Lifecycle Residential Mobility and the Intergenerational Persistence of Economic Status

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Segment I:
Childhood Exposure Effects:
Causality vs Selection and Sorting

Introduction

- Chetty et al. (2018) analyze data on 7 million families who moved across commuting zones (CZ) in the US
- They conclude that neighborhoods (nbhd) in which children grow up shape their various adulthood outcomes
  - Outcomes of children whose families move to a better nbhd —measured by outcomes of children already living there— improve in proportion to the amount of time they spend growing up in that nbhd, at a rate of 4% per year of exposure
- The main identification in Chetty et al. (2018) is using variation in the age of children when families move
- They interpret their results as *causal effects of neighborhoods*
  - Robustness checks using variations among siblings, displacement shocks etc.

Introduction- Cont'd

- We re-examine Chetty et al. (2018) in a Danish context
- First, compare our results to US results in Chetty et al. (2018)
- Then, investigate the mechanisms behind our results
  - Can one interpret the results as ***causal effects of neighborhoods*** or ***"power of place"***?
  - The role of **selection** and **sorting**
- A core identifying assumption in Chetty et al. (2018): selection effects do not vary with the child's age at move
  - This means that children potential outcomes are orthogonal to their age when their parents move across neighborhoods

Preview of Results

- We find similar estimates to those of Chetty et al. (2018) but with a lower precision as we utilize Danish population data
- We provide evidence for violation of main identifying assumption in previous works (constant-in-age selection effect)
- Three sets of results pointing to violation of constant-in-age selection effect:
  - **Self-selection** into "permanent residency" status and self-selection into timing of moves (wrt age of children)
  - When moving, people **sort into nbhds** and the age of child when parents move is not orthogonal to the extent to which there is a positive sorting between parents and neighborhoods:
    - Higher quality moves in early childhood
  - Higher correlation of later moves with income/family shocks

Section 1: Literature Review

Challenges and Questions

- What do we learn from previous works about the role of nbhd?
  - nbhd char.: schools, crime, housing stock, air quality, etc
- Measurement errors
  - nbhd quality defined solely based on children of PRs' inc. rank
  - static nbhd quality
  - measure of resources (family unit, inc type, transitory shocks)
  - definition of PRs and movers
  - missing early years of childhood (before age 9)
- External validity:
  - dynamic results may not be extrapolated to early childhood
  - not clear implication for non-movers: identification
- Methodology:
  - rank-rank analysis
    - welfare implications
  - lack of a life-cycle approach
- Identifying assumptions
  - complementarity between early- and late-childhood investments
  - constant-in-age selection

Chetty et al. (2018):

THE IMPACTS OF NEIGHBORHOODS ON INTERGENERATIONAL MOBILITY I: CHILDHOOD EXPOSURE EFFECTS

Data

- **Data source:** Federal income tax records
- **Data span:** 1996–2012
- **Sample:** Children who were born between 1980–1988 (*covering ages 8-24 of the last cohort & and 16-32 of first*)
  - permanent residents (stayers/PR): subset of parents who reside in a single CZ c in 1996–2012. (*not robust*)
  - movers: individuals in the main sample who are not PR
- **Income type:** Adjusted gross inc. (1040 tax return) + tax-exempt interest inc. and the nontaxable SSDI benefits
  - averaged over 1996-2000 to get parent inc; age 24 for child
- **Unit of Analysis:** Family income
- **Estimation Sample:** Only PR and those who moved across nbhds *exactly once during 1996–2012* (*ad-hoc*)

TABLE I

SUMMARY STATISTICS FOR CZ PERMANENT RESIDENTS AND MOVERS

Variable	Mean (1)	Std. dev. (2)	Median (3)	Num. of obs. (4)
Panel A: Permanent residents: Families who do not move across CZs				
Parent family income	89,909	357,194	61,300	19,499,662
Child family income at 24	24,731	140,200	19,600	19,499,662
Child family income at 26	33,723	161,423	26,100	14,894,662
Child family income at 30	48,912	138,512	35,600	6,081,738
Child individual income at 24	20,331	139,697	17,200	19,499,662
Child married at 26	0.25	0.43	0.00	12,997,702
Child married at 30	0.39	0.49	0.00	6,081,738
Child attends college between 18–23	0.70	0.46	1.00	17,602,702
Child has teen birth (females only)	0.11	0.32	0.00	9,670,225
Child working at age 16	0.41	0.49	0.00	13,417,924
Panel B: Families who move 1–3 times across CZs				
Parent family income	90,468	376,413	53,500	4,374,418
Child family income at 24	23,489	57,852	18,100	4,374,418
Child family income at 26	31,658	99,394	23,800	3,276,406
Child family income at 30	46,368	107,380	32,500	1,305,997
Child individual income at 24	19,091	51,689	15,600	4,374,418
Child married at 26	0.25	0.43	0.00	2,867,598
Child married at 30	0.38	0.49	0.00	1,305,997
Child attends college between 18–23	0.66	0.47	1.00	3,965,610
Child has teen birth (females only)	0.13	0.33	0.00	2,169,207
Child working at age 16	0.40	0.49	0.00	3,068,421
Panel C: Primary analysis sample: families who move exactly once across CZs				
Parent family income	97,064	369,971	58,700	1,553,021
Child family income at 24	23,867	56,564	18,600	1,553,021
Child family income at 26	32,419	108,431	24,500	1,160,278
Child family income at 30	47,882	117,450	33,600	460,457
Child individual income at 24	19,462	48,452	16,000	1,553,021
Child married at 26	0.25	0.43	0.00	1,016,264
Child married at 30	0.38	0.49	0.00	460,457
Child attends college between 18–23	0.69	0.46	1.00	1,409,007
Child has teen birth (females only)	0.11	0.32	0.00	769,717
Child working at age 16	0.39	0.49	0.00	1,092,564

Geographical Variation in Outcomes of PR

- Given birth cohort s and CZ c, let p be the parents' percentile in the national income distribution
- Let y_i denote the child's national income rank in adulthood

Geographical Variation in Outcomes of PR- Cont'd

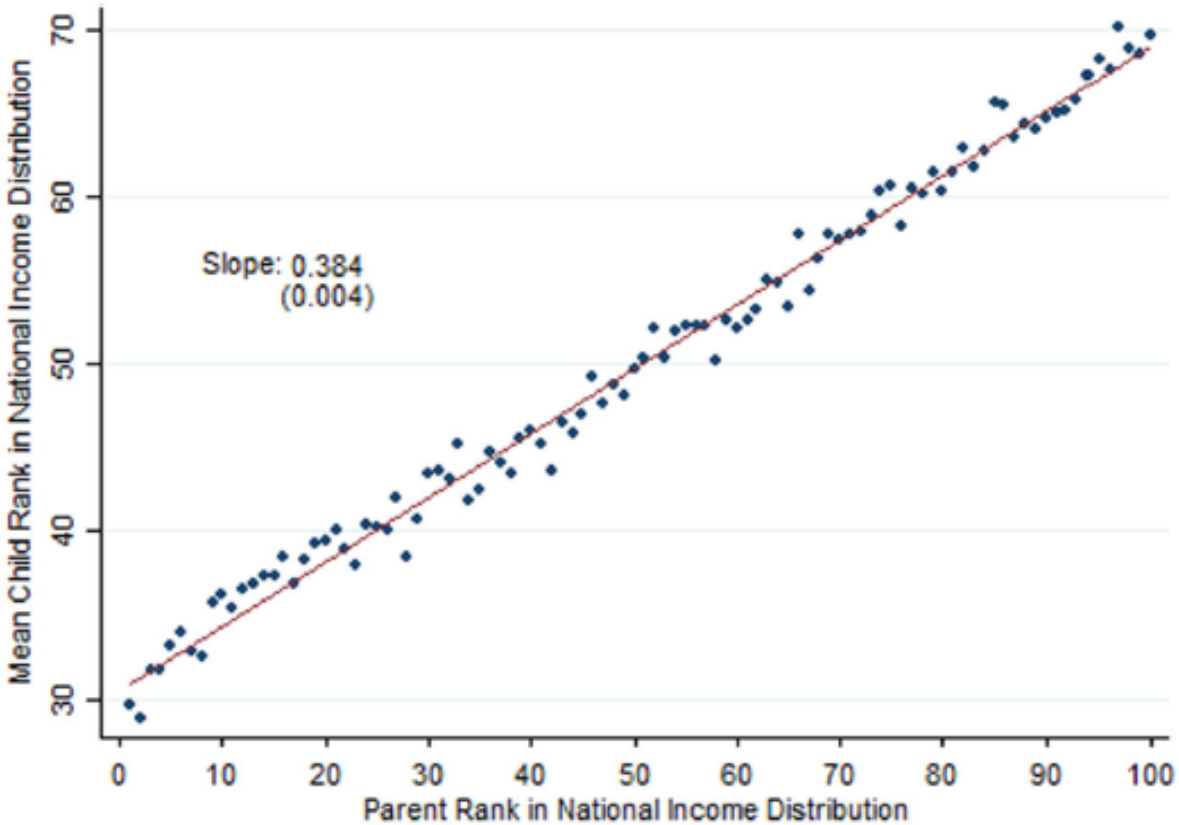


FIGURE I

Mean Child Income Rank versus Parent Income Rank for Children Raised in Chicago

▸ CZs

Geographical Variation in Outcomes of PR

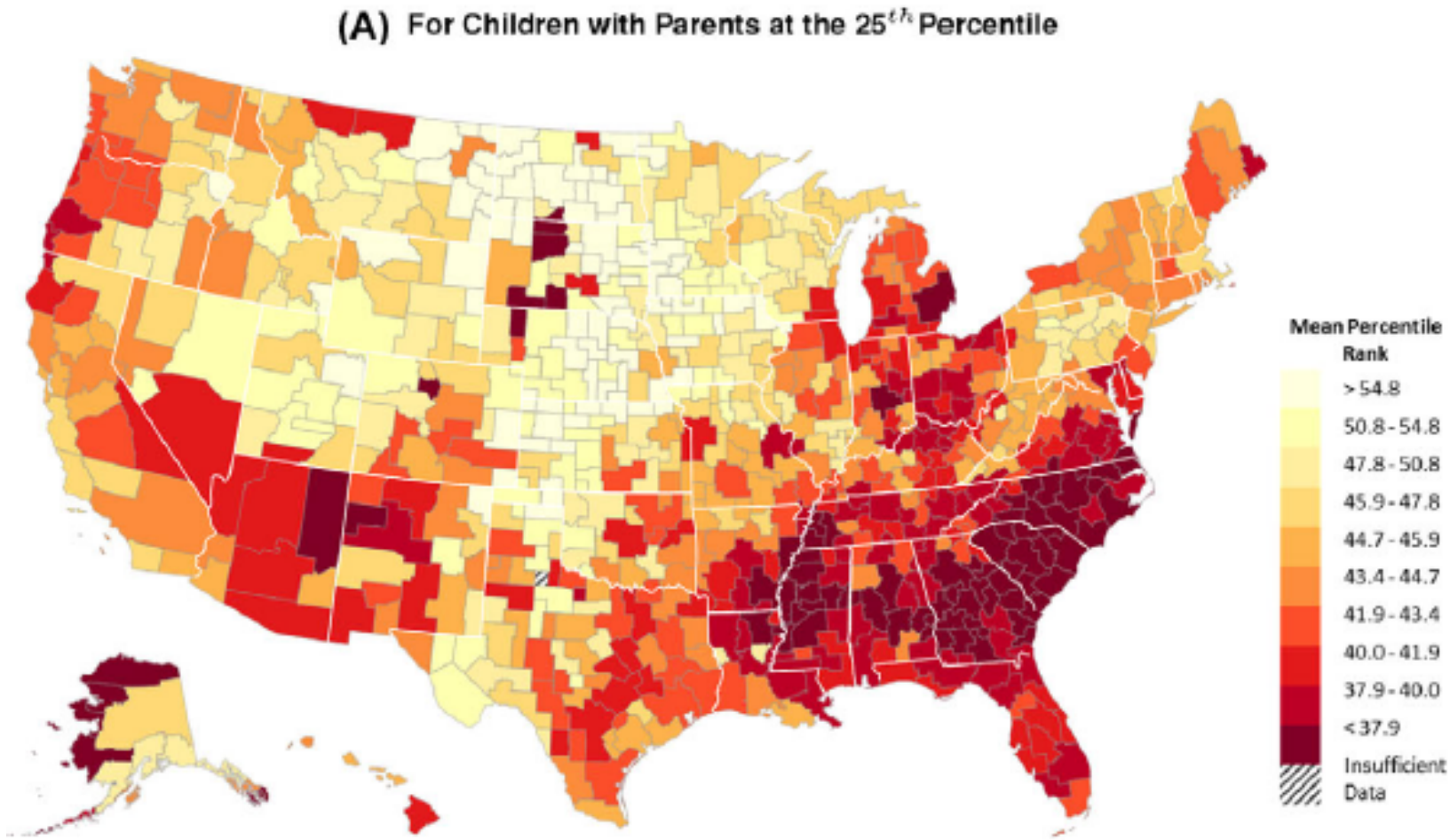
$$y_i = \alpha_{cs} + \psi_{cs} p_i + \epsilon_i$$

then, estimate y_{pcs}, the mean rank of children with parents at percentile p of the income distribution in CZ c in birth cohort s, using the fitted values:

$$\bar{y}_{pcs} = \hat{\alpha}_{cs} + \hat{\psi}_{cs} p$$

For example, $\bar{y}_{25,c,1980} = 40.1$ for children growing up at the 25th percentile of the national income distribution and $\bar{y}_{75,c,1980} = 59.3$ for children growing up at the 75th percentile.

Mean Inc. Ranks for Children with Parents at 25^{th} Pctile



Exposure Effects

Exposure effect at age m: the impact of spending year m of one's childhood in an area where PR's outcomes are 1 pp higher

Thought experiment: randomly assign children to new nbhd d starting at age m for the rest of childhood. The best linear predictor of children's outcomes y_i in the experimental sample, based on the PR's outcomes in CZ d ($\bar{y}_{pds}$):

$$y_i = \alpha_m + \beta_m \bar{y}_{pds} + \theta_i \quad (3)$$

Random assignment: $\theta \perp \bar{y}_{pds}$

Exposure effect at m: $\gamma_m = \beta_m - \beta_{m+1}$, the effect on y_i of spending the year from age m to age m + 1 in the destination

Observational data: $b_m = \beta_m + \delta_m$

Bias $= \delta_m = \frac{cov(\theta_i, \bar{y}_{pds})}{var(\bar{y}_{pds})}$: parent inputs & unobserved det. of children's outcomes covary with PR's outcomes

Exposure Effects- Constant-in-Age Selection Assumption

Bias $= \delta_m = \frac{cov(\theta_i, \bar{y}_{pds})}{var(\bar{y}_{pds})}$

ASSUMPTION 1 (A.1): Selection effects do not vary with the child's age at move: $\delta_m = \delta$ for all m.

