Online Appendix

"Intergenerational Spillovers in Disability Insurance"

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Appendix A: IV versus OLS Estimates

As a supplementary exercise, we compare OLS to similarly scaled IV estimates. To construct OLS estimates, we use all parents between the ages of 40 to 50 at the time of the reform who have at least one child still living at home with them. This sample includes parents who were on DI as of the reform date, but additionally includes parents who were not on DI as of the reform date. To make sure differential re-examinations for those under versus over the age 45 cutoff do not drive our OLS estimates, we split this sample into two groups: parents between the ages of 40 and 45, and parents between the ages of 45 and 50. We estimate the effect of parental DI benefits in 1996 on each of our main child outcomes separately for each group.

To construct IV estimates, we employ our RD design and use the total drop in parental DI payments, including drops to zero, as the first stage outcome variable (see panel A in Table 1). To be valid, one must assume the exclusion restriction that there is no direct effect of exit from DI (see Section B.), an assumption which is unlikely to hold. With this caveat in mind, we report IV estimates to provide some type of comparison to OLS.

Appendix Table A6 presents the OLS and IV estimates. The OLS estimates for the younger versus older parent samples are generally quite similar, but diverge sharply from the IV estimates. Specification A uses whether the child was ever on DI by 2014 as the outcome variable. The OLS estimates imply an extra 1,000 euros in parental DI payments increases a child's probability of participating in DI by 0.3 percentage points for both the older and younger parent samples. This contrasts with the larger IV estimate of 0.9 percentage points. Likewise, looking at days on DI, income from DI, earnings, taxes, education, crime, and mental health the IV estimate is roughly between 2 and 4 times larger compared to OLS. Interestingly, the OLS estimates for cumulative total benefits from other social assistance programs is large and significant, while the IV estimate is close to zero.

Why are the IV estimates substantially larger in general? There are several possible explanations. First, the mean DI participation rate is higher in the IV versus OLS samples (10.4% versus approximately 6.5%). Second, OLS could be biased due to nonrandom parental changes in DI participation and payment amounts. For example, in the OLS sample, a parent may be choosing to voluntarily exit because their health has improved or their payments may be falling because they have found part-time employment. In contrast, the IV estimates compare parents whose health conditions and job prospects are presumably similar, but whose DI payments involuntarily change due to an unexpected shock. A third reason is that the exclusion restriction could be violated as mentioned above. A final reason is that IV estimates a local average treatment effect (LATE) for compliers, while OLS estimates an average treatment effect (ATE) for the whole population. The reform reduced DI benefits for marginal participants who were deemed to have substantial work capacity. In contrast, OLS includes parents with more severe disabilities as well as parents with little attachment to the DI program. This difference is emphasized by De Haan and Schreiner (2018) when discussing how to compare intergenerational ATEs estimated using their bounding assumptions to LATEs estimated using quasi-experimental methods.
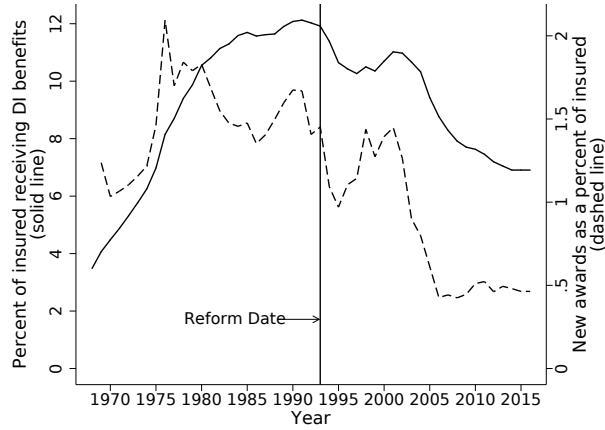
Appendix Figure A1. DI Stocks and Inflows as a Percentage of Insured Workers, 1968-2016.

Notes: Data come from the Dutch Employee Insurance Agency (Uitvoeringsinstituut Werkne-mersverzekeringen), as used in Koning and Lindeboom (2015). Estimates of the number of insured workers are used to calculate receipt and award percentages for 2014 to 2016.
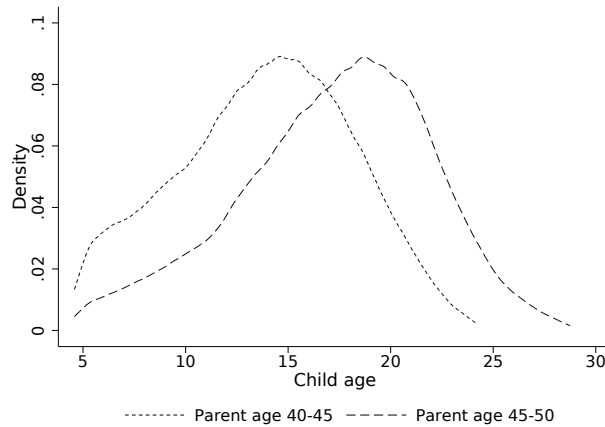

