Public Economics (2450B)

Topic 5: Children and Family Policies

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Early Childhood and Family Policies

- Last lecture: Role of human capital and education
  - Focused on college, job training, K12, etc.
- This lecture: focus on child/childhood/family/environment policies:
  - Preschool policies
  - Family leave
  - Environmental policies
- Broad themes consistent with the first lecture: Kids matter

Outline

1. Preschool and Head Start
2. Family Leave and Childcare policies
3. Environmental Policies and Early Childhood Impacts

Preschool and Head Start

- US Spends ~$10B on head start annually
  - States contract with local providers to provide free preschool to low-income children
  - Children aged 0-5 with incomes below 100% FPL or in SSI/TANF are eligible
  - Funded through federal grants to local public / non-profit organizations providing pre-school
  - Generally administered via waitlists (not enough slots)
- What is the impact of this spending?
- How should we think about the welfare impacts of it?

Early Childhood Investment & Dynamic Complementarity

- A series of papers by Heckman and others argue for the importance of early childhood investments

- Cunha and Heckman (2007) suggests model of dynamic complementarity that leads to high returns to early investments

- Human capital is produced with a production function over inputs in two periods:

$$f(\theta_1, \theta_2)$$

- Dynamic complementarities occur when $\frac{\partial^2 f}{\partial \theta_1 \partial \theta_2} > 0$ so that investment early in childhood increases the returns to later-life investment

Early Childhood Investment & Dynamic Complementarity

- Question: under what conditions does dynamic complementarity suggest higher returns to early as opposed to late childhood (i.e. increase θ_1 instead of θ_2)?

- What is the empirical evidence on dynamic complementarities?

- What about the importance of early childhood investment?

Heckman (2006, Science)

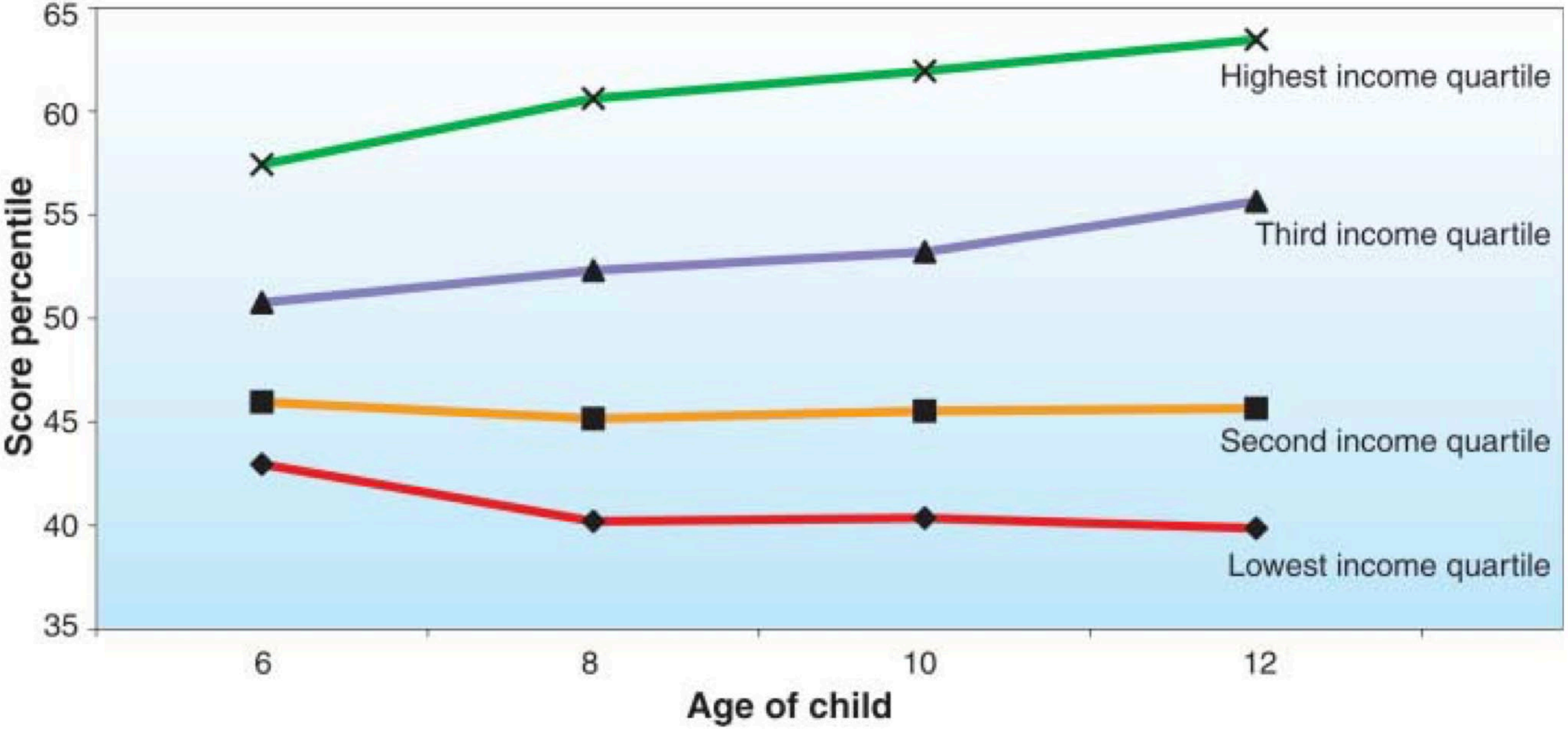


Fig. 1. Average percentile rank on Peabody Individual Achievement Test–Math score by age and income quartile. Income quartiles are computed from average family income between the ages of 6 and 10. Adapted from (*3*) with permission from MIT Press.

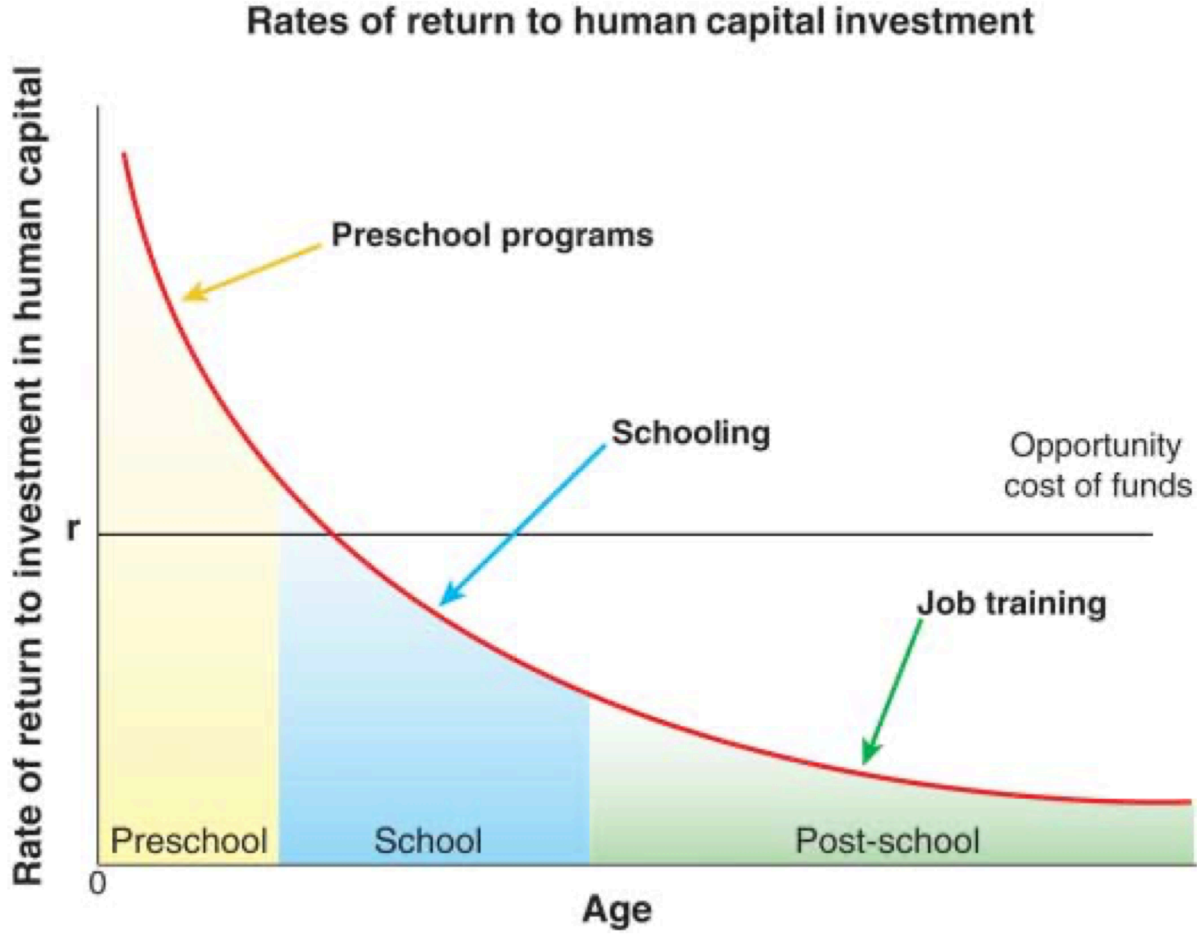
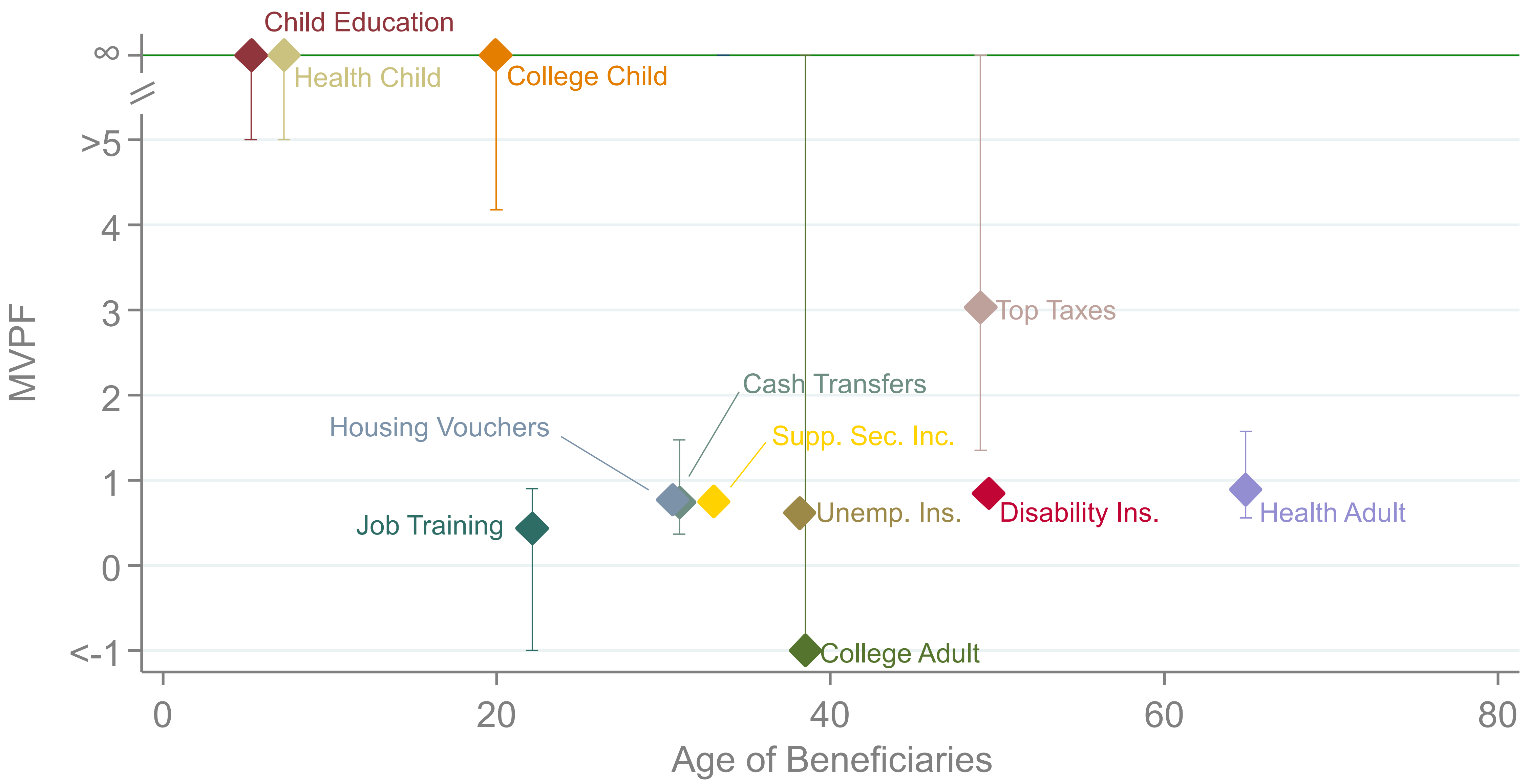
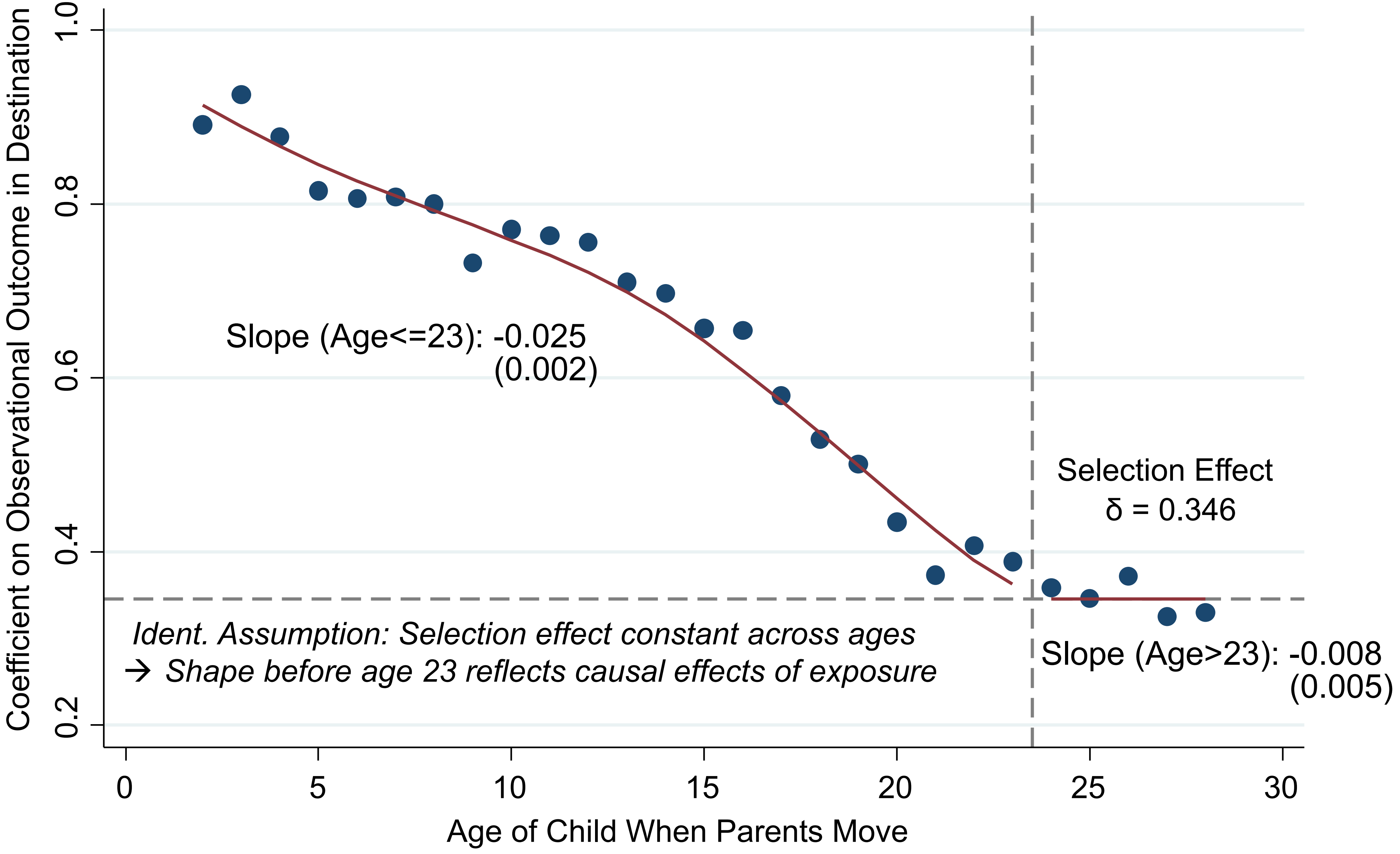


Fig. 2. Rates of return to human capital investment in disadvantaged children. The declining figure plots the payout per year per dollar invested in human capital programs at different stages of the life cycle for the marginal participant at current levels of spending. The opportunity cost of funds (*r*) is the payout per year if the dollar is invested in financial assets (e.g., passbook savings) instead. An optimal investment program from the point of view of economic efficiency equates returns across all stages of the life cycle to the opportunity cost. The figure shows that, at current levels of funding, we overinvest in most schooling and post-schooling programs and underinvest in preschool programs for disadvantaged persons. Adapted from (*3*) with permission from MIT Press.

What does the data say? MVPFs by Age (Hendren and Sprung-Keyser 2019)



What does the data say? Neighborhood Exposure Effects (CFHJP2019)



Preschool and Head Start

- Nonetheless, there is clear evidence that early childhood programs can have large effects (the debate is about whether they are larger/smaller than other policies)

- Generally, evidence on the long-run causal evidence on impact of preschool on children in the US generally comes from three sources:

  - Perry Preschool RCT
  - Abecedarian RCT
  - Introduction of Head Start

- Additional studies looks at more short- and medium-run outcomes (e.g. test scores)
  - Head Start Impact Study (RCT)
  - Sibling designs (Deming 2009)
  - Lotteried Pre-K (Gray-Lobe et al. 2021; Lipsey et al. (2016))

Perry Preschool

- Perry Preschool is one of the most widely-cited preschool studies
- Studies 123 children randomly assigned to treatment and control groups
- Non-random attrition in the follow-up surveys, which is corrected for using a Heckman selection model
- Heckman et al. 2009 conduct a cost-benefit analysis of the program

Table 1. Economic benefits and costs of the Perry Preschool Program (*27*). All values are discounted at 3% and are in 2004 dollars. Earnings, Welfare, and Crime refer to monetized value of adult outcomes (higher earnings, savings in welfare, and reduced costs of crime). K–12 refers to the savings in remedial schooling. College/adult refers to tuition costs.

	Perry Preschool
Child care	$986
Earnings	$40,537
K–12	$9184
College/adult	$–782
Crime	$94,065
Welfare	$355
Abuse/neglect	$0
Total benefits	$144,345
Total costs	$16,514
Net present value	$127,831
Benefits-to-costs ratio	8.74

Table 1
Selected estimates of IRRs (%) and benefit-to-cost ratios.

Return		To individual			To society[a]			To society[a]		
Murder cost[b]					High ($4.1M)			Low ($13K)		
		All[d]	Male	Female	All[d]	Male	Female	All[d]	Male	Female
Deadweight loss[c]										
IRR	0%	7.6	8.4	7.8	9.9	11.4	17.1	9.0	12.2	9.8
		(1.8)	(1.7)	(1.1)	(4.1)	(3.4)	(4.9)	(3.5)	(3.1)	(1.8)
	50%	6.2	6.8	6.8	9.2	10.7	14.9	8.1	11.1	8.1
		(1.2)	(1.1)	(1.0)	(2.9)	(3.2)	(4.8)	(2.6)	(3.1)	(1.7)
	100%	5.3	5.9	5.7	8.7	10.2	13.6	7.6	10.4	7.5
		(1.1)	(1.1)	(0.9)	(2.5)	(3.1)	(4.9)	(2.4)	(2.9)	(1.8)
Discount rate										
Benefit–cost ratios	0%	–	–	–	31.5	33.7	27.0	19.1	22.8	12.7
					(11.3)	(17.3)	(14.4)	(5.4)	(8.3)	(3.8)
	3%	–	–	–	12.2	12.1	11.6	7.1	8.6	4.5
					(5.3)	(8.0)	(7.1)	(2.3)	(3.7)	(1.4)
	5%	–	–	–	6.8	6.2	7.1	3.9	4.7	2.4
					(3.4)	(5.1)	(4.6)	(1.5)	(2.3)	(0.8)
	7%	–	–	–	3.9	3.2	4.6	2.2	2.7	1.4
					(2.3)	(3.4)	(3.1)	(0.9)	(1.5)	(0.5)

Notes: Kernel matching using NLSY data is used to impute missing values for earnings before age-40, and PSID projection for extrapolation of later earnings. For details of these procedures, see Section 3. In calculating benefit-to-cost ratios, the deadweight loss of taxation is assumed to be 50%. Nine separate types of crime are used to estimate the social cost of crime; see the Appendix, Part H for details. Standard errors in parentheses are calculated by Monte Carlo resampling of prediction errors and bootstrapping; see the Appendix, Part K for details. Lifetime net benefit streams are adjusted for compromised randomization. For details, see Section 4.

[a] The sum of returns to program participants and the general public.

[b] "High" murder cost accounts for the standard statistical value of life, while "Low" does not.

[c] Deadweight cost is dollars of welfare loss per tax dollar.

[d] "All" is computed from an average of the profiles of the pooled sample, and may be lower or higher than the profiles for each gender group.

Table 2
Descriptive statistics.

Outcome	Age	Female		Male	
		Control	Treatment	Control	Treatment
Sample size		26	25	39	33
Mother's age	At birth	25.7	26.7	25.6	26.5
		(1.5)	(1.2)	(1.1)	(1.1)
Parent's HS grade-level	3	9.1	9.4	9.6	9.5
		(0.4)	(0.5)	(0.3)	(0.4)
Stanford–Binet IQ	3	79.6	80.0	77.8	79.2
		(1.3)	(0.9)	(1.1)	(1.2)
HS graduation (%)	27	31%	84%	54%	48%
		(9%)	(7%)	(8%)	(9%)
Currently employed (%)	27	55%	80%	56%	60%
		(10%)	(8%)	(8%)	(9%)
Yearly earnings[a] ($)	27	10,523	13,530	14,632	17,399
		(2068)	(2200)	(2129)	(2155)
Currently employed (%)	40	82%	83%	50%	70%
		(8%)	(8%)	(8%)	(8%)
Yearly earnings[a] ($)	40	20,345	24,434	24,730	32,023
		(3883)	(4752)	(4495)	(4938)
Ever on welfare (%)	18–27	82%	48%	26%	32%
		(8%)	(10%)	(7%)	(8%)
Ever on welfare (%)	26–40	41%	50%	38%	20%
		(10%)	(10%)	(8%)	(7%)
Arrests, murder[b]	≤40	0.04	0.00	0.05	0.03
		(0.04)	(–)	(0.04)	(0.03)
Arrests, rape[b]	≤40	0.00	0.00	0.36	0.12
		(–)	(–)	(0.16)	(0.06)
Arrests, robbery[b]	≤40	0.04	0.00	0.36	0.24
		(0.04)	(–)	(0.15)	(0.14)
Arrests, assault[b]	≤40	0.00	0.04	0.59	0.33
		(–)	(0.04)	(0.18)	(0.14)
Arrests, burglary[b]	≤40	0.04	0.00	0.59	0.42
		(0.04)	(–)	(0.19)	(0.16)
Arrests, larceny[b]	≤40	0.19	0.00	1.03	0.33
		(0.10)	(–)	(0.30)	(0.22)
Arrests, MV theft[b]	≤40	0.00	0.00	0.15	0.03
		(–)	(–)	(0.11)	(0.03)
Arrests, all felonies[b]	≤40	0.42	0.04	3.26	2.12
		(0.18)	(0.04)	(0.68)	(0.60)
Arrests, all crimes[b]	≤40	4.85	2.20	12.41	8.21
		(1.27)	(0.53)	(1.95)	(1.78)
Ever arrested (%)	≤40	65%	56%	95%	82%
		(10%)	(10%)	(4%)	(7%)

Table 4
Internal rates of return (%), by imputation and extrapolation method and assumptions about crime costs assuming 50% deadweight cost of taxation.

Returns		To individual			To society, including the individual (nets out transfers)								
Victimization/arrest ratio[a]					Separated			Separated			Property vs. violent		
Murder victim cost[b]					High ($4.1M)			Low ($13K)			Low ($13K)		
Imputation	Extrapolation	All[c]	Male	Female	All[c]	Male	Female	All[c]	Male	Female	All[c]	Male	Female
Piecewise linear interpolation[d]	CPS	6.0	5.0	7.7	8.9	9.7	15.4	7.7	9.7	9.5	7.7	10.1	10.2
		(1.7)	(1.8)	(1.8)	(4.9)	(4.2)	(4.3)	(2.6)	(3.0)	(2.7)	(3.9)	(4.5)	(3.6)
	PSID	4.8	2.5	7.4	7.3	8.0	15.3	7.6	9.2	10.0	7.2	9.5	10.5
		(1.6)	(1.8)	(1.5)	(5.0)	(4.1)	(3.7)	(2.7)	(3.1)	(2.8)	(3.7)	(4.4)	(3.1)
Cross-sectional regression[e]	CPS	5.0	4.8	6.8	7.3	8.3	14.2	7.4	10.0	8.7	7.2	10.1	9.2
		(1.4)	(1.5)	(1.3)	(4.5)	(4.1)	(4.0)	(2.3)	(2.9)	(2.2)	(3.4)	(4.0)	(3.3)
	PSID	4.9	4.3	5.9	8.6	9.8	14.9	7.2	10.0	7.8	7.2	10.4	8.7
		(1.6)	(1.8)	(1.5)	(2.3)	(3.3)	(5.2)	(2.9)	(3.0)	(1.5)	(3.7)	(4.1)	(1.5)
	Hause	4.8	4.9	6.8	7.3	8.5	14.9	7.2	10.0	8.7	7.1	10.1	9.3
		(1.4)	(1.4)	(1.2)	(4.0)	(4.2)	(3.4)	(2.7)	(2.9)	(2.3)	(3.0)	(4.1)	(3.2)
Kernel matching[f]	CPS	6.9	7.6	6.6	8.1	9.5	14.7	8.5	11.2	8.8	8.5	11.1	9.4
		(1.3)	(1.1)	(1.4)	(4.5)	(4.1)	(3.2)	(2.5)	(2.9)	(2.9)	(3.5)	(4.3)	(3.5)
	PSID	6.2	6.8	6.8	9.2	10.7	14.9	8.1	11.1	8.1	8.1	11.4	9.0
		(1.2)	(1.1)	(1.0)	(2.9)	(3.2)	(4.8)	(2.6)	(3.1)	(1.7)	(2.9)	(3.0)	(2.0)
	Hause	6.3	8.0	7.1	8.4	9.7	14.6	8.8	11.2	9.3	8.5	11.2	9.6
		(1.2)	(1.2)	(1.3)	(4.3)	(4.0)	(4.0)	(2.3)	(2.5)	(2.4)	(3.2)	(4.2)	(3.7)
Hause[g]	CPS	7.1	6.5	6.5	8.0	8.9	14.7	8.5	10.5	8.6	8.3	10.5	9.1
		(2.5)	(2.7)	(2.0)	(4.7)	(4.2)	(4.2)	(2.6)	(2.2)	(2.7)	(3.1)	(4.0)	(3.3)
	PSID	7.0	6.0	6.2	9.7	10.5	14.8	8.8	11.0	7.4	8.8	11.3	8.4
		(3.0)	(2.9)	(2.2)	(3.7)	(3.8)	(5.6)	(3.2)	(3.4)	(2.5)	(3.7)	(3.1)	(3.2)
	Hause	6.5	5.7	6.3	7.8	8.7	14.5	8.2	10.6	8.5	8.2	11.0	9.4
		(2.3)	(2.0)	(1.8)	(4.7)	(4.2)	(3.5)	(2.5)	(3.0)	(2.7)	(3.3)	(4.0)	(3.6)

Abecedarian Preschool

- You just saw more summary statistics of data than there are observations in the dataset ☺
- But, there are also strong results from another intervention: Carolina Abecedarian
- Carolina Abecedarian randomized 111 children into treatment and control
- Campbell et al. (2012) conduct a follow-up analysis looking at long run impacts on earnings in young adulthood

Abecedarian Preschool: Increases in Years of Education

Table 3

Educational Outcomes for Abecedarian Adults at Age 30 by Preschool Group

Variable	Group				
	Treated (n = 52)	Control (n = 49)	F, χ^2	p	95% CI
Years of education			**9.60**	**.01****	**[0.42, 1.90]**
M	**13.46**	**12.31**			
SD	**2.02**	**1.70**			
HS graduate/GED (%)	88.46	81.63	0.91	.34	[0.57, 5.27]
College graduate (%)	23.08	6.12	5.03	.03*	[1.21, 17.47]

Abecedarian Preschool: Increases in incomes (p=0.11)

Table 4

Economic and Occupational Outcomes for Abecedarian Adults at Age 30 by Preschool Group

Variable	Group			
	Treated (n = 52)	Control (n = 49)	F, χ^2	p
INR			**1.61**	**.21**
M	**3.11**	**2.22**		
SD	**4.37**	**2.29**		
Annual earned income (in thousands of dollars)			2.60	.11
M	33.44	20.71		
SD	50.81	22.25		
Job prestige (working only)			2.60	.11
M	44.85	39.43		
SD	15.28	12.76		
Proportion employed two thirds of past 24 months (%)	75	53	5.16	.02*
Used public aid more than 10% of time frame (%)	3.85	20.41	5.35	.02*
Head of household (%)	78.85	65.31	2.27	.13

Preschool at Scale

- Can these results be replicated at scale?
- Head Start provides free preschool to low-income families
  - Families must be below the poverty line
  - Homeless families/TANF/SSI families are eligible (even if above 100% FPL)
- Several approaches to analyzing impacts of Head Start
  - Sibling Design (e.g. Deming 2009)
  - Recent RCT "Head Start Impact Study" but too early for income outcomes (Kline and Walters 2016 forecast with test scores)
  - County-level rollout (Jackson et al 2019; Bailey et al 2018)

Deming (2009)

- Deming 2009 uses sibling design to estimate impact of head start on outcomes
- Key question: What drives differences across siblings in head start participation?
  - Head start availability?
  - Shocks to the parents?