Under A.1, we obtain consistent estimates of exposure effects:

$$\gamma_m = (\beta_m + \delta_m) - (\beta_{m+1} + \delta_{m+1}) = b_m - b_{m+1}$$

Even in observational data because the selection effects δ cancel out when estimating the exposure effect.

Rules out differential preferences among parents by age of child for local amenities, such as school quality, that are not fully captured in adult income percentile rank $\bar{y}_{pds}$

Exposure Effects- Estimation

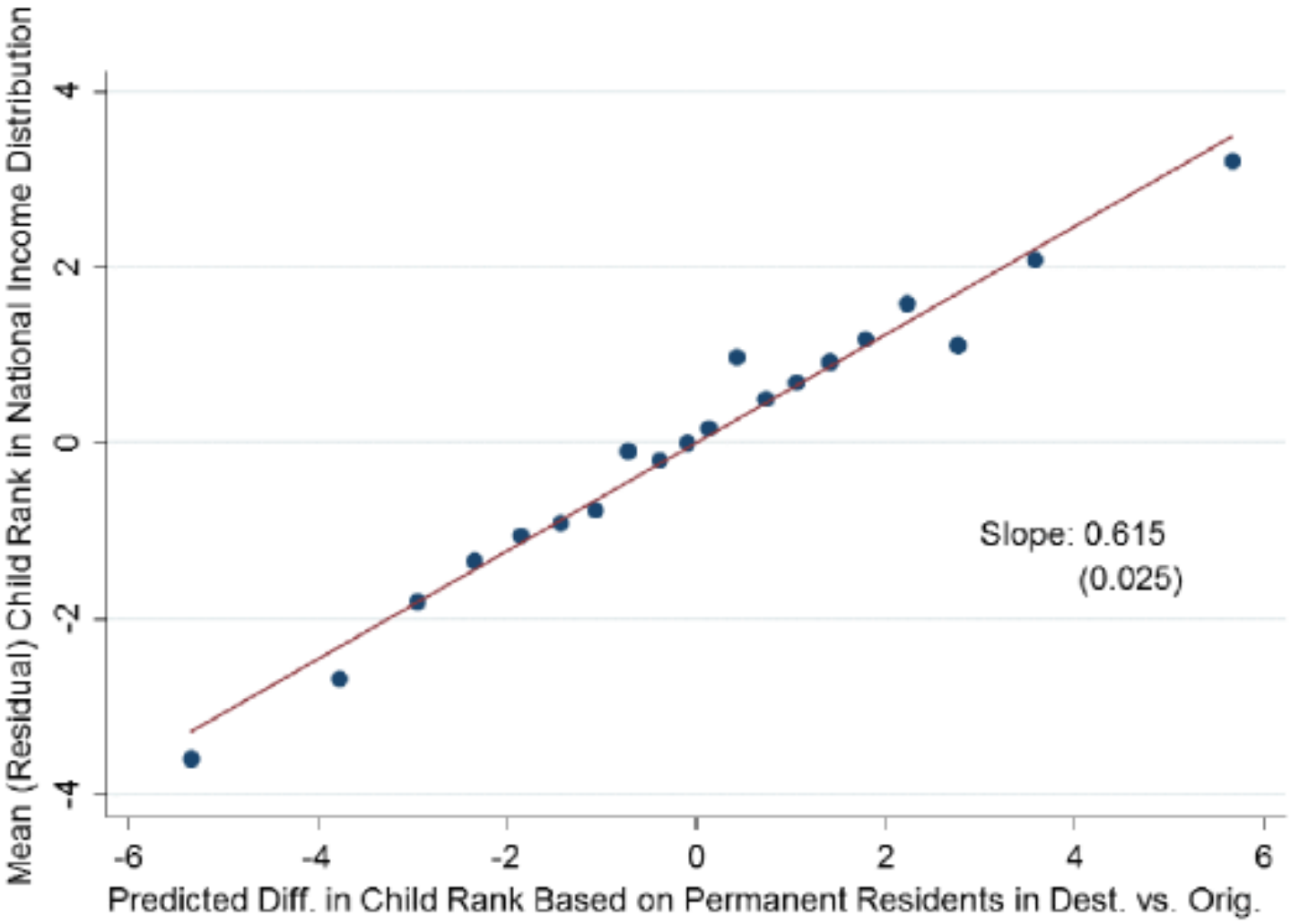
To begin, consider the set of children whose families moved when they were exactly m years old.

We analyze how these children's incomes in adulthood are related to those of PR in their destination CZ using the following linear regression:

$$y_i = \alpha_{qos} + b_m \Delta_{odps} + \epsilon_{1i}, \qquad (4)$$

where y_i denotes the child's income rank at age 24, α_{qos} is a fixed effect for the origin CZ o by parent income decile q by birth cohort s and $\Delta_{odps} = \bar{y}_{pds} - \bar{y}_{pos}$ is the difference in predicted income rank (at age 24) of permanent residents in the destination versus origin for the relevant parent income rank p and birth cohort s.

Movers' Outcomes versus Predicted Outcomes Based on PR in Destination- Movers at Age 13



Childhood Exposure Effects on Inc. Ranks in Adulthood

$$y_i = \alpha_{qosm} + \sum_{m=9}^{30} b_m I(m_i = m)\Delta_{odps} + \sum_{s=1980}^{1987} \kappa_s I(s_i = s)\Delta_{odps} + \varepsilon_{2i}, \quad (5)$$

Δ_{qosm}: (origin $\times$ parent income decile $\times$ birth cohort $\times$ age) FE

$\hat{b}_m$: the average effect on age-24 income rank y_i , conditional on moving from o to d at age m, of a 1 percentile increase in Δ_{odps}

Childhood Exposure Effects on Inc. Ranks in Adulthood

(5)

$$y_i = \alpha_{qosm} + \sum_{m=9}^{30} b_m I(m_i = m)\Delta_{odps} + \sum_{s=1980}^{1987} \kappa_s I(s_i = s)\Delta_{odps} + \varepsilon_{2i},$$

Δ_{qosm}: (origin $\times$ parent income decile $\times$ birth cohort $\times$ age) FE

$\hat{b}_m$: the average effect on age-24 income rank y_i , conditional on moving from o to d at age m, of a 1 percentile increase in Δ_{odps}

Alternative: parametric model estimating cohort- and age-specific slopes instead of FE

$$y_i = \sum_{s=1980}^{1988} I(s_i = s)\left(\alpha_s^1 + \alpha_s^2 \bar{y}_{pos}\right) + \sum_{m=9}^{30} I(m_i = m)\left(\zeta_m^1 + \zeta_m^2 p_i\right)$$

(6)
$$+ \sum_{m=9}^{30} b_m I(m_i = m)\Delta_{odps} + \sum_{s=1980}^{1987} \kappa_s^d I(s_i = s)\Delta_{odps} + \varepsilon_{3i}.$$

Results: $\hat{b}_m$ as Function of Age m

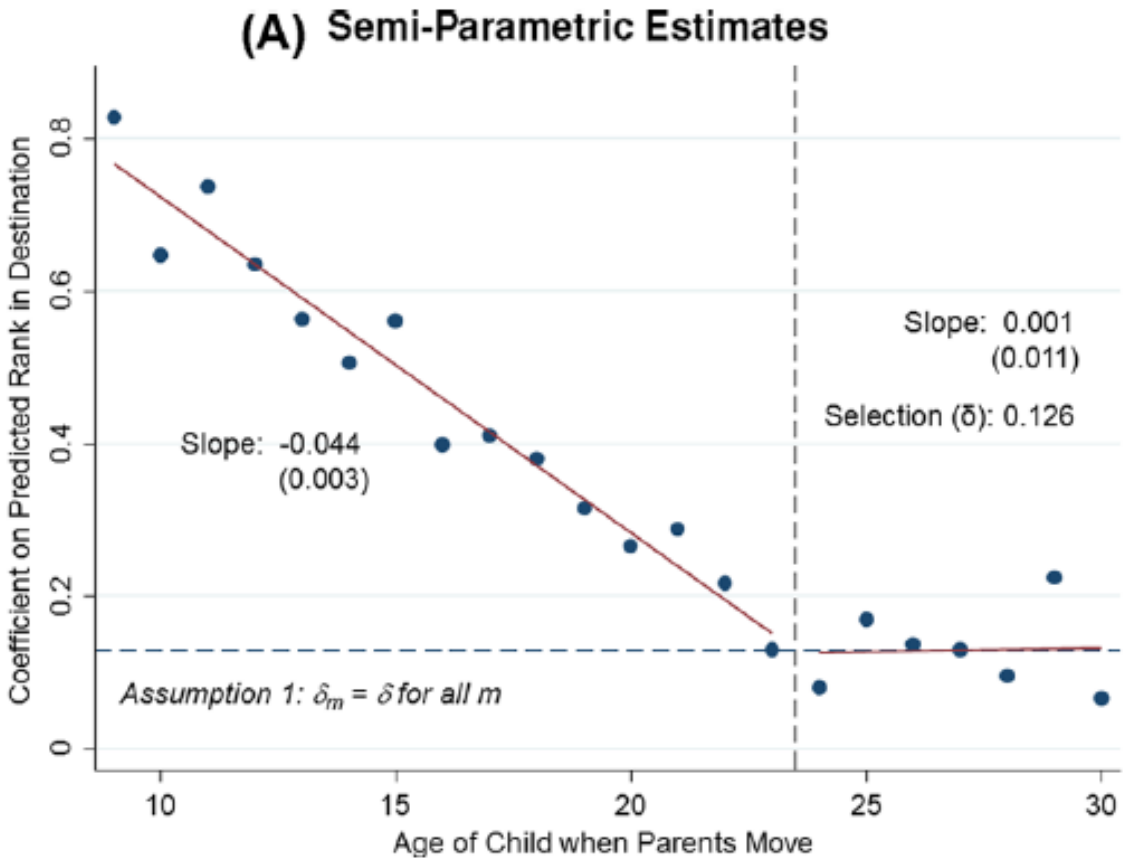


FIGURE IV

Childhood Exposure Effects on Income Ranks in Adulthood

Results: $\hat{b}_m$ as Function of Age m- Parametric Estimates

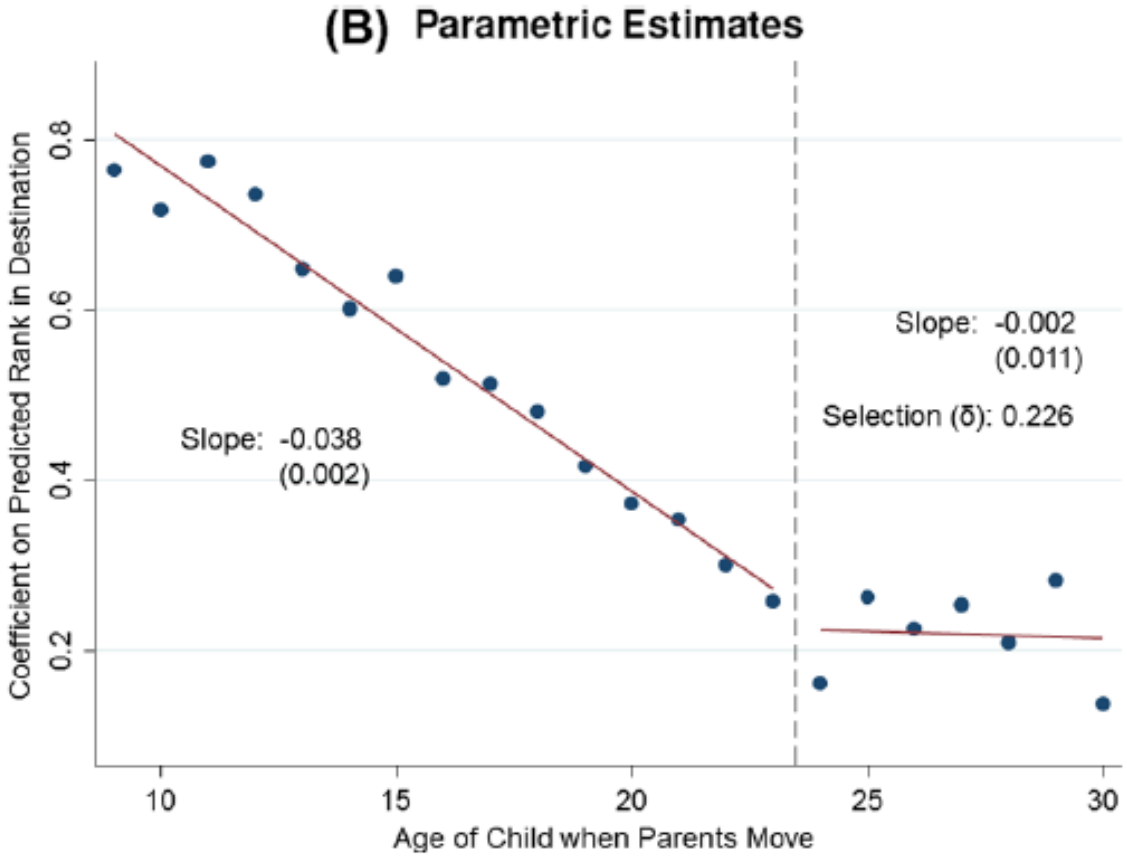


FIGURE IV

Childhood Exposure Effects on Income Ranks in Adulthood

Childhood Exposure Effect Estimates- Specification

$$
\begin{aligned}
y_i = & \sum_{s=1980}^{1988} I(s_i = s)\left(\alpha_s^1 + \alpha_s^2 \bar{y}_{pos}\right) + \sum_{m=9}^{30} I(m_i = m)\left(\zeta_m^1 + \zeta_m^2 p_i\right) \\
& + \sum_{s=1980}^{1987} \kappa_s^d I(s_i = s)\Delta_{odps} + I(m_i \leqslant 23)\left(b_0 + (23 - m_i)\gamma\right)\Delta_{odps} \\
& + I(m_i > 23)(\delta + (23 - m_i)\delta')\Delta_{odps} + \varepsilon_{3i}. \qquad (7)
\end{aligned}
$$