Appendix Figure A2. Child Age as of the Reform Date of August 1993

Notes: Kernel density estimates of child age, trimmed to exclude .3 percent of the data for visual clarity.
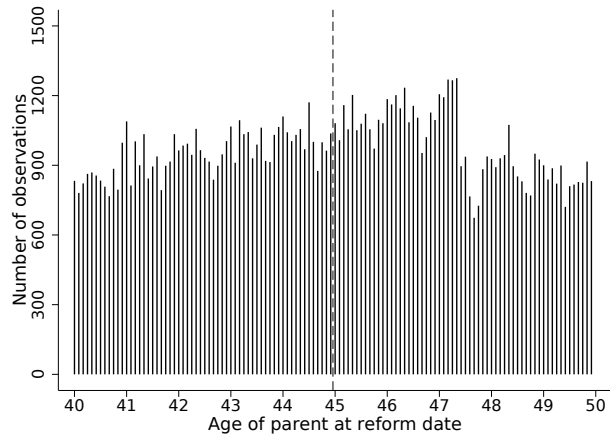
Appendix Figure A3. Number of Observations by Cohort

Notes: The McCrary density test is insignificant (discontinuity estimate=.027, s.e.=.023, p-value=0.25). The large trough and spike around ages 47 and 48 are the effects of WWII (the "hunger winter of 1944") and the subsequent baby boom.
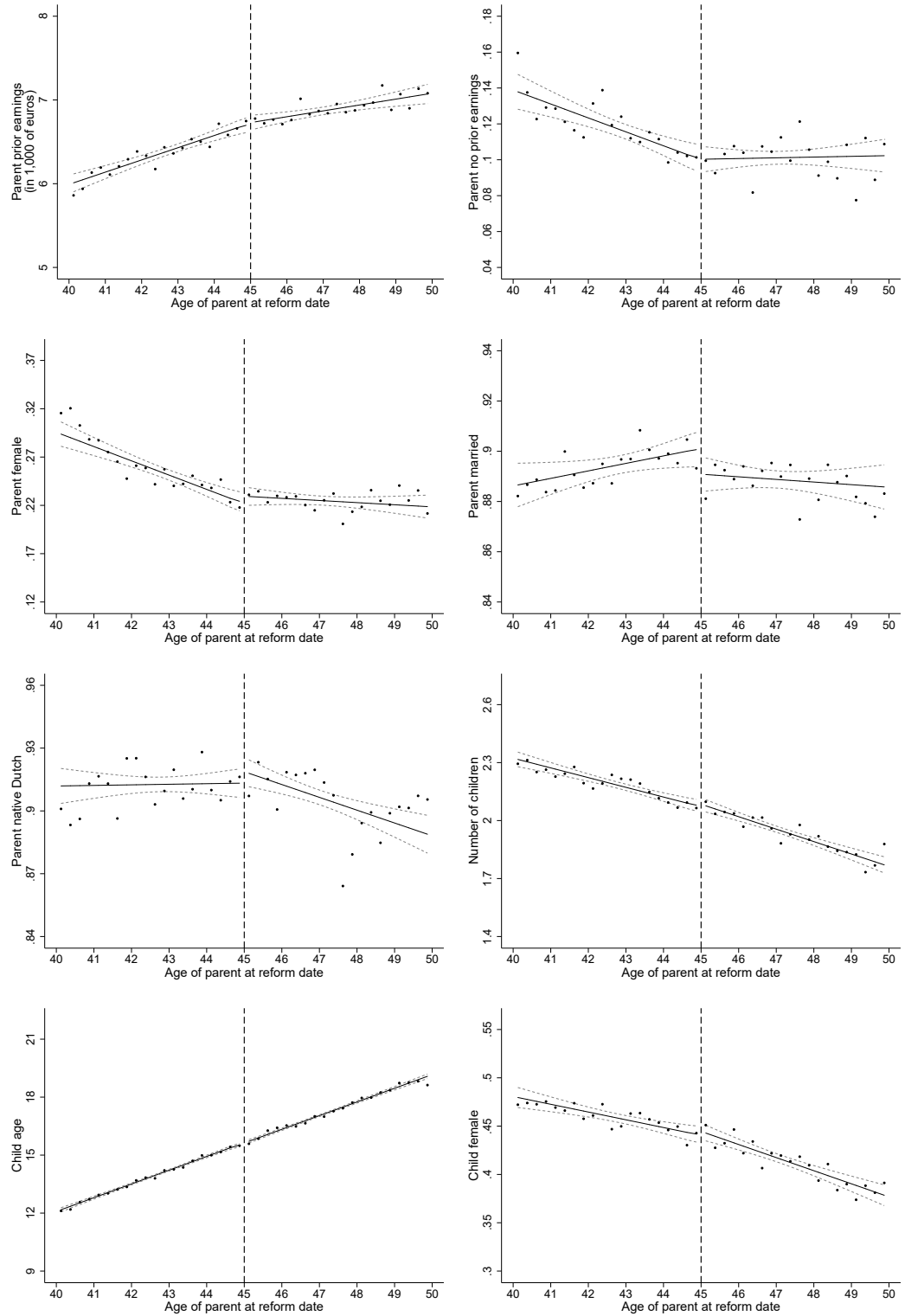
Appendix Figure A4. Covariate Balance, Parental and Child Characteristics.