Deming (2009): Sibling Design

$$(1) \qquad Y_{ij} = \alpha + \beta_1 HS_{ij} + \beta_2 PRE_{ij} + \delta \mathbf{X}_{ij} + \gamma_j + \varepsilon_i,$$

where i indexes individuals and j indexes the family, $\mathbf{X}$ is a vector of family-varying controls, and γ_j is the family fixed effect. HS_{ij} and PRE_{ij} are the estimated effect of Head Start and other preschools, respectively, on the outcomes $Y_{ij.}$ Threats

TABLE 3—THE EFFECT OF HEAD START ON COGNITIVE TEST SCORES

	(1)	(2)	(3)	(4)	(5)
Head Start					
Ages 5–6	–0.025	0.081	0.093	0.131	0.145*
	(0.091)	(0.083)	(0.079)	(0.087)	(0.085)
Ages 7–10	–0.116	0.040	0.067	0.116*	0.133**
	(0.072)	(0.065)	(0.061)	(0.060)	(0.060)
Ages 11–14	–0.201***	–0.053	–0.017	0.029	0.055
	(0.070)	(0.065)	(0.061)	(0.061)	(0.062)
Other preschools					
Ages 5–6	0.167**	0.022	–0.019	–0.102	–0.079
	(0.083)	(0.082)	(0.078)	(0.084)	(0.085)
Ages 7–10	0.230***	0.111*	0.087	0.031	0.048
	(0.070)	(0.064)	(0.061)	(0.061)	(0.065)
Ages 11–14	0.182**	0.076	0.037	–0.040	–0.022
	(0.072)	(0.068)	(0.065)	(0.066)	(0.069)
Permanent income (standardized) mean (0), SD (1)			0.112*		
			(0.064)		
Maternal AFQT (standardized) mean (0), SD (1)			0.353***		
			(0.057)		
Mom high school			0.141**		
			(0.071)		
Mom some college			0.280***		
			(0.080)		
p (all age effects equal—Head Start)	0.074	0.096	0.161	0.092	0.151
Pre-treatment covariates	N	Y	Y	N	Y
Sibling fixed effects	N	N	N	Y	Y
Total number of tests	4,687	4,687	4,687	4,687	4,687
R^2	0.028	0.194	0.268	0.608	0.619
Sample size	1,251	1,251	1,251	1,251	1,251

Notes: The outcome variable is a summary index of test scores that includes the child's standardized PPVT and PIAT math and reading scores at each age. Head Start and other preschool indicators are interacted with the three age groups (5–6, 7–10, and 11–14) listed above. Each column includes controls for gender, first born status, and age-at-test and year fixed effects, plus the covariates indicated in the bottom rows. The unit of observation is child-by-age. Standard errors are clustered at the family level.

Table 4—The Effect of Head Start Overall and by Subgroup

	Test scores				Nontest score	Long term
	5–6 (1)	7–10 (2)	11–14 (3)	5–14 (4)	7–14 (5)	19+ (6)
Panel A: Overall						
Head Start	0.145*	0.133**	0.055	0.101	0.265***	0.228***
	(0.085)	(0.060)	(0.062)	(0.057)	(0.082)	(0.072)
Other preschools	–0.079	0.048	–0.022	–0.012	0.172*	0.069
	(0.085)	(0.065)	(0.069)	(0.062)	(0.088)	(0.072)
p (HS = preschool)	0.021	0.254	0.315	0.118	0.372	0.080
Panel B: By race						
Head Start (black)	0.287***	0.127*	0.031	0.107	0.351***	0.237**
	(0.095)	(0.075)	(0.076)	(0.072)	(0.120)	(0.103)
Head Start (white/Hispanic)	–0.057	0.111	0.156	0.110	0.177	0.224**
	(0.120)	(0.092)	(0.095)	(0.090)	(0.111)	(0.102)
p (black = nonblack)	0.024	0.895	0.308	0.982	0.282	0.924
Panel C: By gender						
Head Start (male)	0.154	0.181**	0.141**	0.159**	0.390***	0.182*
	(0.107)	(0.079)	(0.081)	(0.076)	(0.123)	(0.103)
Head Start (female)	0.128	0.059	0.033	0.055	0.146	0.272**
	(0.106)	(0.083)	(0.085)	(0.081)	(0.108)	(0.106)
p (male = female)	0.862	0.287	0.357	0.346	0.135	0.553
Panel D: By maternal AFQT score						
Head Start (AFQT ≤ –1)	0.171	0.016	–0.023	0.015	0.529***	0.279**
(*n* = 361)	(0.129)	(0.095)	(0.102)	(0.094)	(0.156)	(0.114)
Head Start (AFQT > –1)	0.133	0.172**	0.144*	0.154**	0.124	0.202**
(*n* = 890)	(0.094)	(0.073)	(0.074)	(0.071)	(0.091)	(0.091)
p (low = high AFQT)	0.809	0.198	0.192	0.245	0.024	0.595
Panel E: P-values for equality of test scores by age group						
	Black	Nonblack	Male	Female	Low AFQT	High AFQT
p (all effects equal)	0.003	0.240	0.262	0.254	0.198	0.205

Notes: All results are reported using the specification in column 5 of Table 3, which includes a family fixed effect, all pre-treatment covariates, and controls for gender, age, and firstborn status. Race and gender subgroup estimates are obtained by interacting the Head Start treatment effect with a full set of dummy variables for each subgroup. Standard errors are in parentheses and are clustered at the family level. The test score indices include the PPVT and PIAT Math and Reading Recognition tests. The nontest score index includes indicator variables for grade retention and learning disability diagnosis. The long-term outcome index includes high school graduation, college attendance, idleness, crime, teen parenthood, and self-reported health status.

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	(0.085)	(0.065)	(0.069)	(0.062)	(0.088)	(0.072)
p (HS = preschool)	0.021	0.254	0.315	0.118	0.372	0.080
Panel B: By race						
Head Start (black)	0.287***	0.127*	0.031	0.107	0.351***	0.237**
	(0.095)	(0.075)	(0.076)	(0.072)	(0.120)	(0.103)
Head Start (white/Hispanic)	–0.057	0.111	0.156	0.110	0.177	0.224**
	(0.120)	(0.092)	(0.095)	(0.090)	(0.111)	(0.102)
p (black = nonblack)	0.024	0.895	0.308	0.982	0.282	0.924
Panel C: By gender						
Head Start (male)	0.154	0.181**	0.141**	0.159**	0.390***	0.182*
	(0.107)	(0.079)	(0.081)	(0.076)	(0.123)	(0.103)
Head Start (female)	0.128	0.059	0.033	0.055	0.146	0.272**
	(0.106)	(0.083)	(0.085)	(0.081)	(0.108)	(0.106)
p (male = female)	0.862	0.287	0.357	0.346	0.135	0.553
Panel D: By maternal AFQT score						
Head Start (AFQT $\leq$ –1)	0.171	0.016	–0.023	0.015	0.529***	0.279**
(*n* = 361)	(0.129)	(0.095)	(0.102)	(0.094)	(0.156)	(0.114)
Head Start (AFQT > –1)	0.133	0.172**	0.144*	0.154**	0.124	0.202**
(*n* = 890)	(0.094)	(0.073)	(0.074)	(0.071)	(0.091)	(0.091)
p (low = high AFQT)	0.809	0.198	0.192	0.245	0.024	0.595
Panel E: P-values for equality of test scores by age group						
	Black	Nonblack	Male	Female	Low AFQT	High AFQT
p (all effects equal)	0.003	0.240	0.262	0.254	0.198	0.205

“Fade out” (but long-run effect)

Notes: All results are reported using the specification in column 5 of Table 3, which includes a family fixed effect, all pre-treatment covariates, and controls for gender, age, and firstborn status. Race and gender subgroup estimates are obtained by interacting the Head Start treatment effect with a full set of dummy variables for each subgroup. Standard errors are in parentheses and are clustered at the family level. The test score indices include the PPVT and PIAT Math and Reading Recognition tests. The nontest score index includes indicator variables for grade retention and learning disability diagnosis. The long-term outcome index includes high school graduation, college attendance, idleness, crime, teen parenthood, and self-reported health status.

TABLE 5—POINT ESTIMATES FOR INDIVIDUAL OUTCOMES

	All	Black	Nonblack	Male	Female	Low AFQT	High AFQT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grade repetition	–0.069*	–0.107*	–0.027	–0.204***	0.055	–0.140**	–0.031
	(0.040)	(0.056)	(0.059)	(0.058)	(0.057)	(0.069)	(0.050)
Learning disability	–0.059***	–0.071**	–0.046	–0.047	–0.070***	–0.109***	–0.032
	(0.021)	(0.028)	(0.030)	(0.030)	(0.026)	(0.042)	(0.021)
High school graduation	0.086***	0.111***	0.055	0.114**	0.058	0.167***	0.042
	(0.031)	(0.041)	(0.048)	(0.048)	(0.044)	(0.056)	(0.036)
not including GED	0.063*	0.067	0.058	0.108**	0.021	0.126**	0.027
	(0.034)	(0.044)	(0.051)	(0.052)	(0.047)	(0.063)	(0.038)
At least one year of college attempted	0.057	0.136***	–0.034	0.022	0.091*	0.012	0.082*
	(0.036)	(0.049)	(0.050)	(0.045)	(0.054)	(0.051)	(0.047)
Idle	–0.071*	–0.030	–0.123**	–0.100**	–0.043	–0.070	–0.072
	(0.038)	(0.053)	(0.055)	(0.049)	(0.052)	(0.070)	(0.045)
Crime	0.019	0.051	–0.020	0.036	0.002	0.038	0.008
	(0.040)	(0.050)	(0.062)	(0.058)	(0.057)	(0.072)	(0.047)
Teen parenthood	–0.019	–0.040	–0.001	0.011	–0.047	–0.038	–0.008
	(0.036)	(0.052)	(0.053)	(0.052)	(0.056)	(0.065)	(0.043)
Poor health	–0.070***	–0.047	–0.094**	–0.036	–0.102**	–0.090*	–0.060*
	(0.026)	(0.035)	(0.043)	(0.037)	(0.042)	(0.047)	(0.033)

Notes: Results for each outcome are reported using the specification in column 5 of Table 3, which includes a family fixed effect, all pre-treatment covariates, and controls for gender, age, and firstborn status. Race and gender subgroup estimates are obtained by interacting the Head Start treatment effect with a full set of dummy variables for each subgroup. Standard errors are in parentheses and are clustered at the family level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Deming (2009)

- Large impacts of Head Start participation on outcomes
- Roughly 80% of the size of Perry Preschool effects
- But, perhaps we’re worried about selection bias?

Head Start Impact Study

- Head Start Impact Study conducted large scale RCT of head start
- Existing work documents impacts on test scores throughout children's youth
- Generally, results are smaller than those from Deming (2009) and other quasi-experimental studies
- Why?
  - Selection Bias?
  - Other?

Kline and Walters (2016)

Table 2: Experimental Impacts on Test Scores

		Three-year-old cohort			Four-year-old cohort			Cohorts pooled		
		Reduced form	First stage	IV	Reduced form	First stage	IV	Reduced form	First stage	IV
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year 1		0.194	0.699	0.278	0.141	0.663	0.213	0.168	0.682	0.247
		(0.029)	(0.025)	(0.041)	(0.029)	(0.022)	(0.044)	(0.021)	(0.018)	(0.031)
	N		1970			1601			3571	
Year 2		0.087	0.356	0.245	-0.015	0.670	-0.022	0.046	0.497	0.093
		(0.029)	(0.028)	(0.080)	(0.037)	(0.023)	(0.054)	(0.024)	(0.020)	(0.049)
	N		1760			1416			3176	
Year 3		-0.010	0.365	-0.027	0.054	0.666	0.081	0.019	0.500	0.038
		(0.031)	(0.028)	(0.085)	(0.040)	(0.025)	(0.060)	(0.025)	(0.020)	(0.050)
	N		1659			1336			2995	
Year 4		0.038	0.344	0.110		-			-	
		(0.034)	(0.029)	(0.098)						
	N		1599							

Notes: This table reports experimental estimates of the effects of Head Start on a summary index of test scores. Columns (1), (4) and (7) report coefficients from regressions of test scores on an indicator for assignment to Head Start. Columns (2), (5) and (8) report coefficients from first-stage regressions of Head Start attendance on Head Start assignment. The attendance variable is an indicator equal to one if a child attends Head Start at any time prior to the test. Columns (3), (6) and (9) report coefficients from two-stage least squares (2SLS) models that instrument Head Start attendance with Head Start assignment. All models weight by the reciprocal of a child's experimental assignment, and control for sex, race, Spanish language, teen mother, mother marital status, presence of both parents in

Kline and Walters (2016)

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	(0.029)	(0.028)	(0.080)	(0.037)	(0.023)	(0.054)	(0.024)	(0.020)	(0.049)
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	(0.031)	(0.028)	(0.085)	(0.040)	(0.025)	(0.060)	(0.025)	(0.020)	(0.050)
N		1659			1336			2995	
Year 4	0.038	0.344	0.110		-			-	
	(0.034)	(0.029)	(0.098)						
N		1599							

Fade Out

Notes: This table reports experimental estimates of the effects of Head Start on a summary index of test scores. Columns (1), (4) and (7) report coefficients from regressions of test scores on an indicator for assignment to Head Start. Columns (2), (5) and (8) report coefficients from first-stage regressions of Head Start attendance on Head Start assignment. The attendance variable is an indicator equal to one if a child attends Head Start at any time prior to the test. Columns (3), (6) and (9) report coefficients from two-stage least squares (2SLS) models that instrument Head Start attendance with Head Start assignment. All models weight by the reciprocal of a child's experimental assignment, and control for sex, race, Spanish language, teen mother, mother marital status, presence of both parents in

Kline and Walters (2016)

- 1/3 of control group attended other preschools!
- Most of these preschools were publicly funded
- Suggests causal effect should be attenuated
- And costs would be over-stated in traditional CBA
- Aside: What’s implication for the incidence of the policy of providing free preschool?

Table 3: Funding Sources

Largest funding source	Head Start (1)	Other centers (2)	Other centers attended by c -> h compliers (3)
Head Start	0.842	0.027	0.038
Parent fees	0.004	0.153	0.191
Child and adult care food program	0.011	0.026	0.019
State pre-K program	0.004	0.182	0.155
Child care subsidies	0.013	0.097	0.107
Other funding or support	0.022	0.118	0.113
No funding or support	0.000	0.003	0.001
Missing	0.105	0.394	0.375

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Table 5: Benefits and Costs of Head Start

Parameter (1)	Description (2)	Value (3)	Source (4)
Panel A. Parameter values			
p	Effect of a 1 SD increase in test scores on earnings	$0.1\bar{e}$	Table A3
e_{US}	US average present discounted value of lifetime earnings at age 3.4	$438,000	Chetty et al. 2011 with 3% discount rate
e_{parent}/e_{US}	Average earnings of Head Start parents relative to US average	0.46	Head Start Program Facts
IGE	Intergenerational income elasticity	0.40	Lee and Solon 2009
$\bar{e}$	Average present discounted value of lifetime earnings for Head Start applicants	$343,392	$[1 - (1 - e_{parent}/e_{US})IGE]e_{US}$
$0.1\bar{e}$	Effect of a 1 SD increase in test scores on earnings of Head Start applicants	$34,339	
$LATE_h$	Local Average Treatment Effect	0.247	HSIS
τ	Marginal tax rate for Head Start population	0.35	CBO 2012
S_c	Share of Head Start population drawn from other preschools	0.34	HSIS
ϕ_h	Marginal cost of enrollment in Head Start	$8,000	Head Start program facts
ϕ_c	Marginal cost of enrollment in other preschools	$0	Naïve assumption: $\phi_c = 0$
		$4,000	Pessimistic assumption: $\phi_c = 0.5\phi_h$
		$6,000	Preferred assumption: $\phi_c = 0.75\phi_h$
Panel B. Marginal value of public funds			
NMB	Marginal benefit to Head Start population net of taxes	$5,513	$(1 - \tau)pLATE_h$
MFC	Marginal fiscal cost of Head Start enrollment	$5,031	$\phi_h - \phi_c S_c - \tau pLATE_h$, naïve assumption
		$3,671	Pessimistic assumption
		$2,991	Preferred assumption
$MVPF$	**Marginal value of public funds**	1.10 (0.22) p-value = 0.1 Breakeven $p/\bar{e} = 0.09$ (0.01)	NMB/MFC (s.e.), naïve assumption
		1.50 (0.34) p-value = 0.00 Breakeven $p/\bar{e} = 0.08$ (0.01)	Pessimistic assumption
		1.84 (0.47) p-value = 0.00 Breakeven $p/\bar{e} = 0.07$ (0.01)	Preferred assumption

Notes: This table reports results of cost/benefit calculations for Head Start. Estimated parameter values are obtained from the sources listed in column (4). Standard errors for MVPF ratios are calculated using the delta method. *P*-values are from one-tailed tests of the null hypotheses that the MVPF is less than one. These tests are performed via nonparametric block bootstrap of the *t*-statistic, clustered at the Head Start center level. Breakevens give percentage effects of a standard deviation of test scores on earnings that set *MVPF* equal to one.

Kline and Walters

- How should we calculate the MVPF?

- How might parents time / earnings / payments to preschools affect WTP and Cost?

Head Start Rollout

- Other evidence comes from the introduction of Head Start
- Idea: Exploit county-by-cohort-variation in introduction of Head Start
- Two main papers looking at long-run outcomes directly:
- Bailey et al. (2019)
  – Use census data to look at long-run outcomes
- Jackson et al. (2019)
  – Use PSID data to look at long-run outcomes

Johnson and Jackson (2019)

- Key advantage of PSID is that it can restrict to low-income parents

- Johnson and Jackson (2019) look at impact of head start and also its interaction with K12 spending

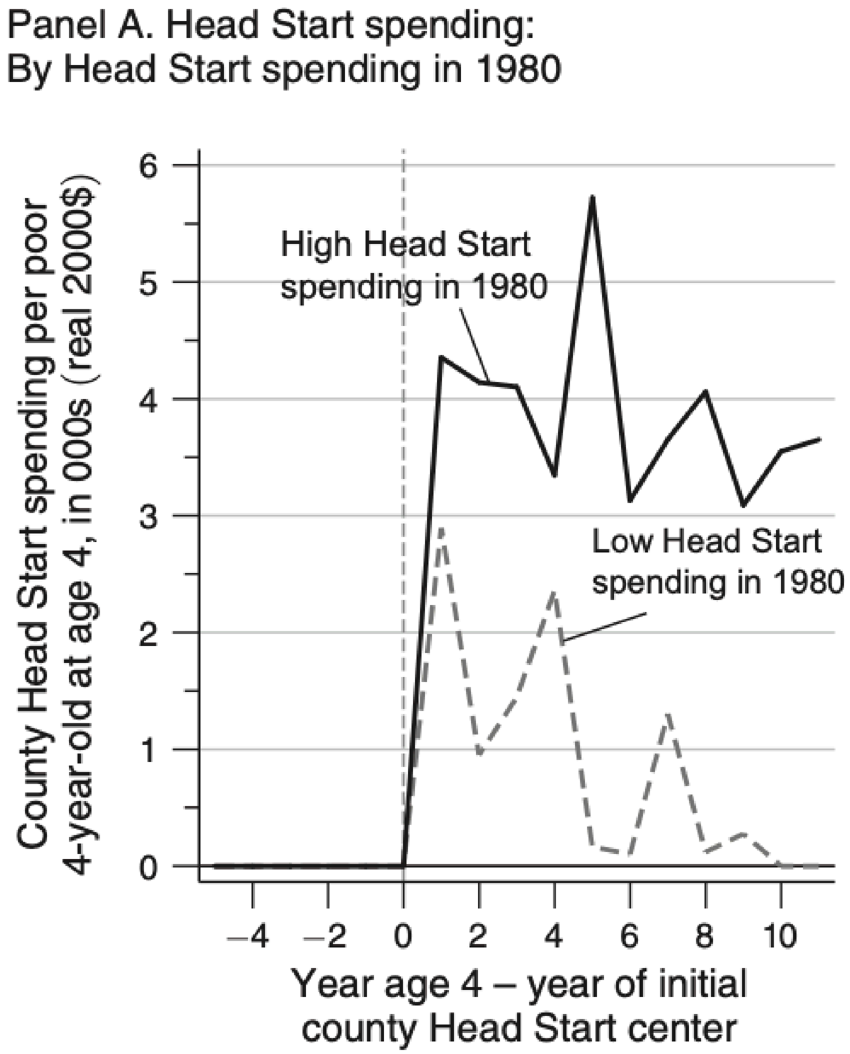
- Combine:
  - Roll out of head start (Preschool)
  - School finance equalization rulings (K-12)

- Explore the role of “dynamic complementarities”

  - Compare effect of head start in places with and without court-mandated school finance reform

- Does this test dynamic complementarities? Why or why not?

Johnson and Jackson (2019): Increases in Head Start Spending



Johnson and Jackson (2019): Increases in K-12 Spending

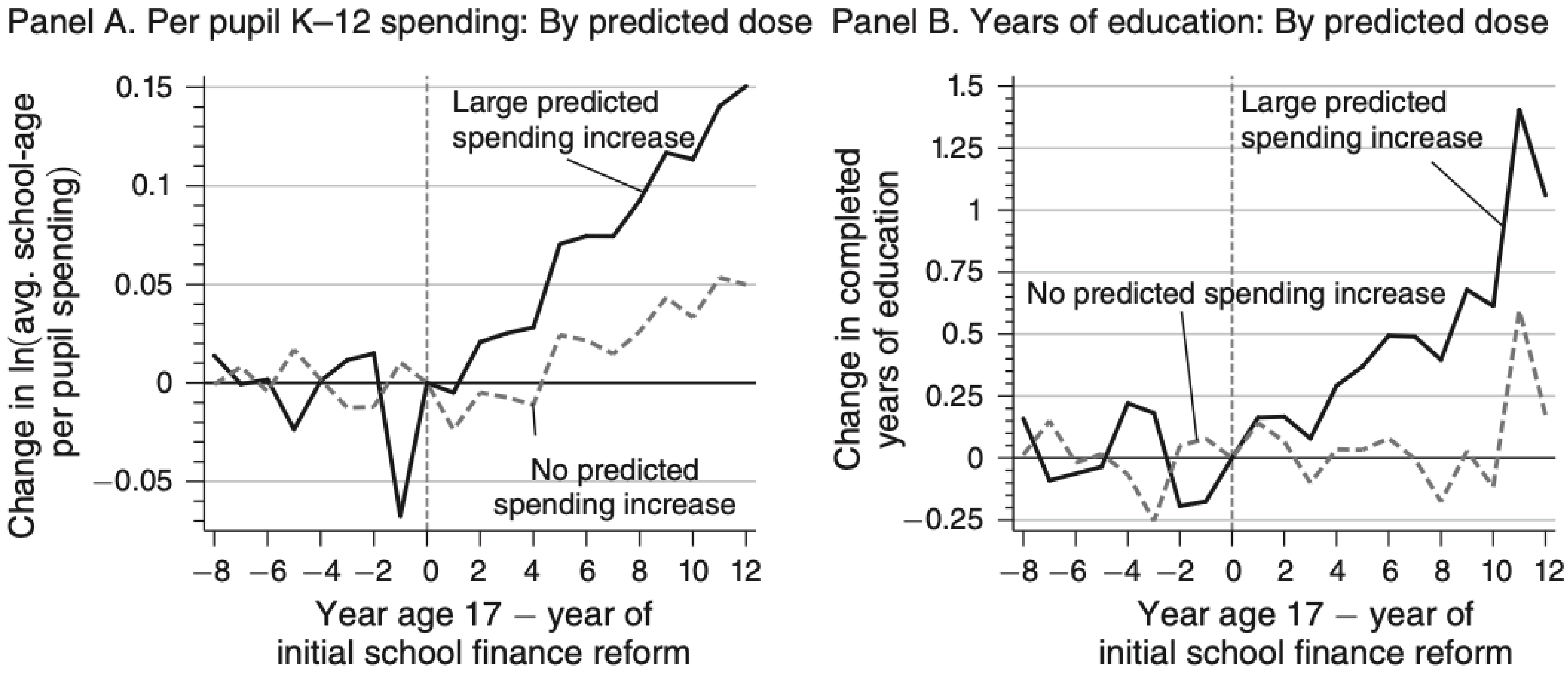


Figure 4. Evolution of K–12 Spending and Educational Attainment after SFR Reform (All Children)

Table 2—Marginal Effects of Head Start Spending and Public Per Pupil Spending and Their Interaction: Poor Children

	Pr(high school grad)		Years of completed education		ln(wage), ages 20–50	
	DiD-2SLS (1)	2SLS-IV (2)	DiD-2SLS (3)	2SLS-IV (4)	DiD-2SLS (5)	2SLS-IV (6)
Head Start spending$_{(\text{age } 4)}$	0.02503	0.04089	0.07721	0.2255	0.02334	0.03615
	(0.006942)	(0.02453)	(0.01992)	(0.1212)	(0.004503)	(0.01956)
(SFR) instrumented ln(PPE)$_{(\text{age } 5\text{–}17)}$	1.1016	1.4163	4.0399	4.0218	2.0561	1.2596
	(0.3268)	(0.3390)	(1.6751)	(1.7856)	(0.4348)	(0.2690)
Head Start spending$_{(\text{age } 4)}$	0.1012	0.2273	0.6460	0.8345	0.1698	0.2561
× ln(PPE)$_{(\text{age } 5\text{–}17)}$	(0.05454)	(0.06518)	(0.2354)	(0.4824)	(0.06985)	(0.07191)
Marginal effects of 10% increase in K–12 spending by Head Start access						
No Head Start$_{(\text{age } 4)}$	0.0673	0.0455	0.1307	0.0492	0.1338	0.0176
	(0.0236)	(0.0316)	(0.1274)	(0.1064)	(0.0349)	(0.0219)
Head Start center access$_{(\text{age } 4)}$	0.1102	0.1416	0.4040	0.4022	0.2056	0.1260
	(0.0327)	(0.0339)	(0.1675)	(0.1786)	(0.0435)	(0.0269)
Marginal effects of Head Start with 10% increase or decrease in K–12 spending						
With 10% decrease	0.0630	0.0768	0.0533	0.6010	0.0269	0.0446
	(0.0481)	(0.1169)	(0.1393)	(0.5937)	(0.0284)	(0.0921)
Average	0.1059	0.1730	0.3266	0.9540	0.0987	0.1529
	(0.0294)	(0.1038)	(0.0843)	(0.5129)	(0.0190)	(0.08275)
With 10% increase	0.1487	0.2691	0.5999	1.3070	0.1706	0.2613
	(0.0217)	(0.0968)	(0.1209)	(0.5068)	(0.0408)	(0.0841)
Number of person-year observations	—	—	—	—	55,706	55,706
Number of children	5,419	5,419	5,419	5,419	5,613	5,613

(*continued*)

Johnson and Jackson (2019)

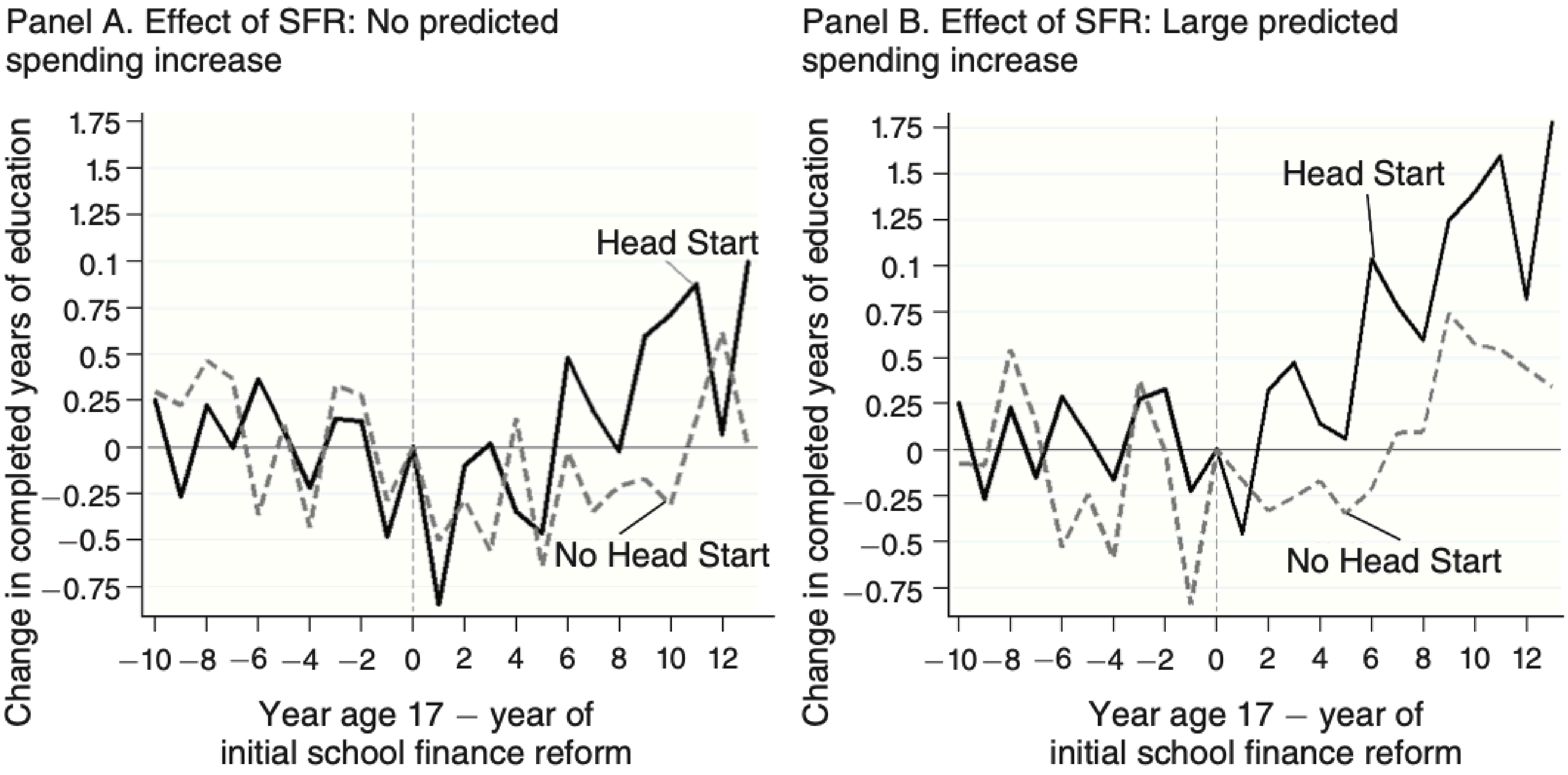


FIGURE 5. EFFECT OF K–12 SPENDING ON YEAR OF COMPLETED EDUCATION: BY HEAD START EXPOSURE STATUS (POOR CHILDREN)