Childhood Exposure Effect Estimates- Results

TABLE II

CHILDHOOD EXPOSURE EFFECT ESTIMATES

	Dependent variable: Child's income rank at age 24								
							With family fixed effects		
Specification:	Pooled	Age $\leqslant 23$	Age < 18	No cohort controls	Individual income	Child CZ FE	Baseline	No cohort controls	Time-varying controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Exposure effect (γ)	0.040	0.040	0.037	0.036	0.041	0.031	0.044	0.031	0.043
	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.002)	(0.008)	(0.005)	(0.008)
Num. of obs.	1,553,021	1,287,773	687,323	1,553,021	1,553,021	1,473,218	1,553,021	1,553,021	1,553,021

Section 2: Neighborhood Exposure Effects in Denmark

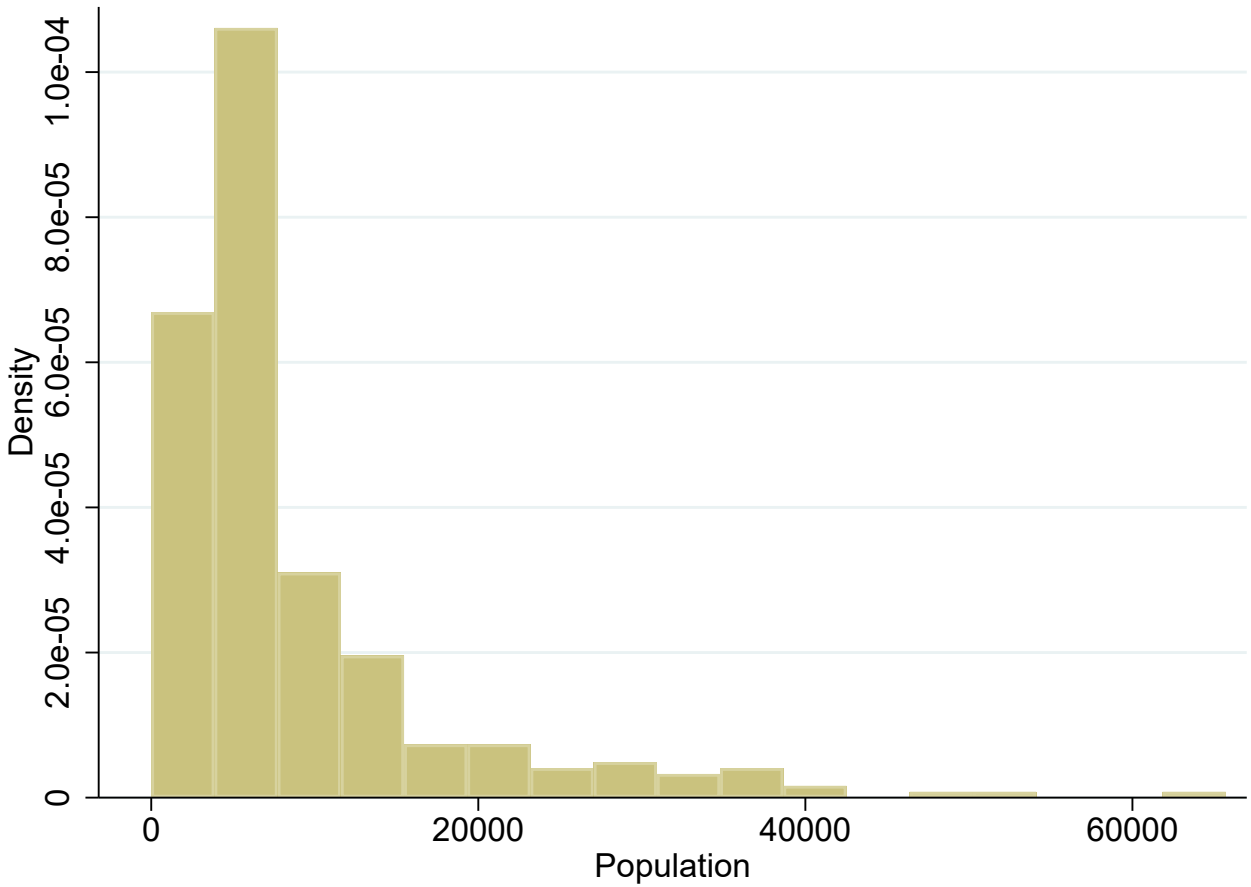
Data

- **Data source:** Danish registers
- **Data span:** 1982–2000
- **Sample:** Children who were born between 1970–1982
  - permanent residents (stayers/PR): subset of parents who reside in a single *municipality (parish)* c in 1982–2000
  - movers: individuals in the main sample who are not PR
- **Income type:** Disposable income
  - averaged over 1982–2000 to get parental income
- **Unit of Analysis:** Family income for parents and individual income for children

Summary Statistics

Population Distribution

Figure: Distribution of Population across Municipalities



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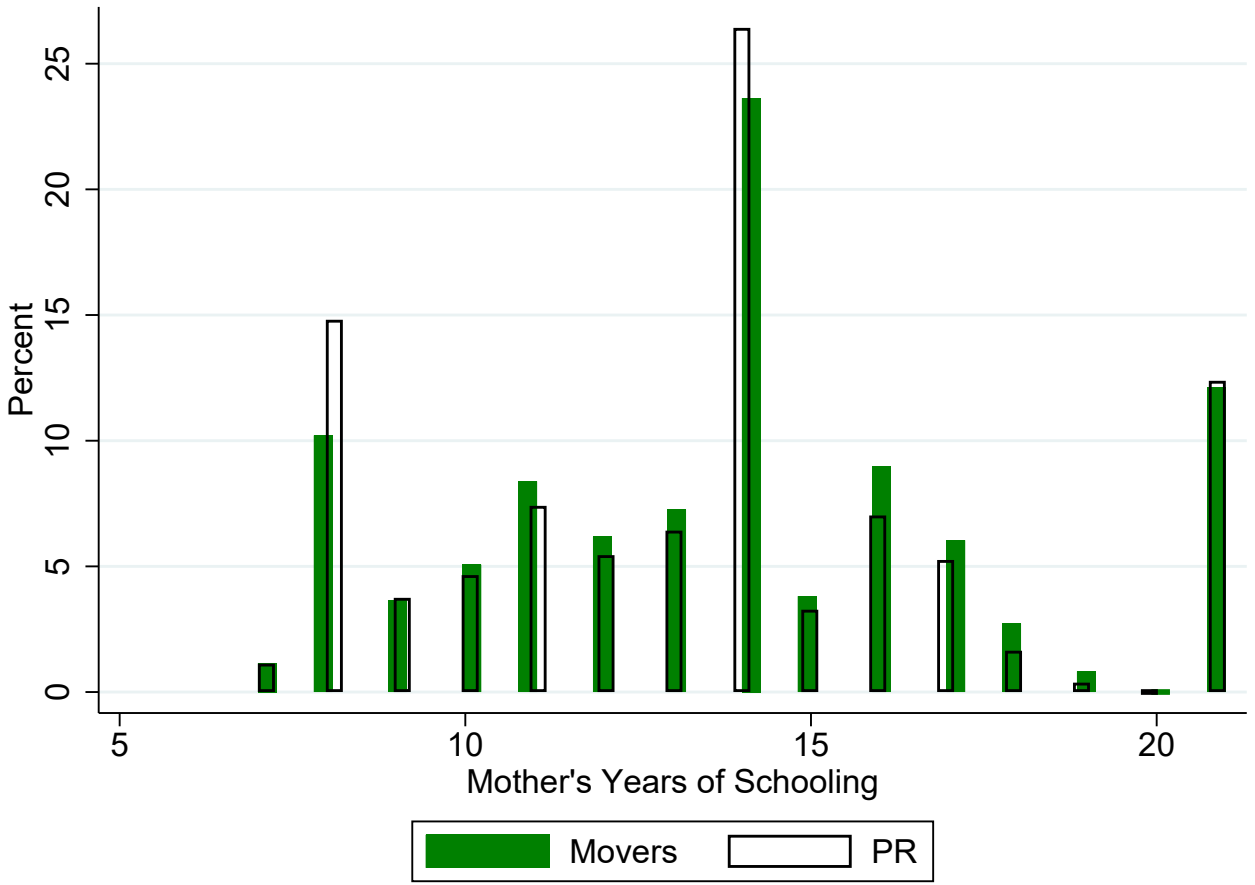
Education Level and PR Status

Figure: Distribution of Years of Schooling by Permanent Residence Status



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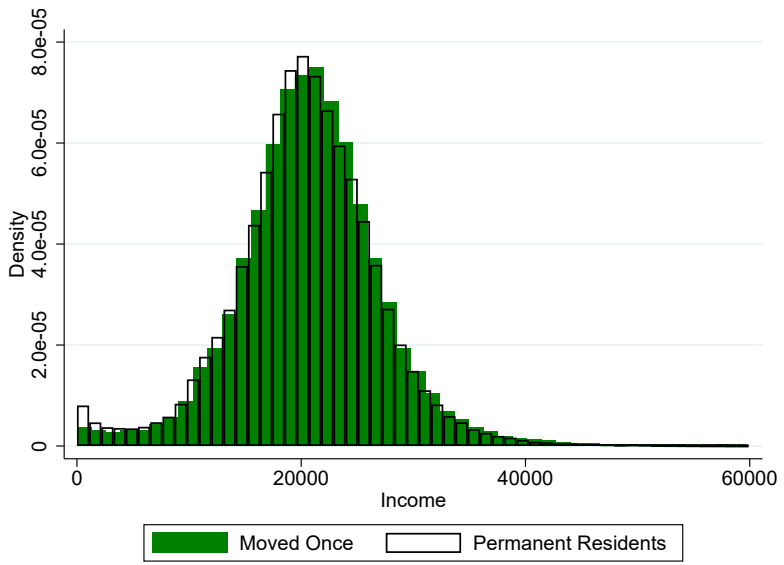
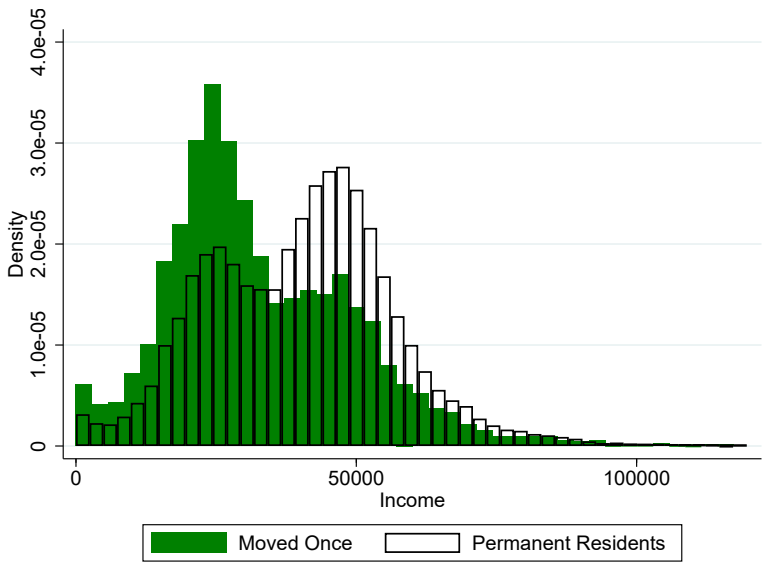
Characteristics of Movers and Stayers