Note: Graphs mirror those in Figure 2, but use pre-existing parental and child variables as the outcome variables.
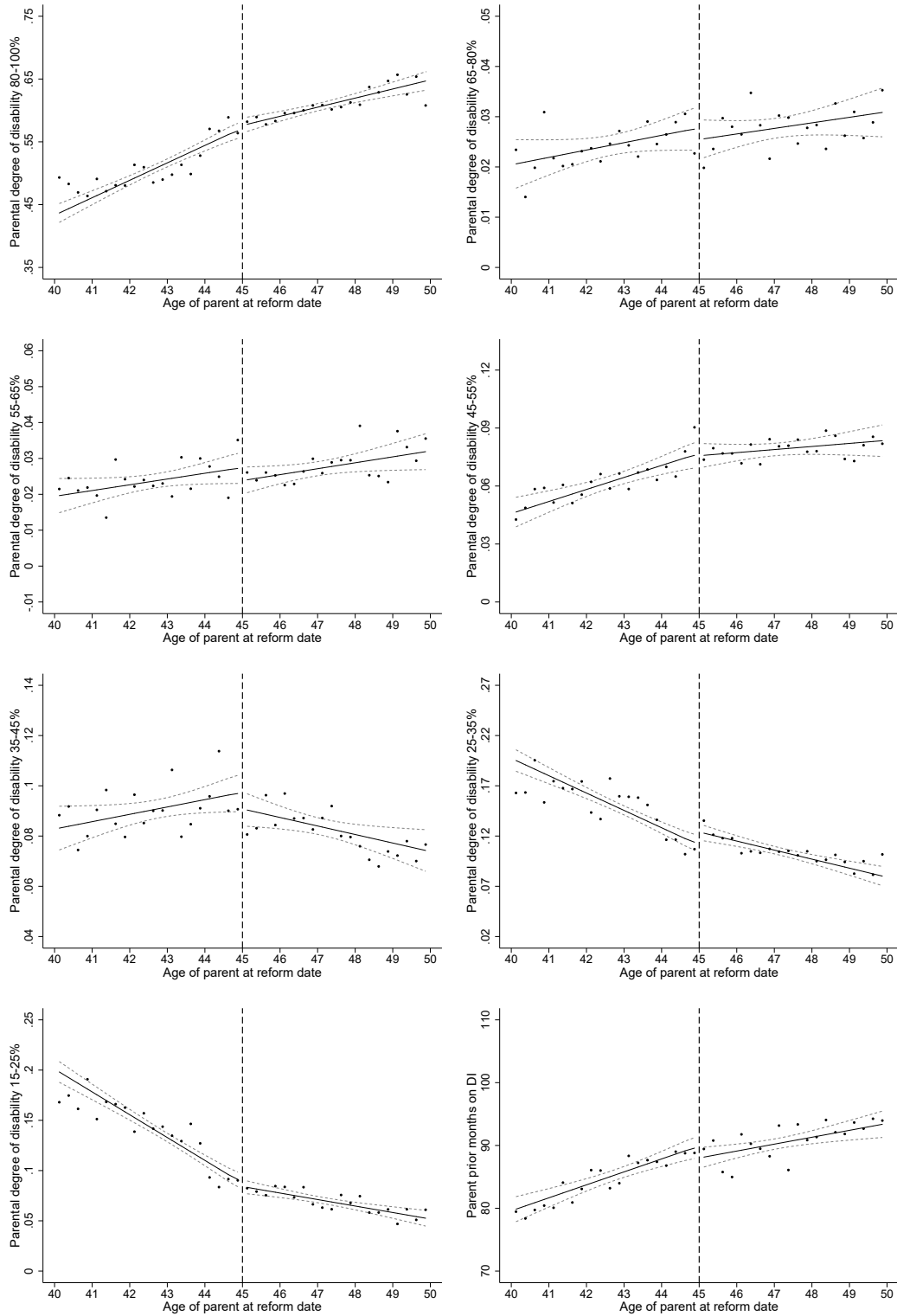
Appendix Figure A5. Covariate Balance, Parental Degree of Disability and Prior Months on DI.

