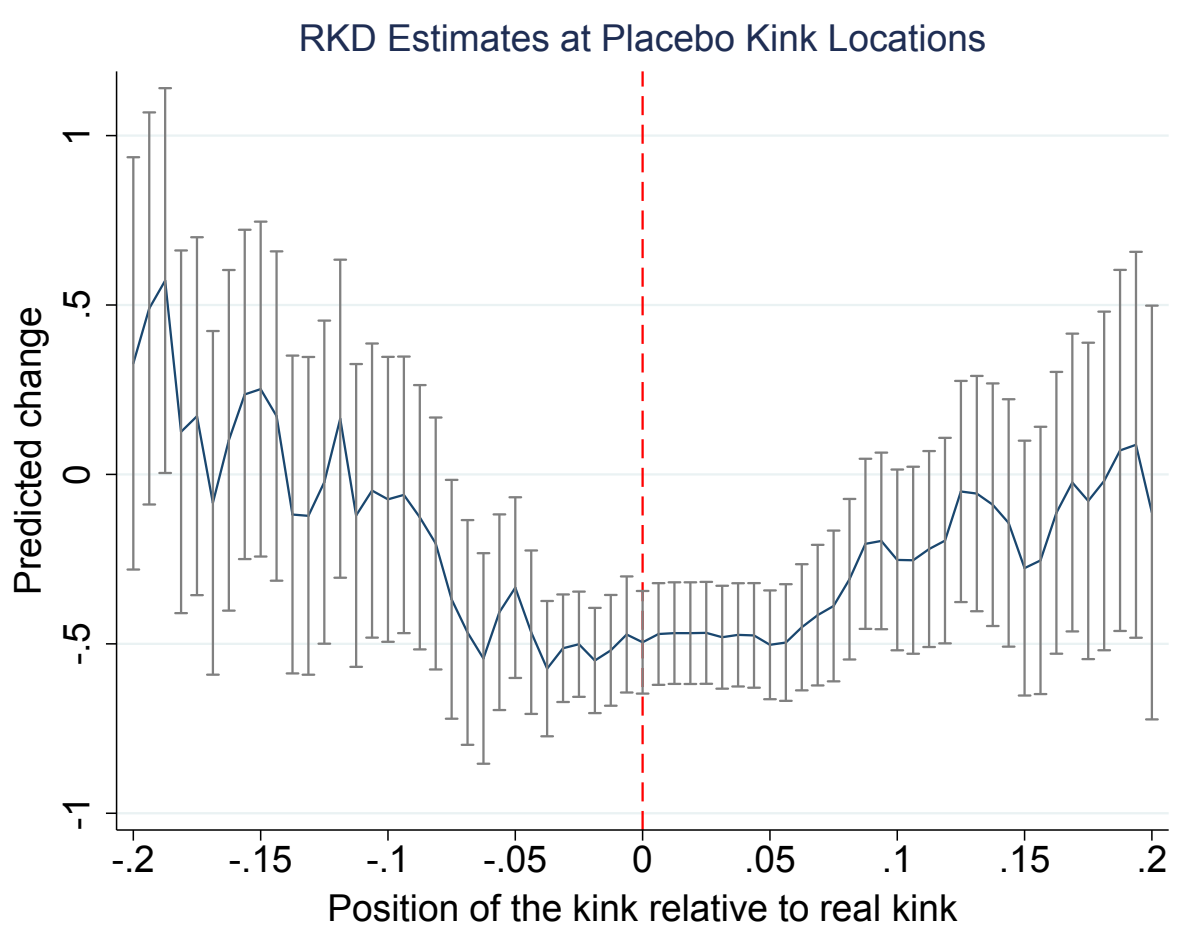
Standard errors in parentheses †$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Placebo Kinks