Figure: Income Distribution of Parents: Movers vs Non-movers

(a) Individual Level

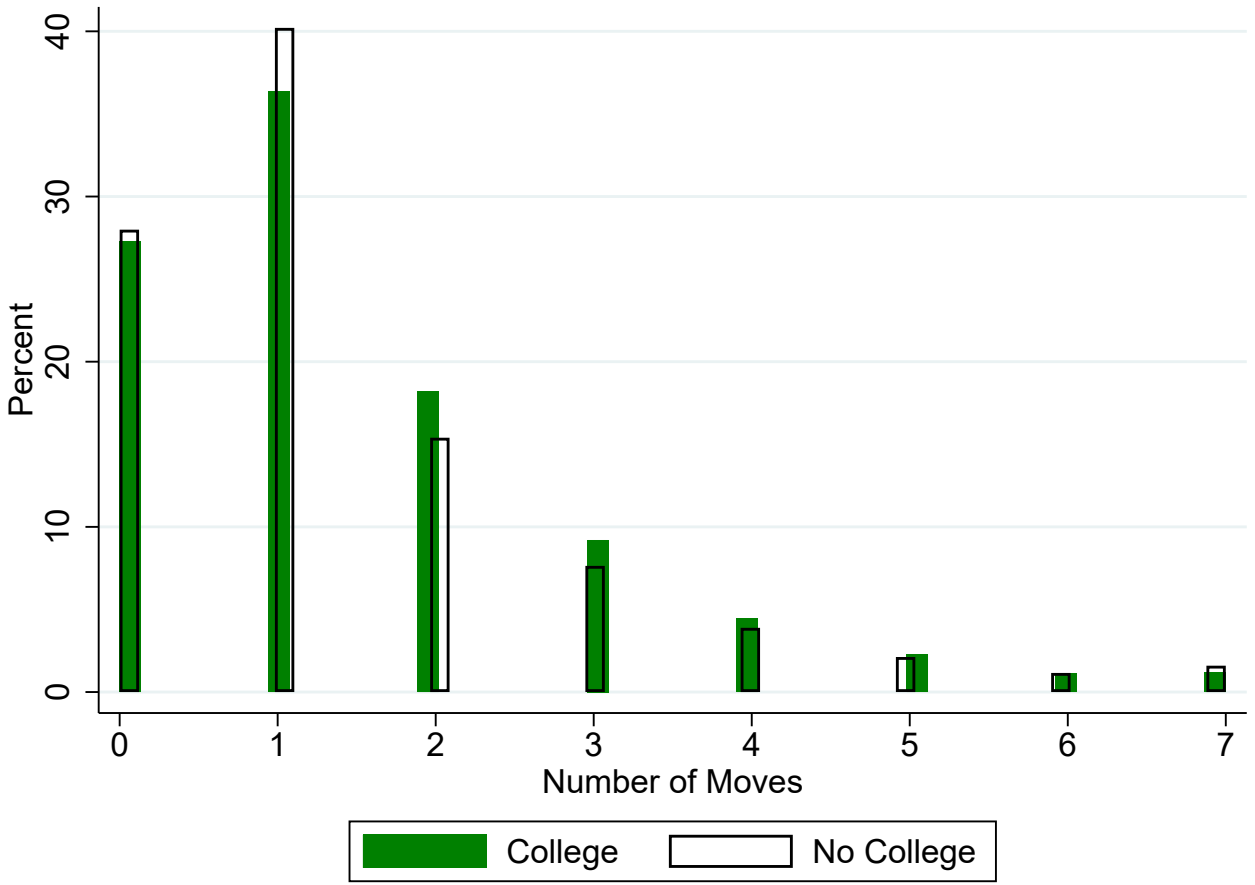


(b) Household Level



Number of Moves

Figure: Number of Moves by Education Level



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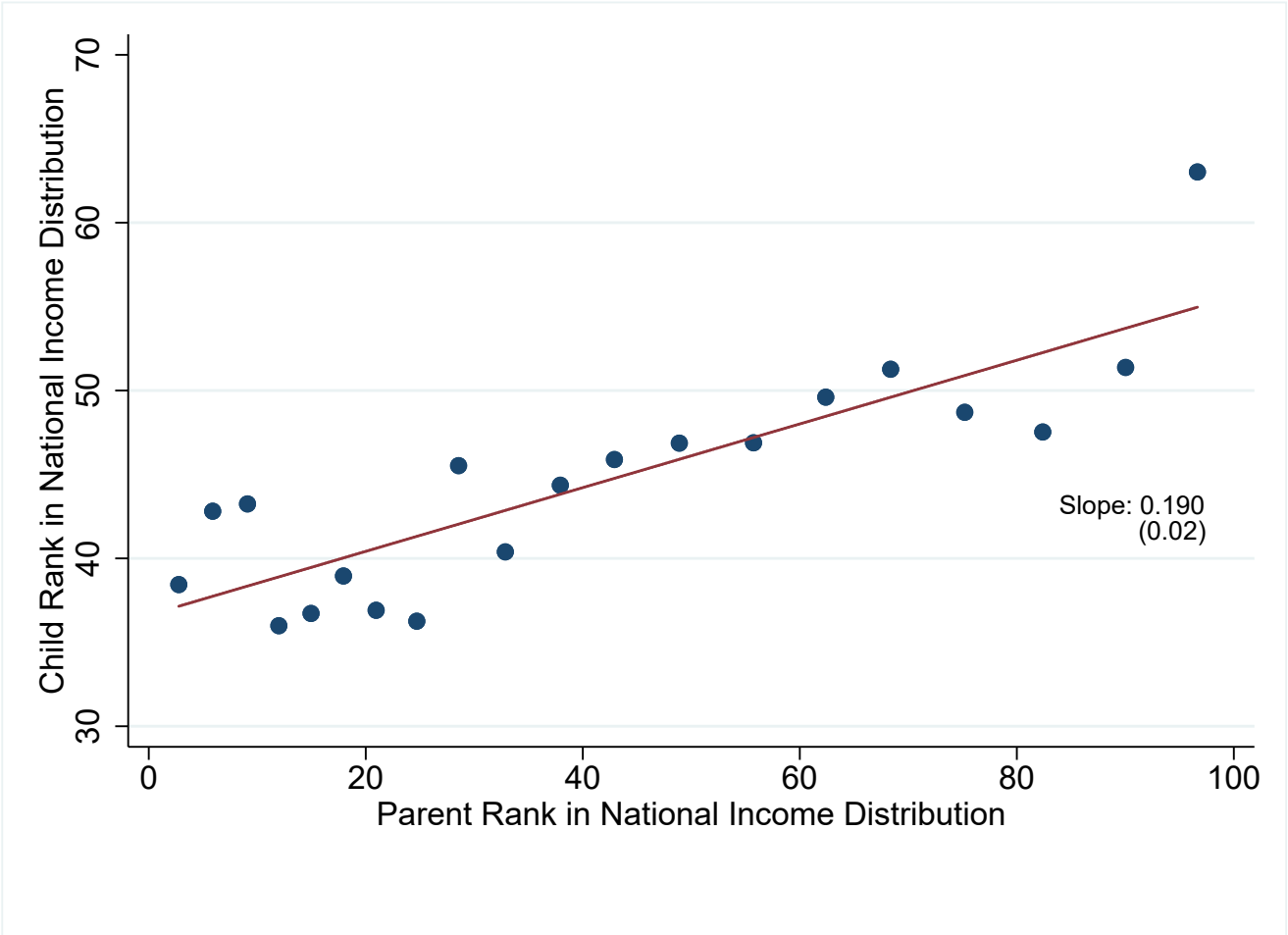
Neighborhood Exposure Effects

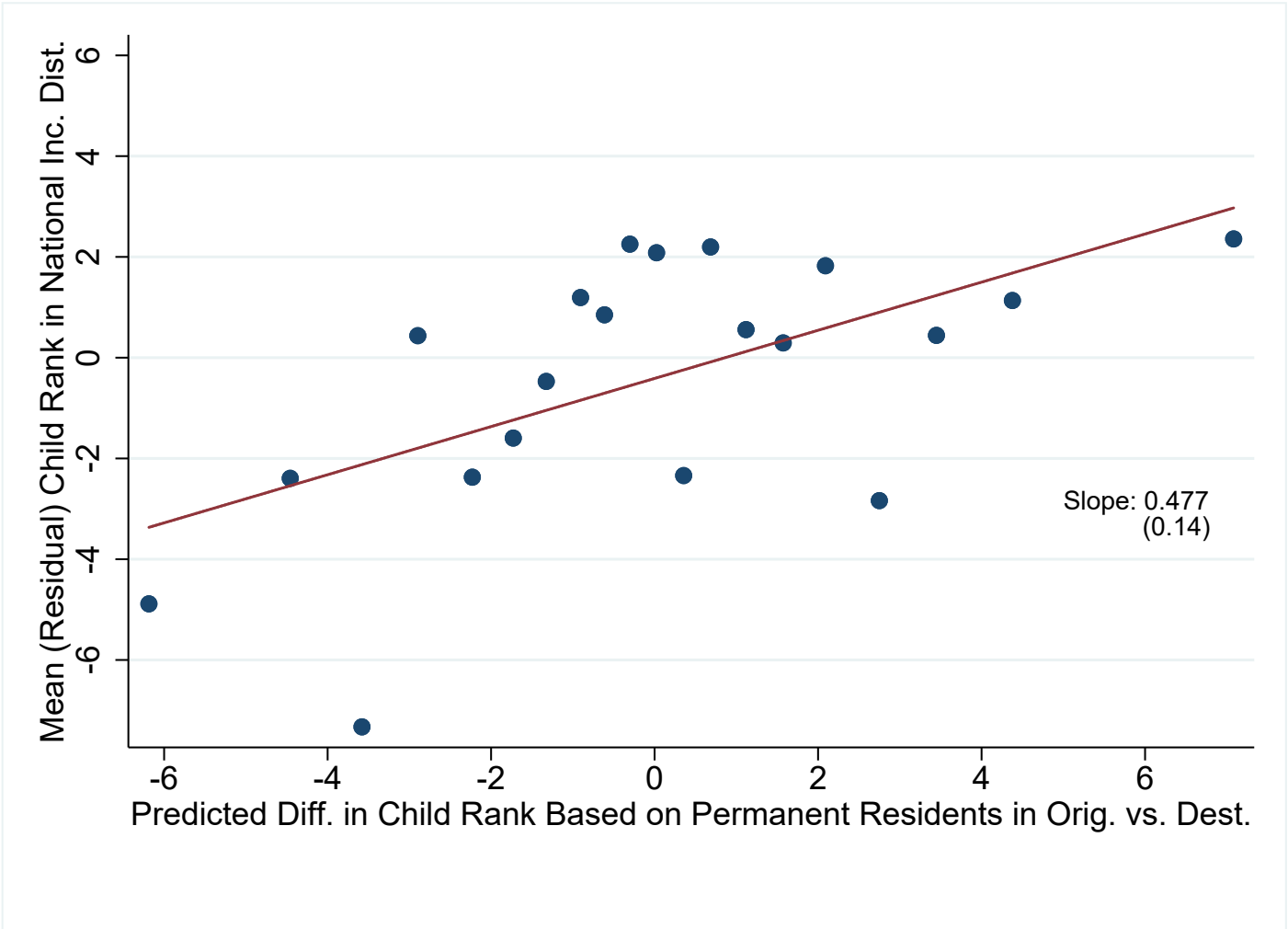
Mean Income Ranks for Children of PR of Copenhagen

Figure: Mean Child Inc. Rank vs Parent Inc. Rank for Children



▸ Full

Movers' Outcomes versus Predicted Outcomes Based on PR in Destination- Movers at Age 13

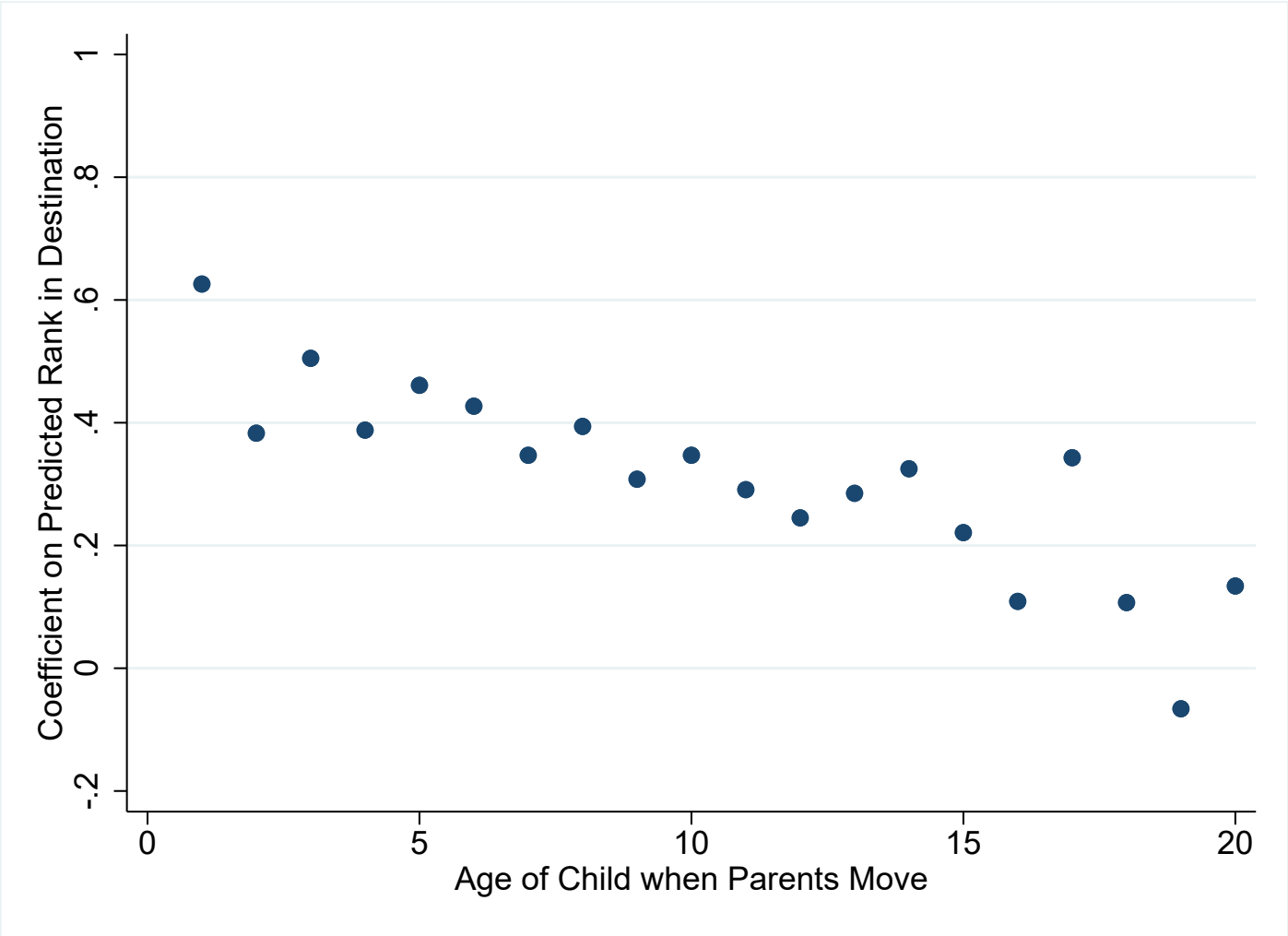


Childhood Exposure Effect Estimates- Specification

$$
\begin{aligned}
y_i = & \sum_{s=1980}^{1988} I(s_i = s)\left(\alpha_s^1 + \alpha_s^2 \bar{y}_{pos}\right) + \sum_{m=9}^{30} I(m_i = m)\left(\zeta_m^1 + \zeta_m^2 p_i\right) \\
& + \sum_{s=1980}^{1987} \kappa_s^d I(s_i = s)\Delta_{odps} + I(m_i \leqslant 23)\left(b_0 + (23 - m_i)\gamma\right)\Delta_{odps} \\
& + I(m_i > 23)(\delta + (23 - m_i)\delta')\Delta_{odps} + \varepsilon_{3i}. \qquad (7)
\end{aligned}
$$

Childhood Exposure Effects on Inc. Ranks

Figure: Childhood Exposure Effects on Income Ranks in Adulthood



Childhood Exposure Effect Estimates

Table 1: Childhood Exposure Effect Estimates

Dependent variable: Child's income rank at age 26 (30)

							Family FE		
Spec:	Pooled	Age <= 23	Age < 18	No cohort controls	Family Income	Child nbhd FE	Baseline	No cohort controls	Time-varying controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
US (γ)	0.040	0.040	0.037	0.036	0.041	0.031	0.044	0.031	0.043
	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.002)	(0.008)	(0.005)	(0.008)
DK :	0.013	0.014	0.015	0.011	0.014	0.012	0.009	0.012	-0.008
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.009)	(0.008)	(0.016)

Section 3: Discussion

(A) Selection and Age of Child at Move:

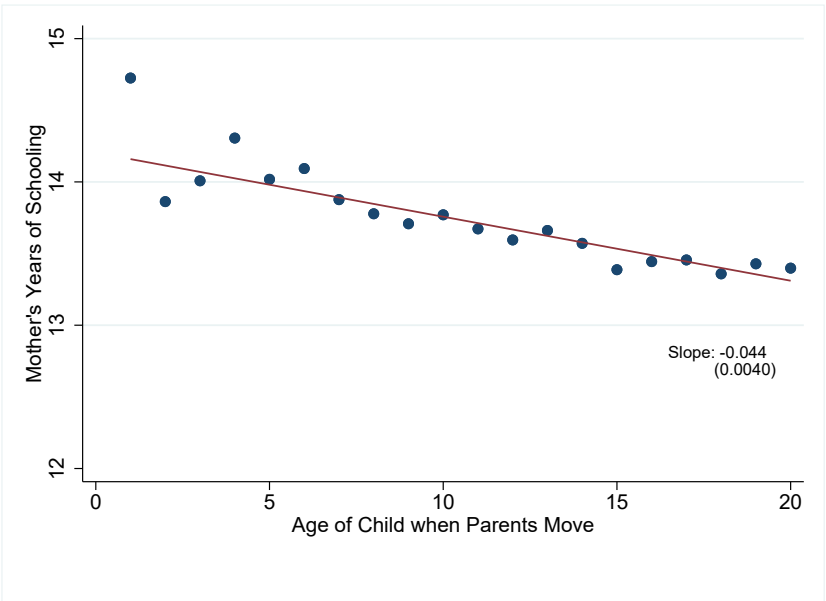
(A.i) Parental Characteristics

(A.i-1) Education

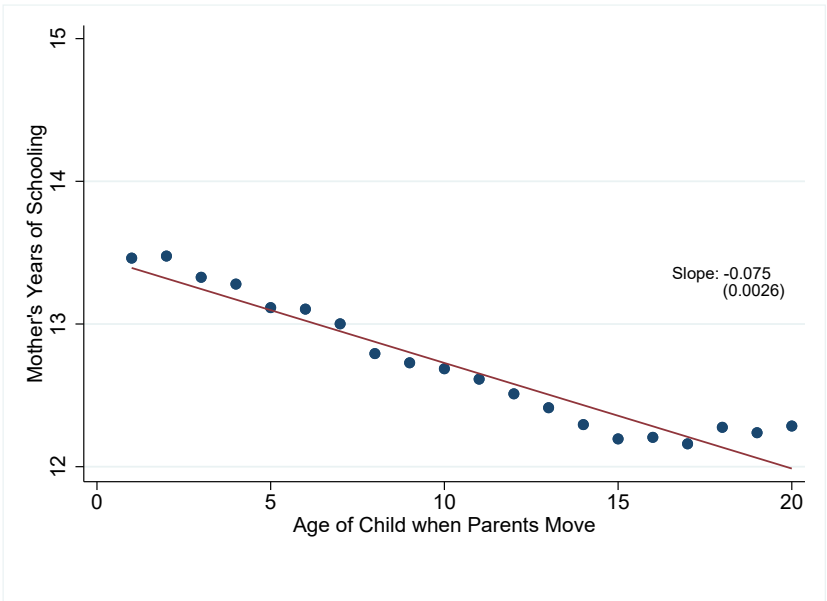
Parental Char. and Age of Child when Parents Move

Figure: Age of Child at Move and Parental Edu. by Ownership Status

(a) Owners



(b) Renters



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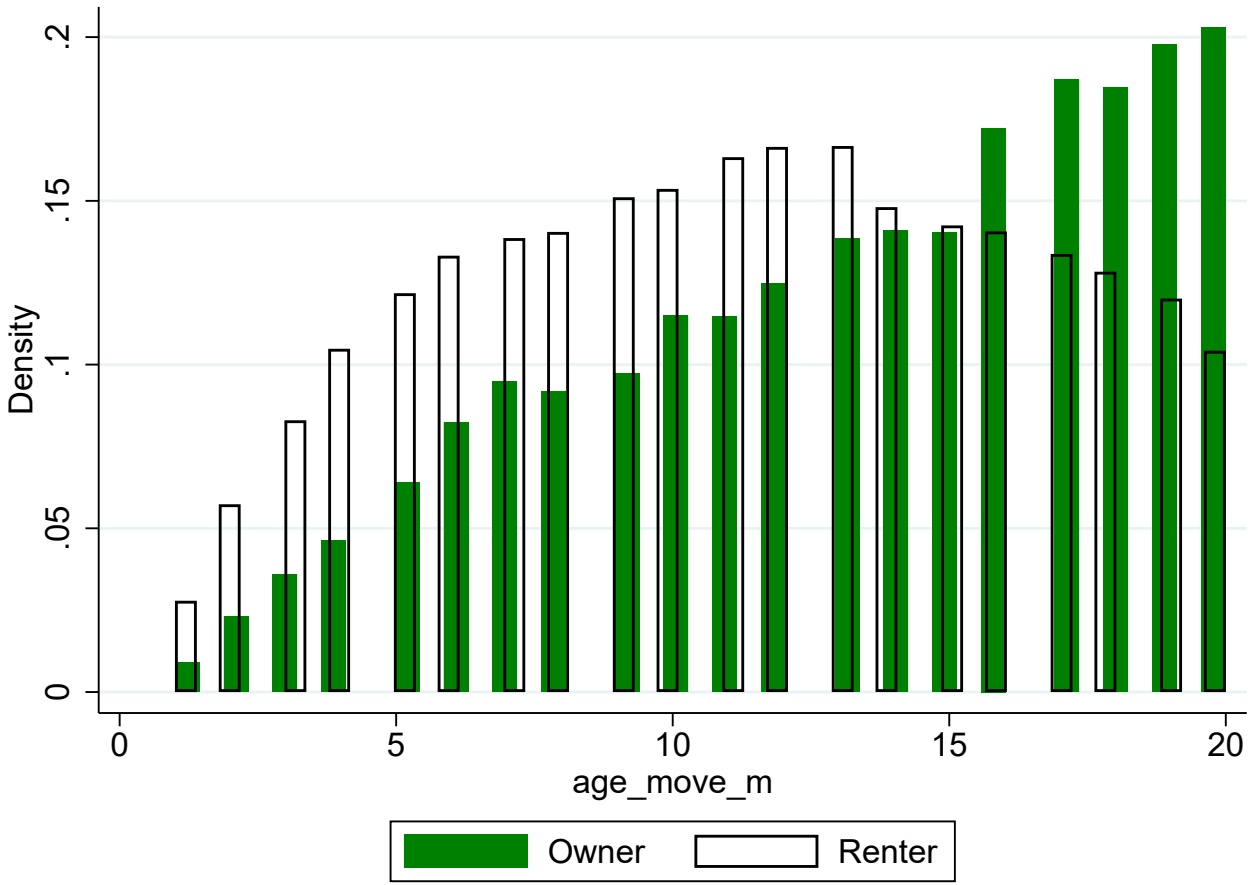
Distribution of Age of Child at Move- by Ownership Status

Figure: Timing of Moves across Neighborhoods by Home Ownership



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(A) Selection and Age of Child at Move:

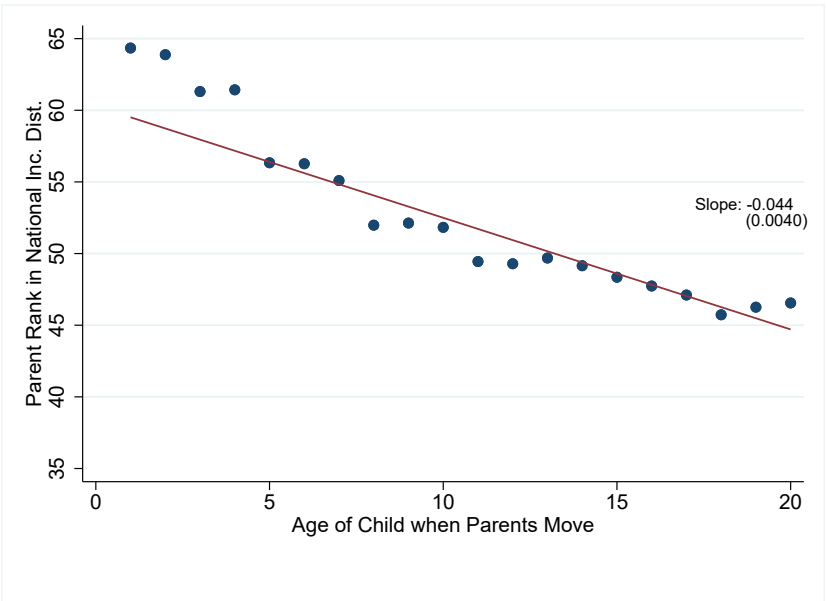
(A.i) Parental Characteristics

(A.i-2) Disposable Income

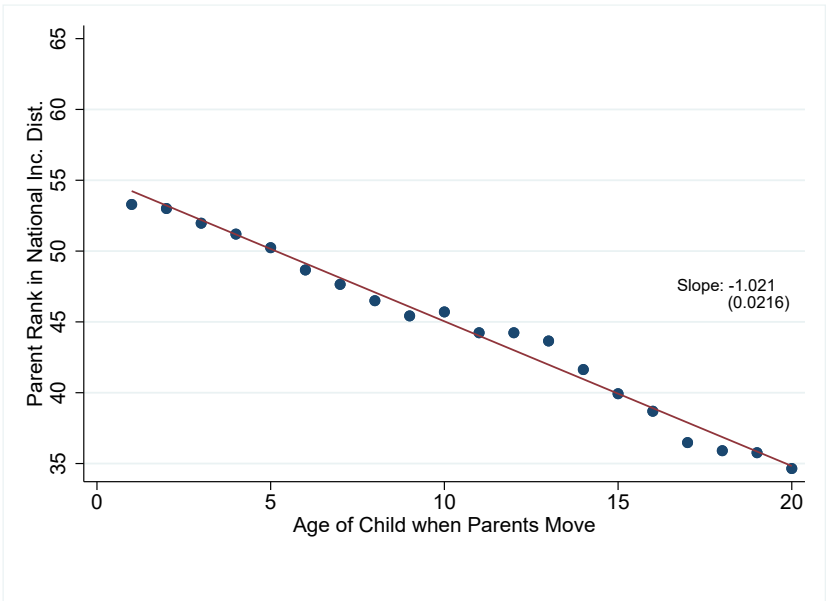
Parental Disposable Inc. by Ownership Status

Figure: Parental Income Rank and Age of Child when Parents Move

(a) Owners



(b) Renters



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(A) Selection and Age of Child at Move:

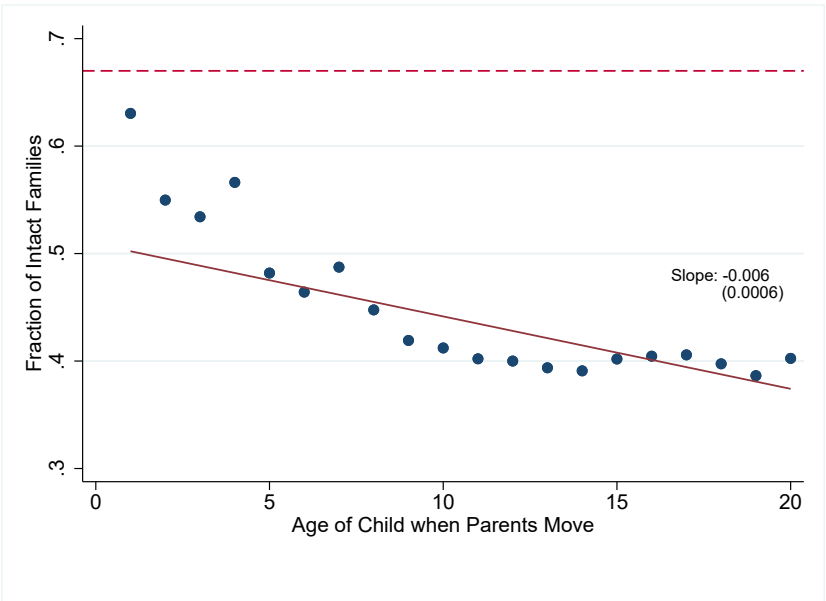
(A.i) Parental Characteristics

(A.i-3) Family Structure

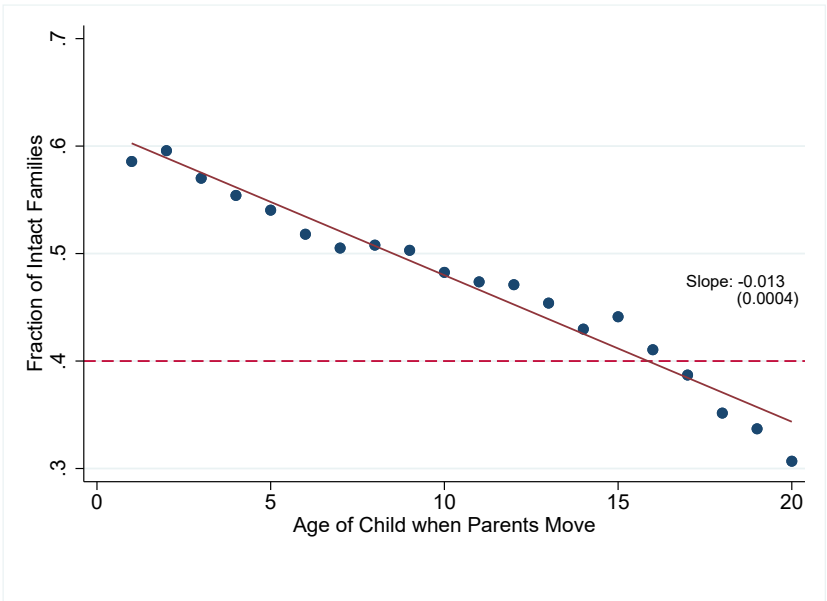
Parental Family Structure and Age of Child at Move

Figure: Fraction of Intact Families and Age of Child when Parents Move

(a) Owners



(b) Renters



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(A) Selection and Age of Child at Move:

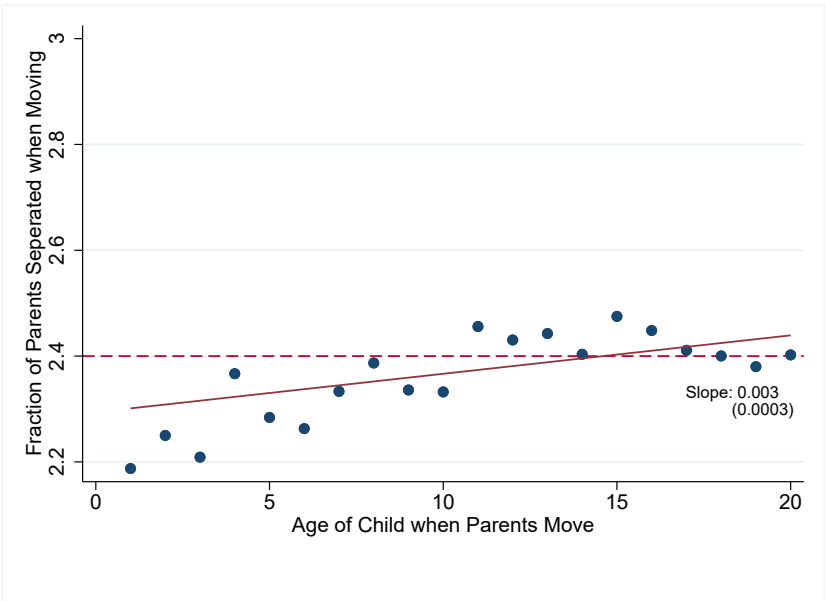
(A.i) Parental Characteristics

(A.i-4) Family Size

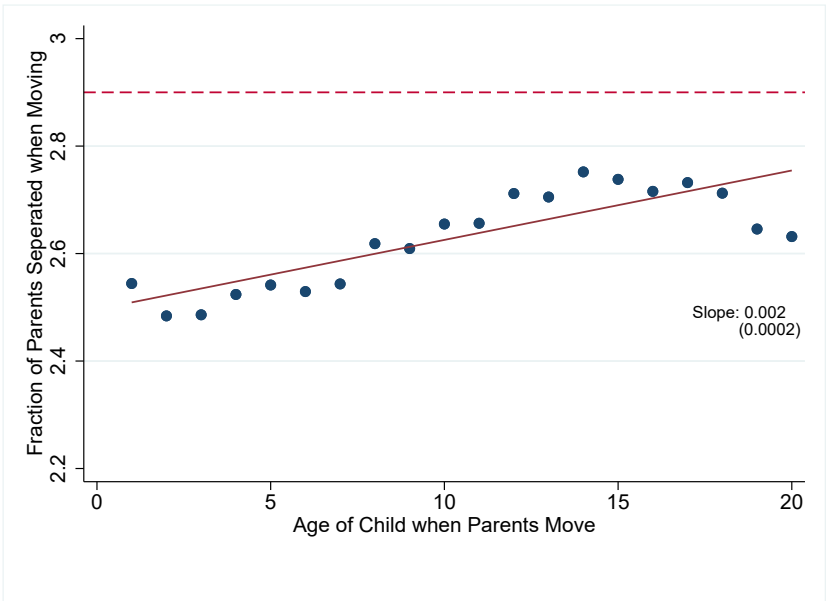
Family Size and Age of Child at Move

Figure: Average Family Size and Age of Child when Parents Move

(a) Owners



(b) Renters



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(B) Parental Sorting to Neighborhoods:

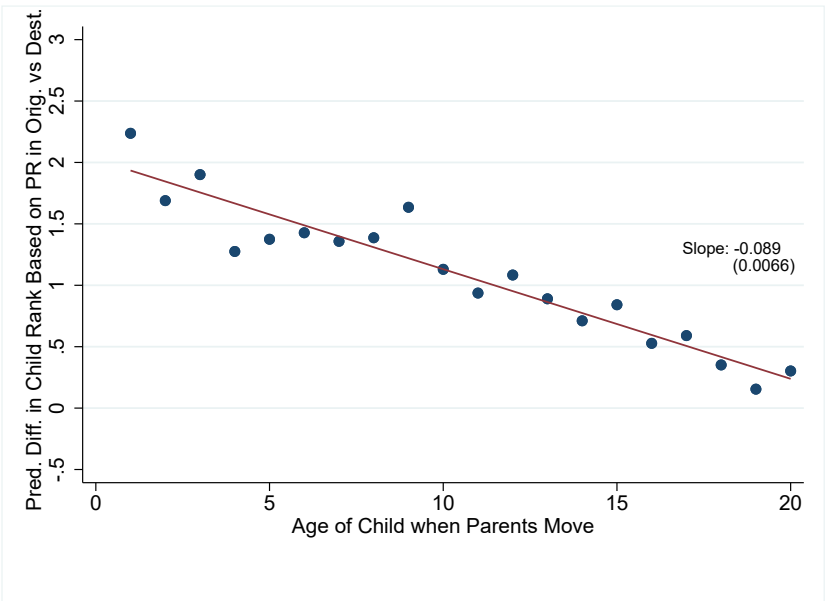
(B.i) Quality of Moves

(B.i-1) Predicted Difference in Predicted Outcomes of Children in Orig. vs Dest.

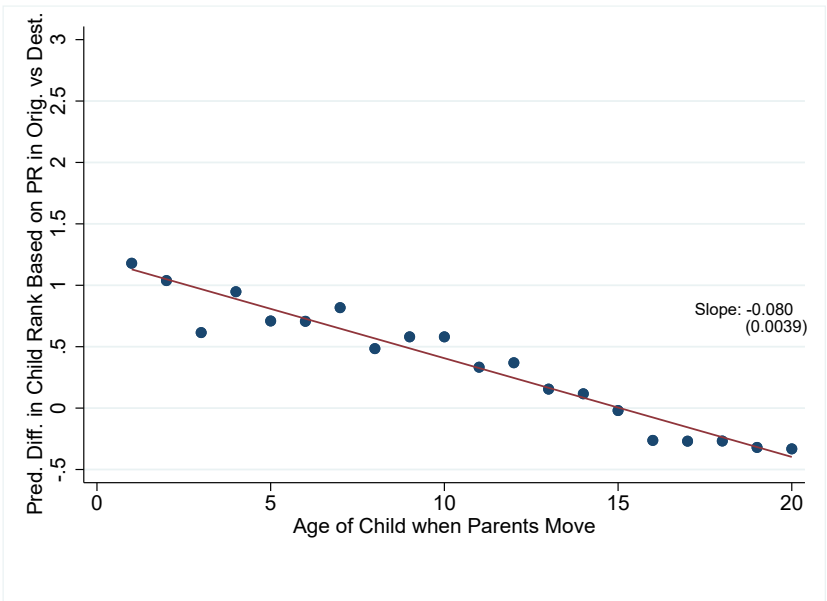
The Quality of Moves and Age of Child at Move

Figure: The Quality of Moves by Ownership Status

(a) Owners



(b) Renters

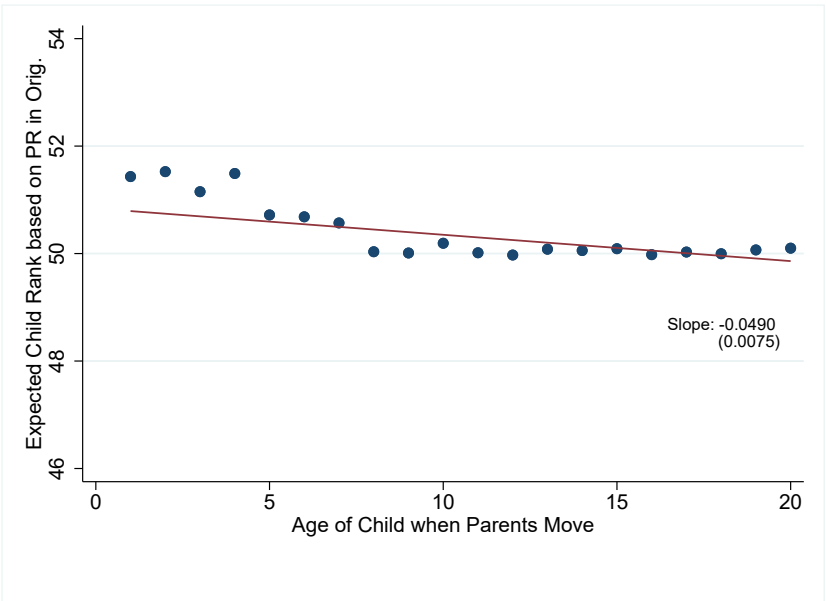


▸ parish

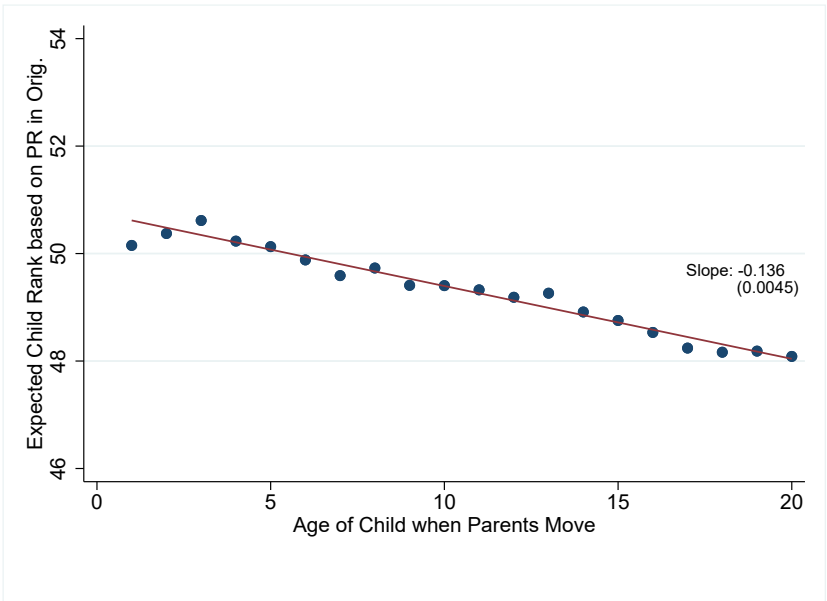
The Quality of Origin and Age of Child at Move

Figure: The Quality of Moves by Ownership Status

(a) Owners



(b) Renters

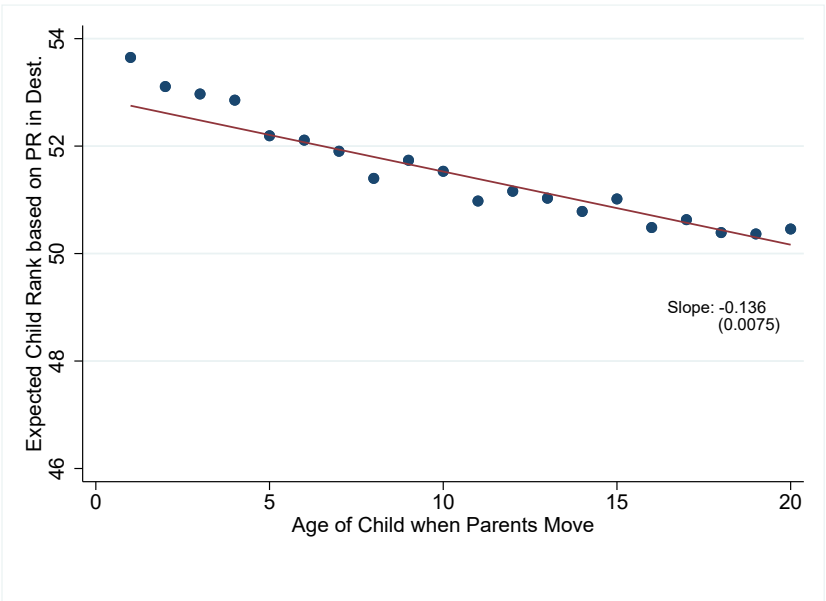


▸ parish

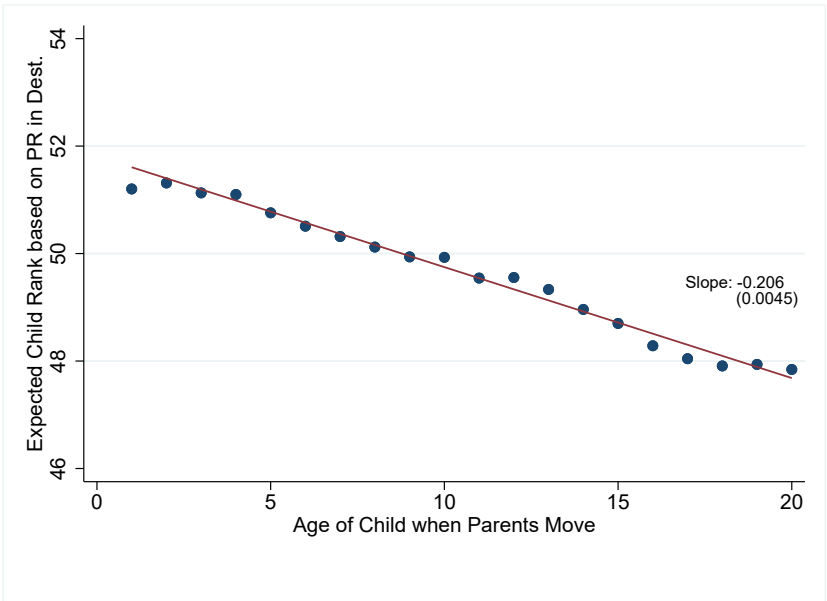
The Quality of Destination and Age of Child at Move

Figure: The Quality of Moves by Ownership Status

(a) Owners



(b) Renters



▸ parish

(B) Parental Sorting to Neighborhoods:

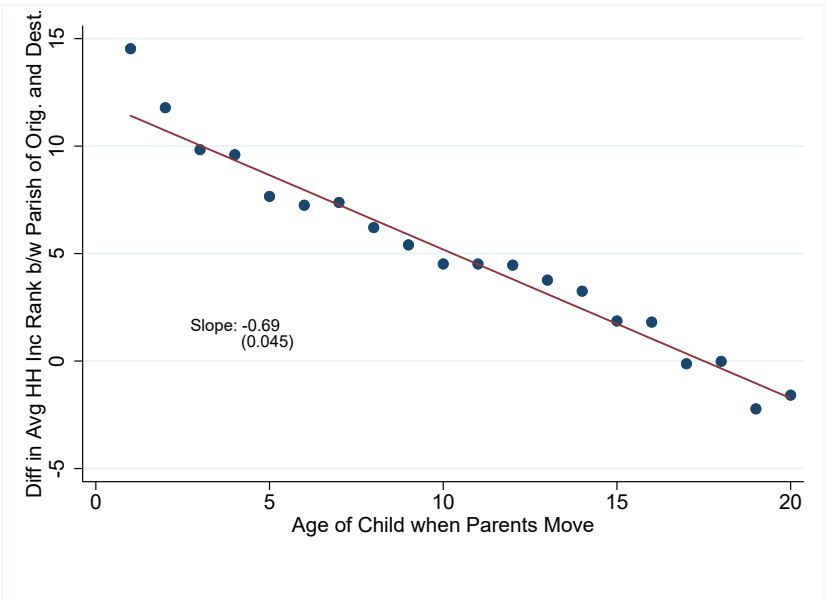
(B.i) Quality of Moves

(B.i-2) NBHD Avg Inc Rank at Orig. vs Dest.