Note: Graphs mirror those in Figure 2, but use pre-existing parental degree of disability bins and prior months on DI as the outcome variables.
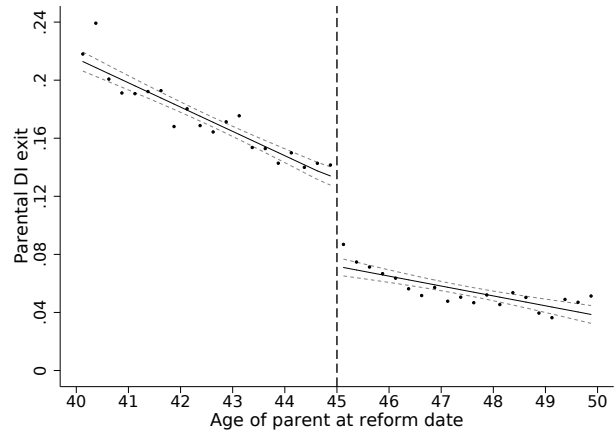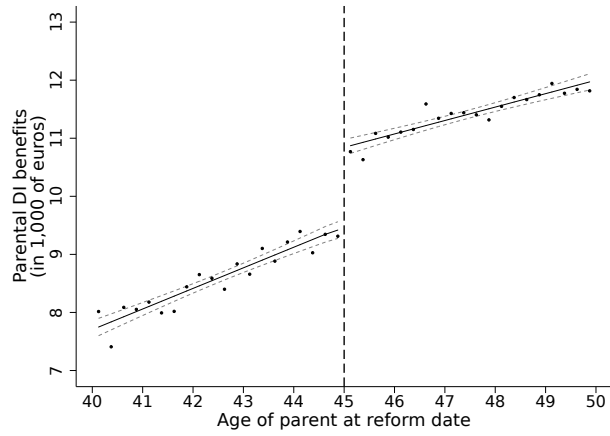
Appendix Figure A6. Effect of the Reform on Parents

Note: Graphs mirror those in Figure 1, but with 3 month age bins.
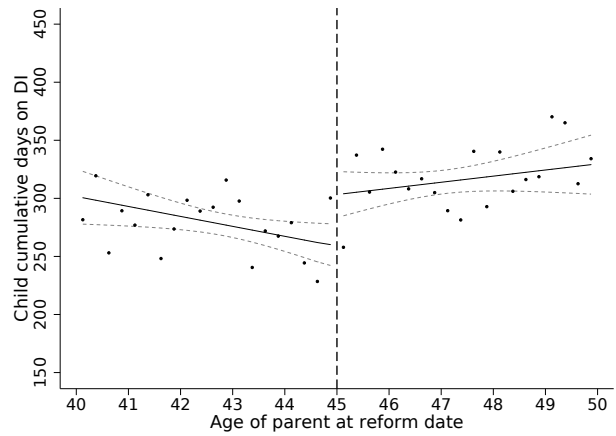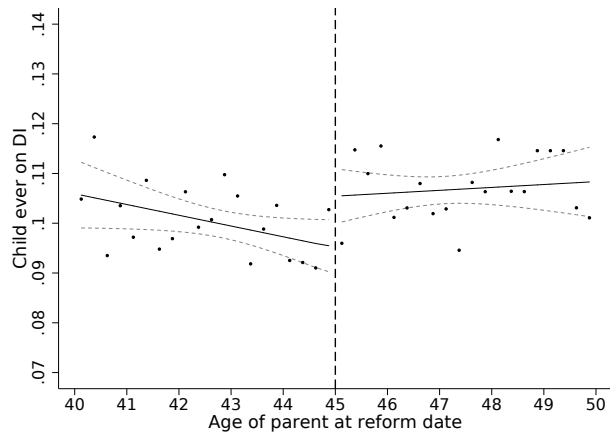
Appendix Figure A7. Child DI Participation

Note: Graphs mirror those in Figure 2, but with 3 month age bins.
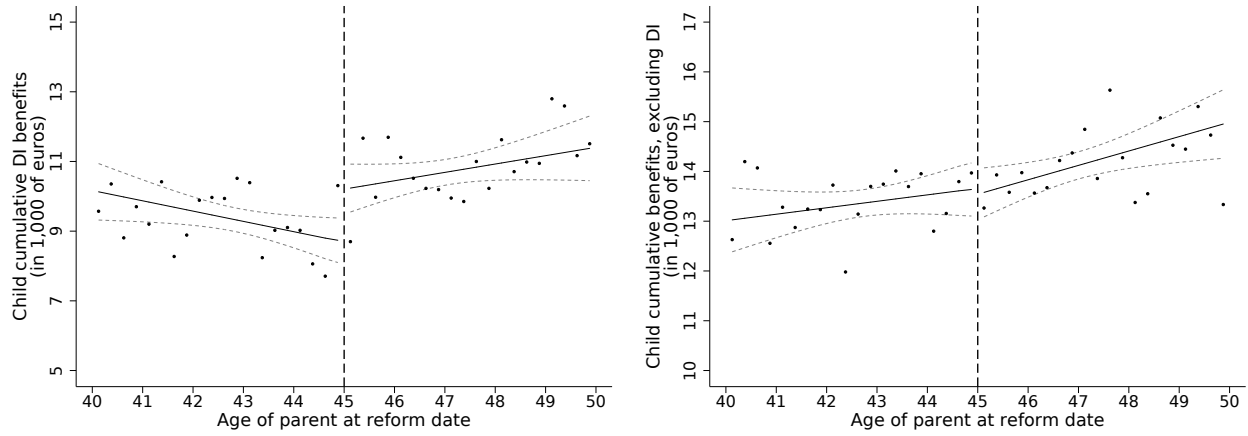
Appendix Figure A8. Child DI and Other Benefit Receipt