Bailey et al. (2019)

- Advantage of PSID: Can focus on subpopulation of poor parents most likely to be eligible

- Disadvantage: poor follow-up / attrition / measurement of income

- Baily et al. (2019) implement same strategy in Census data

Figure 2. The Expected Pattern of Effects on Adult Outcomes by Age of Child at Head Start's Launch

A. No Sibling Spill-overs or Complementarities with Other Programs

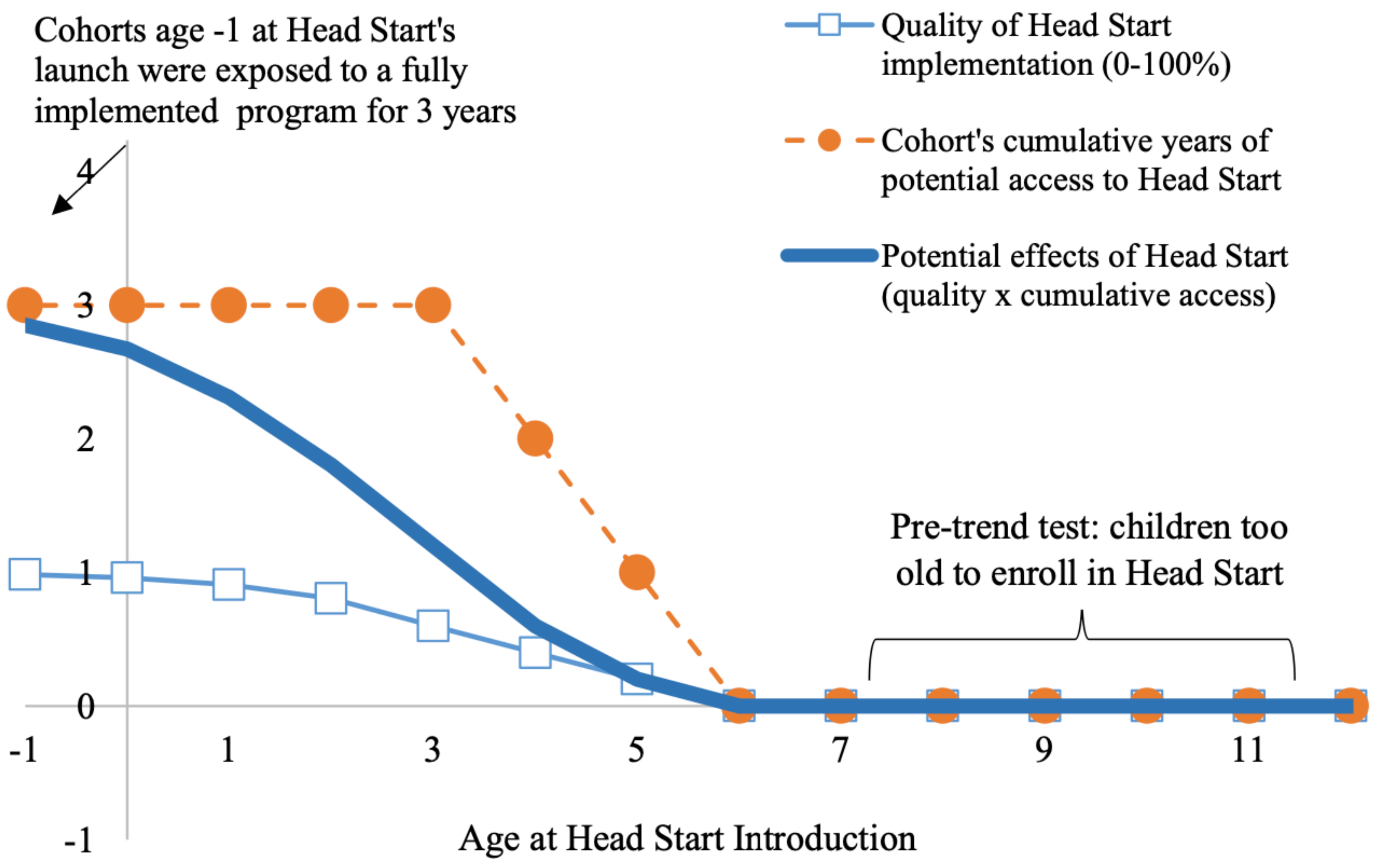
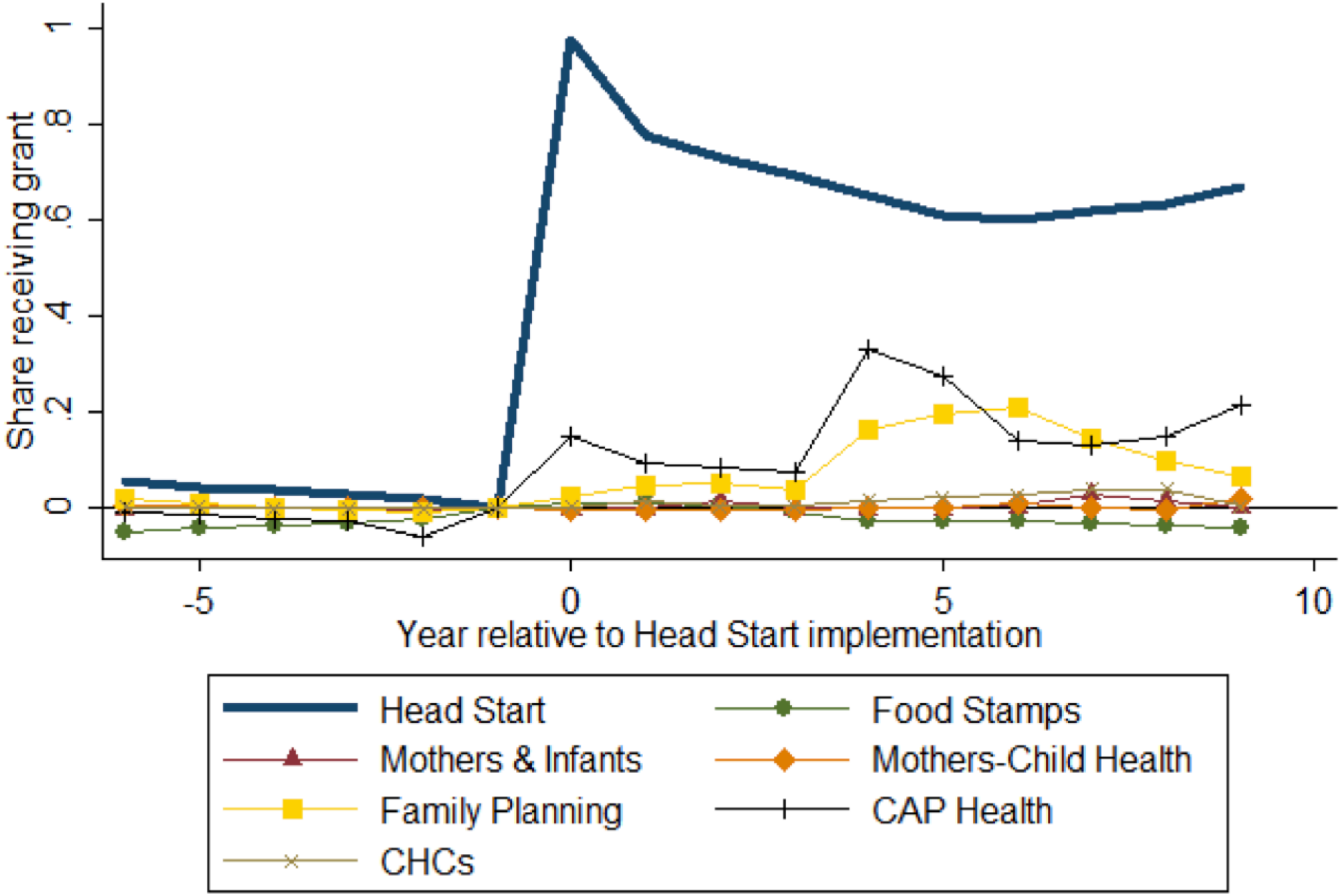
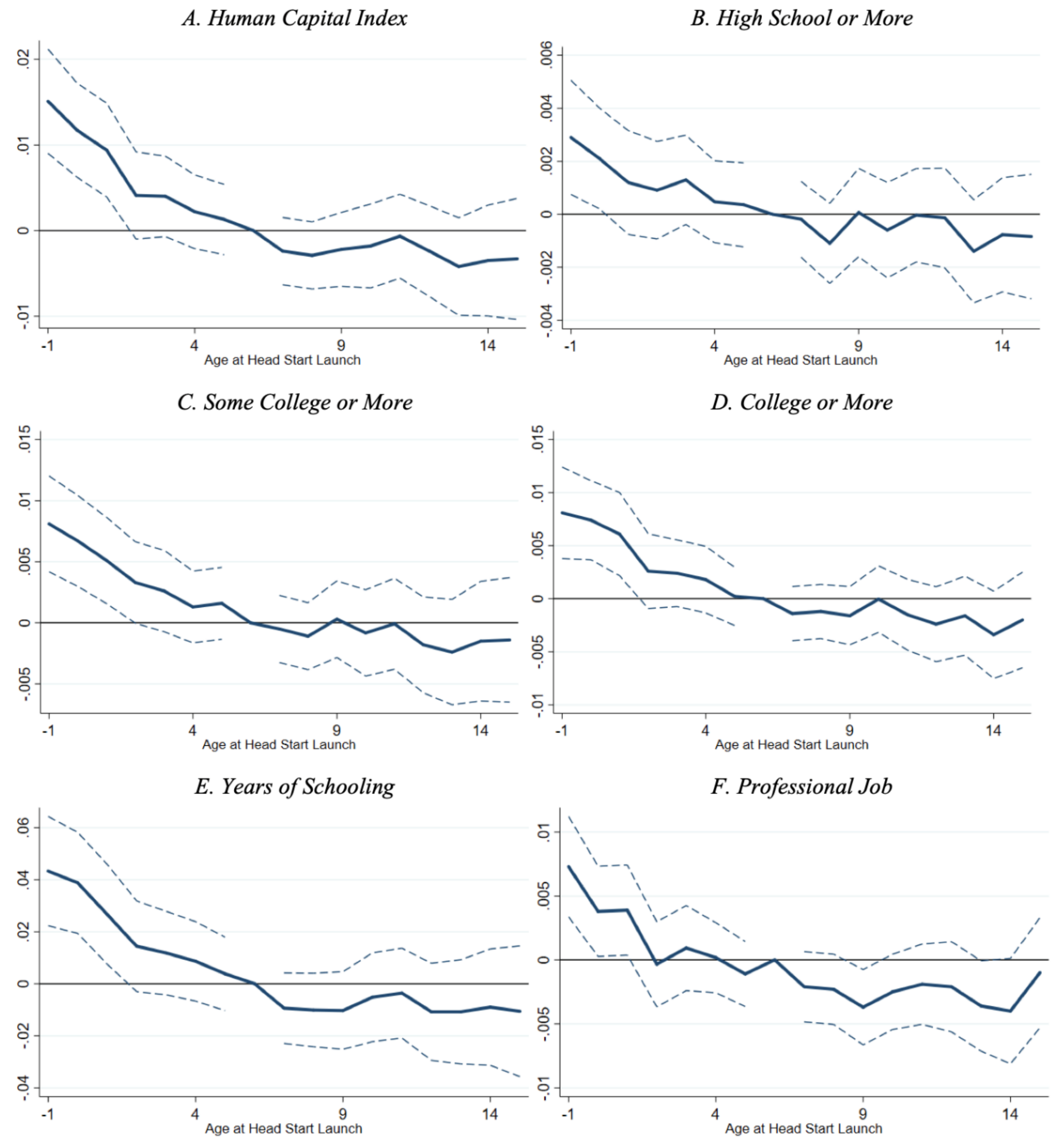


Figure 3. Funding for Other OEO Programs Relative to the Year Head Start Began



Notes: Dependent variable are binary variables for whether a county received a grant for the indicated program in the indicated year. Data on federal grants and programs are drawn from the NARA.

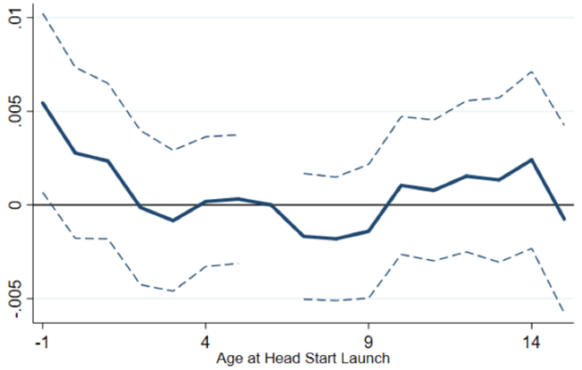
Figure 4. The Effect of Head Start on Adult Human Capital



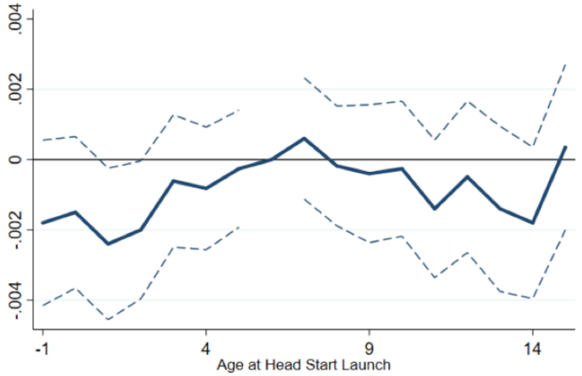
Notes: The figures plot event-study estimates of φ for different outcomes using the specification in equation (1). Standard errors clustered at the county level. Dashed lines show 95-percent, point-wise confidence intervals for each estimate.

Figure 7. The Effect of Head Start on Adult Economic Self-Sufficiency

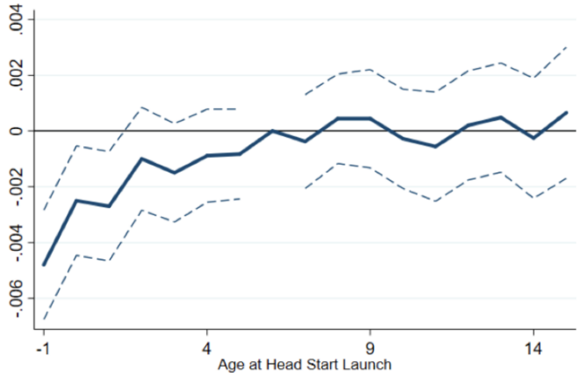
A. Economic Self-Sufficiency Index



B. In Poverty



C. Received Public Assistance Income



Notes: See Figure 4 notes. Note that In Poverty and Received Public Assistance are reverse coded when included in the Economic Self-Sufficiency Index.

Tennessee Pre-K

- Tennessee has a pre-K program that is oversubscribed
- Literature has analyzed its impact on test scores over time
- Lipsey, Farran, and Hofer (2016) study impacts up through 3rd grade
- Durkin, Lipsey, Farran, & Wiesen (2022) study impacts up through 6th grade

Table 5: TN-VPK Effect Estimates for Pre-K Gain on Woodcock Johnson Achievement Measures

Outcome	TN-VPK effect estimate in W-score units	*p*-value	Effect size	Effect size for non-participant gain	Effect size for TN-VPK participant gain	% Increase in Gain for TN-VPK participants
WJ Composite6	5.32	<.001	.32	.74	1.06	44%
Literacy Measures						
Letter-Word Identification	10.77	<.001	.41	.60	1.01	68%
Spelling	7.22	<.001	.29	.80	1.09	36%
Language Measures						
Oral Comprehension	1.50	.093	.09	.44	.53	20%
Picture Vocabulary	3.66	<.001	.20	.24	.44	83%
Math Measures						
Applied Problems	4.03	.005	.17	.61	.78	28%
Quantitative Concepts	4.32	<.001	.27	.68	.96	40%

Table 7: TN-VPK Effect Estimates for Kindergarten Teachers' Ratings

Outcome	TN-VPK effect estimate	*p*-value	Effect size
ACBR Preparedness for K (range 1-7)	.30	**.005**	.22
ACBR Peer Relations (range 1-7)	.04	.684	.04
ACBR Behavior Problems[a] (range 0-1)	-.01	.757	-.04
ACBR Feelings About School[a] (0-1)	-.00	.767	-.03
Cooper-Farran Interpersonal Skills (range 1-7)	.17	**.049**	.19
Cooper-Farran Work-Related Skills (range 1-7)	.22	**.016**	.20

(a) Ratings on these scales were skewed; the analysis was done on log transformed values and those are the results shown here

Table 9: TN-VPK Effect Estimates for the Kindergarten through 3rd Grade Years on the Woodcock Johnson Achievement Measures

	End of pre-k year		End of kindergarten year		End of 1st grade year		End of 2nd grade year		End of 3rd grade year	
Outcome	Effect estimate	Effect size	Effect estimate	Effect size	Effect estimate	Effect size	Effect estimate	Effect size	Effect estimate	Effect size
WJ Composite6	5.32**	.32	.25	.02	-.51	-.04	-2.07*	-.15	-1.83†	-.13
WJ Composite8	N/A	-	-.13	-.01	-.70	-.05	-1.91*	-.15	-1.73†	-.13
Literacy										
Letter-Word ID	10.77**	.41	-.27	-.01	-1.56	-.05	-3.24	-.13	-3.46	-.14
Spelling	7.22**	.29	-.68	-.03	-2.11	-.10	-2.45	-.12	-2.36	-.12
Language										
Oral Comprehension	1.50†	.09	.94	.06	-.90	-.07	-1.43	-.11	-.51	-.04
Picture Vocabulary	3.66**	.20	1.01	.09	.95	.08	-.48	-.04	.77	.07
Passage Comprehension	N/A	-	-2.26	-.10	-1.61	-.08	-2.10†	-.13	-1.13	-.07
Math										
Applied Problems	4.03**	.17	1.17	.07	.55	.04	-2.38†	-.14	-3.76*	-.21
Quantitative Concepts	4.32**	.27	-1.07	-.08	-1.33	-.10	-3.45**	-.25	-2.02†	-.15
Calculation	N/A	-	-.13	-.01	-.70	-.05	-1.91*	-.15	-1.73†	-.13

Notes: Effect estimates are the coefficients on the TN-VPK participation variable indicating the difference between the mean outcomes for T-VPK participants and nonparticipants in W-score units. Effect sizes are those coefficients divided by the pooled participant and nonparticipant group standard deviations on the outcome variable.
**p<.01, *p<.05, $^{\dagger}p$<.10

EARLY EDUCATION

A state-funded pre-K program led to ‘significantly negative effects’ for kids in Tennessee

In some pre-K programs, ‘something is not better than nothing,’ study shows

by **JACKIE MADER** January 24, 2022

Table 2

Intent-to-Treat (ITT) and Treatment-on-Treated (TOT) Effect Estimates for Third and Sixth Grade State Achievement Tests (RCT Analytic Sample)

	ITT					TOT		
Subject	Treatment group mean[a]	Control group mean[a]	Pooled *SD*[b]	Coefficient for T-C Difference[c]	Effect size[d]	*p* -value[e]	Coefficient for T-C Difference[c]	Effect size[d]
				Third grade TCAP (observed values)				
Reading	746.1	748.2	34.34	−2.13	−.062	.146	−4.05	−.118
Math	755.9	760.2	35.56	−4.22*	−.119	.006	−8.02*	−.225
Science	748.6	752.2	35.33	−3.58*	−.101	.016	−6.80*	−.192
	N = 1,505-1,506	*N* = 935−936		*N* = 2,440-2,442				
				Sixth grade TNReady (observed values)				
ELA	321.2	325.0	29.86	−3.83*	−.128	.002	−7.18*	−.240
Math	317.1	323.6	36.31	−6.46*	−.178	.000	−12.12*	−.333
Science	750.4	755.6	39.37	−5.18*	−.132	.002	−9.83*	−.249
	N = 1,615-1,630	*N* = 976−996		*N* = 2,591-2,626				
				Third grade TCAP (weighted observed values)				
Reading	746.9	750.1	33.59	−3.26*	−.097	.027	−6.19*	−.184
Math	755.6	761.0	34.84	−5.40*	−.155	.000	−10.24*	−.293
Science	750.0	754.1	35.48	−4.03*	−.114	.008	−7.64*	−.215
	N = 1,505-1,506	*N* = 935−936		*N* = 2,440-2,442				
				Sixth grade TNReady (weighted observed values)				
ELA	320.5	325.1	30.26	−4.56*	−.151	.000	−8.56*	−.282
Math	316.8	324.5	36.14	−7.70*	−.213	.000	−14.44*	−.399
Science	750.0	756.4	39.09	−6.35*	−.163	.000	−12.06*	−.308
	N = 1,615-1,630	*N* = 976−996		*N* = 2,591-2,626				

Table 3

Effect Sizes for the RCT and ISS Samples for Sixth Grade Outcomes

Outcome	RCT ($N = 2,591–2,700$)		ISS ($N = 914–965$)	
	ITT	TOT	ITT	TOT
Achievement tests				
English	−.128	−.240	−.091	−.185
Math	−.178	−.333	−.113	−.227
Science	−.132	−.249	−.075	−.156
On grade	−.025	−.047	.063	.125
IEP	−.107	−.203	−.135	−.270
School rules	−.119	−.222	−.158	−.316
Major offenses	−.083	−.157	−.073	−.146
Any offenses	−.090	−.170	−.140	−.278

Note. Effect sizes are the coefficient for the treatment-control difference divided by the pooled standard deviation. Negative signs indicate a less favorable outcome for the treatment group. RCT = randomized control trial; ISS = intensive substudy; ITT = intent-to-treat; TOT = treatment-on-treated; IEP = Individualized Education Program.

Boston Pre-K

- Boston used lotteries to assign kids to pre-K
- Gray-Lobe, Pathak, and Walters analyzed its impact on college enrollment and other outcomes

Boston Pre-K

The Long-Term Effects of Universal Preschool in Boston
Guthrie Gray-Lobe, Parag A. Pathak, and Christopher R. Walters
NBER Working Paper No. 28756
May 2021
JEL No. I20,I21,I24,I28

ABSTRACT

We use admissions lotteries to estimate the effects of large-scale public preschool in Boston on college-going, college preparation, standardized test scores, and behavioral outcomes. Preschool enrollment boosts college attendance, as well as SAT test-taking and high school graduation. Preschool also decreases several disciplinary measures including juvenile incarceration, but has no detectable impact on state achievement test scores. An analysis of subgroups shows that effects on college enrollment, SAT-taking, and disciplinary outcomes are larger for boys than for girls. Our findings illustrate possibilities for large-scale modern, public preschool and highlight the importance of measuring long-term and non-test score outcomes in evaluating the effectiveness of education programs.

Table 1: Descriptive statistics and covariate balance

	Average characteristics		Offer differentials	
	All applicants	Randomized applicants	No controls	Risk controls
	(1)	(2)	(3)	(4)
		A. Applicant demographics		
Black	0.432	0.407	-0.011	-0.015
			(0.011)	(0.017)
White	0.166	0.149	-0.012	-0.023*
			(0.008)	(0.012)
Hispanic	0.291	0.344	0.036***	0.020
			(0.011)	(0.015)
Female	0.495	0.488	0.011	0.060***
			(0.011)	(0.020)
Age at enrollment	4.569	4.580	-0.025	-0.031
			(0.017)	(0.031)
Bilingual Spanish	0.108	0.187	0.044***	0.004
			(0.008)	(0.005)
		B. Application characteristics		
Number of programs ranked	3.055	2.949	-0.098***	0.041
			(0.028)	(0.038)
First choice walkzone	0.215	0.176	0.154***	-0.005
			(0.010)	(0.005)
		C. Neighborhood characteristics		
Population	1255.2	1252.7	-56.747***	-8.681
			(12.067)	(21.408)
Median family income	53731.9	54039.2	1339.143*	1605.203
			(765.277)	(1230.354)
Poverty rate	0.234	0.232	0.004	-0.011
			(0.004)	(0.007)
Share Black	0.388	0.399	0.027***	-0.012
			(0.007)	(0.010)
Share white	0.366	0.357	-0.030***	0.014
			(0.007)	(0.009)
Share Hispanic	0.251	0.260	-0.014***	-0.002
			(0.004)	(0.006)
Sample size	8786	4215	8786	4215

Table 3: Effects of preschool attendance on post-secondary outcomes

	Enrollment on-time				Enrollment at any time			
	Non-offered mean	First stage	Reduced form	2SLS estimate	Non-offered mean	First stage	Reduced form	2SLS estimate
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any college	0.459	0.645***	0.054***	0.083***	0.650	0.645***	0.035*	0.054*
		(0.015)	(0.019)	(0.030)		(0.015)	(0.019)	(0.029)
	2669		4175		2669		4175	
Two-year college	0.096		0.018	0.028	0.291		0.019	0.030
			(0.012)	(0.019)			(0.018)	(0.028)
	2669		4175		2669		4175	
Four-year college	0.363		0.035*	0.055*	0.506		0.038*	0.059*
			(0.019)	(0.029)			(0.020)	(0.030)
	2669		4175		2669		4175	
Massachusetts college	0.329		0.055***	0.085***	0.504		0.045**	0.071**
			(0.019)	(0.029)			(0.020)	(0.030)
	2669		4175		2669		4175	
Public college	0.260		0.025	0.038	0.474		0.033*	0.051*
			(0.018)	(0.027)			(0.020)	(0.031)
	2669		4175		2669		4175	
Private college	0.200		0.029*	0.045*	0.316		0.015	0.024
			(0.016)	(0.025)			(0.018)	(0.028)
	2669		4175		2669		4175	
Number of semesters					5.567		0.396*	0.614*
							(0.220)	(0.340)
					2669		4175	
Graduation	0.208	0.621***	0.003	0.005	0.325	0.621***	0.033	0.052
		(0.017)	(0.018)	(0.029)		(0.017)	(0.021)	(0.034)
	2108		3281		2108		3281	
Graduation from four-year	0.207		0.005	0.008	0.297		0.022	0.035
			(0.018)	(0.029)			(0.020)	(0.033)
	2108		3281		2108		3281	

Outline

1. Preschool and Head Start
2. Family Leave and Childcare policies
3. Environmental Policies and Early Childhood Impacts

Child Penalties

- Large and growing literature estimating impact of childbirth on maternal labor supply
  - Angelov et al. (2016 JOLE), Kleven et al. (2018), Kleven et al. (2019)
- Also large literature on child policies on labor supply
  - Olivetti and Petrongolo (2017) review the literature
- To begin, consider Kleven et al. (2018) and Kleven et al. (2019) 's work on impact of childbirth on parental incomes