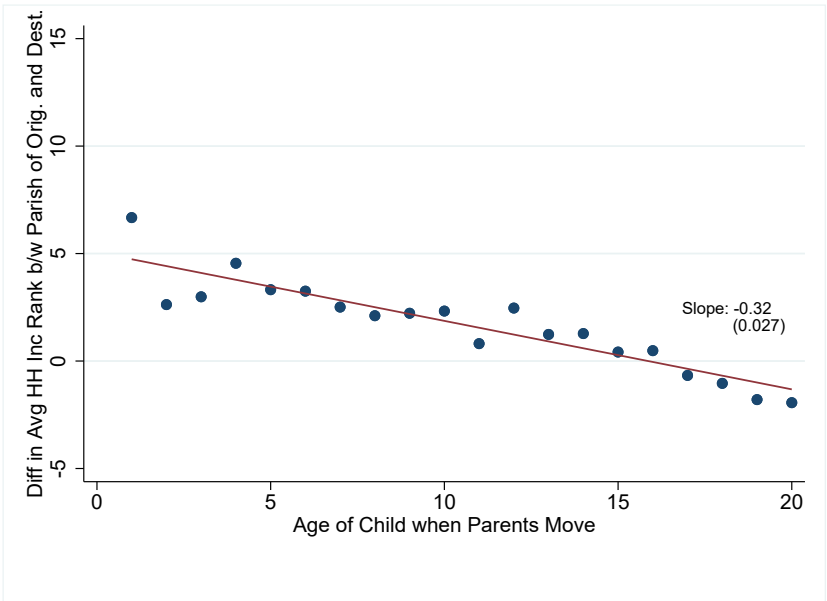
NBHD (Parish) Income Rank and Age of Child at Move

Figure: Change in nbhd Inc Rank and Age of Child

(a) Owners



(b) Renters

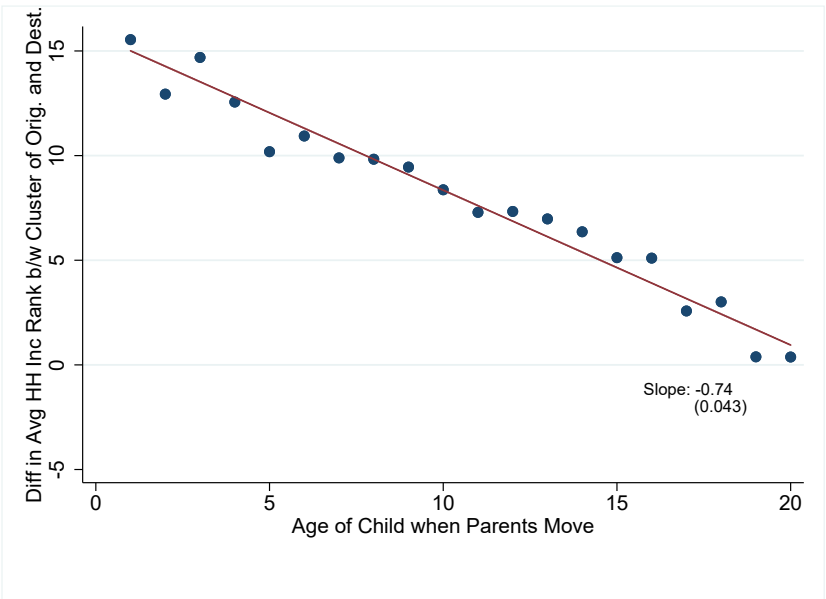


▸ parish

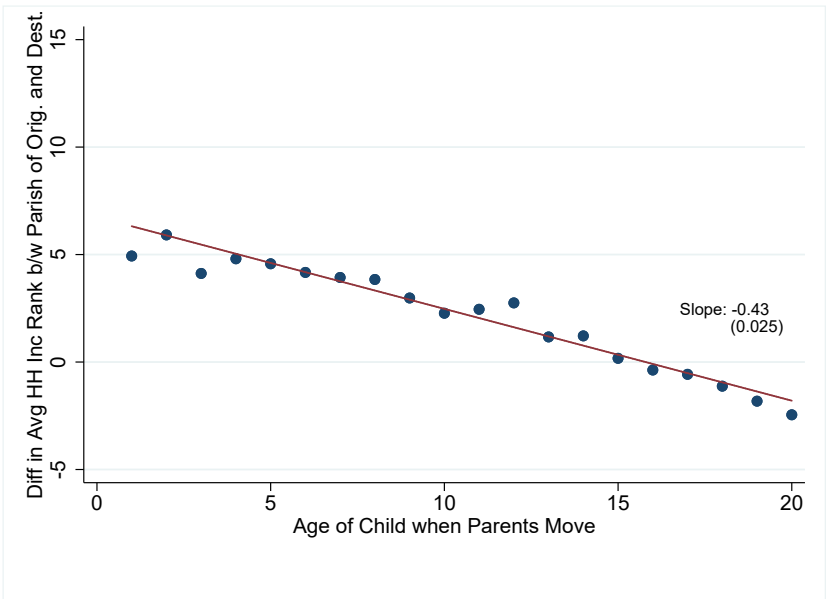
NBHD (Large Clusters) Inc Rank and Age of Child at Move

Figure: Change in nbhd Inc Rank and Age of Child

(a) Owners



(b) Renters

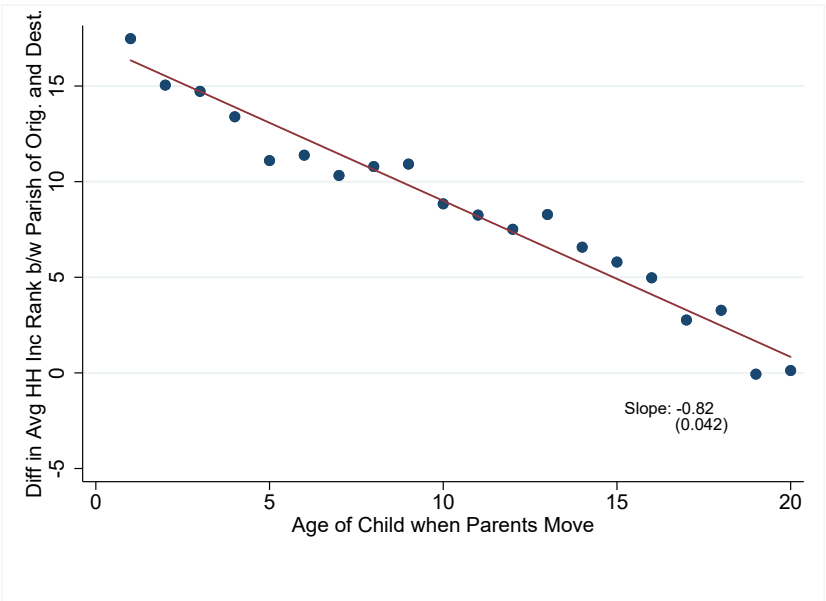


▸ parish

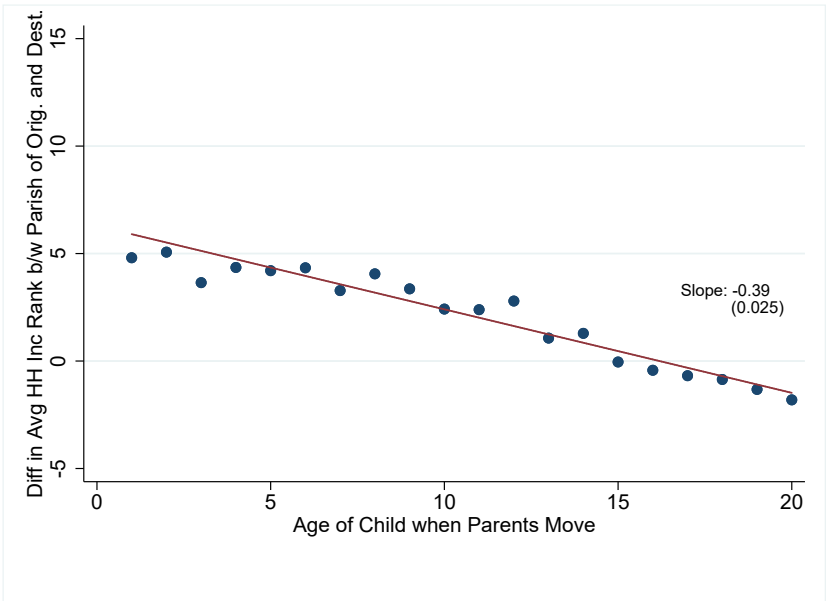
NBHD (Small Clusters) Inc Rank and Age of Child at Move

Figure: Change in nbhd Inc Rank and Age of Child

(a) Owners



(b) Renters



▸ parish

(B) Parental Sorting to Neighborhoods:

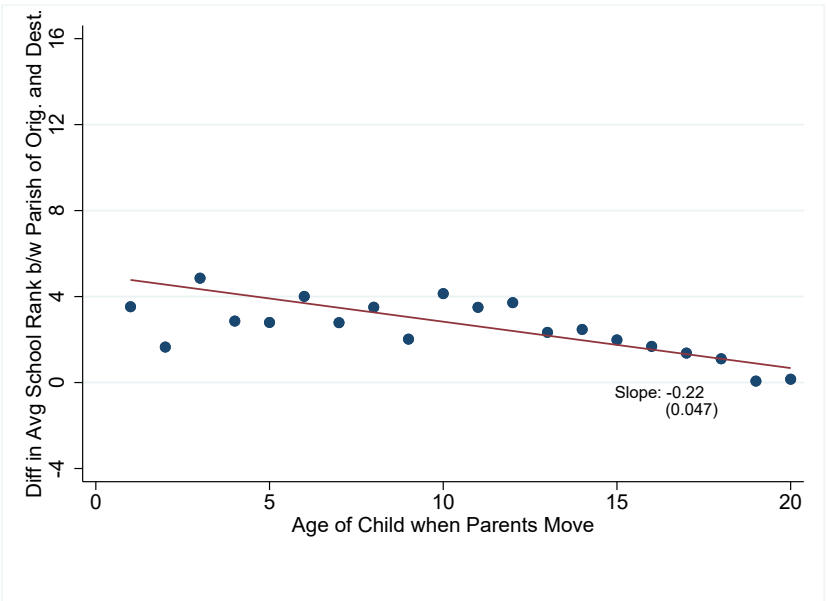
(B.i) Quality of Moves

(B.i-3) School Quality Rank at Orig. vs Dest.

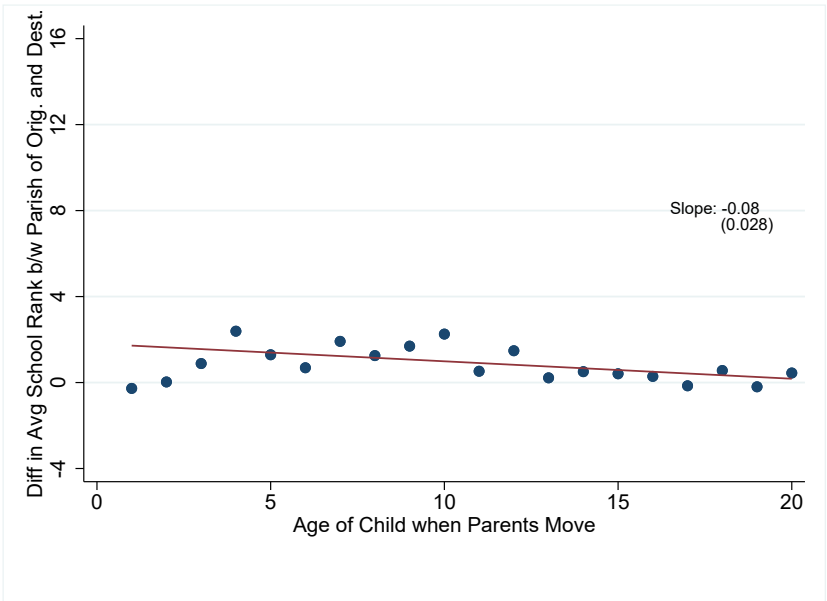
NBHD (Parish) School Quality Rank and Age at Move

Figure: Change in nbhd School Rank (Math Grades) and Age of Child

(a) Owners



(b) Renters



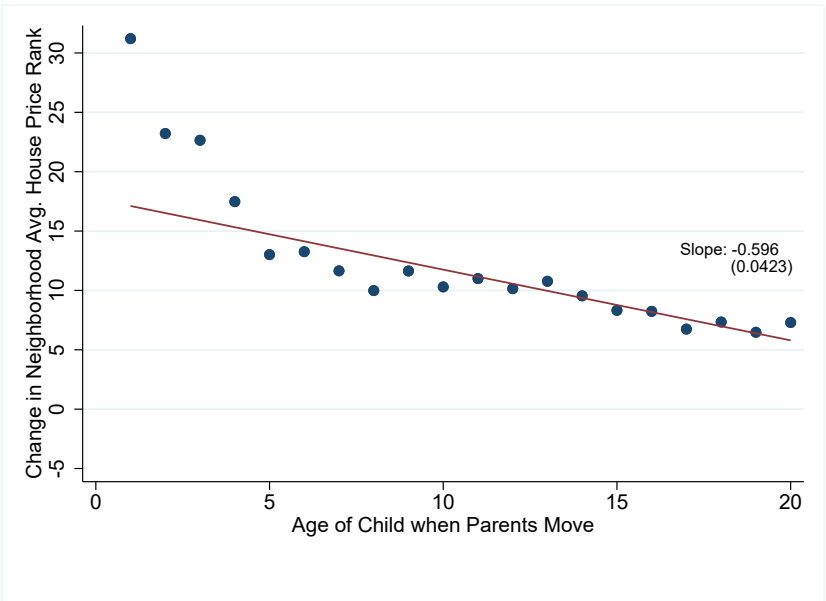
▸ parish

(B.i-4) Average Neighborhood House Price Rank at 200-HH Block Level

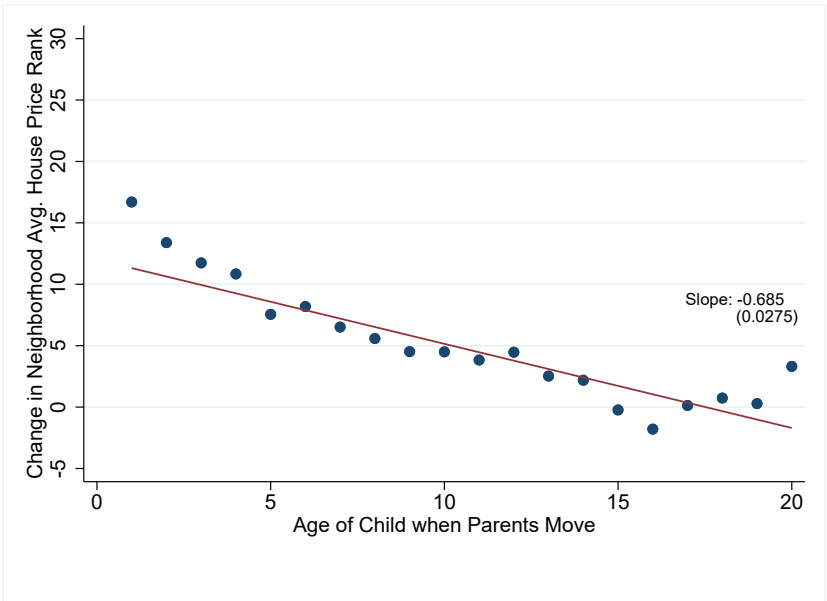
Neighborhood House Price Rank and Age of Child at Move