Note: Graphs mirror those in Figure 3, but with 3 month age bins.
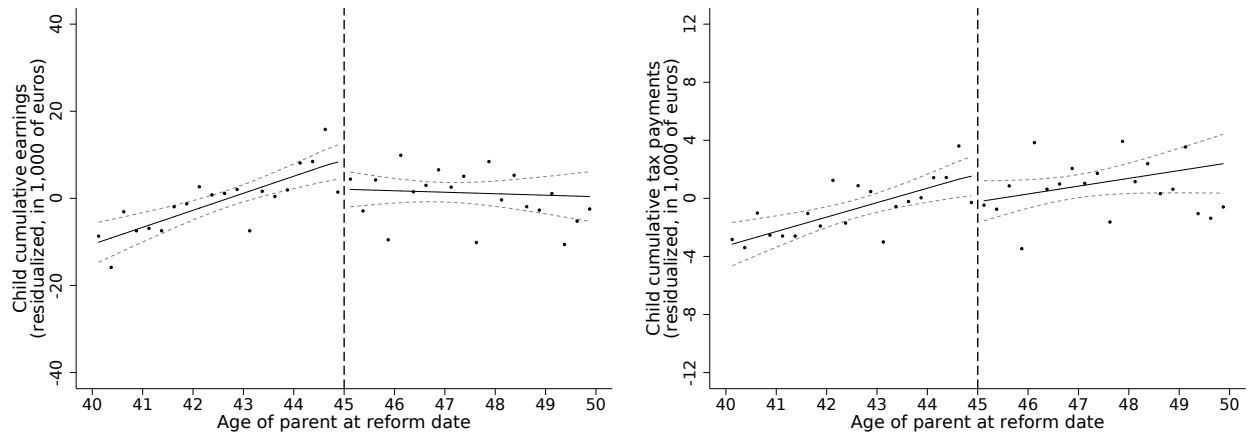
Appendix Figure A9. Residualized Child Earnings and Taxes

Note: Graphs mirror those in Figure 4, but with 3 month age bins.

Appendix Figure A10. Child Educational Attainment

Note: Graphs mirror those in Figure 6, but with 3 month age bins.

Appendix Figure A11. Child Serious Crime

Note: Graph mirrors Figure 7, but with 3 month age bins.
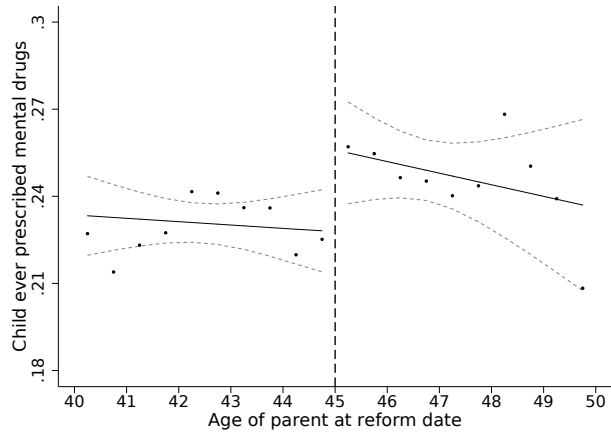
Appendix Figure A12. Child Mental Health

Note: Graph mirrors Figure 8, but with 3 month age bins.