Figure 1: Impacts of Children

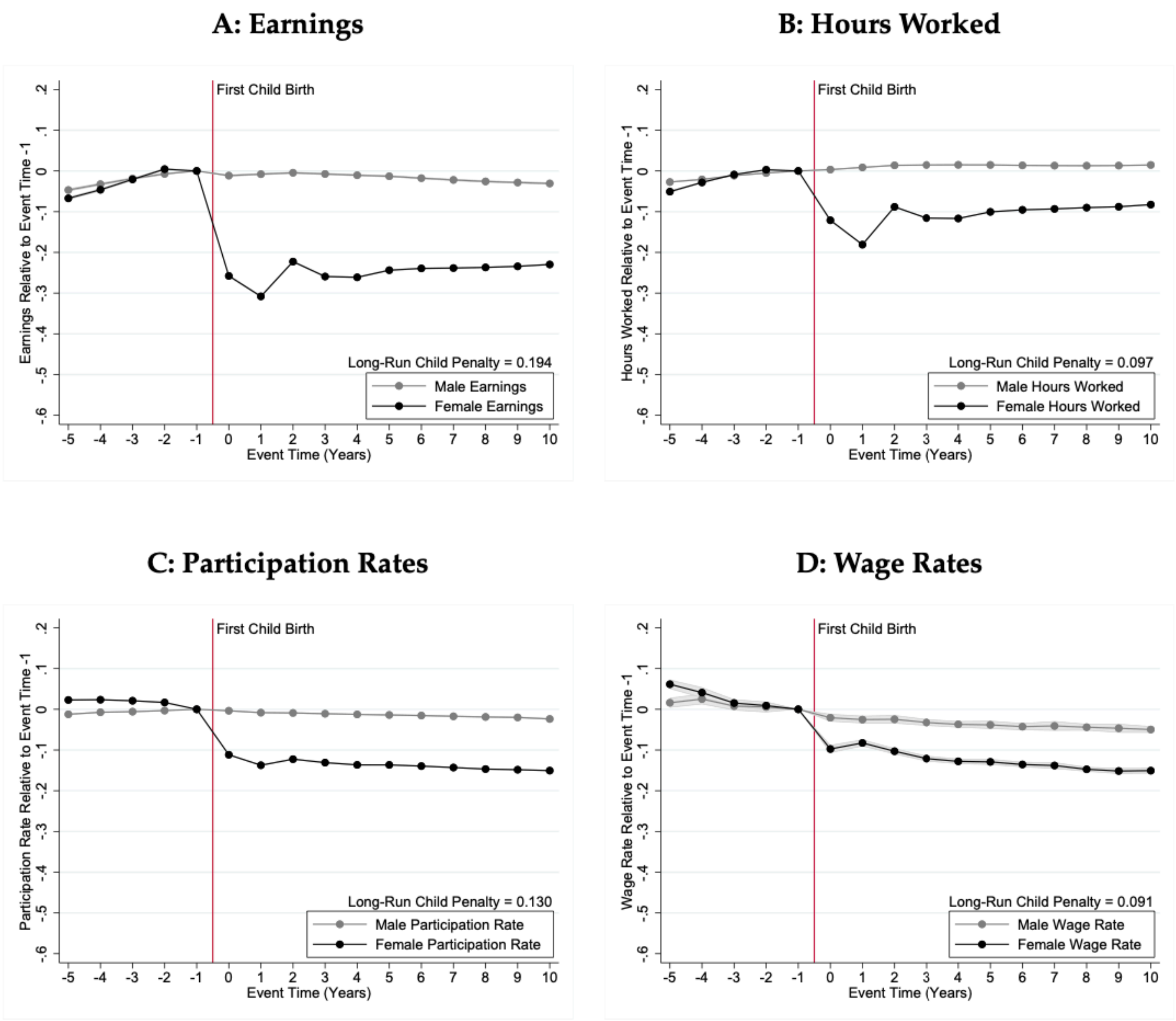


Figure 2: Impacts of Children in the Very Long Run

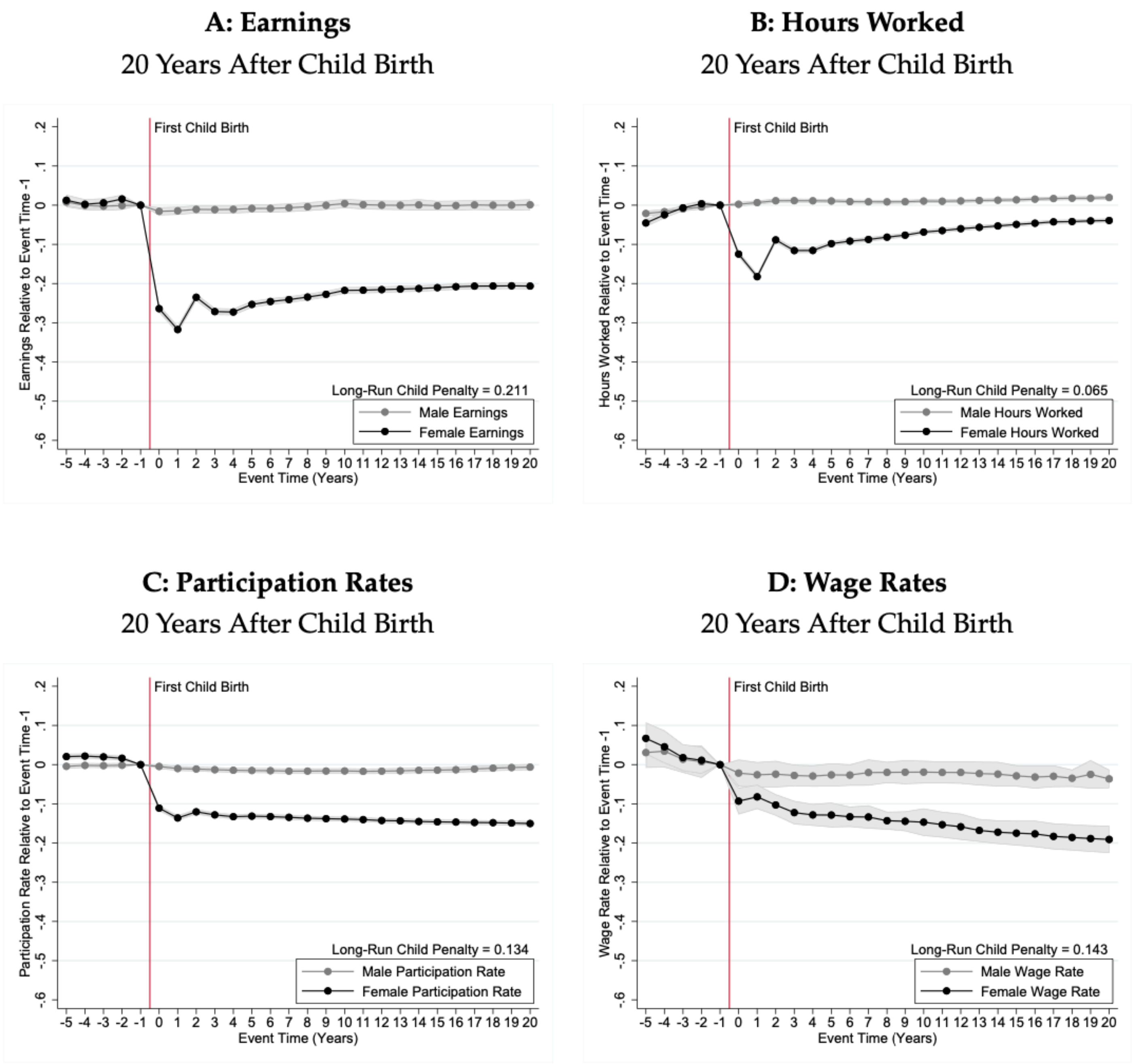
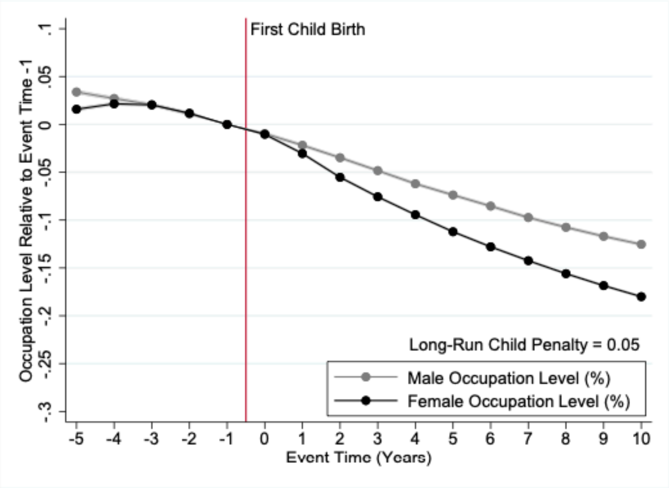


Figure 3: Anatomy of Child Impacts

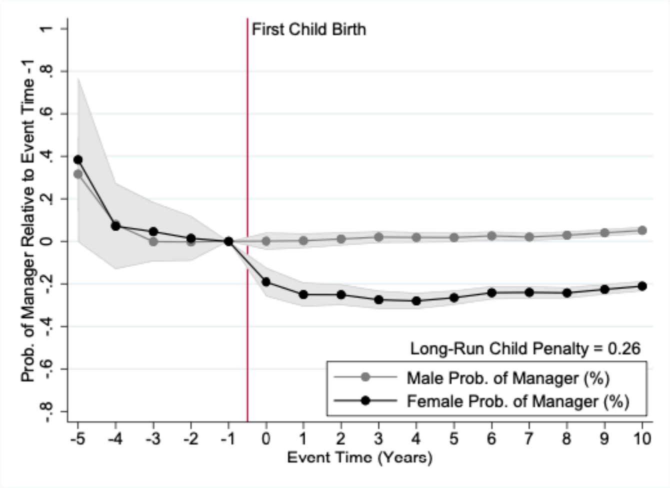
A: Occupational Rank

Levels 1-5 from Unskilled Labor to Manager



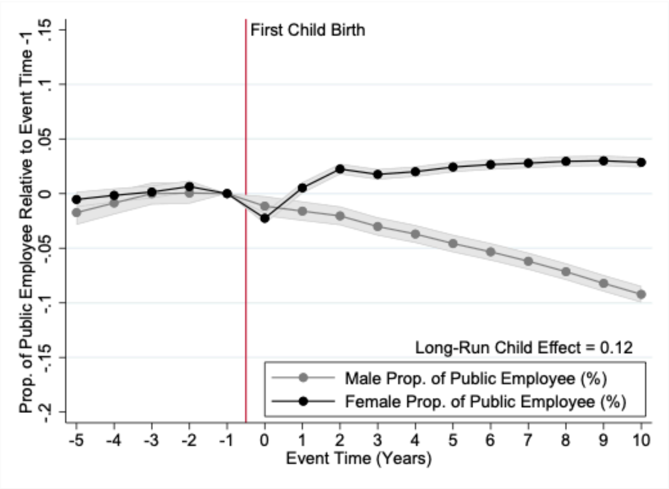
B: Probability of Being Manager

Manager Dummy



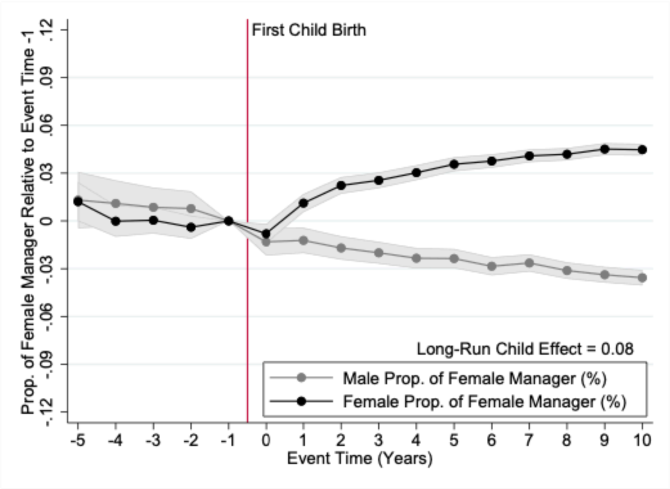
C: Probability of Public Sector Job

Public Sector Dummy



D: Probability of Having a Female Manager with Children

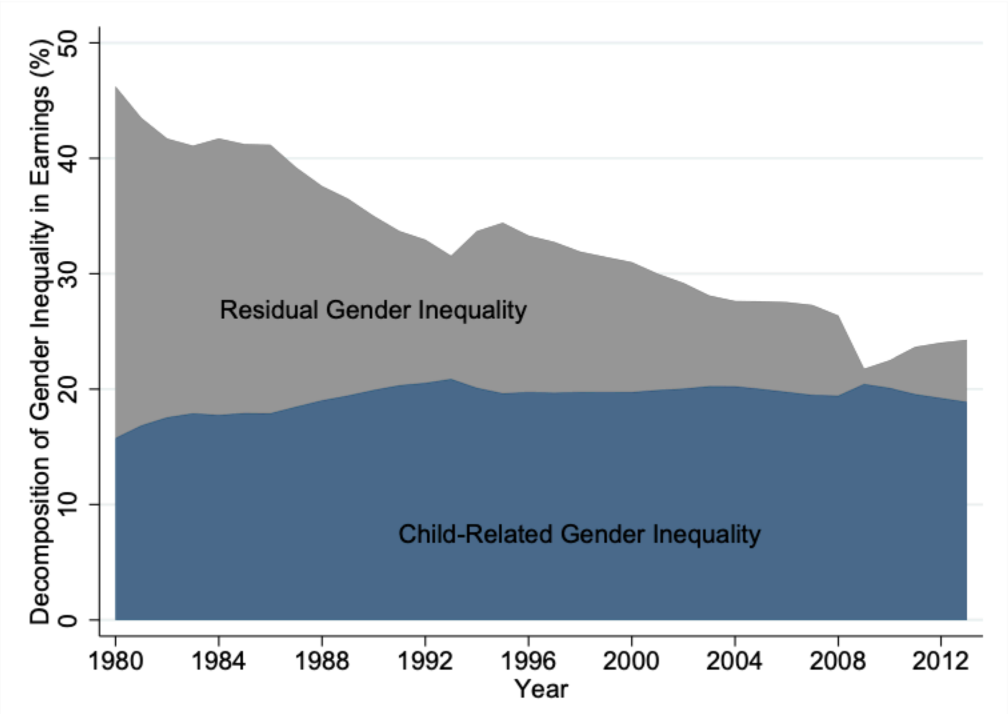
Female Manager with Children Dummy



Child Penalties

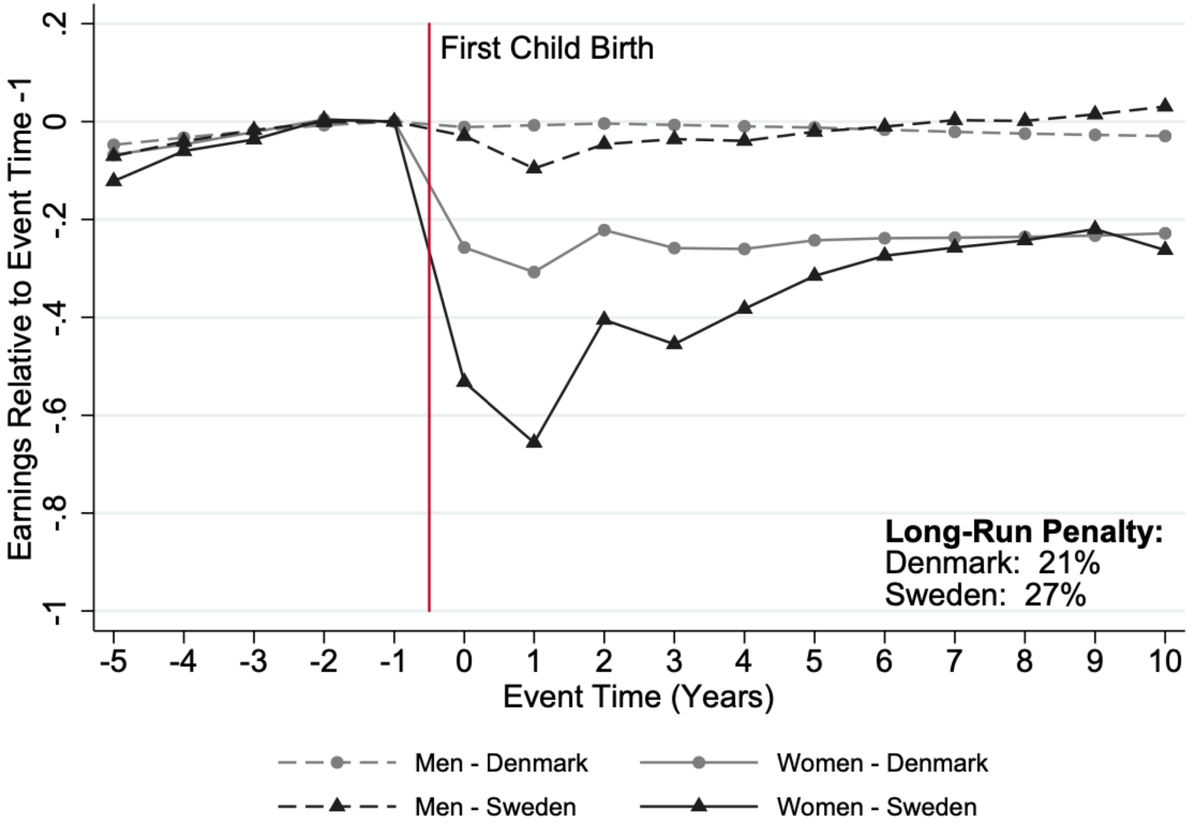
Figure 5: Decomposing Gender Inequality in Earnings

A: Child-Related Inequality vs Non-Child Inequality



Kleven et al. (2019) Document Heterogeneity Across Countries

Figure 1: Child Penalties in Earnings in Scandinavian Countries



Notes: The figure shows percentage effects of parenthood on earnings across event time t for each gender g, i.e. P_t^g defined above. The figure also displays long-run child penalties, defined as the average penalty P_t from event time 5 to 10. Earnings are unconditional on employment status and the effects therefore include both the extensive and intensive margins.

Figure 2: Child Penalties in Earnings in English-Speaking Countries

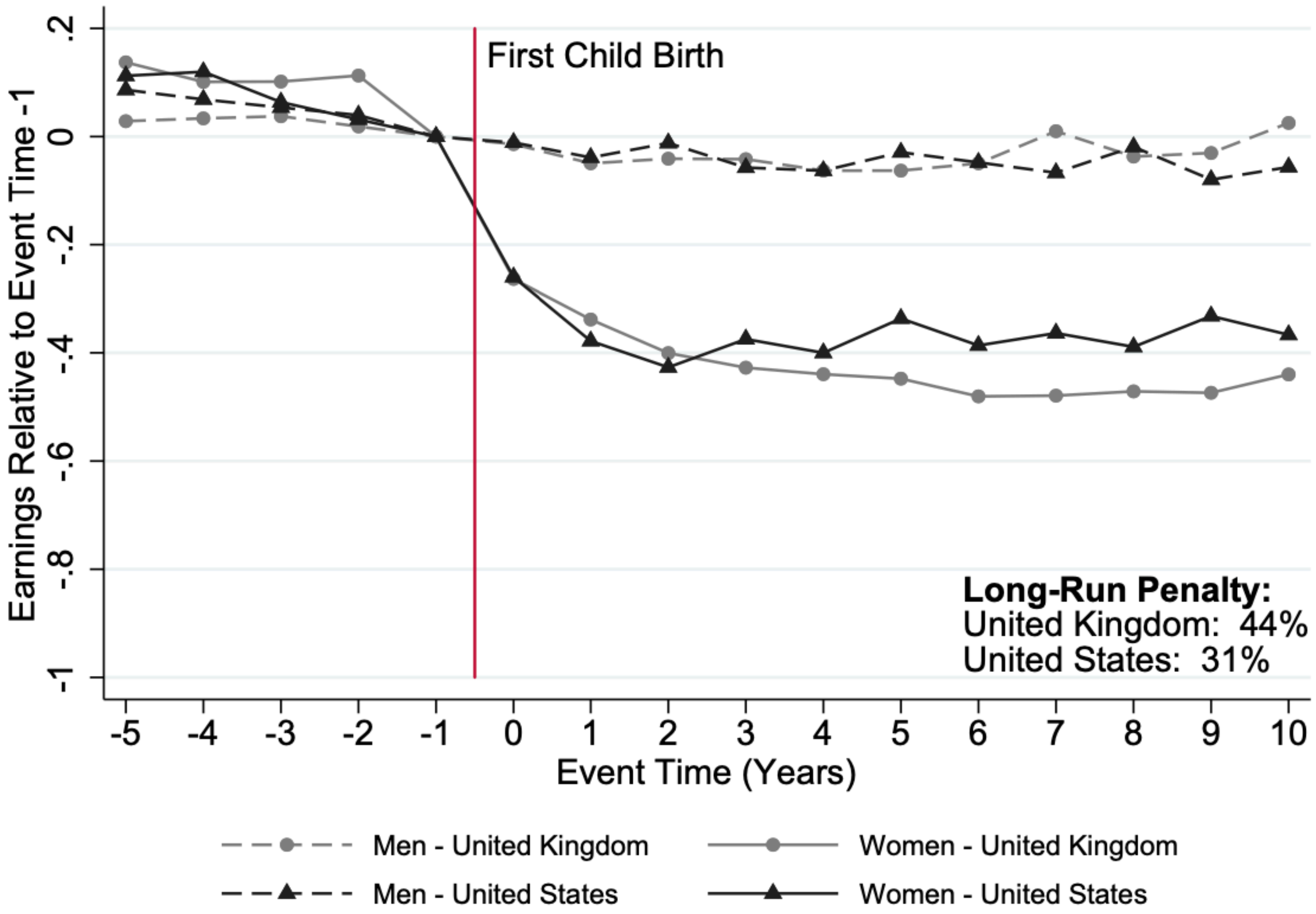


Figure 3: Child Penalties in Earnings in German-Speaking Countries

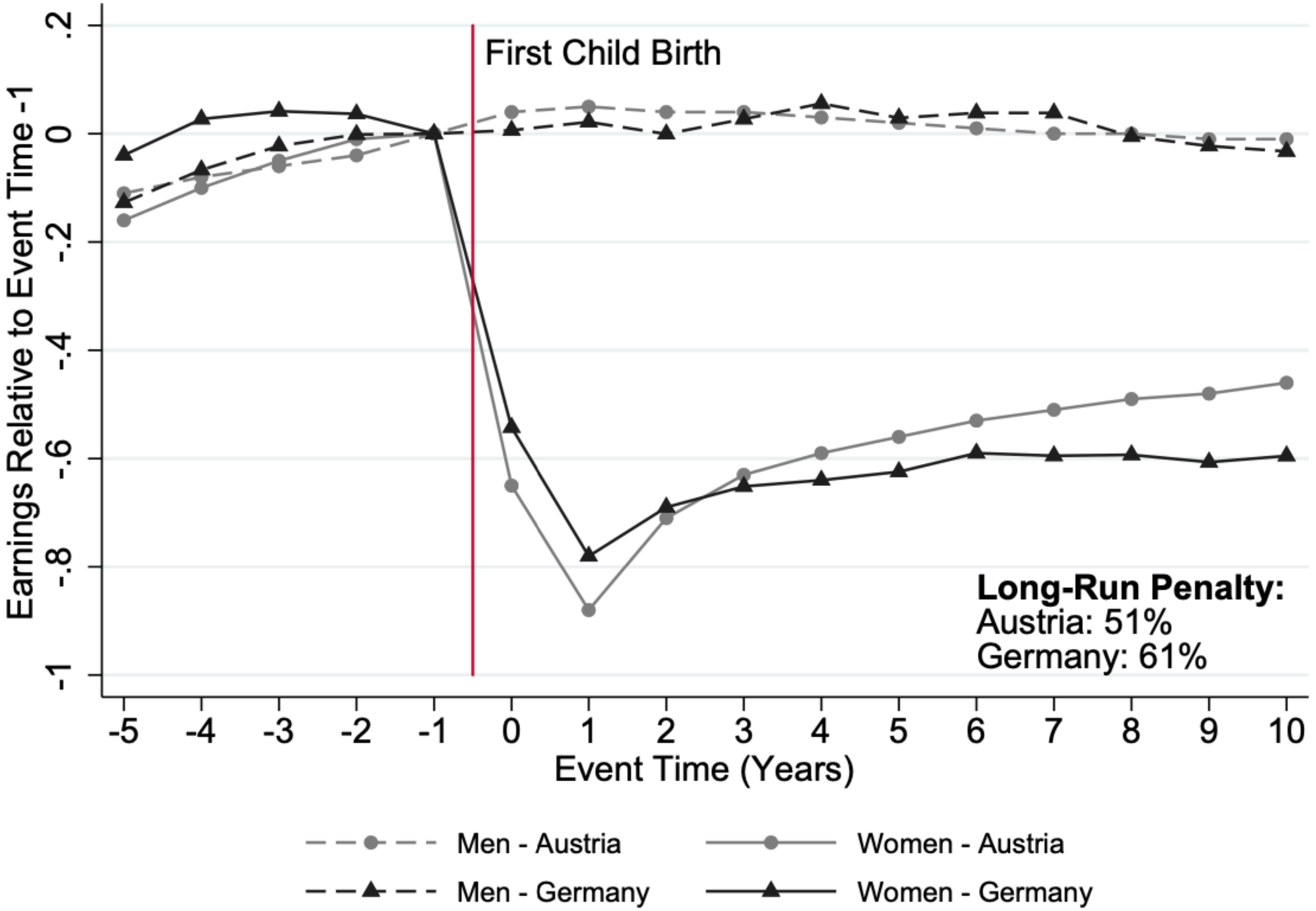
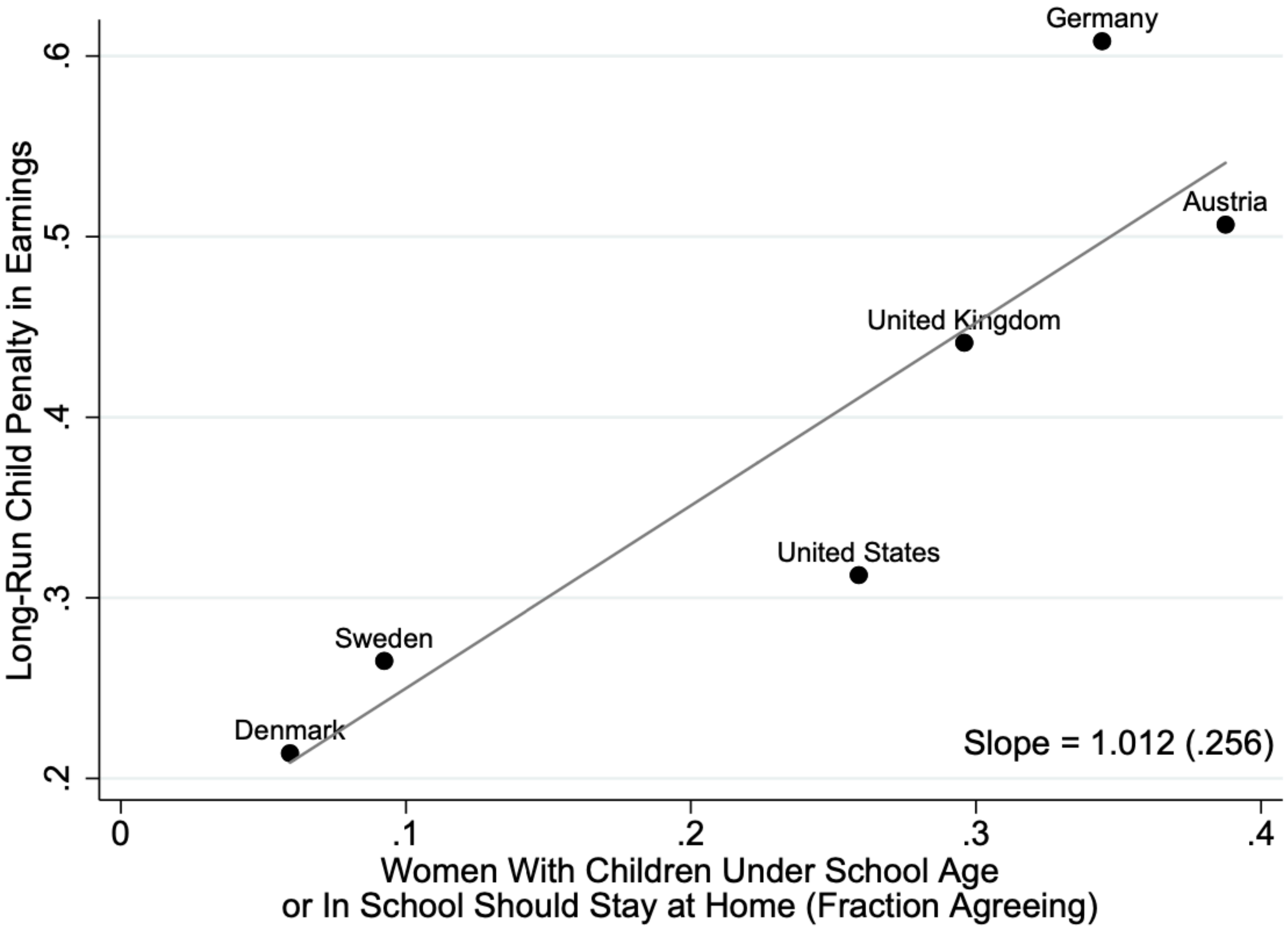


Figure 4: Estimated Child Penalties vs Elicited Gender Norms



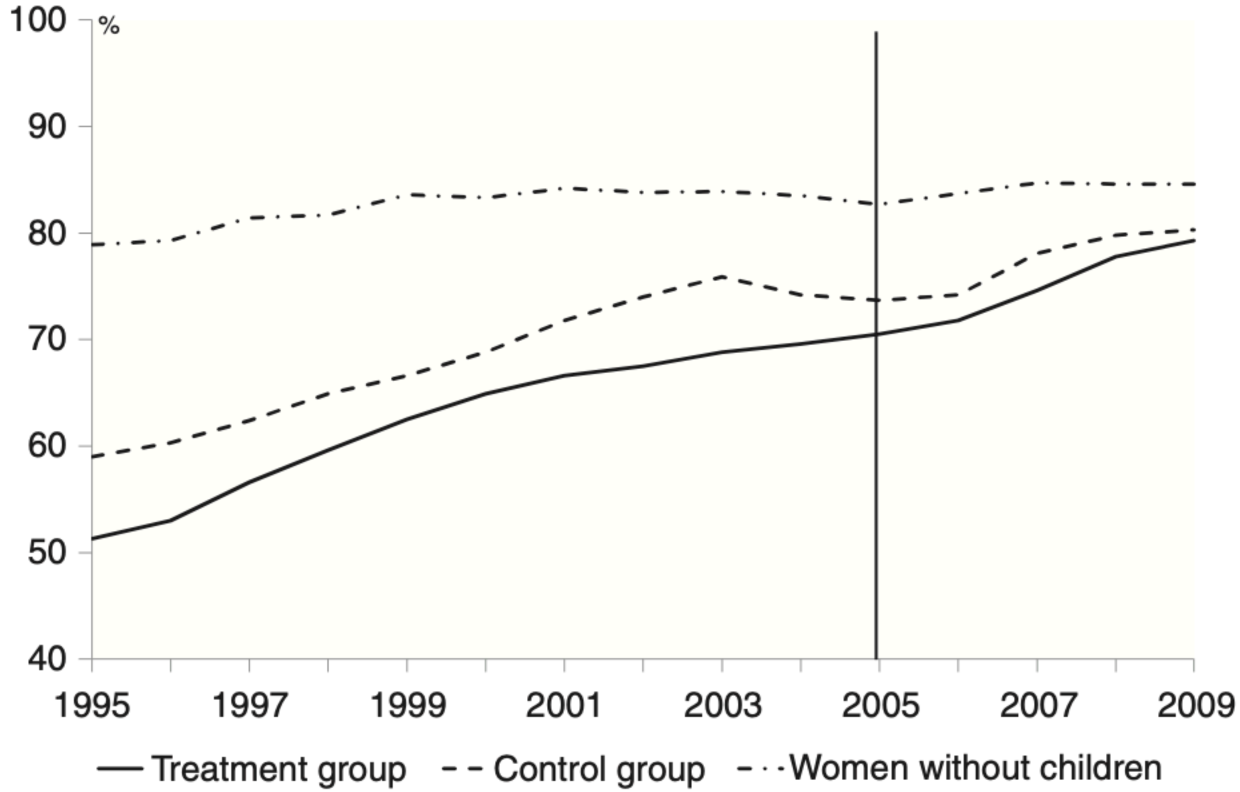
Notes: The figure plots our estimated long-run child penalties in earnings against elicited gender norms from the International Social Survey Program (ISSP). We focus on responses to an ISSP question of whether women with children under school age or in school should work outside the home (full-time or part-time) or stay at home. The figure plots child penalties against the fraction of respondents who agree that women should stay at home.