▸ Back

Placebo Kinks



Back

Placebo Forcing Variables

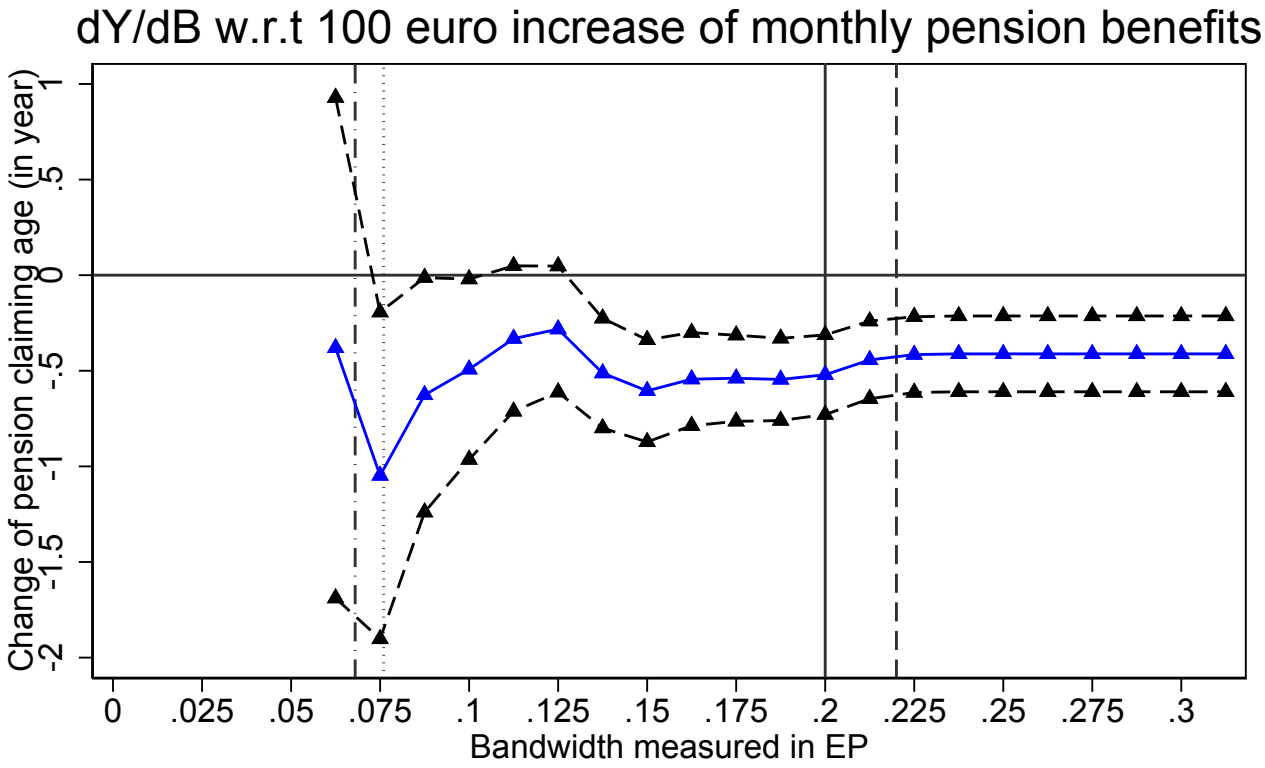
Back

Table A4: Placebo tests using average EP five years after exiting employment as the forcing variable

	Average EP				
	1 year after employment	2 years	3 years	4 years	5 years
	(1)	(2)	(3)	(4)	(5)
First-stage $\Delta \frac{dB}{dr}$					
Monthly subsidies (€100)	-4.820***	-4.804***	-4.800***	-4.794***	-4.781***
	(0.130)	(0.129)	(0.128)	(0.129)	(0.128)
Change per €100 more subsidy $\Delta \frac{dY}{dB}$					
Age at claiming old-age pension	-0.116	-0.103	-0.094	-0.088	-0.101
	(0.212)	(0.210)	(0.209)	(0.210)	(0.210)
Hazard to claim at age 60	0.021	0.016	0.013	0.013	0.018
	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)
Age at claiming disability pension	1.715	0.128	0.049	-1.852	-4.316
	(4.386)	(4.607)	(4.710)	(4.716)	(4.511)
Age at exiting employment	0.469	0.448	0.483	0.453	0.513
	(0.702)	(0.700)	(0.698)	(0.700)	(0.703)
Adjusted age at exiting employment	0.308	0.290	0.292	0.219	0.220
	(0.367)	(0.364)	(0.363)	(0.361)	(0.361)
Hazard to exit at age 63	0.151	0.150	0.148	0.147	0.147
	(0.095)	(0.094)	(0.094)	(0.094)	(0.095)
Controls	Yes	Yes	Yes	Yes	Yes
Cohort Fixed Effect	Yes	Yes	Yes	Yes	Yes
Obs	24065	24084	24104	24102	24112