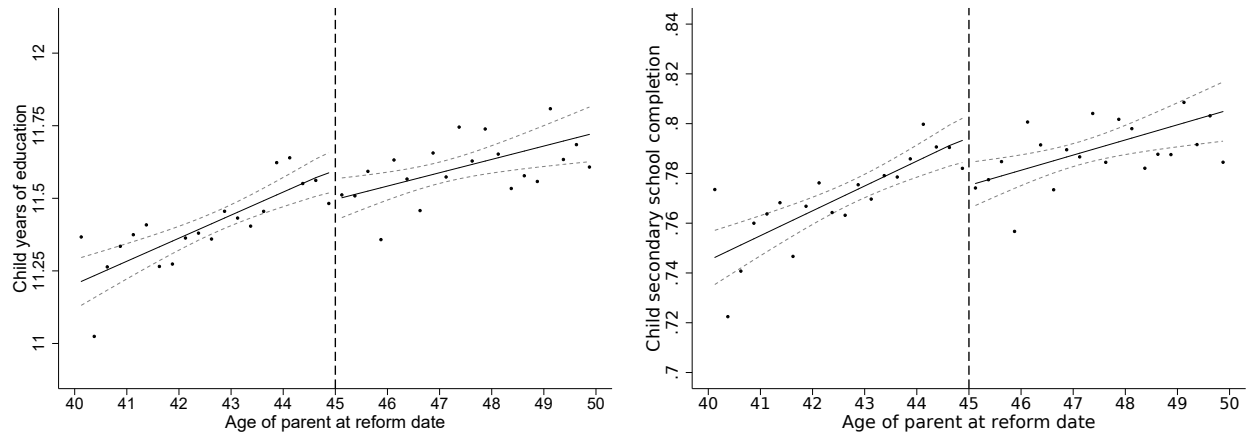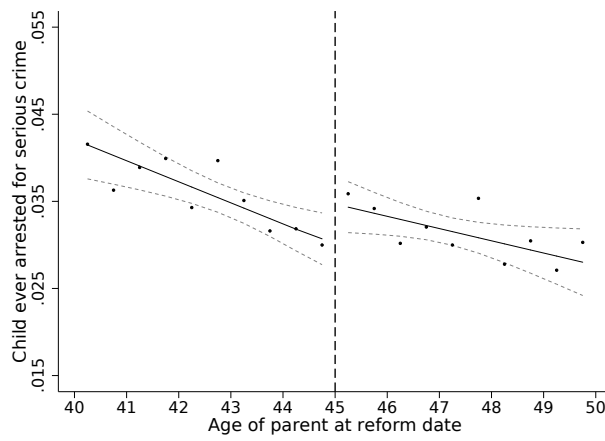**Appendix Table A1.** Summary Statistics

	Overall	Parent age: 40-45	Parent age: 45-50
A. Parents			
Female	0.27	0.29	0.26
Married	0.87	0.87	0.87
Age (Aug 1993)	45.17	42.58	47.36
Duration DI (months)	88.38	85.20	91.08
Degree of disability			
15-25%	0.10	0.14	0.07
25-35%	0.12	0.14	0.10
35-45%	0.08	0.09	0.08
45-55%	0.07	0.06	0.08
55-65%	0.02	0.02	0.03
65-80%	0.02	0.02	0.03
80-100% (Full disability)	0.58	0.53	0.63
Pre-DI earnings (euros)	6,529	6,249	6,766
Native Dutch	0.91	0.91	0.91
Number of kids in HH	1.71	1.87	1.58
Parent observations	70,319	32,279	38,040
B. Children			
Female	0.44	0.46	0.41
Age (Aug 1993)	15.60	13.86	17.27
Child observations	116,356	57,028	59,328

Notes: The sample in panel A is parents between the ages of 40-50 and on DI as of the reform date of August 1, 1993, who were still on DI in 1995, and had children living at home around the time of the reform. The sample in panel B is the children of these parents. A degree of disability between 0-15% does not qualify for DI benefits. Variables are measured as of January 1, 1996, unless otherwise indicated.

Appendix Table A2. Transition Matrices in Parental Disability Rating

A. Parent age: 40-45

				Disability rating in 1999 (post re-examinations)					
		Exit DI	15-25%	25-35%	35-45%	45-55%	55-65%	65-80%	80-100%	All
	15-25%	4.7	8.0	0.3	0.1	0.1	0.0	0.0	0.8	14.1
	25-35%	3.3	0.8	9.2	0.5	0.1	0.1	0.1	1.1	15.0
Disability rating	35-45%	1.3	0.3	0.8	5.5	0.3	0.1	0.1	0.7	9.1
in 1996	45-55%	1.0	0.1	0.2	0.4	3.7	0.1	0.1	0.6	6.2
(pre re-examinations)	55-65%	0.3	0.1	0.0	0.1	0.1	1.4	0.1	0.3	2.4
	65-80%	0.2	0.0	0.1	0.1	0.1	0.1	1.6	0.4	2.4
	80-100%	6.7	0.5	0.7	0.5	0.4	0.3	0.4	41.3	50.9
	All	17.4	9.8	11.4	7.2	4.7	2.0	2.4	45.1	100.0

B. Parent Age: 45-50

				Disability rating in 1999 (post re-examinations)					
		Exit DI	15-25%	25-35%	35-45%	45-55%	55-65%	65-80%	80-100%	All
	15-25%	1.1	4.5	0.3	0.1	0.1	0.0	0.0	0.7	6.9
	25-35%	1.0	0.4	7.1	0.5	0.2	0.1	0.1	1.0	10.5
Disability rating	35-45%	0.5	0.1	0.3	5.9	0.2	0.1	0.1	1.0	8.2
in 1996	45-55%	0.4	0.0	0.1	0.3	5.8	0.2	0.1	1.0	7.9
(pre re-examinations)	55-65%	0.2	0.0	0.0	0.1	0.1	2.0	0.1	0.3	2.8
	65-80%	0.1	0.0	0.0	0.0	0.0	0.1	2.1	0.5	2.8
	80-100%	2.3	0.1	0.2	0.2	0.2	0.2	0.3	57.3	60.9
	All	5.7	5.3	8.1	7.1	6.8	2.6	2.8	61.7	100.0

Notes: The sample is as described in Appendix Table A1. "Exit DI" captures both voluntary exit and being forced off of DI.