#msc2022

Childcare Subsidies

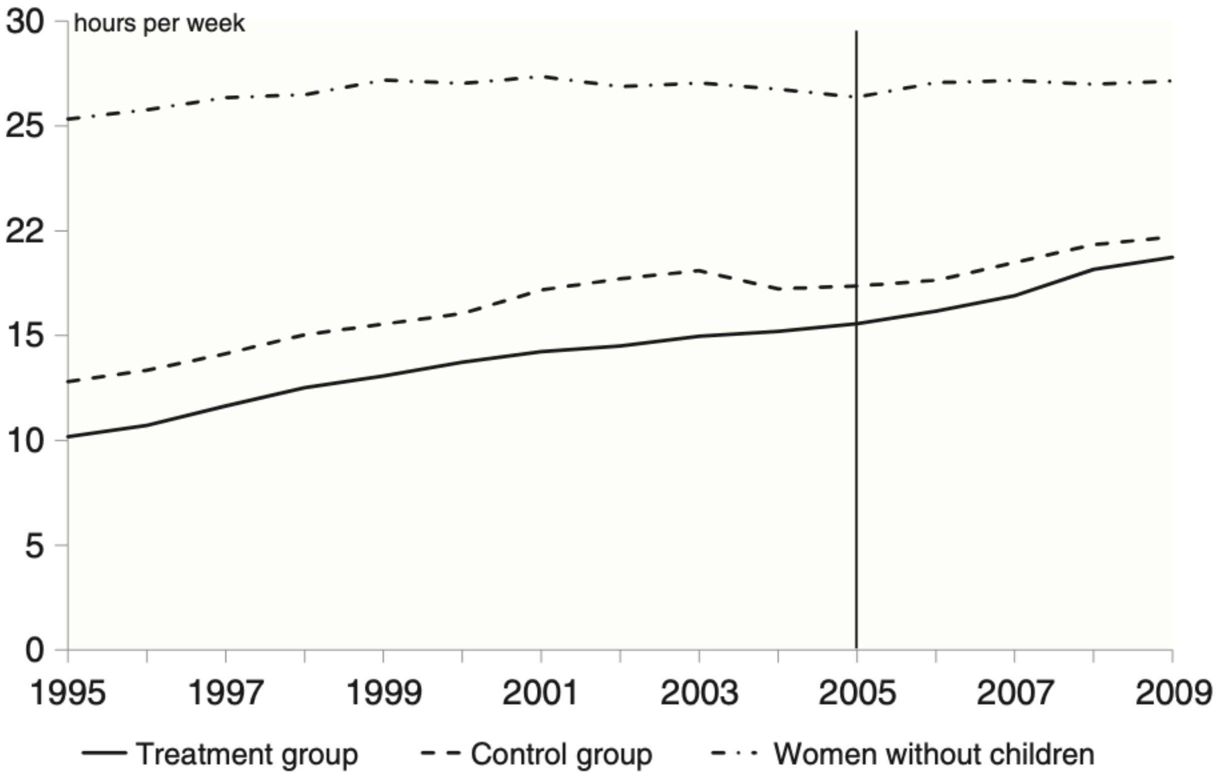
- Bettendorf et al. (2015, Labour Economics) study "Law on Childcare" in 2005 in Netherlands
  - Cut fee for childcare cut in half
  - Subsidies allowed to be used at small-scale providers
  - Treatment group = mothers with a youngest child up to age 12
  - Control group = mothers with youngest child 12-18 years old
- Problem: some expansion of EITC at the same time
- Broad patterns suggest no significant difference in female LFP or hours worked

Impact on LFP



Source: Labour Force Survey (Statistics Netherlands).

Impact on Hours Worked

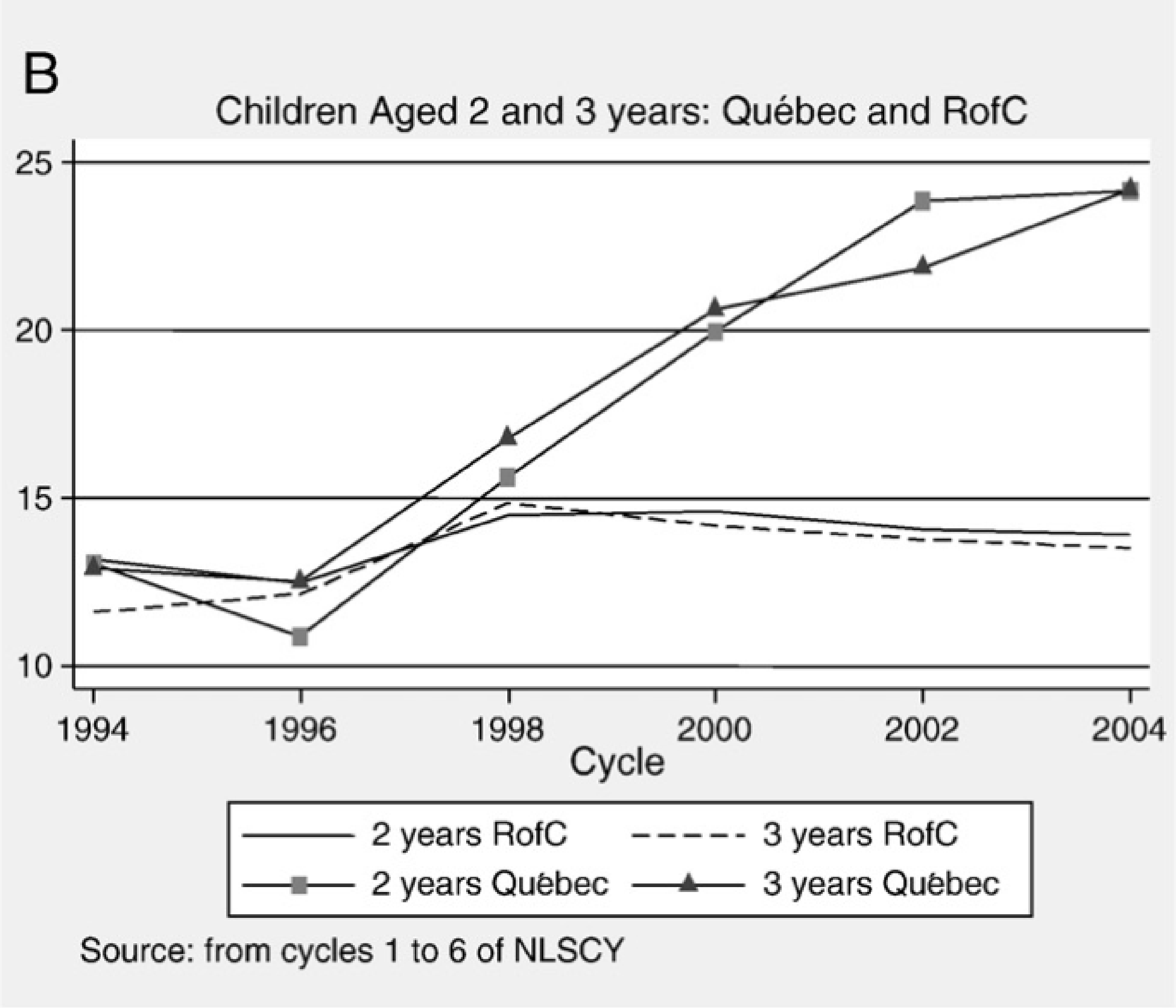


Source: Labour Force Survey (Statistics Netherlands).

Childcare Subsidies

- Baker, Gruber, and Milligan (2008) and Lefebvre, Merrigan, and Verstraete (2009) study 1997 introduction of subsidized childcare in Quebec for 4 year olds
  - On September 1997, a new childcare policy was initiated by the provincial government of Québec. Licensed and regulated providers of childcare services began offering day care spaces at the subsidized fee of $5/day/child for children aged 4.
  - LMV argue that policy led to long-run dynamic effects on labor force participation, effects on mothers with children below 6, concentrated on less-educated mothers
  - BGM find similar effects, and also study impacts on children

Childcare Participation (Note that age 2 in 1997 is age 7 in 2002)



Labor force participation (Note that age 2 in 1997 is age 7 in 2002)

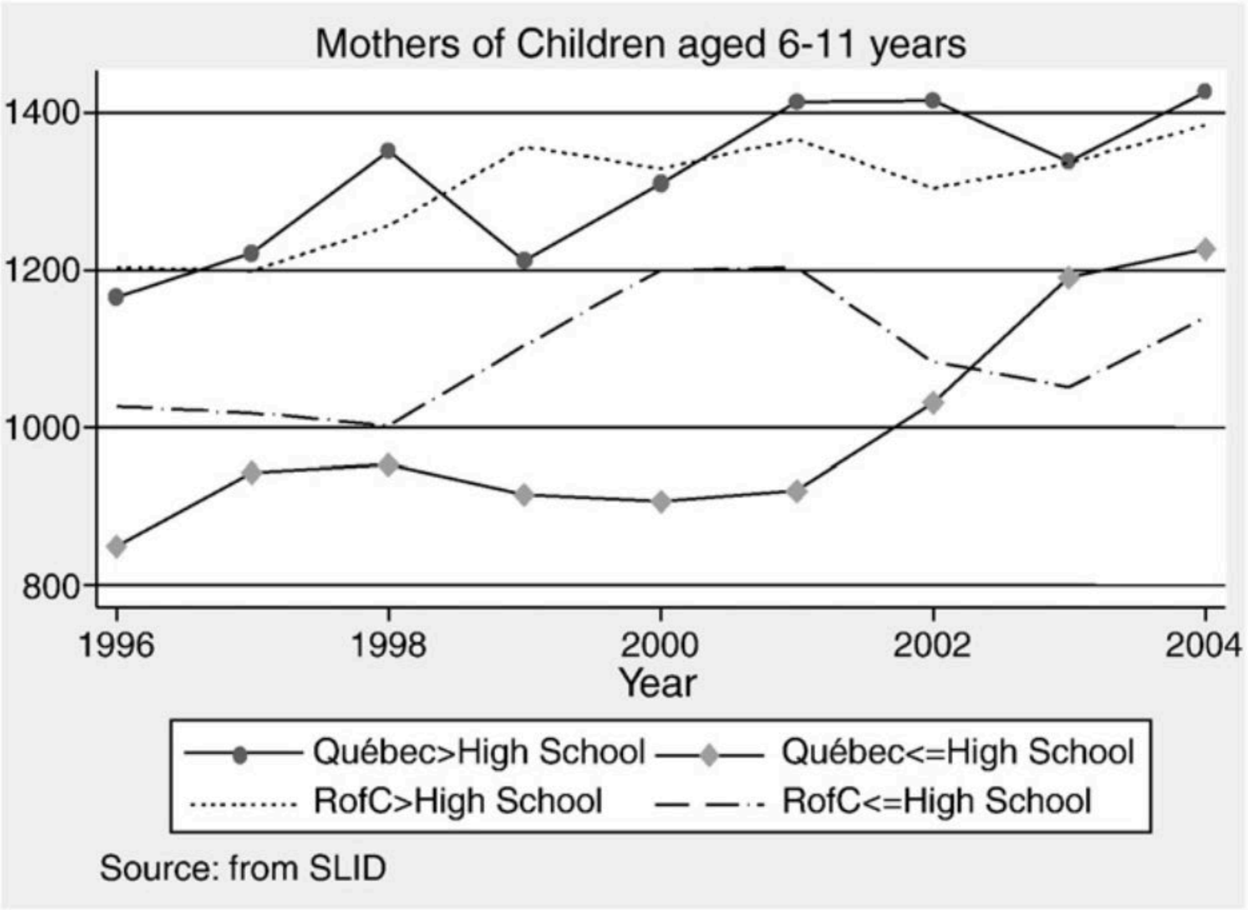
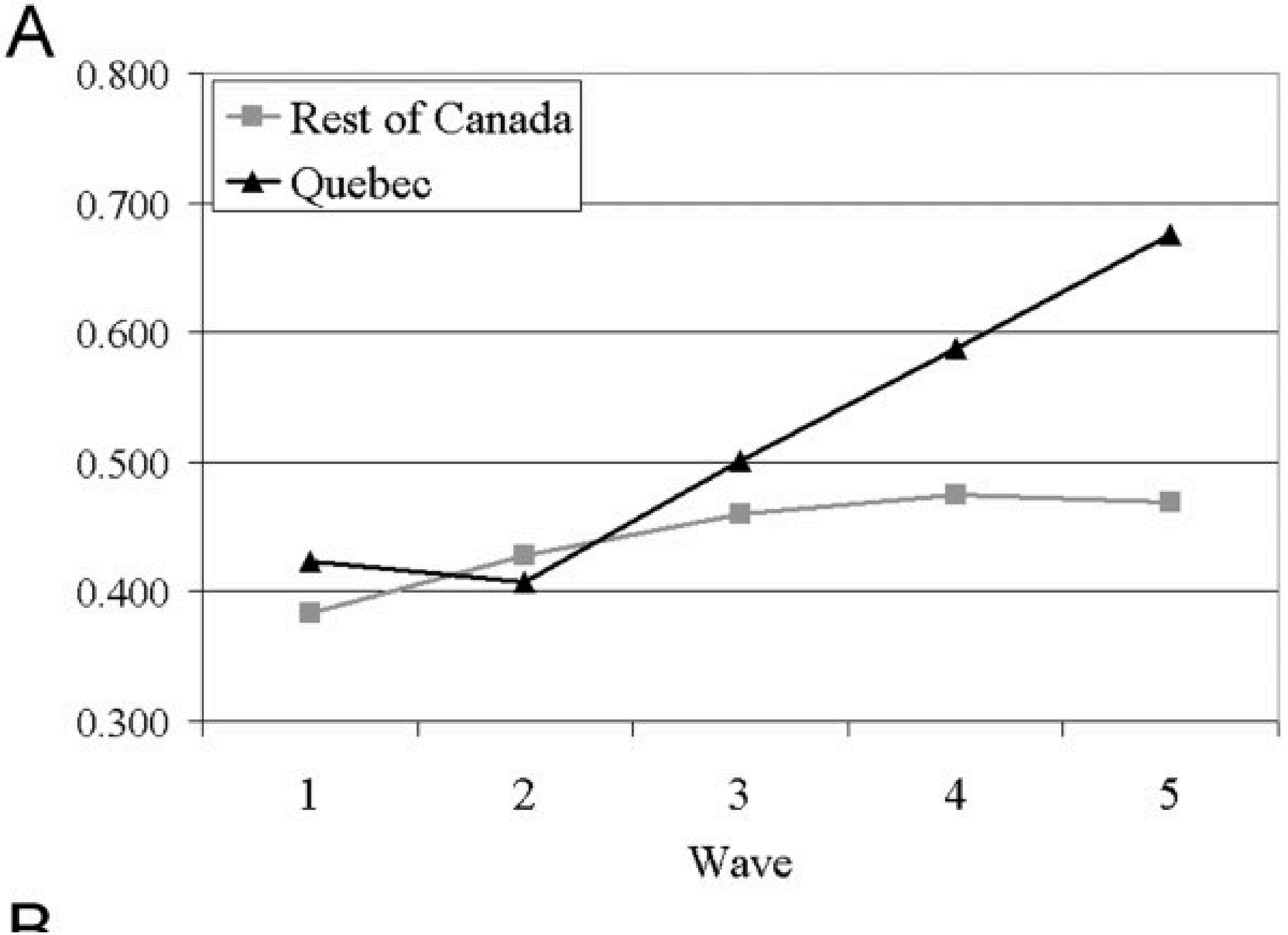
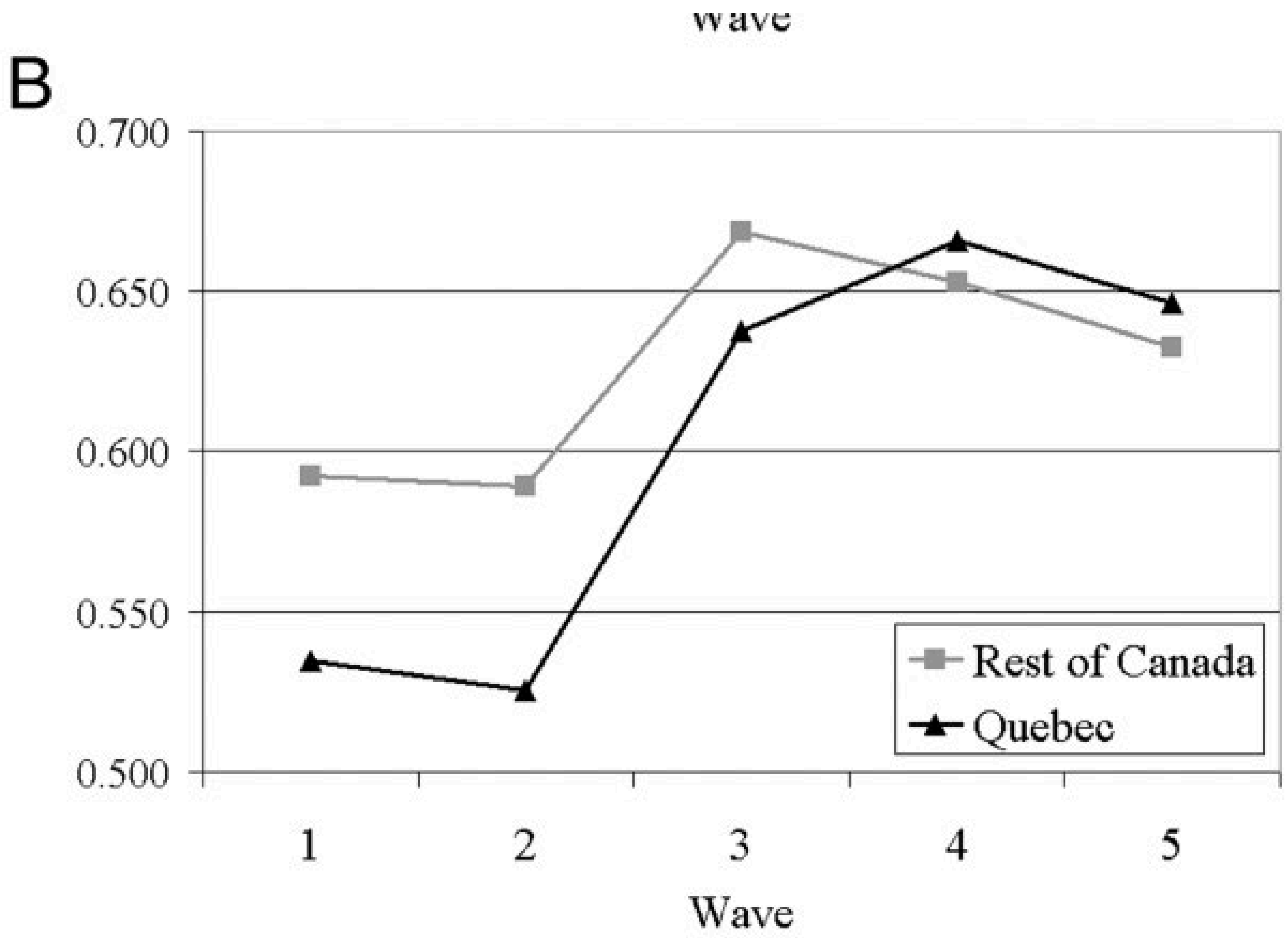


Fig. 5. Mean annual hours worked by education.

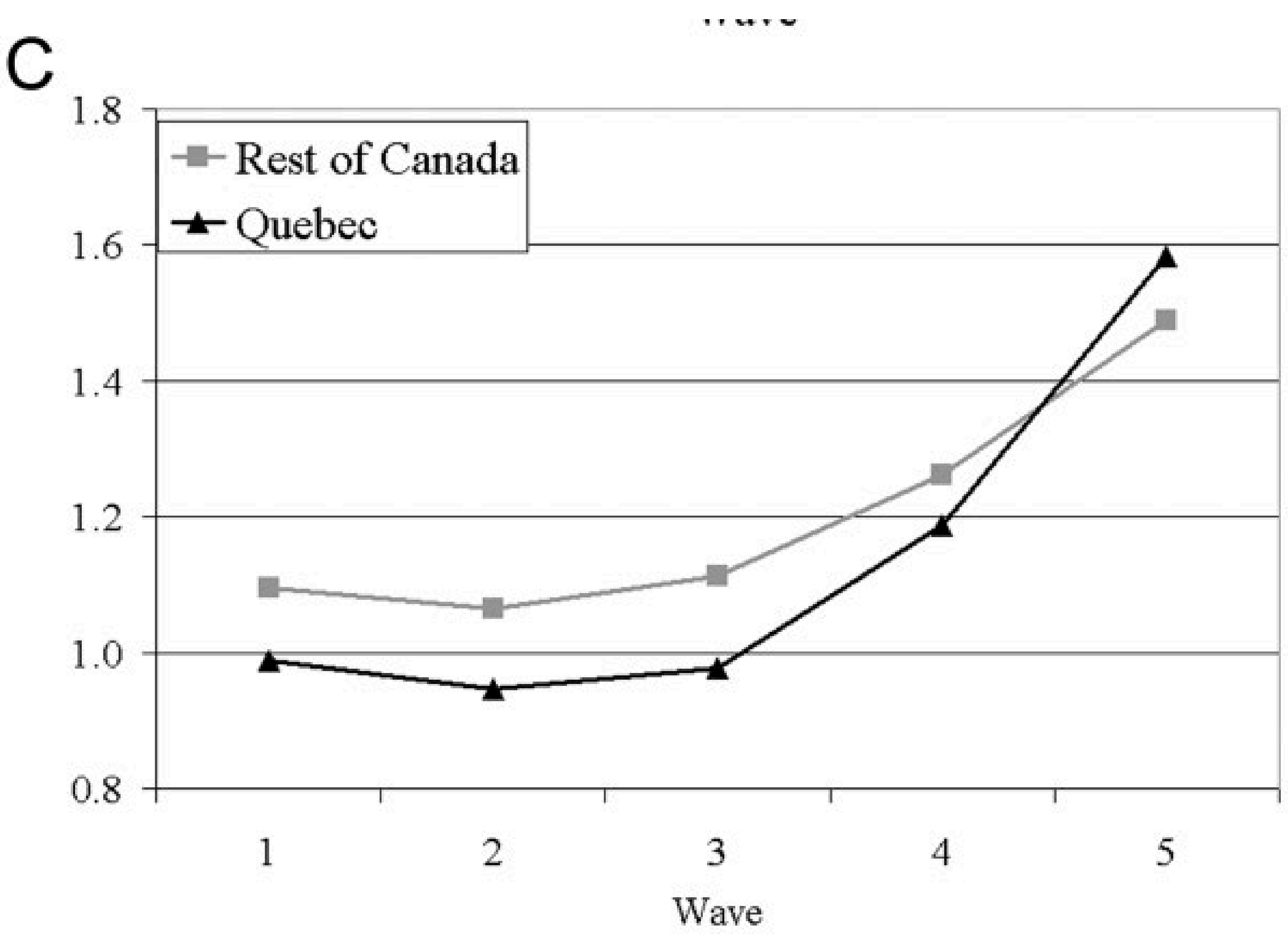
BGM Impact on non-parental care



BGM Impact on maternal labor supply



BGM Impact on Child Anxiety Score (age 2-3)



BGM Impact on Child Behavior

TABLE 3
RESULTS ON CHILD BEHAVIOR, FAMILY, AND HEALTH

Dependent Variable	Observations	Range	Mean (Standard Deviation)	ELIG Dummy
	A. Child Behavior and Health			
Hyperactivity-inattention, ages 2–3	14,494	0–14	4.102 (3.134)	.103 (.146)
Emotional disorder–anxiety score, ages 2–3	14,555	0–12	.967 (1.343)	.120** (.055)
Separation anxiety score, ages 2–3	14,580	0–10	2.668 (2.029)	.099 (.085)
Physical aggression and opposition, ages 2–3	14,435	0–16	4.375 (3.041)	.380*** (.084)
Standardized motor and social development score, ages 0–3	26,176	1–177	99.32 (15.03)	−1.65*** (.46)
PPVT score, scaled, age 4	5,210	45–160	99.76 (15.15)	.36 (.75)
In general, child is in excellent health, ages 0–4	33,891	0/1	.641 (.480)	−.055*** (.016)
Child never has nose or throat infections, ages 0–2	28,175	0/1	.404 (.491)	−.140*** (.025)
Child has never had an ear infection, ages 0–2	28,161	0/1	.438 (.496)	−.057*** (.019)
Had asthma attack in past 12 months, ages 0–4	33,867	0/1	.955 (.208)	−.003 (.004)
Child has been injured in past 12 months, ages 0–4	33,878	0/1	.071 (.258)	.006 (.008)

BGM Impact on Parental Behavior

	B. Parent Behavior and Health			
Hostile, ineffective parenting, ages 2–4	20,017	0–25	8.320 (3.842)	.728*** (.091)
Consistency, ages 2–4	19,809	0–20	14.048 (3.266)	−.504*** (.117)
Aversive parenting, ages 2–4	20,116	0–20	8.346 (2.014)	.198*** (.067)
Family functioning, ages 0–4	33,248	0–36	7.188 (4.979)	.257 (.173)
Mother health status is excellent, ages 0–4	33,708	0/1	.406 (.491)	−.011 (.011)
Father health status is excellent, ages 0–4	33,586	0/1	.449 (.497)	−.029** (.012)
Mother depression score, ages 0–4	29,595	0–36	4.199 (4.563)	.422*** (.119)
Satisfaction with relationship, ages 0–4	26,473	0–11	9.505 (1.679)	−.194*** (.025)

NOTE.—For each dependent variable we show the number of observations, the preprogram mean for Quebec (with standard deviation in parentheses), the range for the dependent variable, and the coefficient from a regression on the eligibility dummy. Also included in the regressions is a set of control variables including dummies for the child's age, sex, number of older siblings, and number of younger siblings; the mother's age, education, and immigrant status; the father's age, education, and immigrant status; and the size of the urban area and the province in which the family lives, as well as dummies for each wave.

* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.

Baker, Gruber, and Milligan analyze impact on children

The Long-Run Impacts of a Universal Child Care Program†

By Michael Baker, Jonathan Gruber, and Kevin Milligan*

Past research documents the persistence of positive impacts of early life interventions on noncognitive skills. We test the symmetry of this finding by studying the persistence of a sizeable negative shock to noncognitive outcomes arising with the introduction of universal child care in Quebec. We find that the negative effects on noncognitive outcomes persisted to school ages, and also that cohorts with increased child care access had worse health, lower life satisfaction, and higher crime rates later in life. Our results reinforce previous evidence of the central role of the early childhood environment for long-run success. (*JEL* I12, I31, J13, K42)

Preschool Outcomes

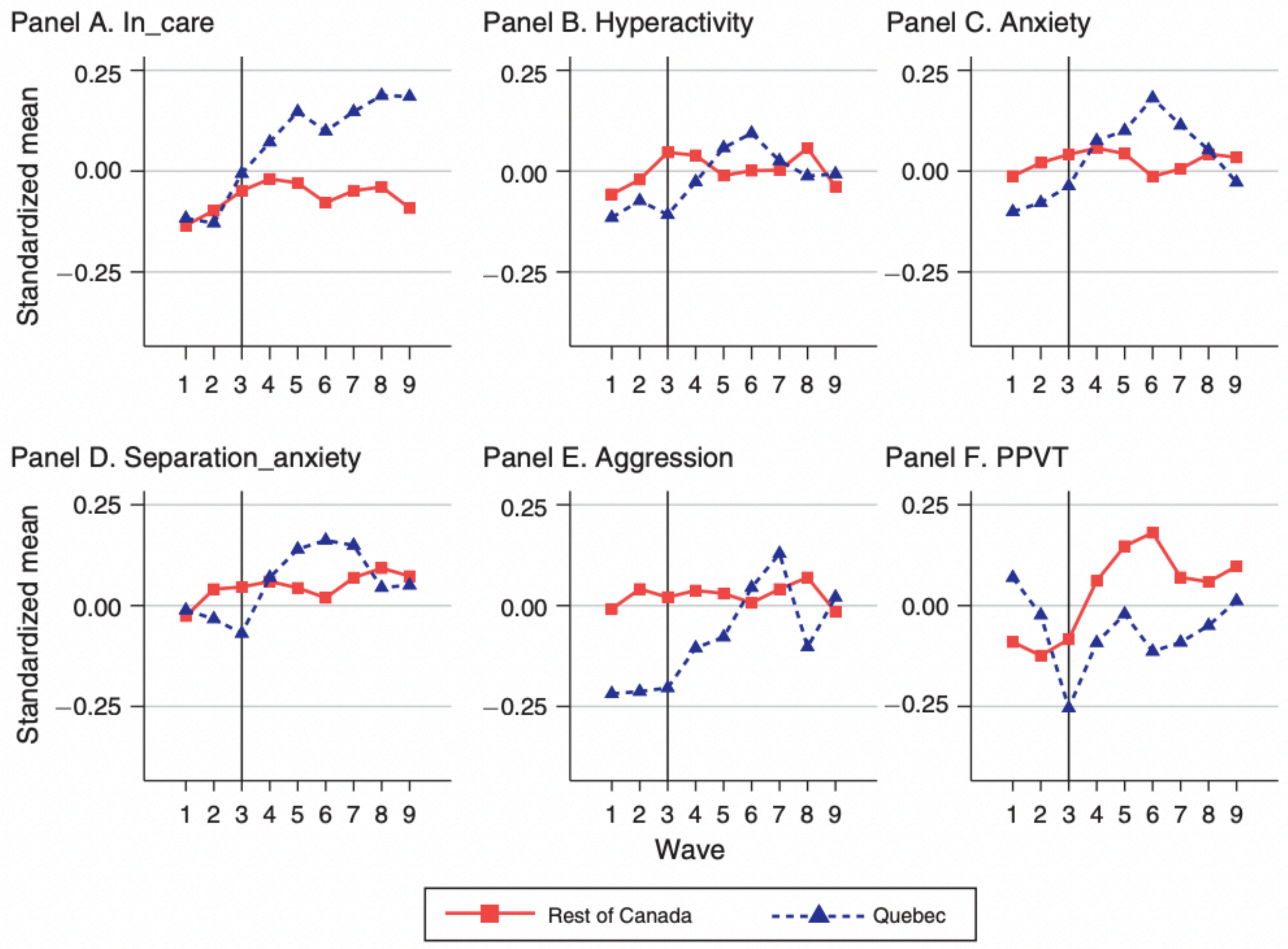


FIGURE 1. TIME TRENDS IN STANDARDIZED PRESCHOOL OUTCOMES

Notes: Authors' calculations from NLSCY/SYC data. The graph shows the mean standardized value for each of the outcomes in Table 1 across time in Quebec and the rest of Canada. The variable in care shows the deviation from the average value of the variable measured across all children age 0–4. The other variables are standardized using the mean and standard deviation.