Robustness: By Bandwidth

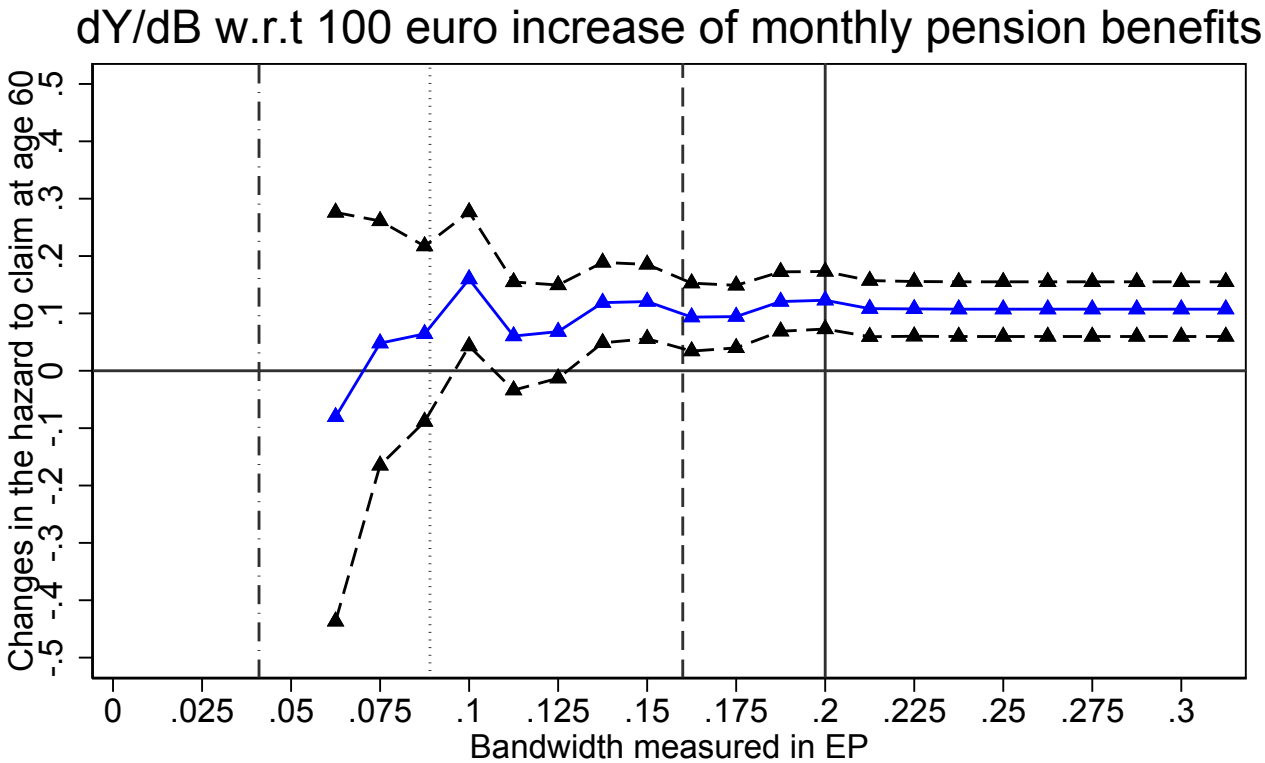
Effect of €100 increase of pension benefit per month on pension claim age. ▸ Back