Appendix Table A3. RD Estimates for Covariate Balance

	Treatment dummy: age<45	Mean
A. Parents		
Female	-0.007 (0.007)	0.27
Married	0.010 (0.005)	0.87
Duration DI (months)	1.778 (1.215)	88.38
Degree of disability		
15-25%	0.005 (0.005)	0.10
25-35%	-0.012 (0.006)	0.12
35-45%	0.007 (0.005)	0.08
45-55%	0.001 (0.005)	0.07
55-65%	0.004 (0.003)	0.02
65-80%	0.002 (0.003)	0.02
80-100% (Full disability)	-0.006 (0.009)	0.58
Pre-DI earnings (euros)	-17.205 (63.779)	6,529
No pre-DI earnings	0.0001 (0.005)	0.01
Native Dutch	-0.005 (0.005)	0.91
Number of kids in HH	-0.008 (0.023)	1.71
Parent observations	70,319	
B. Children		
Female	-0.003 (0.006)	0.44
Age (Aug 1993)	-0.044 (0.066)	15.60
Child observations	116,356	
Joint F-test [p-value]	0.69 [0.202]	

Notes: Each row is a separate RD regression, and uses the same sample and specification as Table 2, except that each regression includes no additional covariates besides the running variable. Standard errors in parentheses, clustered at the parent level.

Appendix Table A4. Serious and Minor Crimes by Arrest Category

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A. Serious crimes

Mugging, Theft of a car, Theft of a motorcycle, Extortion, Burglary in a school,
Theft of items from a car, Burglary in a shed/garage, Murder, Vandalism of a public
building, Rape, Burglary in a sports complex, Burglary in a residence, Theft of a
bicycle, Pickpocketing, Commerical theft, Trespassing, Arson, Possession of stolen
goods, Fraud, Assault, Other public disturbance or trespass, Gun offense, Violation of
court order

B. Minor crimes

Cybercrime, Drunk driving, Sexual acts with a minor, Other traffic violation, Leaving
the scene of an accident, Disorderly conduct, Miscellaneous civil offense, Public
indecency, Maltreatment, Stalking, Other sexual offense, Drug offense, Vandalism of a
car, Miscellaneous criminal offense, Disrespecting public authority, Other violent
offense, Other financial crime, Driving with a suspended license, Forgery, Shoplifting,
Other theft or burglary, Kidnapping, Other Vandalism, Threats

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Notes: These are translations of the 48 arrest categories used in the Standard Crime Classifi-
cation of Statistics Netherlands. To categorize serious versus minor crime, we take everyone
who was arrested for a specific crime in 2014 (e.g., assault) and then calculate the probability
that these individuals are incarcerated in 2014 for any reason. Serious and minor crimes
are defined as an incarceration probability above or below the median across the 48 arrest
categories, respectively.

Appendix Table A5. Robustness Tests for Main Child Outcomes (Reduced Form Models)