Impacts on Children: Havnes and Mogstad (2011)

- Havnes and Mogstad (2011) study impact of a 1975 Norway reform that expanded childcare subsidies

- Large long-run positive impact on *children's* outcomes at age 30

- DD strategy: Compare adult outcomes of 3-6 year olds in places that did versus did not experience large expansions of child care coverage

Childcare Coverage Rates (Havnes and Mogstad (2011))

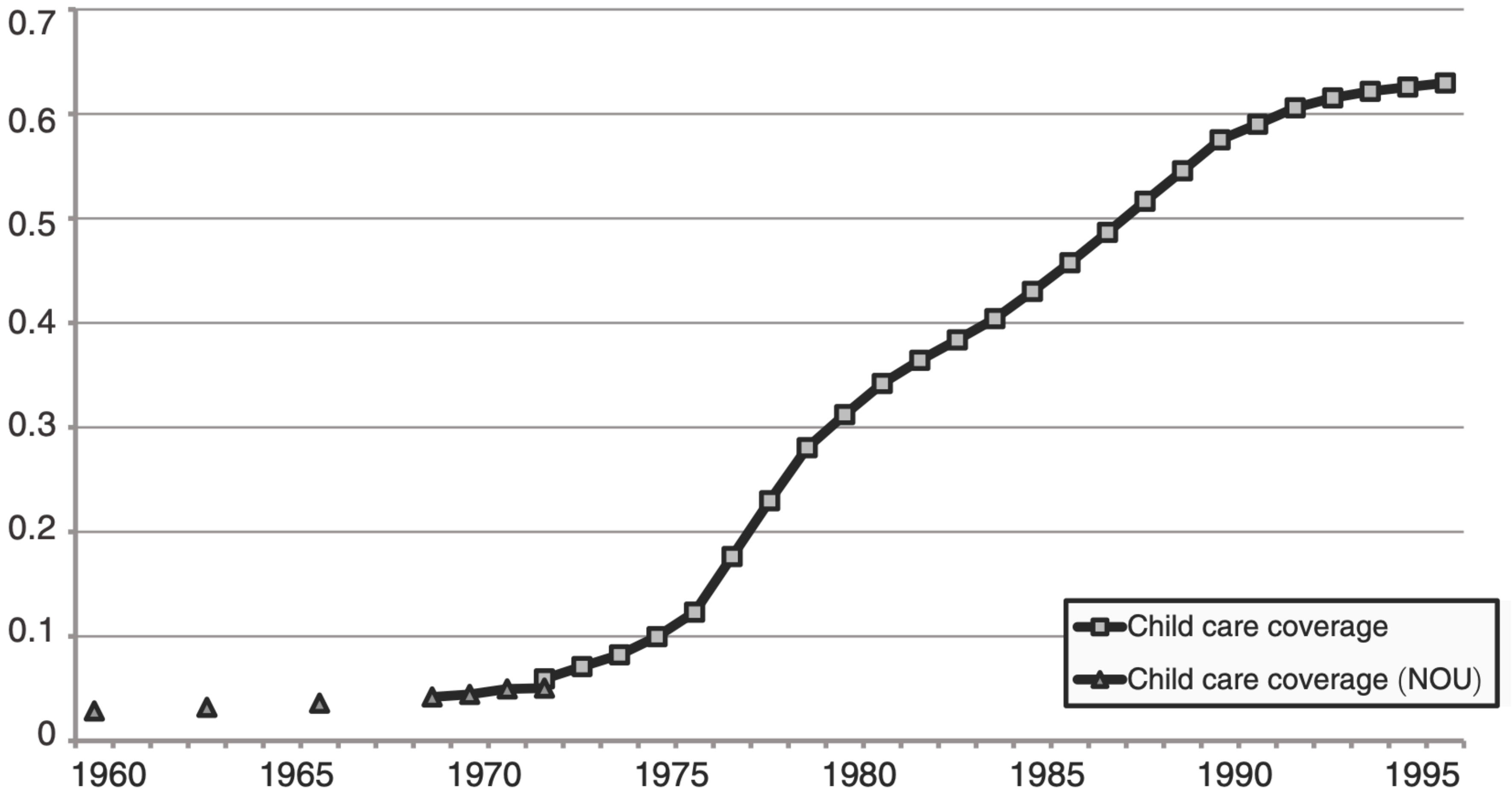


FIGURE 1. CHILD CARE COVERAGE RATE IN NORWAY 1960–1996 FOR CHILDREN 3–6 YEARS OLD

Sources: Administrative data for 1972–1996. Data for 1960–1972 from the Norwegian Ministry of Administration and Consumer Affairs (1972), Table II.1.

Child Care Structure: Havnes and Mogstad (2011)

TABLE 1—CHILD CARE INSTITUTIONS BY OWNERSHIP STRUCTURE

	1975	1977	1979	1981
Private (%)	28.4	26.7	26.3	21.9
Municipality (%)	48.6	45.4	46.9	51.2
Church (%)	7.3	8.0	8.6	8.6
Cooperatives (%)	5.6	8.2	9.7	10.0
Child care institutions	880	1,469	2,294	2,754
Children in child care (3–6 years old)	25,536	43,239	63,218	73,152
Coverage rate (3–6 years old, %)	10.0	17.6	28.1	34.2

Notes: Private ownership indicates ownership by a private firm, organization, or foundation. Cooperatives are parental or residential. Categories not reported are ownership by state, regions, and other.

Treatment vs. Control Municipalities Coverage Rates (Havnes and Mogstad (2011))

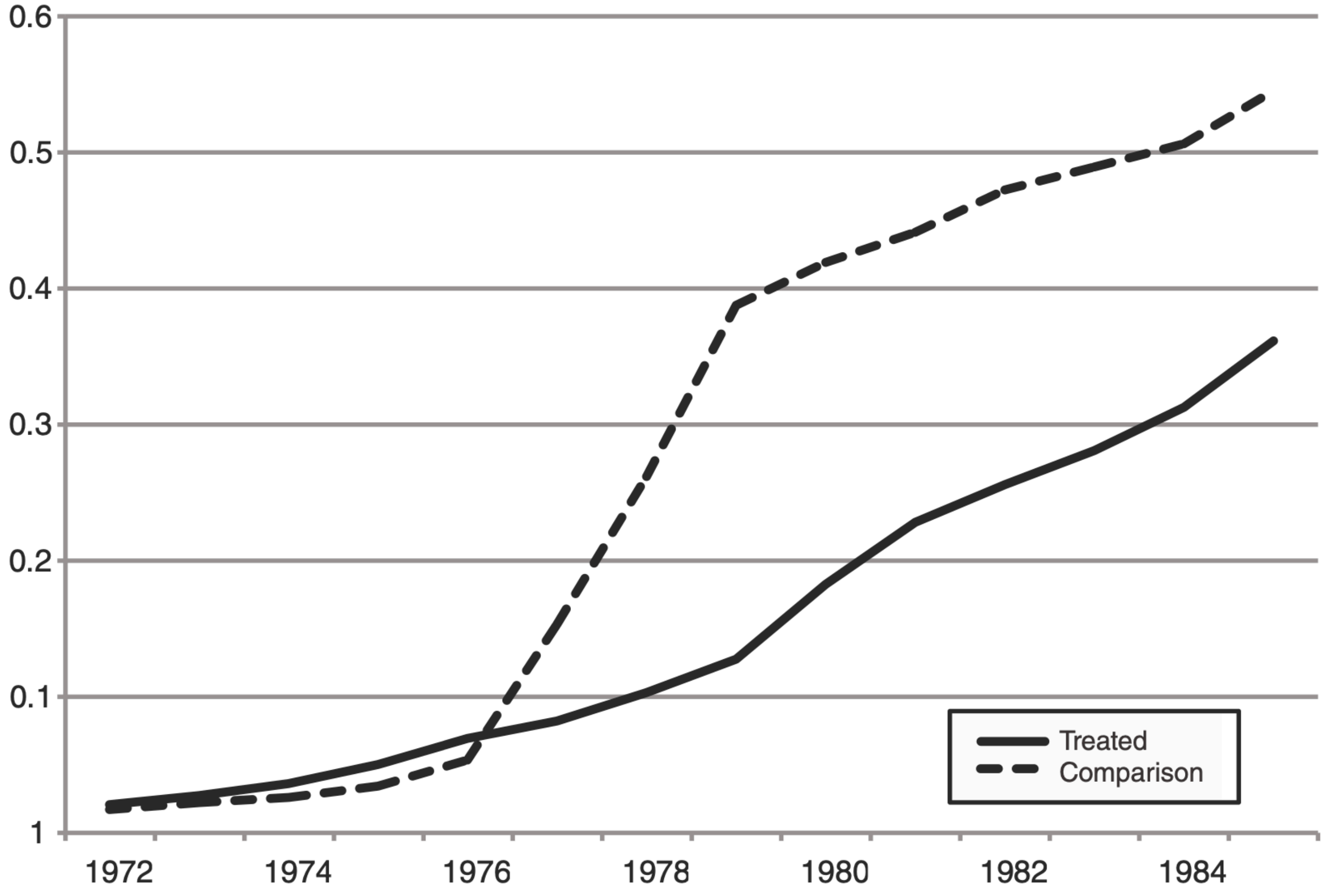


FIGURE 2. CHILD CARE COVERAGE RATES 1972–1985 FOR 3–6 YEAR OLDS IN TREATMENT AND COMPARISON MUNICIPALITIES

Note: Treatment (comparison) municipalities are above (below) the median in child care coverage growth from 1976 to 1979.

Empirical Specification (Havnes and Mogstad (2011))

cut-off defining treatment and comparison municipalities. In addition, we follow Berlinski, Galiani, and Gertler (2009) in regressing child outcome on child care coverage rate in each municipality, controlling for cohort and municipality fixed-effects, as well as a set of controls. This regression model, estimated by OLS over the sample of children born during the period 1967–1976, restricts the marginal effects of additional child care slots to be constant, and can be defined as

$$Y_{ijt} = \delta_t + \zeta CC_{it} + \mathbf{X}'_{ijt}\varphi + \epsilon_{ijt}, \tag{2}$$

where CC_{it} is the average child care rate in the municipality of child i from the year t when the child turns 3 years old until, but not including, year $t+4$ when he or she turns 7 and starts primary school.

Impacts on Children: Havnes and Mogstad (2011)

TABLE 4—MAIN RESULTS

	TT (1)	ITT (2)	SE(ITT) (3)	Mean (4)	Controls (5)
Panel A. Educational attainment					
Years of education	0.4129***	0.0737***	0.0174	12.66	No
	0.3523***	0.0629***	0.0155		Yes
Attended college	0.0868***	0.0155***	0.0034	0.3764	No
	0.0685***	0.0122***	0.0031		Yes
High school dropout	−0.0498***	−0.0089***	0.0029	0.2618	No
	−0.0584***	−0.0104***	0.0028		Yes
Panel B. Earnings and welfare dependency					
Low earner	−0.0281**	−0.0050**	0.0025	0.1552	No
	−0.0359***	−0.0064***	0.0025		Yes
Average earner	0.0596***	0.0106***	0.0032	0.6931	No
	0.0514***	0.0092***	0.0031		Yes
High earner	−0.0219**	−0.0039**	0.0023	0.1628	No
	−0.0337***	−0.0060***	0.0022		Yes
Top earner	−0.0183***	−0.0033***	0.0011	0.0422	No
	−0.0220***	−0.0039***	0.0011		Yes
On welfare	−0.0496***	−0.0089***	0.0025	0.1632	No
	−0.0511***	−0.0091***	0.0025		Yes
Panel C. Family formation					
Parent	−0.1029***	−0.0184***	0.0030	0.8083	No
	−0.0799***	−0.0143***	0.0029		Yes
Single, no child	0.0472***	0.0084***	0.0026	0.1398	No
	0.0347***	0.0062***	0.0025		Yes
Single, parent	−0.0036	−0.0007	0.0018	0.084	No
	−0.0025	−0.0004	0.0017		Yes

Impacts on Parents: Havnes and Mogstad (2011)

TABLE 7—MECHANISMS: FAMILY SIZE, MOTHER'S EDUCATION, AND MATERNAL EMPLOYMENT

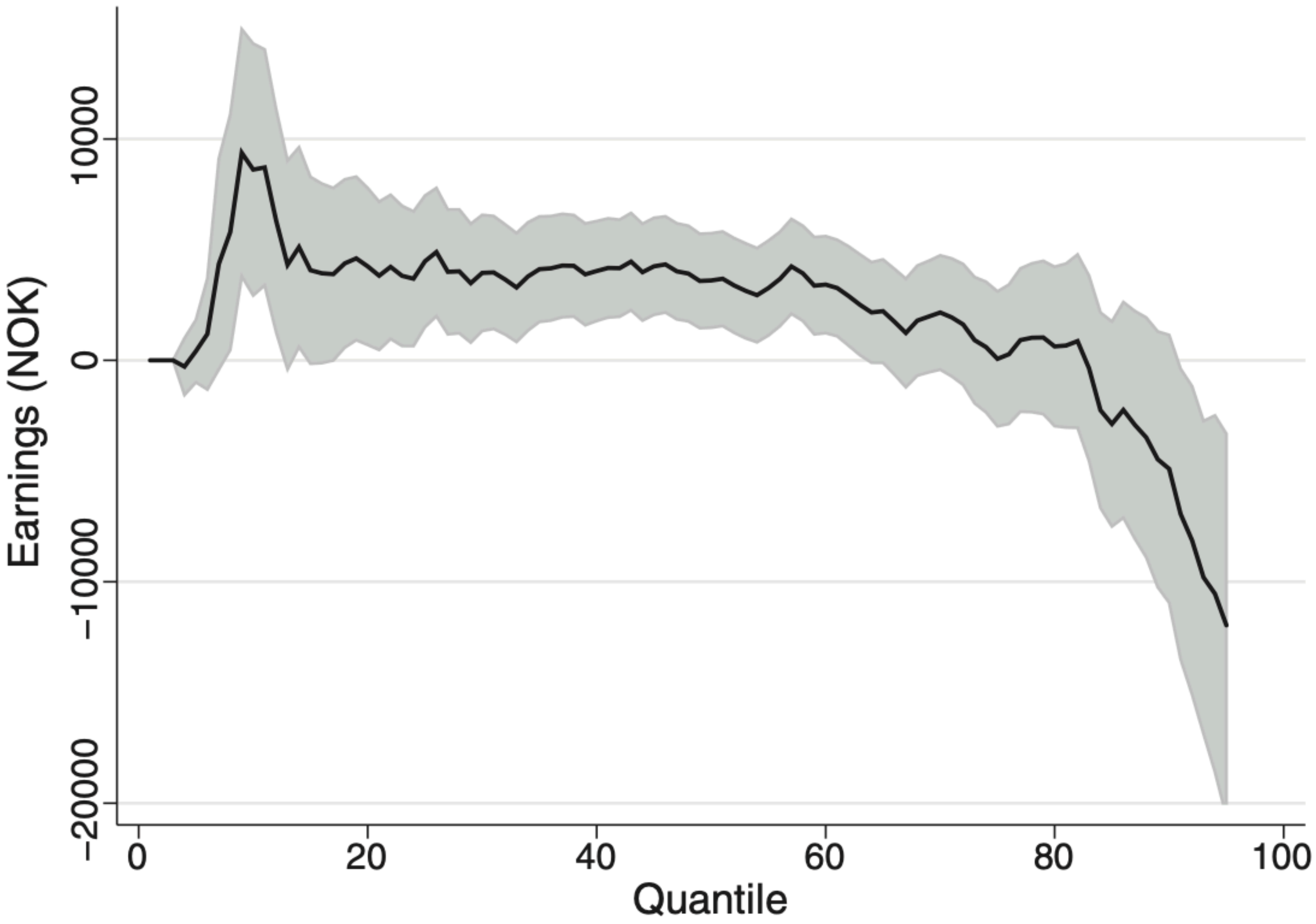
	TT (1)	ITT (2)	SE(ITT) (3)	Mean (4)
Family size	0.1003***	0.0179***	0.0060	2.995
Mother's education	−0.0051	−0.0009	0.0061	10.15
Maternal employment				
Low earner	−0.0431***	−0.0077***	0.0025	0.1190
Average earner	0.0443***	0.0079***	0.0015	0.0373

Notes: The sample consists of 318,367 mothers of the 499,026 children from cohorts born in 1967–1976. ITT/TT = 0.1785 (i.e., the increase in child care coverage following the reform in the treatment group relative to the comparison group). Standard errors are clustered on the mother. Maternal employment: Maternal employment status is determined based on average earnings over the years the child is between three and six years old. Estimations are based on OLS on the equation in footnote 38. Family size and mother's education: Estimations are based on OLS on equation (1), with controls listed in Table 3 and municipal-specific fixed effects. Mother's education is measured when the child is 16 years old. Family size is measured in 2006. Standard errors are robust to within family clustering and heteroskedasticity.

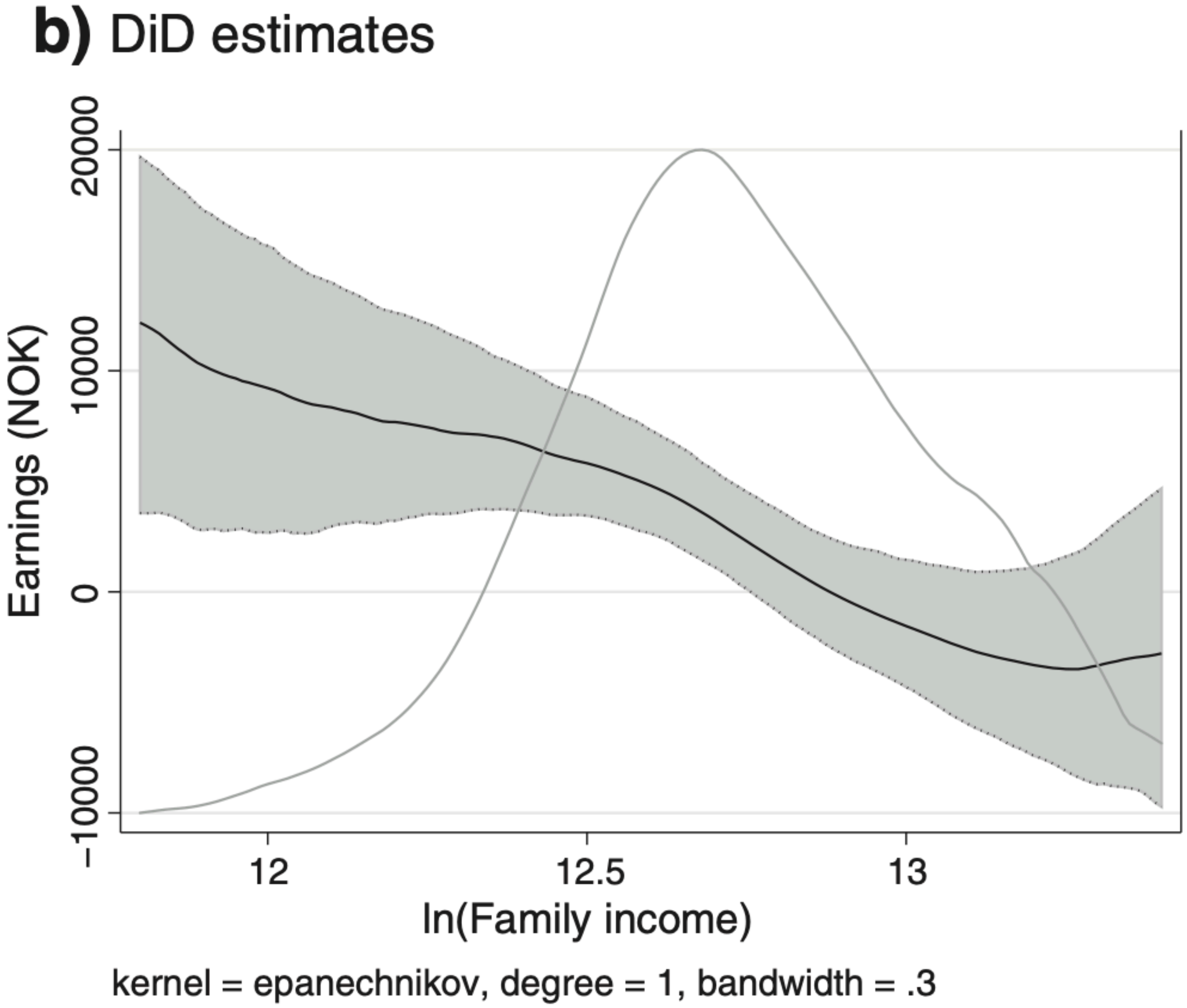
Quantile Treatment Effects: Havnes and Mogstad (2012)

- Havnes and Mogstad (2011) find large positive average effects on children
- Havnes and Mogstad (2012) study the quantile treatment effects
- Find large heterogeneity in the effects – they “leveled the playing field”

Quantile Treatment Effects: Havnes and Mogstad (2012)



Heterogeneity by Parental Income: Would not have seen sig negative effects



Childcare Subsidies

- Overall, mixed evidence on the impact of childcare subsidies
  - Gruber, Huttunen, and Kosonen (2023) finds negative effects of paying women to stay home to take care of children on both labor supply and children's academic outcomes
- Some evidence of heterogeneous effects – e.g. leveling the playing field

- Nathan's take: This is consistent with the VA literature – teachers matter, which means we should expect to find that subsidies that homogenize child experiences should lead to more equal outcomes for children

- Welfare implications?
  - Reason to subsidize poor children is impact on children (improves human capital)
    - Also, evidence from Abecedarian of increases in parental labor earnings
  - Reason to subsidize rich children? Impacts on adults? If anything, Quebec impacts had no effects on rich families labor supply, but maybe this is because those families don't take up the subsidies? Havnes and Mogstad find increases in labor supply for more affluent families

Paid Parental Leave

- Impact of paid parental leave policies

- Olivetti and Petrongolo (2017) study cross-sountry variation in family-friendly policies

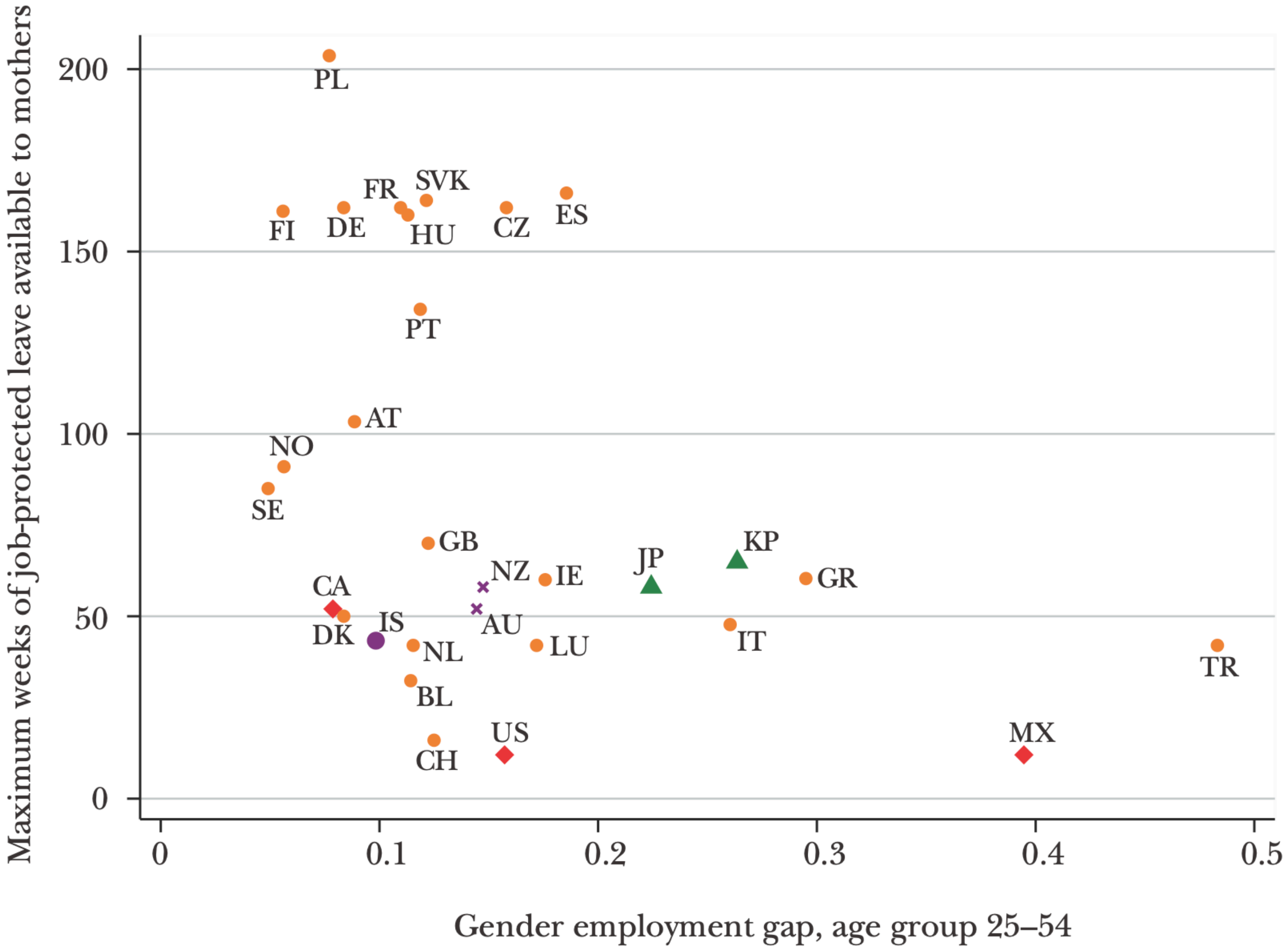
- Find broad cross-country pattern: countries with paid parental leave have smaller LFP gaps between men and women aged 25-54

Table 1

Cross-country Variation in Family-Friendly Policies

	Maximum job-protected leave for mothers (weeks) (1)	*Total maternity leave (weeks)* (2)	*Pre-birth leave (% maternity leave)* (3)	*Total paid leave available to mothers (weeks)* (4)	*Average payment rate for mothers (% of average, 2014, national earnings)* (5)	*Total paid leave available to father (% total paid leave for both parents)* (6)	*Early childhood education and care (% GDP)* (7)	*Accumulate days off and vary start/ end of daily work (% companies)* (8)
Spain	166	16	63	16	100	12	0.6	34.07
France	162	16	38	42/110[a]	44.7	40/33[a]	1.2	54.29
Germany	162	14	43	58	73.4	13	0.5	62.00
Finland	161.03	17.5	29	161.03	26.5	5	1.1	86.05
Norway	91	13	23	91	50.0	10	1.2	—
Sweden	85	15.6	45	60	63.4	14	1.6	74.18
United Kingdom	70	52	21	39	31.3	5	1.1	46.83
Greece	60.33	43	19	43	53.9	1	0.1	20.60
Japan	58	14	43	58	61.6	47	0.4	—
Australia	52	6	100	18	42.0	10	0.6	—
Canada	52	17	47	52	52.6	0	0.2	—
Denmark	50	18	22	50	54.1	4	2.0	76.91
Italy	47.7	21.7	18	47.7	52.7	0	0.6	39.96
Netherlands	42	16	38	16	100	2	0.9	66.48
United States	**12**	**0**	**0**	**0**	**0**	**0**	**0.4**	—

Figure 2
Employment Gap and Maximum Length of Job-Protected Leave for Mothers



Source: OECD Employment Database, 2016, http://stats.oecd.org/Index.aspx?DataSetCode=LFS_SEXAGE_I_R. OECD, Family Database, Public policies for families and children (PF), indicator "PF2.5. Trends in parental leave policies since 1970," 2016.
Note: The figure plots the gender gap in employment rates (as defined in Table 2) against the maximum weeks of job-protected leave available to mothers for the countries in our sample.