Fuzzy IK Bandwidth (Dotted Vertical Line, =0.076): dY/dB Estimate =-0.71(s.e. =0.39)
Fuzzy CCT Bandwidth (Dash Dotted Vertical Line, =0.068): dY/dB Estimate =-1.35 (s.e. =0.63)
FG Bandwidth (Dashed Vertical Line, 0.22): dY/dB Estimate = -0.49 (s.e. =0.08)
Baseline Bandwidth (Solid Vertical Line, 0.2): dY/dB Estimate =-0.52 (s.e. =0.11)

Robustness: By Bandwidth

Effect of €100 increase of pension benefit per month on harzard to claim at age 60. Back



Fuzzy IK Bandwidth (Dotted Vertical Line, 0.089): dY/dB Estimate =0.08 (s.e. =0.08)
Fuzzy CCT Bandwidth (Dash Dotted Vertical Line, =0.041): dY/dB Estimate =-0.07 (s.e. =0.16)
FG Bandwidth (Dashed Vertical Line, 0.16): dY/dB Estimate =0.094 (s.e. =0.03)
Baseline Bandwidth (Solid Vertical Line, 0.2): dY/dB Estimate =0.123 (s.e. =0.026)

Robustness: By Polynomial Orders

Table A8: RKD estimates by bandwidth

Change per €100 more subsidy $\Delta \frac{dY}{dB}$	Bandwidth 0.3BW	0.25 BW	0.2BW	0.15BW	0.10BW	0.05BW
Age at claiming pension	-0.336*	-0.338*	-0.496**	-0.503†	-0.449	-1.554
	(0.135)	(0.143)	(0.181)	(0.274)	(0.520)	(2.245)
Hazard to claim at age 60	0.074*	0.068†	0.125**	0.105	0.185	0.117
	(0.034)	(0.035)	(0.045)	(0.069)	(0.134)	(0.580)
Age at exiting employment	0.109	-0.479	-0.530	-1.428	-3.029	-4.107
	(0.486)	(0.490)	(0.643)	(0.967)	(1.870)	(7.854)
Hazard to exit at age 63	0.135†	0.180*	0.206*	0.298*	0.142	-0.680
	(0.075)	(0.076)	(0.098)	(0.145)	(0.292)	(1.253)
Retirement rate (age 55-65)	0.050***	0.048***	0.063***	0.067***	0.079***	0.223***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.005)	(0.045)
Employment rate (age 55-65)	-0.014***	-0.028***	-0.030***	-0.066***	-0.117***	-0.485***
	(0.004)	(0.003)	(0.003)	(0.005)	(0.008)	(0.096)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	27220	26651	24834	21084	15363	8311
Specification	Linear	Linear	Linear	Linear	Linear	Linear

Pathways to Pension Claim

Back

In Germany, it is common that older workers do not transition directly from full-time employment to retirement.

Female recipients transition to pension claim via the following pathways:

- Regular employment (43%)
  - The effect on age at exiting regular employment is noisy with a magnitude of zero Effect on age exit regular employment
- Marginal employment ("450 euro" jobs) (5%)
  - Exempt from both social security contributions and income taxation ((Tazhitdinova (2017), Gudgeon and Trenkle (2017))
- Unemployment insurance + unemployment assistant (29%)
  - The generosity of UI (∼60% replacement rate) and the lenient job search requirement for older workers make it an attractive pathway to retirement. (Lalive (2008), Börsch-Supan and Juerges (2012), Manoli and Weber (2016))

RKD Estimates: Pathways to Claim Pension

The probability to bridge to pension via unemployment increases by **9%**.

▸ Back

Table: Impact on Pathways to Claim Pension

Status before pension claim	Regular Employment (1)	Marginal Employment (2)	Unemployment (UI+UA) (3)
$\frac{dY}{dB}$	-0.004	-0.0224	**0.090**†
	(0.0569)	(0.0261)	(0.052)
Sample means	0.43	0.05	0.29
Observations	924,059		
Individuals	5,763		
Controls	Yes	Yes	Yes
Cohort Fixed Effect	Yes	Yes	Yes

Standard errors in parentheses† $p < 0.10$