Specification	Ever on DI	Cum. days on DI	Cum. DI income	Cum. other transfers	Cum. earnings	Cum. taxes	Years educ.	Upper second. school	Serious crime	Mental drugs
A. Baseline	-0.011 (0.004)	-47.151 (13.921)	-1.579 (0.499)	0.092 (0.379)	7.178 (2.836)	1.997 (0.969)	0.117 (0.050)	0.022 (0.007)	-0.0055 (0.0023)	-0.026 (0.013)
B. Quadratic trends	-0.016 (0.006)	-57.876 (20.334)	-2.076 (0.729)	0.346 (0.562)	10.469 (4.165)	3.120 (1.415)	0.130 (0.073)	0.026 (0.010)	-0.0075 (0.0034)	-0.046 (0.018)
C. No triangular weights	-0.010 (0.004)	-36.897 (13.054)	-1.175 (0.469)	0.021 (0.354)	5.282 (2.642)	1.313 (0.908)	0.099 (0.046)	0.018 (0.006)	-0.0042 (0.0022)	-0.020 (0.012)
D. No control variables	-0.010 (0.004)	-44.400 (13.822)	-1.515 (0.497)	0.098 (0.385)	5.877 (3.242)	1.548 (1.117)	0.100 (0.052)	0.019 (0.007)	-0.0049 (0.0024)	-0.028 (0.013)
E. 45 month window	-0.012 (0.004)	-52.179 (15.094)	-1.776 (0.541)	0.128 (0.411)	8.028 (3.084)	2.248 (1.051)	0.120 (0.054)	0.022 (0.007)	-0.0058 (0.0025)	-0.031 (0.014)
F. 30 month window	-0.018 (0.005)	-69.737 (18.142)	-2.440 (0.651)	0.264 (0.495)	11.077 (3.684)	2.941 (1.254)	0.142 (0.065)	0.026 (0.009)	-0.0080 (0.0031)	-0.044 (0.016)
G. Local linear regression bandwidth 60 months	-0.010 (0.004)	-37.323 (12.737)	-1.227 (0.459)	-0.019 (0.345)	3.923 (3.040)	0.676 (1.029)	0.076 (0.048)	0.015 (0.006)	-0.0039 (0.0022)	-0.022 (0.011)
H. Local linear regression bandwidth 45 months	-0.010 (0.004)	-46.517 (14.526)	-1.589 (0.543)	0.954 (0.412)	6.116 (3.424)	1.641 (1.196)	0.091 (0.055)	0.018 (0.007)	-0.0048 (0.0025)	-0.027 (0.013)
I. Local linear regression bandwidth 30 months	-0.016 (0.005)	-67.382 (17.858)	-2.338 (0.629)	0.308 (0.501)	8.993 (4.161)	2.298 (1.416)	0.147 (0.067)	0.025 (0.009)	-0.0075 (0.0031)	-0.044 (0.016)
J. Sample of children not living at home	-0.007 (0.006)	-17.811 (20.977)	-0.333 (0.812)	-0.200 (0.712)	6.038 (4.179)	1.665 (1.470)	0.122 (0.066)	0.013 (0.009)	0.0035 (0.0031)	-0.006 (0.007)
K. Cluster s.e.'s by parental age	-0.011 (0.003)	-47.151 (13.007)	-1.578 (0.513)	0.091 (0.332)	7.178 (2.576)	1.997 (0.792)	0.117 (0.043)	0.022 (0.005)	-0.0054 (0.0019)	-0.026 (0.011)
L. Excluding non-natives	-0.011 (0.004)	-42.131 (14.629)	-1.375 (0.521)	0.034 (0.387)	8.126 (2.959)	2.229 (1.019)	0.124 (0.052)	0.023 (0.007)	-0.0040 (0.0023)	-0.033 (0.014)
M. Excluding children whose parents left DI in 1995	-0.012 (0.004)	-49.767 (14.144)	-1.694 (0.506)	0.014 (0.384)	7.172 (2.866)	1.837 (0.977)	0.126 (0.050)	0.022 (0.007)	-0.0059 (0.0024)	-0.026 (0.013)

Notes: See notes to Tables 1-7. Standard errors in parentheses, clustered at the parent level.

Appendix Table A6. OLS versus IV Estimates

	Independent variable: Parental DI payments in 1996 (in 1,000 euros)		
	OLS		IV
	Parent age:		Parent age:
Child outcome in 2014	40-45	45-50	40-50
A. Ever on DI	0.003	0.003	0.009
	(0.000)	(0.000)	(0.004)
B. Cumulative days on DI	8.6	8.4	37.5
	(0.3)	(0.3)	(14.6)
C. Cumulative DI income	0.293	0.289	1.256
(in 1,000 euro)	(0.009)	(0.010)	(0.522)
D. Cumulative total benefits, excl. DI	0.230	0.235	-0.073
(in 1,000 euro)	(0.007)	(0.008)	(0.388)
E. Cumulative income from work	-2.383	-2.964	-5.711
(in 1,000 euro)	(0.062)	(0.080)	(2.951)
F. Cumulative estimated taxes	-0.668	-0.933	-1.589
(in 1,000 euro)	(0.023)	(0.032)	(1.008)
G. Years of education	-0.052	-0.050	-0.096
	(0.001)	(0.001)	(0.050)
H. Upper secondary school or more	-0.005	-0.005	-0.018
	(0.000)	(0.000)	(0.007)
I. Ever arrested for serious crime	0.0009	0.0009	0.0042
	(0.0000)	(0.0000)	(0.0024)
J. Ever prescribed mental drugs	0.004	0.004	0.019
	(0.000)	(0.000)	(0.011)

Notes: OLS samples include children still living at home, regardless of whether the parent was on DI as of the reform date. The OLS samples are split into two parental age groups to ensure the stricter DI rules for those parents under versus over the age 45 cutoff do not contribute to the estimates. See notes to Table 1 for a list of control variables. Samples sizes for the three columns, in order, are: A-F 498,378; 421,731; 116,356, G, H 387,264; 287,799; 79,924, I 923,119; 612,885; 123,186, J 368,372; 85,202; 27,218. The IV estimates scale the RF estimates using the drop in DI payments, assuming exit itself has no effect; see Tables 1-7. Standard errors in parentheses, clustered at the parent level.