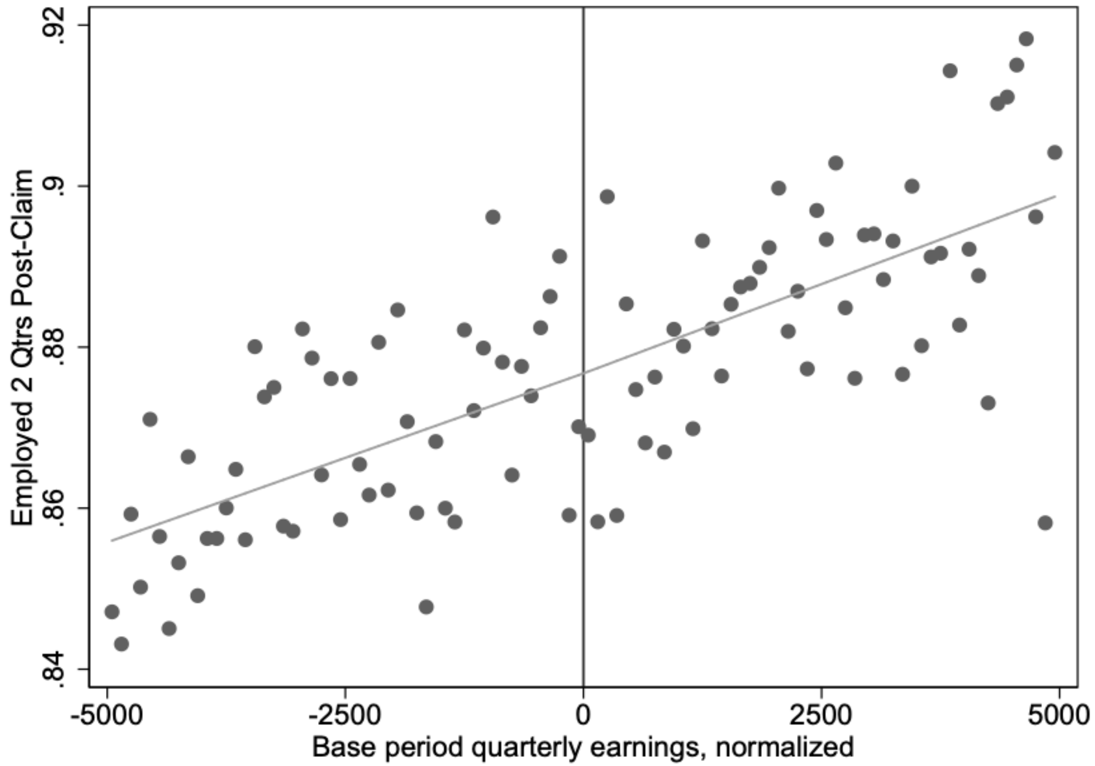
Paid Parental Leave

- Bana et al. (2020) estimate the impact of paid parental leave
- RK design in CA state-level paid family leave
- Exploit kink in the paid family leave schedule benefit amount in CA
- Individuals get 55% earnings up to a max benefit amount
- Find no impact on adverse impacts on future labor supply and an increase in likelihood of returning to pre-leave firm

(b) First Stage

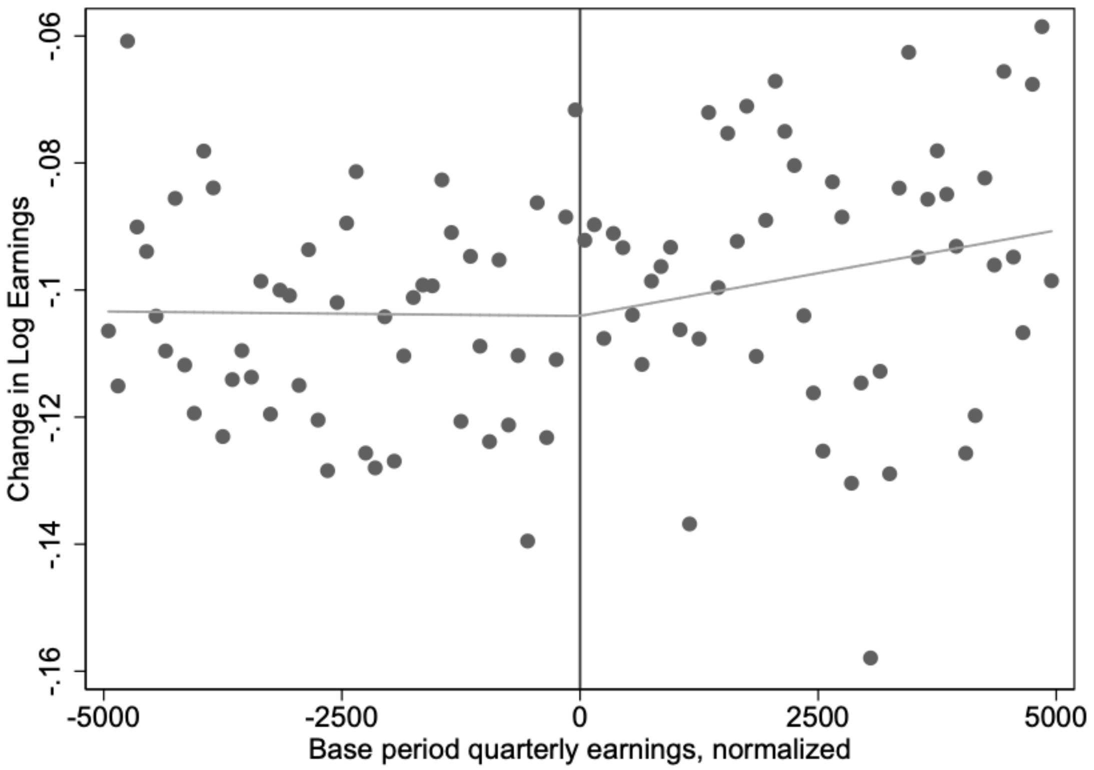
Paid Parental Leave

(b) Employed, 2 Qtrs. Post-Claim



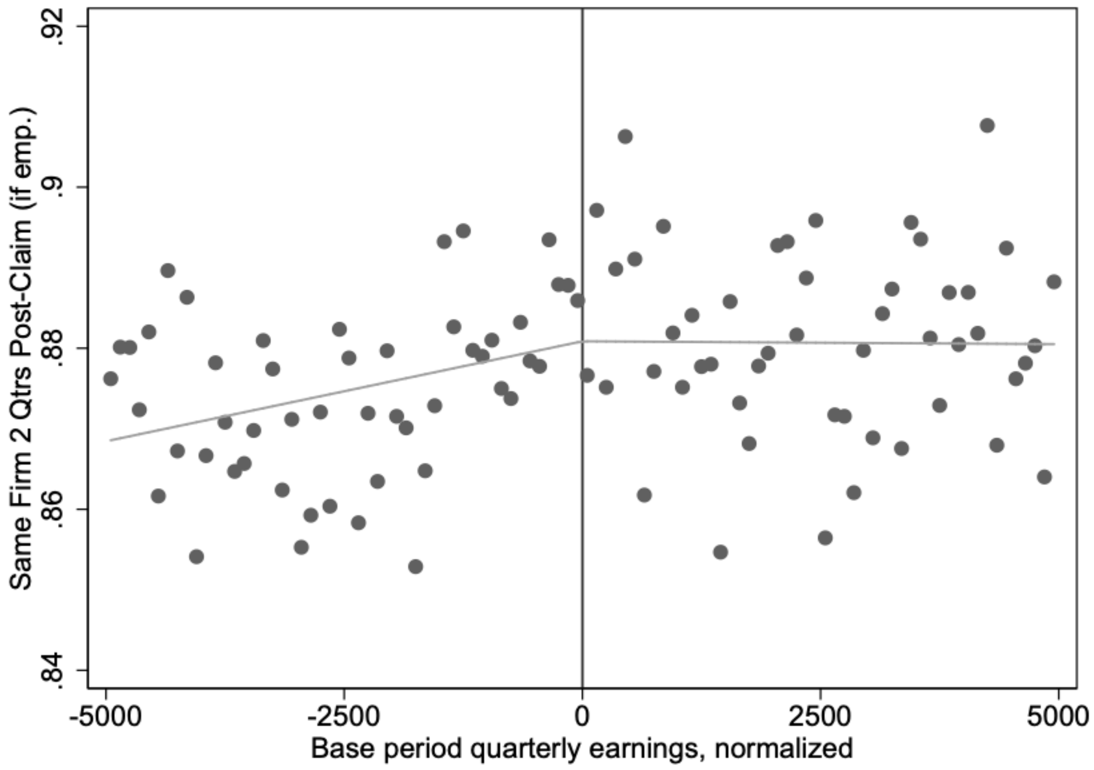
Paid Parental Leave

(d) Δ Log Earnings



Paid Parental Leave

(c) Same Firm (if Employed)



Parental Leave: What about Paternal Leave?

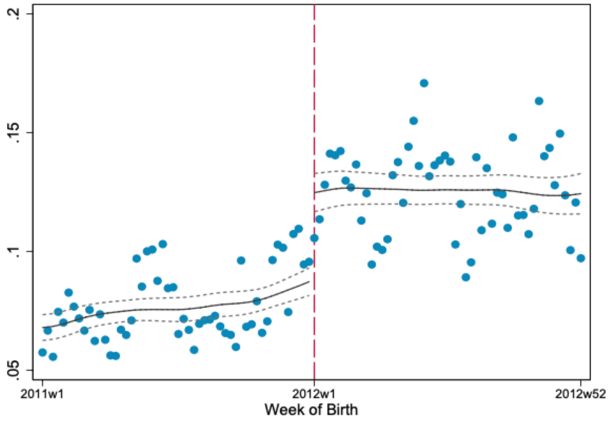
- Persson and Rossin-Slater (2019) study impact of paternal leave on maternal health

  - Prior to reform, parents given 16 months paid leave to be shared across both parents
  - However parents were not allowed to both be on leave at the same time

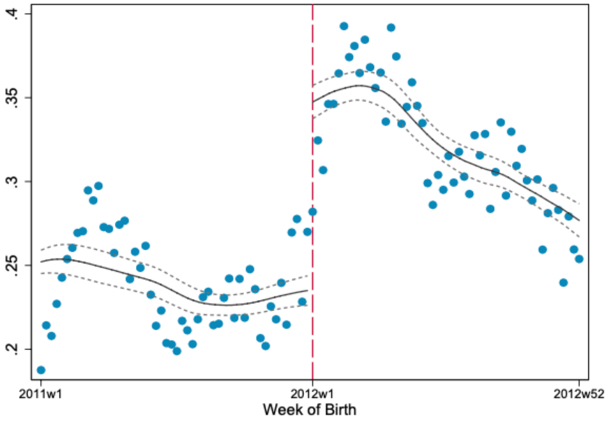
  - “Double days” reform in Sweden allowed fathers to choose whether to claim paid leave on a day-to-day basis, independent of whether the mother was on leave

Figure 3: Effects of 2012 "Double Days" Reform on Paternity Leave Take-Up

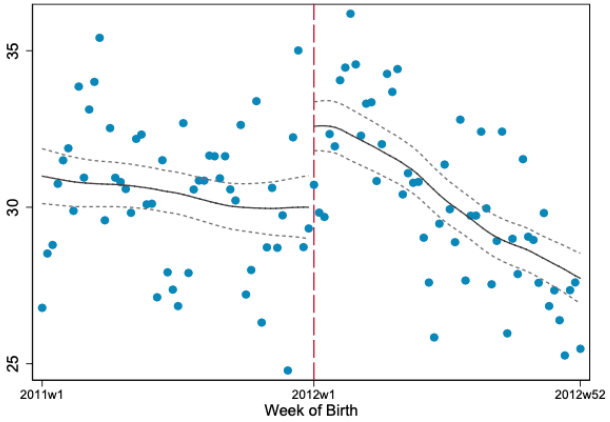
(a) Any Post-Baseline Leave in First 60 Days



(b) Any Post-Baseline Leave in First 180 Days

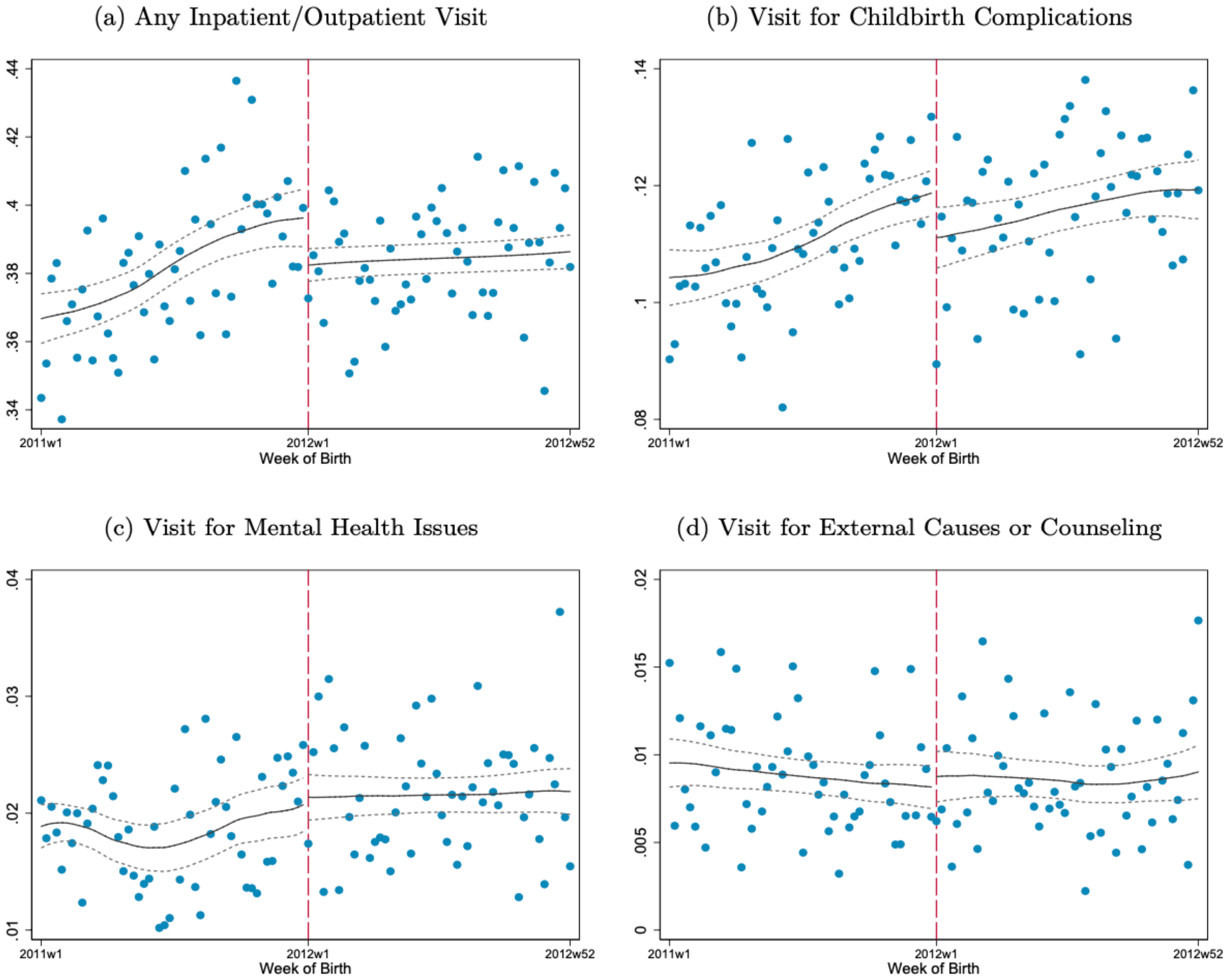


(c) Tot. # Leave Days in First 180 Days



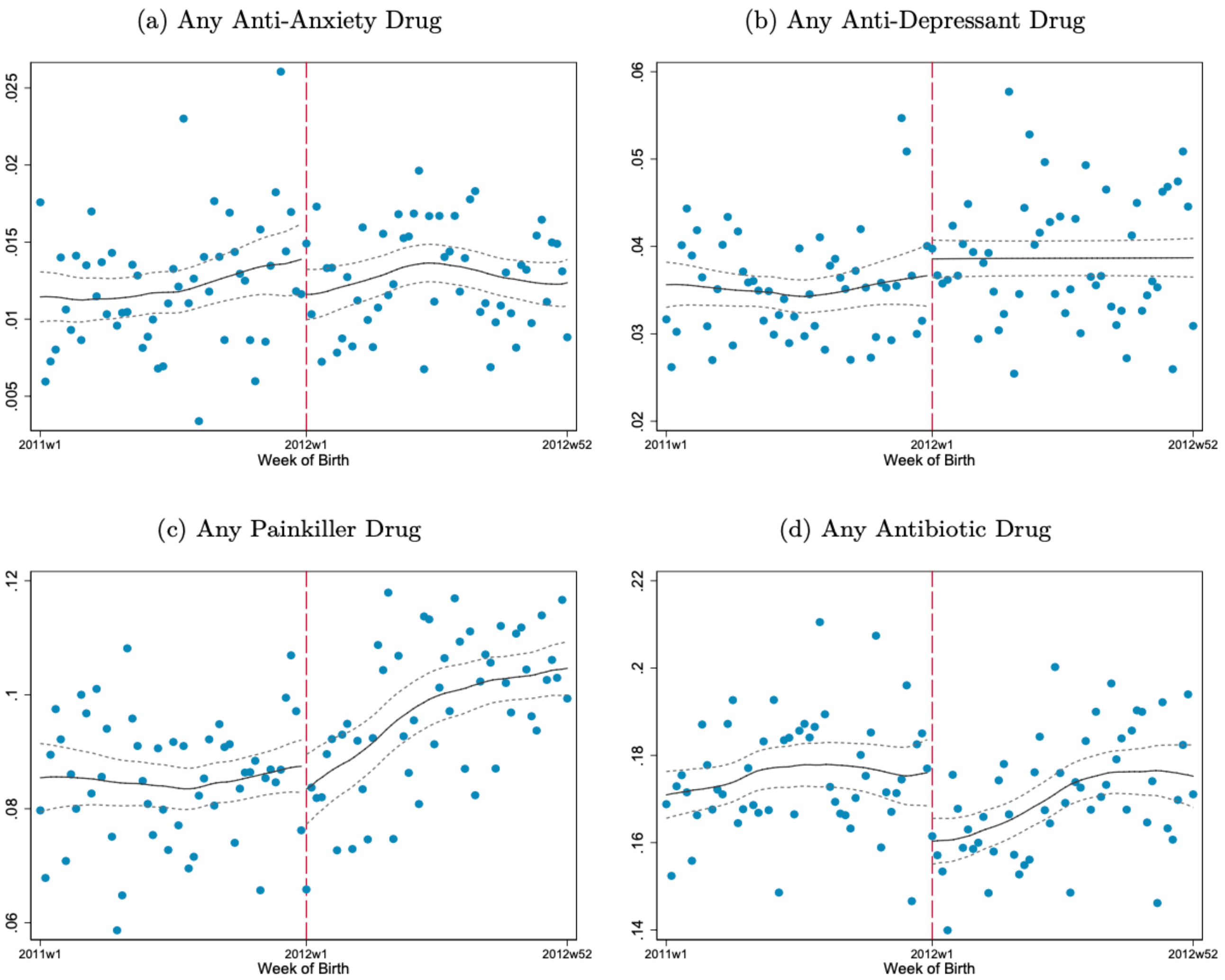
Note: The sample includes all firstborn singleton children born in 2011-2012 with information on exact date of birth. The figures display the means of outcome variables by the child's birth week. The 2012 reform is denoted with a vertical red dashed line. The fitted curves and 95% confidence intervals are predicted from local linear polynomial models on each side of the cut-off. The paternity leave outcomes are listed in the sub-figure headings. The total number of leave days in first 180 days post-childbirth (sub-figure c) includes both baseline and post-baseline leave.

Figure 4: Effects of 2012 "Double Days" Reform on Maternal Health Outcomes in First 180 Days Post-Childbirth, Inpatient and Outpatient Data



Note: The sample includes all firstborn singleton children born in 2011-2012 with information on exact date of birth. The figures display the means of outcome variables by the child's birth week. The 2012 reform is denoted with a vertical red dashed line. The fitted curves and 95% confidence intervals are predicted from local linear polynomial models on each side of the cut-off. The outcomes are measured using inpatient and specialist outpatient records data. See Appendix B for more details on the exact ICD codes for outcomes.

Figure 5: Effects of 2012 "Double Days" Reform on Maternal Health Outcomes in First 180 Days Post-Childbirth, Prescription Drug Data



Note: The sample includes all firstborn singleton children born in 2011-2012 with information on exact date of birth. The figures display the means of outcome variables by the child's birth week. The 2012 reform is denoted with a vertical red dashed line. The fitted curves and 95% confidence intervals are predicted from local linear polynomial models on each side of the cut-off. The outcomes are measured using prescription drug records data. See Appendix B for more details on the exact ATC codes for outcomes.

Outline

1. Preschool and Head Start
2. Family Leave and Childcare policies
3. **Environmental Policies and Early Childhood Impacts**

Environmental Policies and Early Childhood Impacts

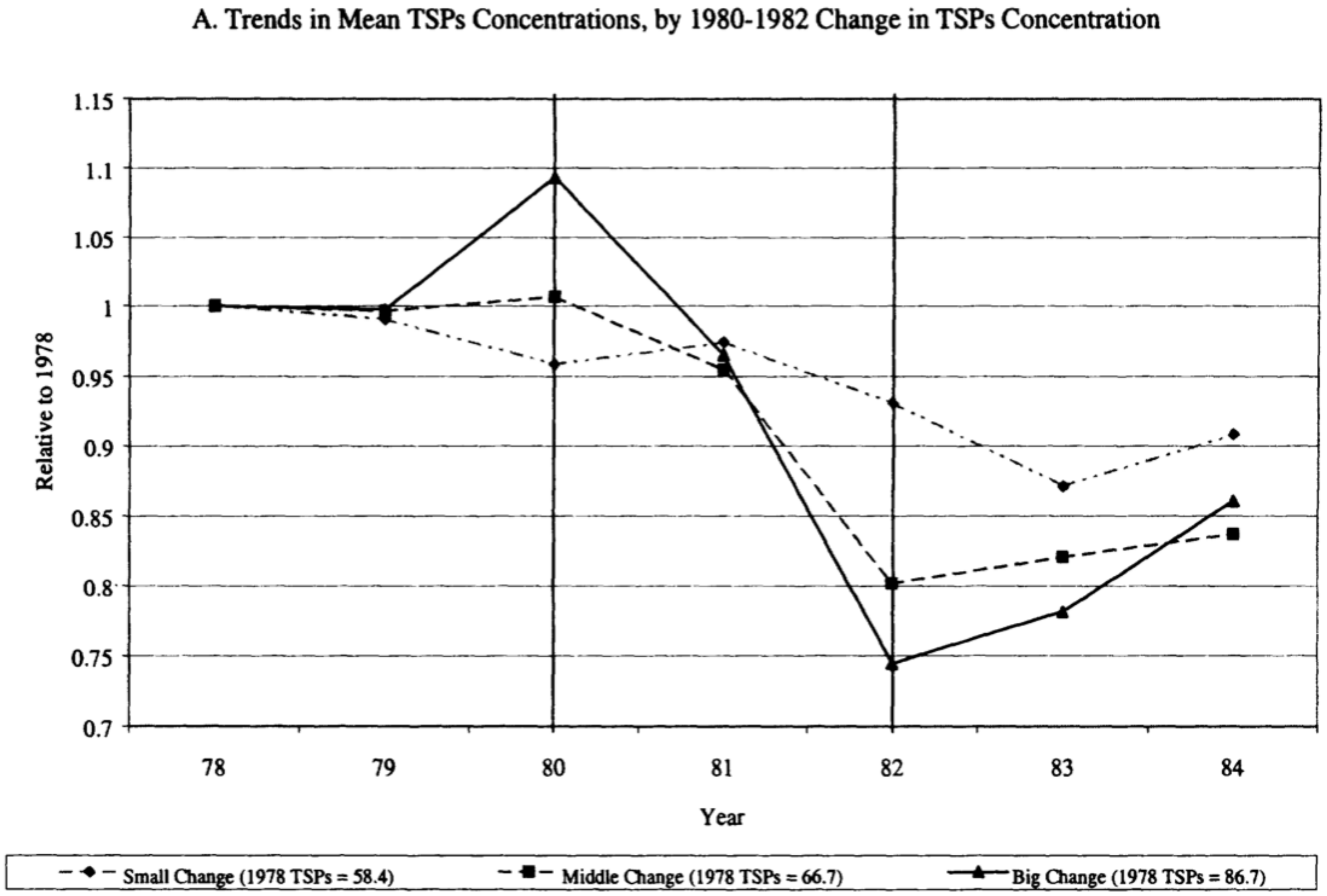
- Large body of evidence suggesting environmental hazards have significant impacts on young children in particular

- Begin with evidence from the Clean Air Act

- Chay and Greenstone (2009) exploit variation from attainment vs. non-attainment counties that exceeded a threshold above which they were subject to higher regulations to limit air pollution.

- Policy induced change in 80-82

Chay and Greenstone (2009): First stage reduction in TSPs



Chay and Greenstone (2009): Reduced form impact on infant mortality

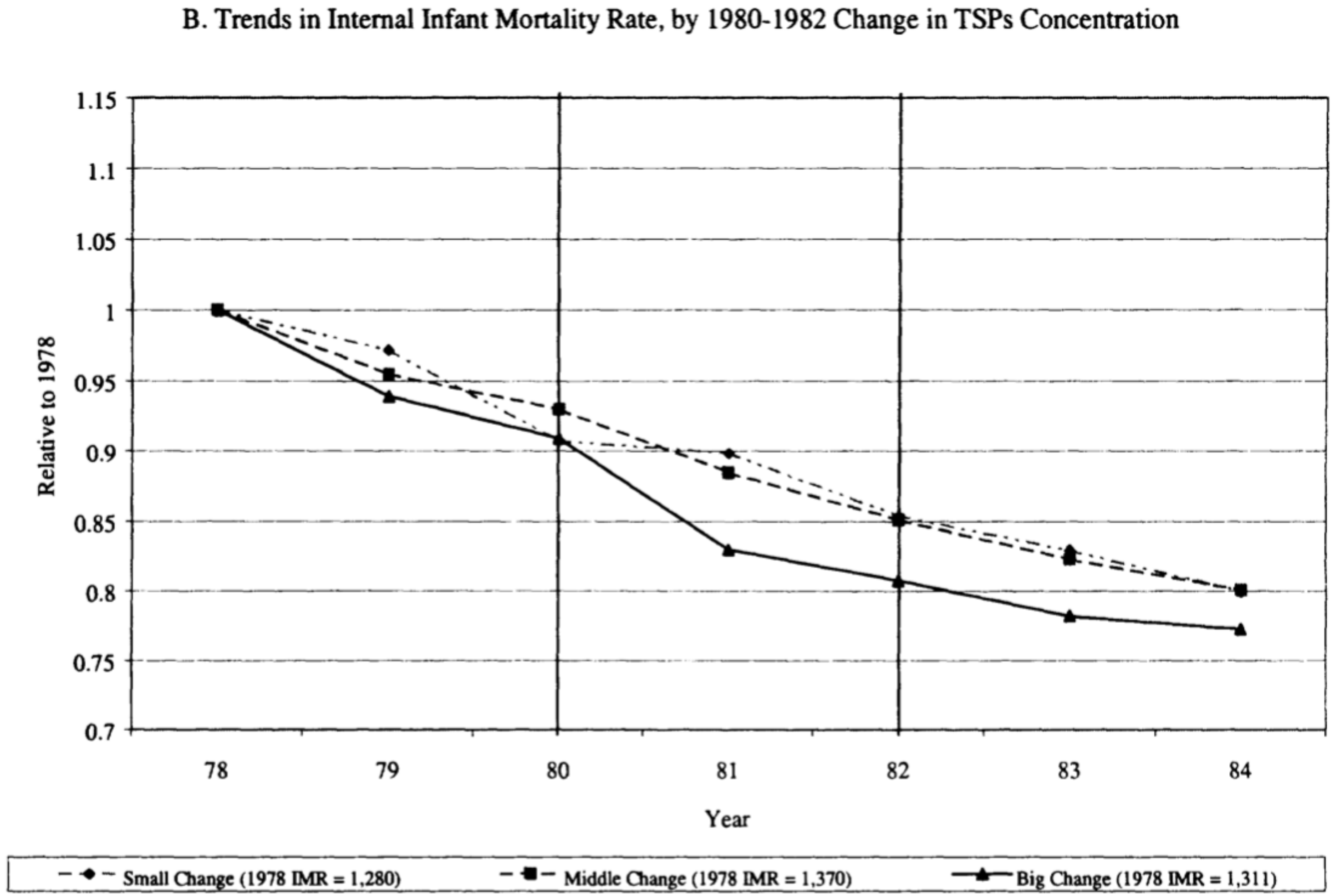
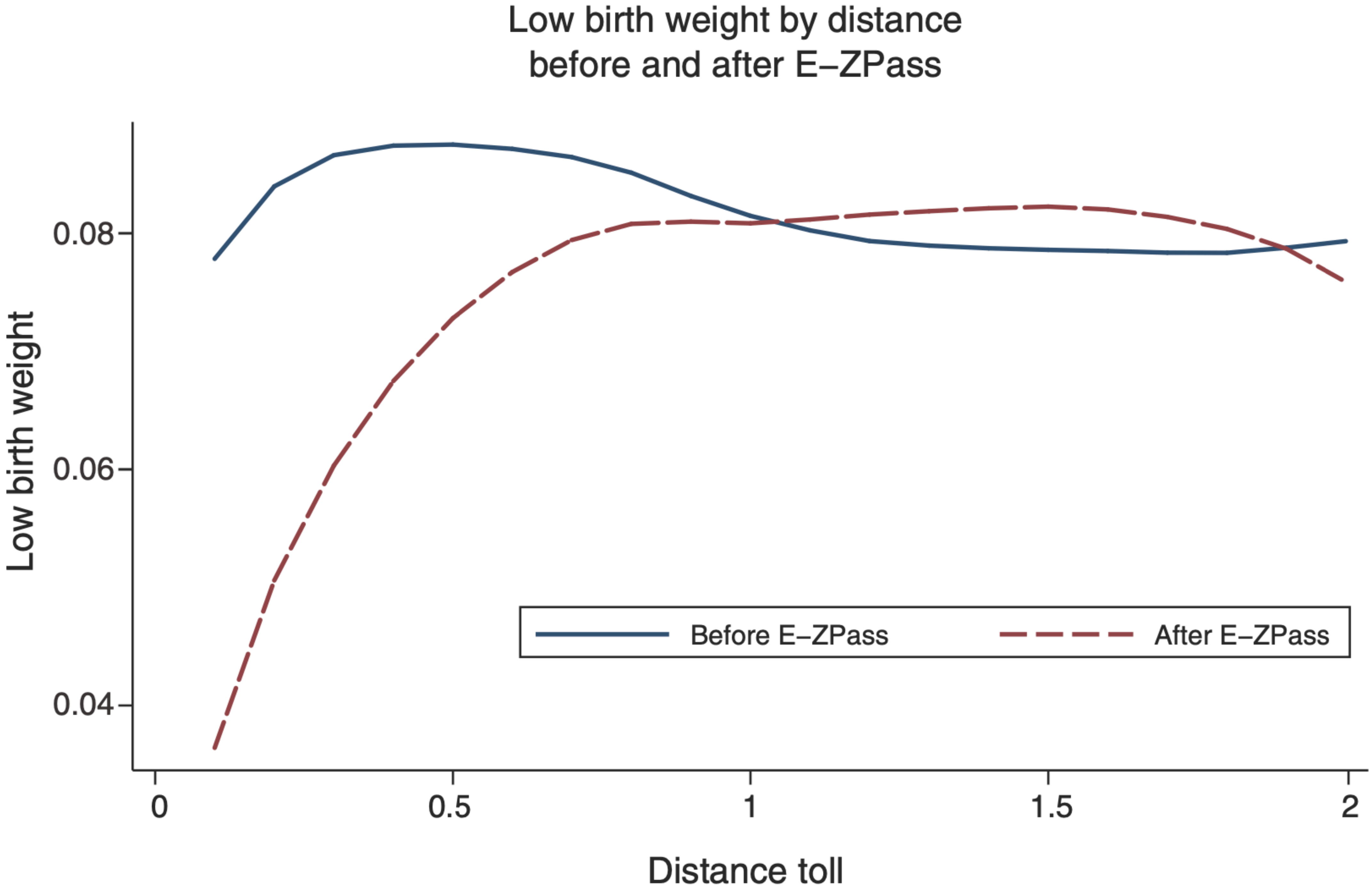


FIGURE II

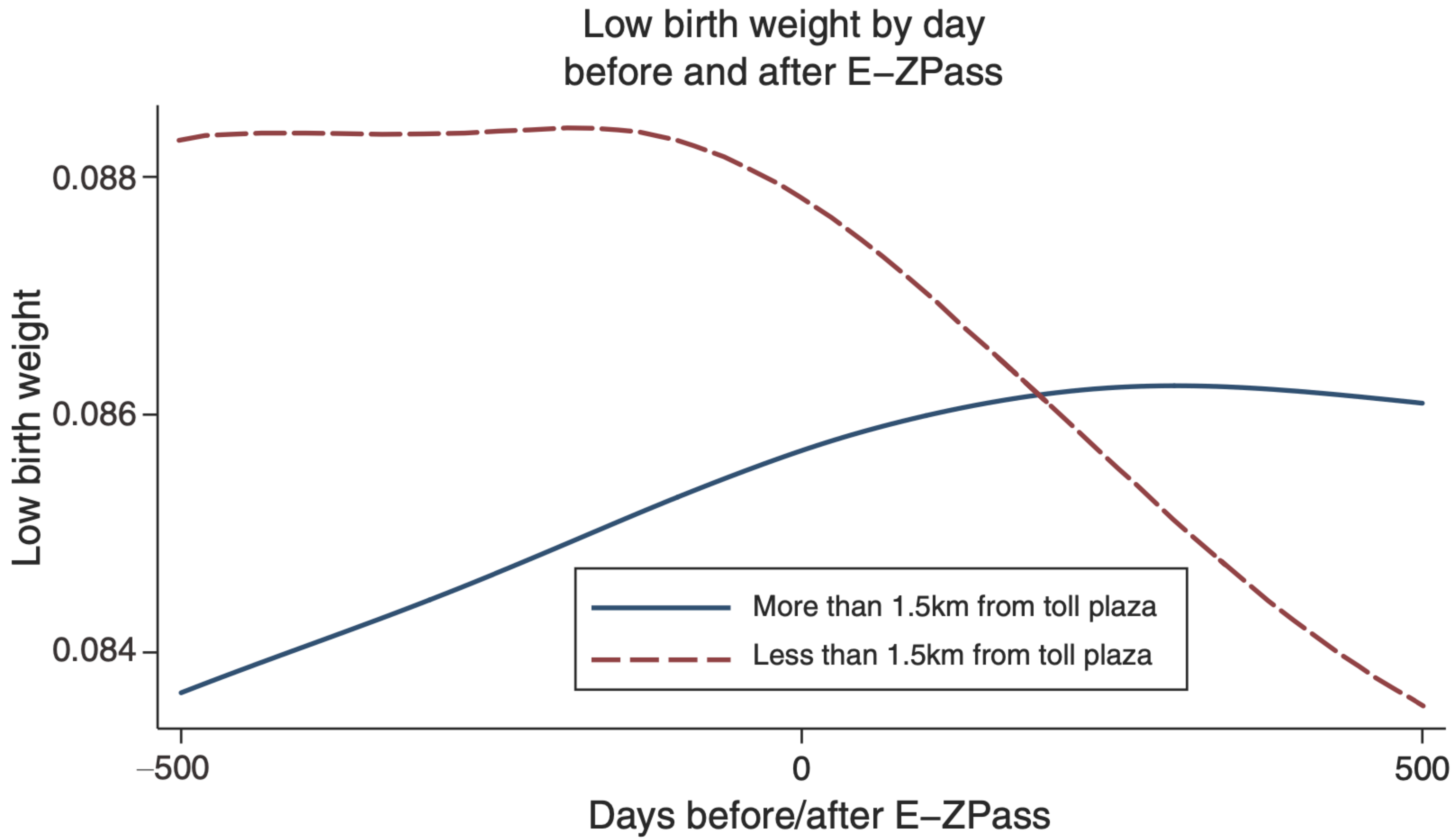
Environmental Policies and Early Childhood Impacts

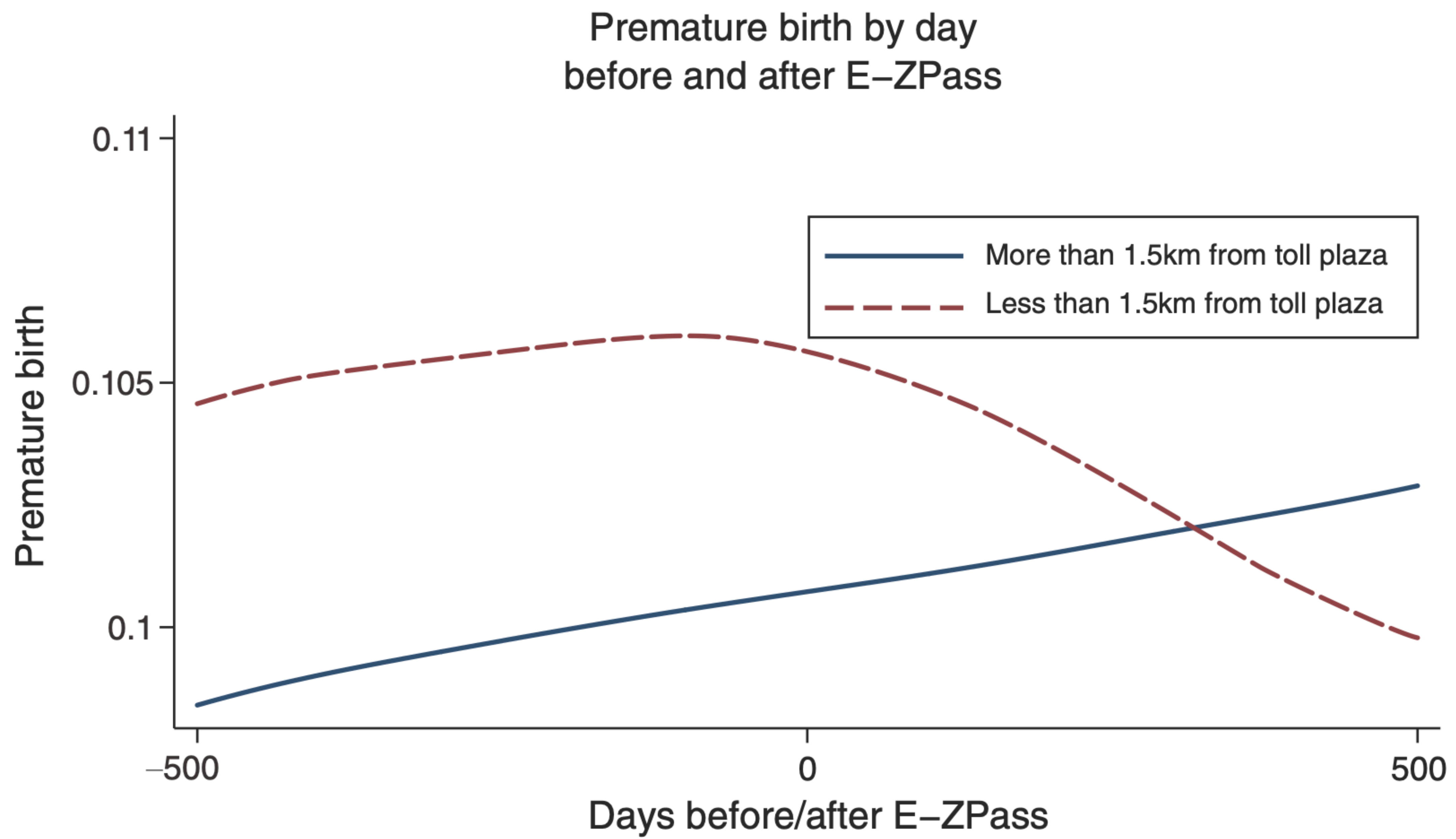
- Currie and Walker (2011) exploit variation from the removal of toll booths as a result of EZ-Pass

- Exploit variation in timing of rollout of EZ Pass
- Compare groups close vs far from toll booths
- Also include specifications with mother fixed effects



Low birth weight by distance
before and after E–ZPass
Low birth weight
0.08
0.06
0.04
0
0.5
1
1.5
2
Distance toll
Before E–ZPass
After E–ZPass

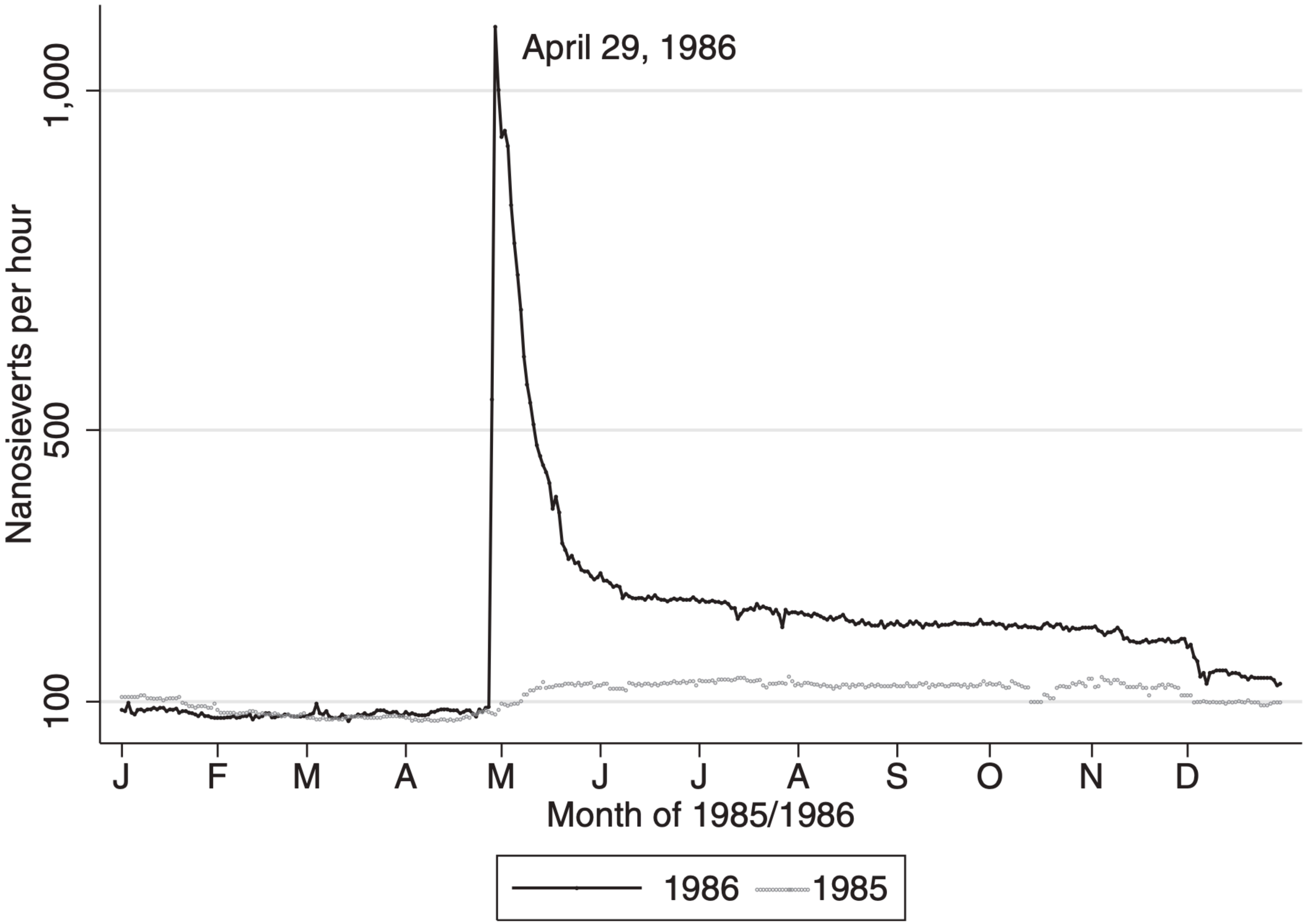

Low birth weight by day
before and after E–ZPass
Low birth weight
0.088
0.086
0.084
–500
0
500
Days before/after E–ZPass
More than 1.5km from toll plaza
Less than 1.5km from toll plaza



Premature birth by day
before and after E–ZPass
Premature birth
0.11
0.105
0.1
More than 1.5km from toll plaza
Less than 1.5km from toll plaza
–500
0
500
Days before/after E–ZPass

Environmental Policies and Early Childhood Impacts

- Lastly, Almond et al. (2009 QJE) look at impact of prenatal exposure to Chernobyl fallout on school outcomes in Sweden


April 29, 1986
Nanosieverts per hour
1,000
500
100
J
F
M
A
M
J
J
A
S
O
N
D
Month of 1985/1986
1986
1985

Difference in Difference outcomes for Exposed vs Unexposed Regions by Cohort

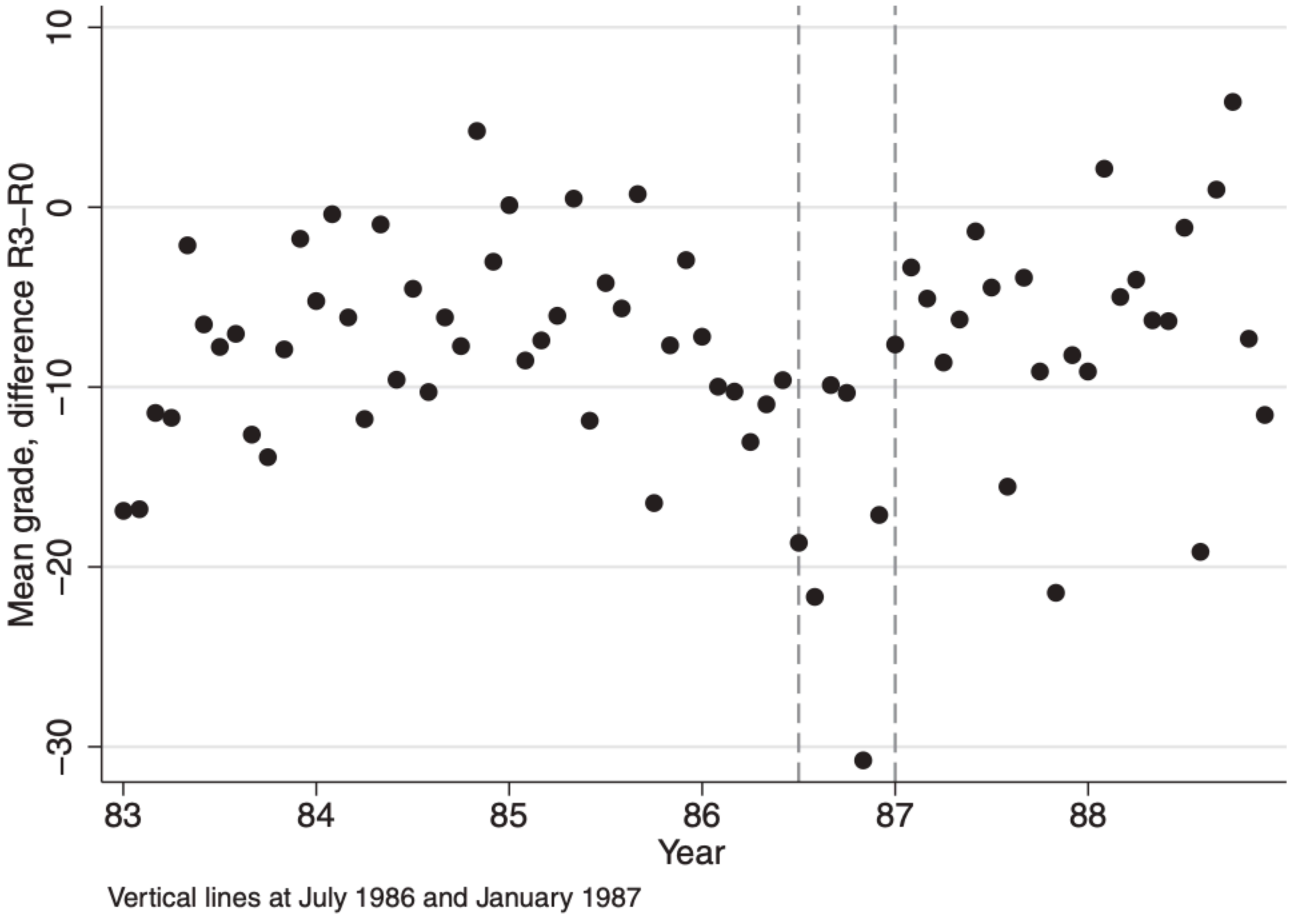


FIGURE V
Difference in Mean Grade Sums by Calendar Month of Birth: R3 (Eight Most Exposed Municipalities) Relative to R0 ("Norrbotten")

Difference in Difference outcomes for Exposed vs Unexposed Regions by Cohort

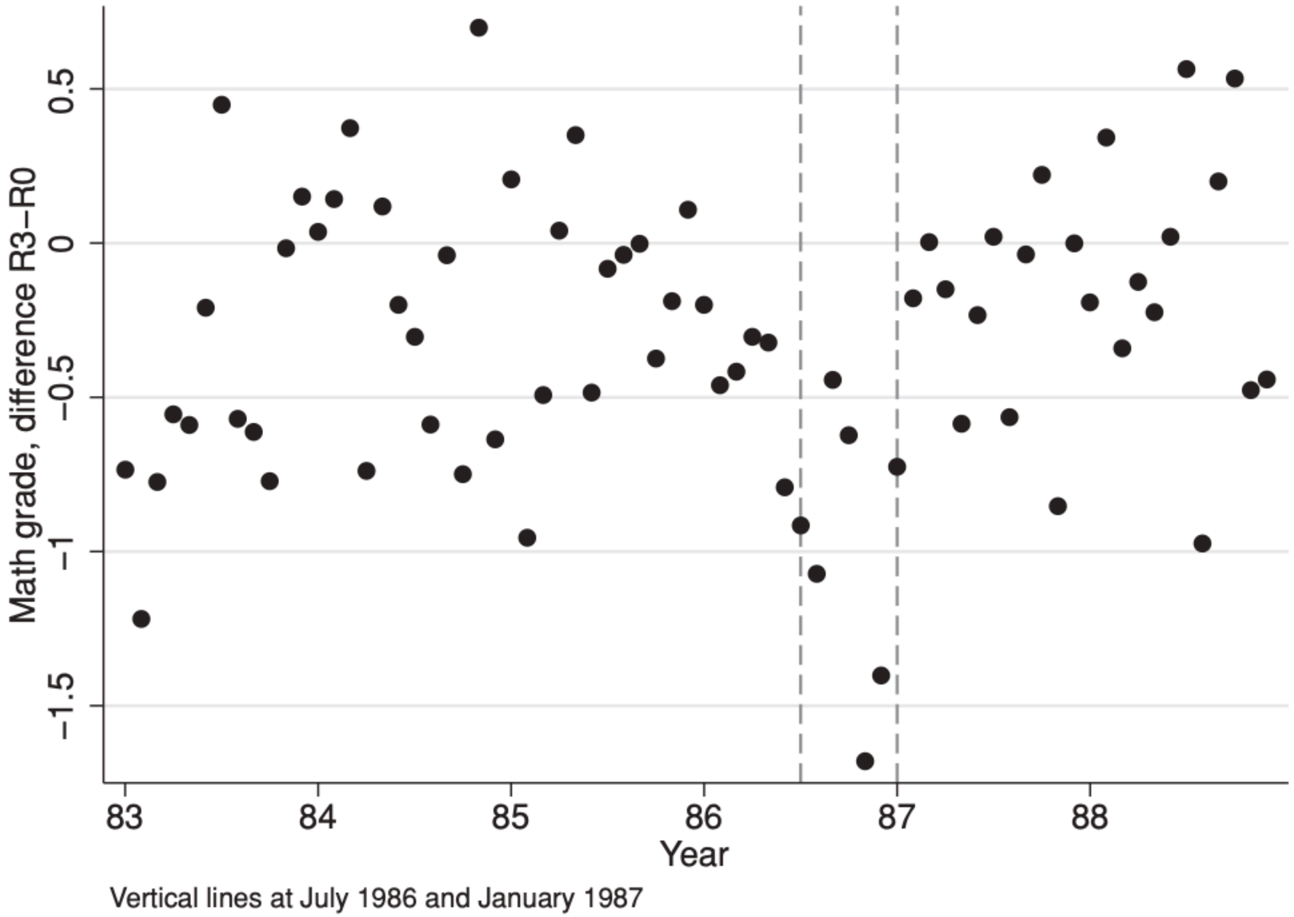


FIGURE VI
Difference in Mean Mathematics Grades by Calendar Month of Birth: R3 (Eight Most Exposed Municipalities) Relative to R0 ("Norrbotten")

Summary

- Childhood matters
- Environment matters
- Policies promoting childcare have mixed evidence of impacts on parents
- But strong evidence they are an efficient method of redistribution to low-income families because of spillover effects on kids
- Some evidence promoting labor force attachment for high income families can have large returns (and potentially large FEs)

Implications for Optimal Policy

- Let y denote income, x denote consumption of normal goods, c denote childcare

- Do we have evidence that:

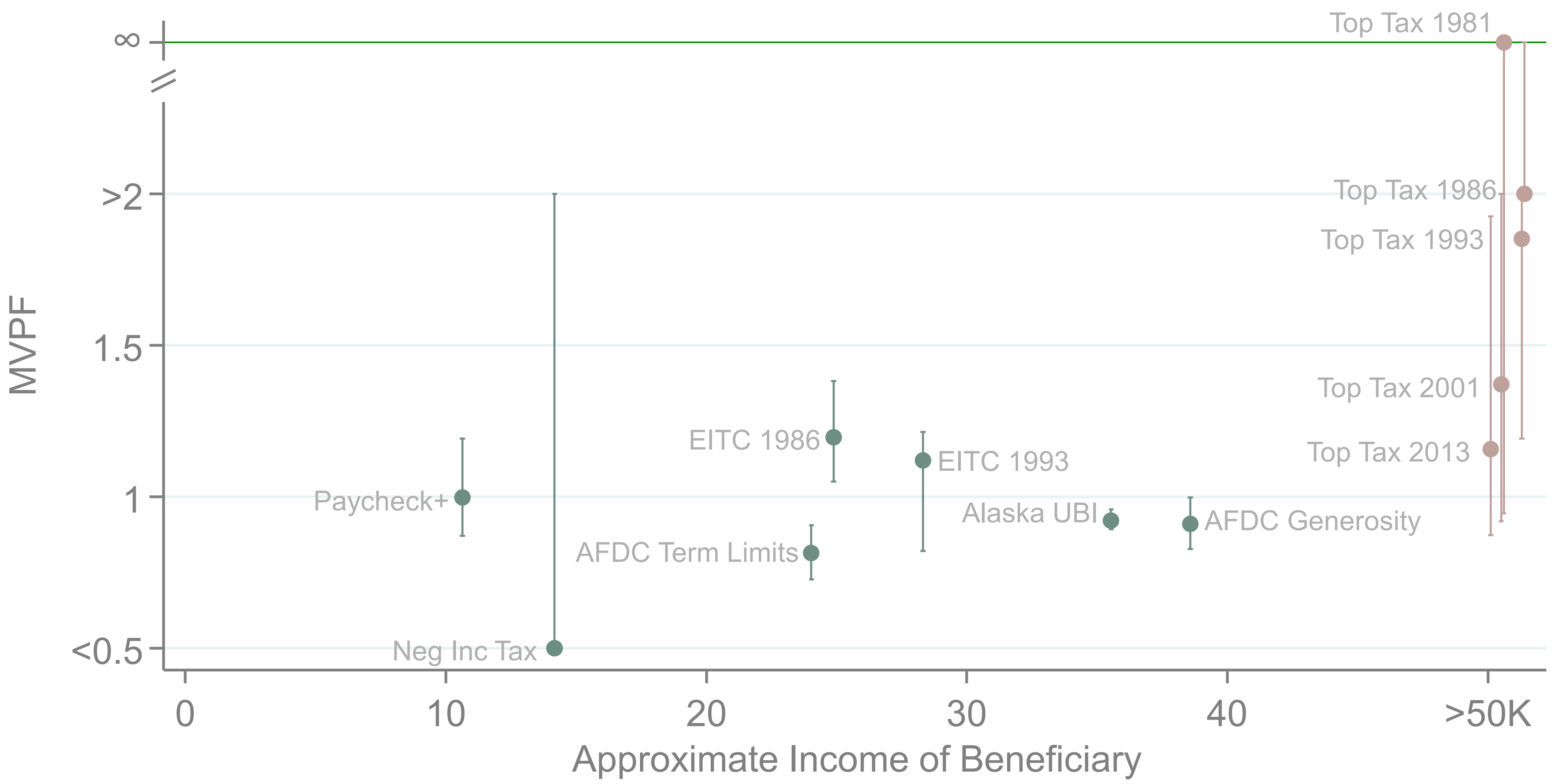
$$u_i(c, x, y) = \tilde{u}_i(g(c, x), y)$$

- What about:

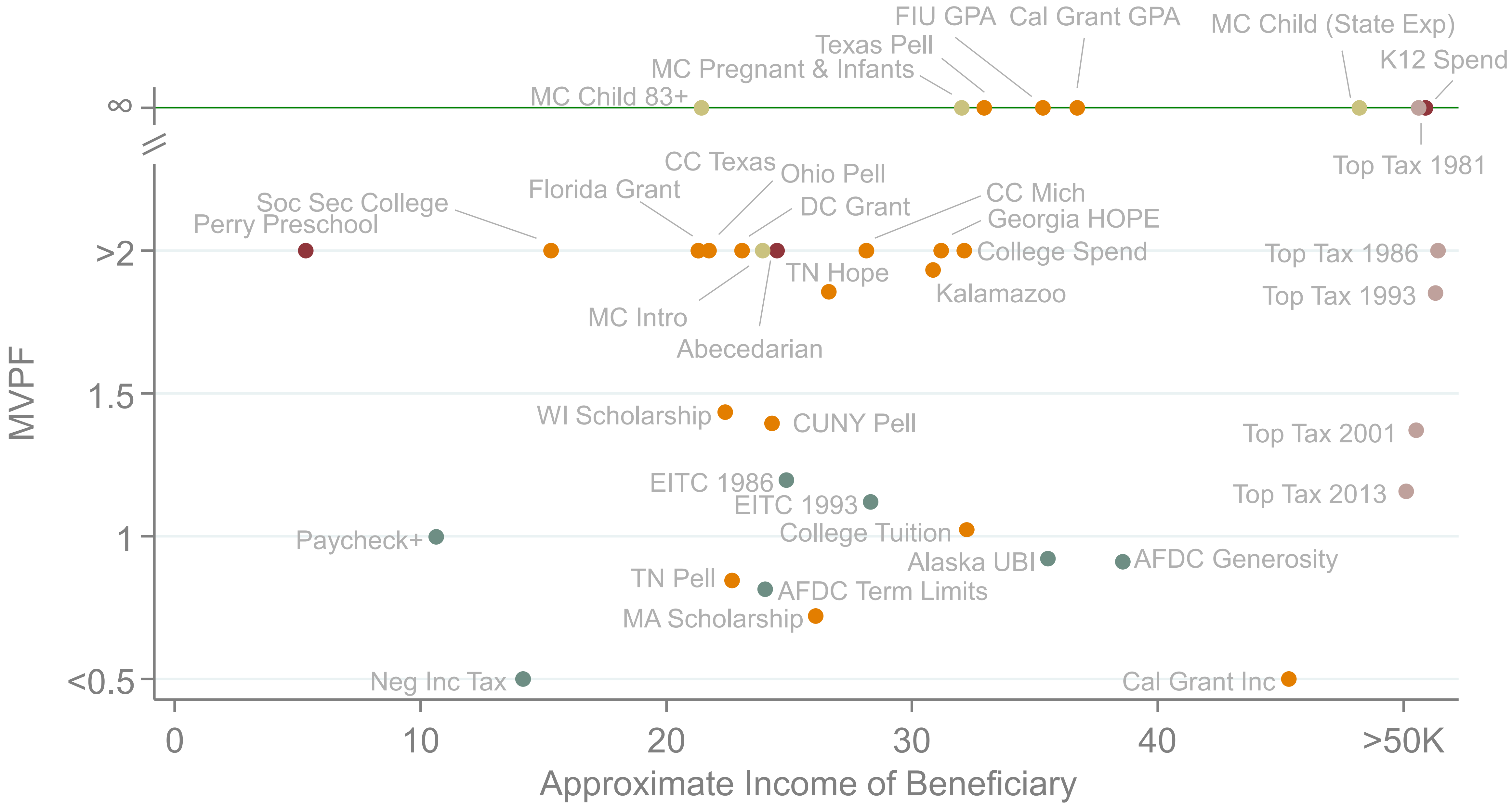
$$u_i(c, x, y) = \tilde{u}_i(x, g(c, y))$$

- How can we test this?

Quantifying the Tradeoffs of Redistribution through the Tax Schedule



Redistribution through Investments in Low-Income Children



Implications for Optimal Policy

- Returns to direct investment in children are inconsistent with high MVPFs

- What about child care subsidies?

  – How do we construct that MVPF?

  – Can pre-school subsidies be optimal even if no impacts on kids?

- Do we have evidence that environmental policies provide g (e.g. clean air) that is weakly separable in the utility function?

  – Or do we have evidence of a violation of weak separability?

EITC OBRA 1993 MVPF Estimates

Incorporating Different Estimates of Spillovers on Children