Figure: Change in nbhd House Price Rank. and Age of Child

(a) Owners



(b) Renters



▸ parish

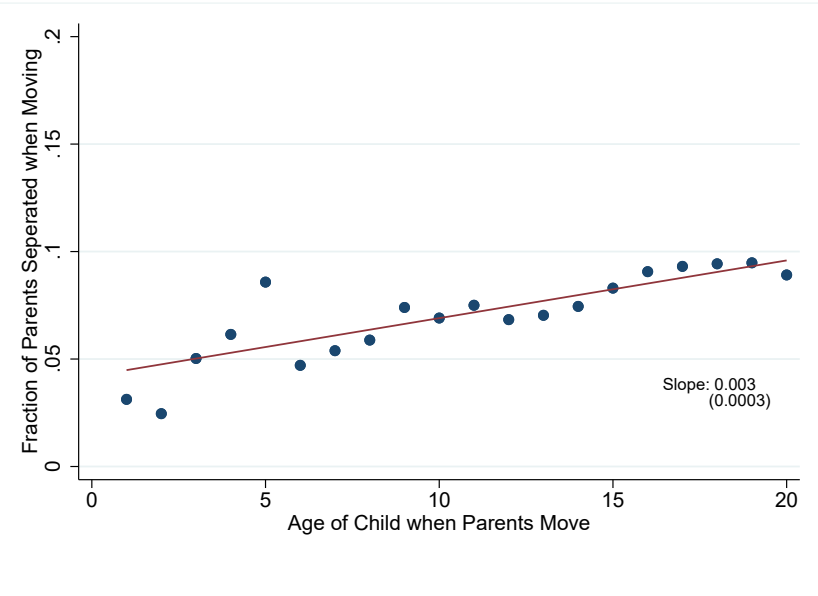
(C) Timing of Moves and Lifecycle Shocks

(C.i) Divorce

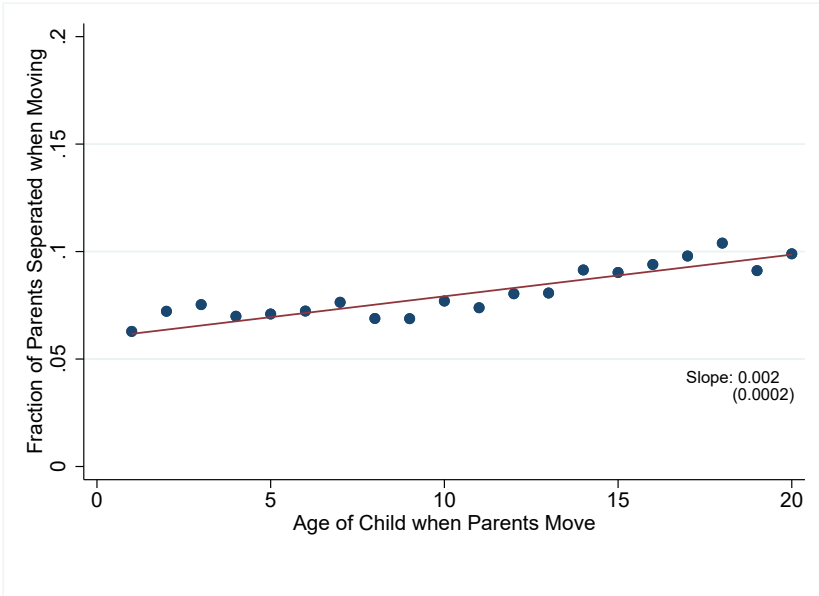
Divorce and Age of Child at Move

Figure: Age of Child at Move & Frac. of Parents Separated when Moving

(a) Owners



(b) Renters



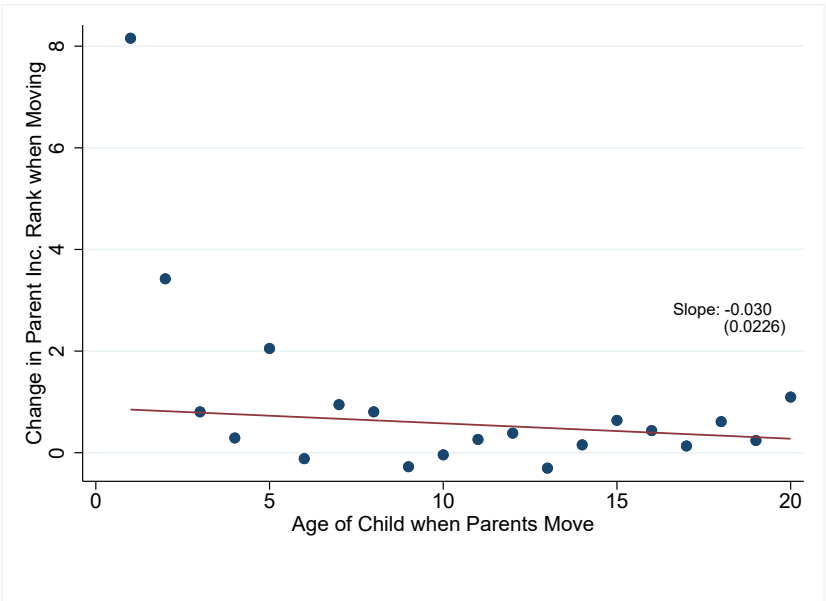
▸ parish

(C) Timing of Moves and Lifecycle Shocks

(C.ii) Change to Income when Moving

Figure: Age of Child at Move and the Change to Family Disp. Inc. Rank

(a) Owners



(b) Renters

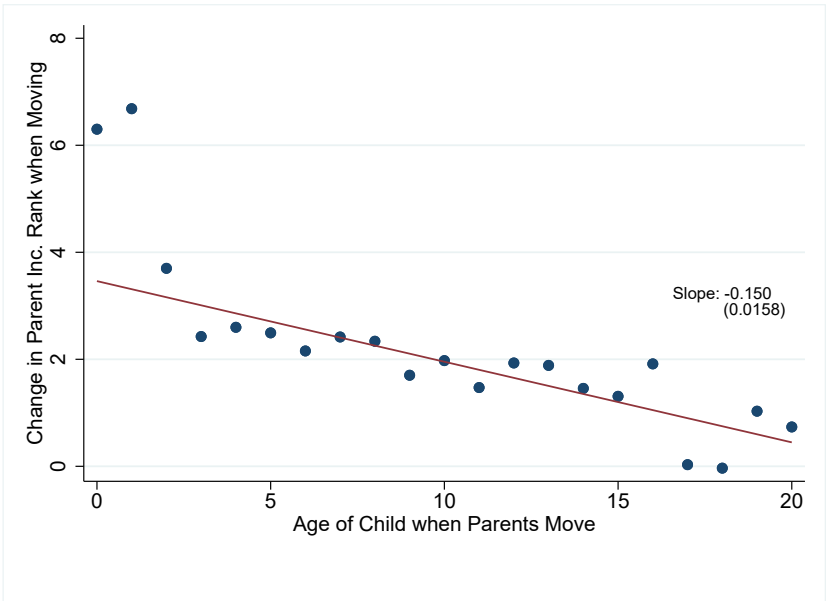
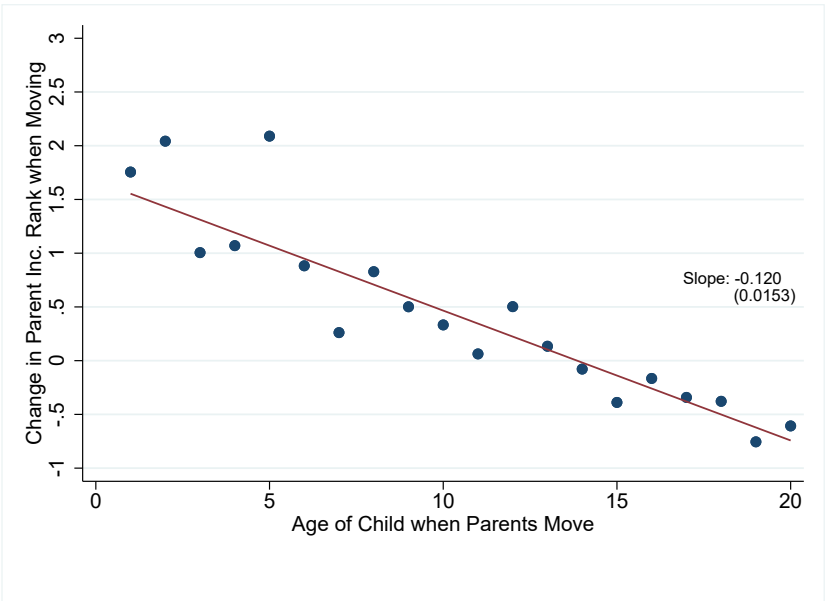
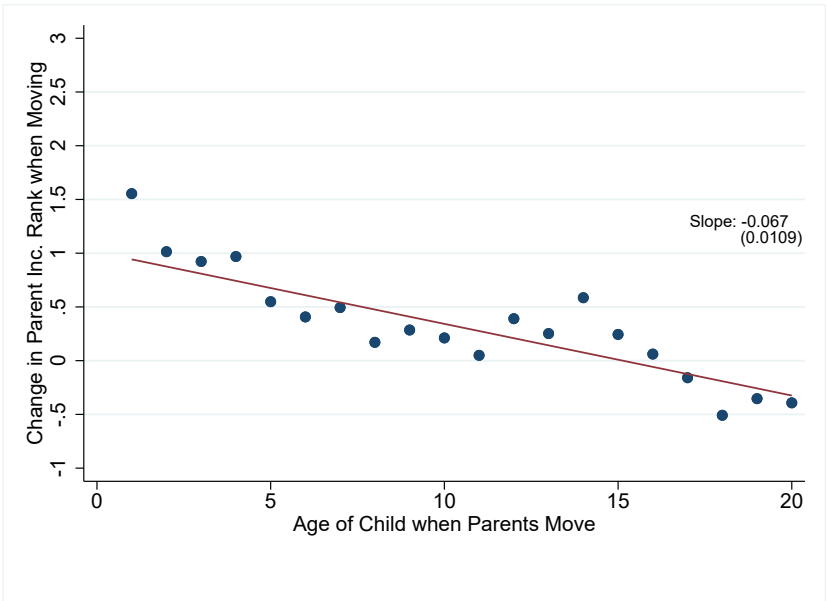


Figure: Age of Child at Move and the Change to Family Wage Inc. Rank

(a) Owners



(b) Renters



(D) Family Fixed Effect and Exogeneity Assumption

Family Fixed Effect Model

- Authors address time-varying selection possibility by adding family FE to the parametric model (and, separately, by controlling for changes in parents' income and marital status):

$$y_i = \sum_{s=1980}^{1988} I(s_i = s)\left(\alpha_s^1 + \alpha_s^2 \bar{y}_{pos}\right) + \sum_{m=9}^{30} I(m_i = m)\left(\zeta_m^1 + \zeta_m^2 p_i\right)$$

$$+ \sum_{m=9}^{30} b_m I(m_i = m)\Delta_{odps} + \sum_{s=1980}^{1987} \kappa_s^d I(s_i = s)\Delta_{odps} + \varepsilon_{3i}. \quad (6)$$

- Regression is now should estimated entirely on sample of families with 2 children. Intuitively, family-level mean effects are taken out.

Childhood Exposure Effect Estimates- Results

TABLE II

CHILDHOOD EXPOSURE EFFECT ESTIMATES

	Dependent variable: Child's income rank at age 24								
							With family fixed effects		
Specification:	Pooled	Age $\leqslant 23$	Age < 18	No cohort controls	Individual income	Child CZ FE	Baseline	No cohort controls	Time-varying controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Exposure effect (γ)	0.040	0.040	0.037	0.036	0.041	0.031	0.044	0.031	0.043
	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.002)	(0.008)	(0.005)	(0.008)
Num. of obs.	1,553,021	1,287,773	687,323	1,553,021	1,553,021	1,473,218	1,553,021	1,553,021	1,553,021

Discussion: Family Fixed Effect Model

- Suppose we can write $\epsilon_i = \hat{\theta}_{fam,i} + e_i$
  - $\hat{\theta}_{fam,i}$: fixed family inputs (culture, parents' HC, etc.)
  - e_i: variable inputs (e.g., wealth shocks, noise)
- The selection assumption: $\delta_m = \frac{cov(\epsilon_i, \bar{y}_{pds})}{var(\bar{y}_{pds})}$ is constant in age
- Including family fixed effects controls for $\hat{\theta}_{fam}$: if higher-skill families choose better neighborhoods at earlier ages
- To interpret results as *causal* still need $\frac{cov(e_i, \bar{y}_{pds})}{var(\bar{y}_{pds})}$ cons. in age
  - May be violated if shocks to wealth are corr. with child's age
  - One such shock correlated with first child's age: the birth of a 2^{nd} child
  - Meaningful differences between families where kids are 2 years vs. 8 years apart.

Figure: Time Space and Differences in Sibling Outcomes

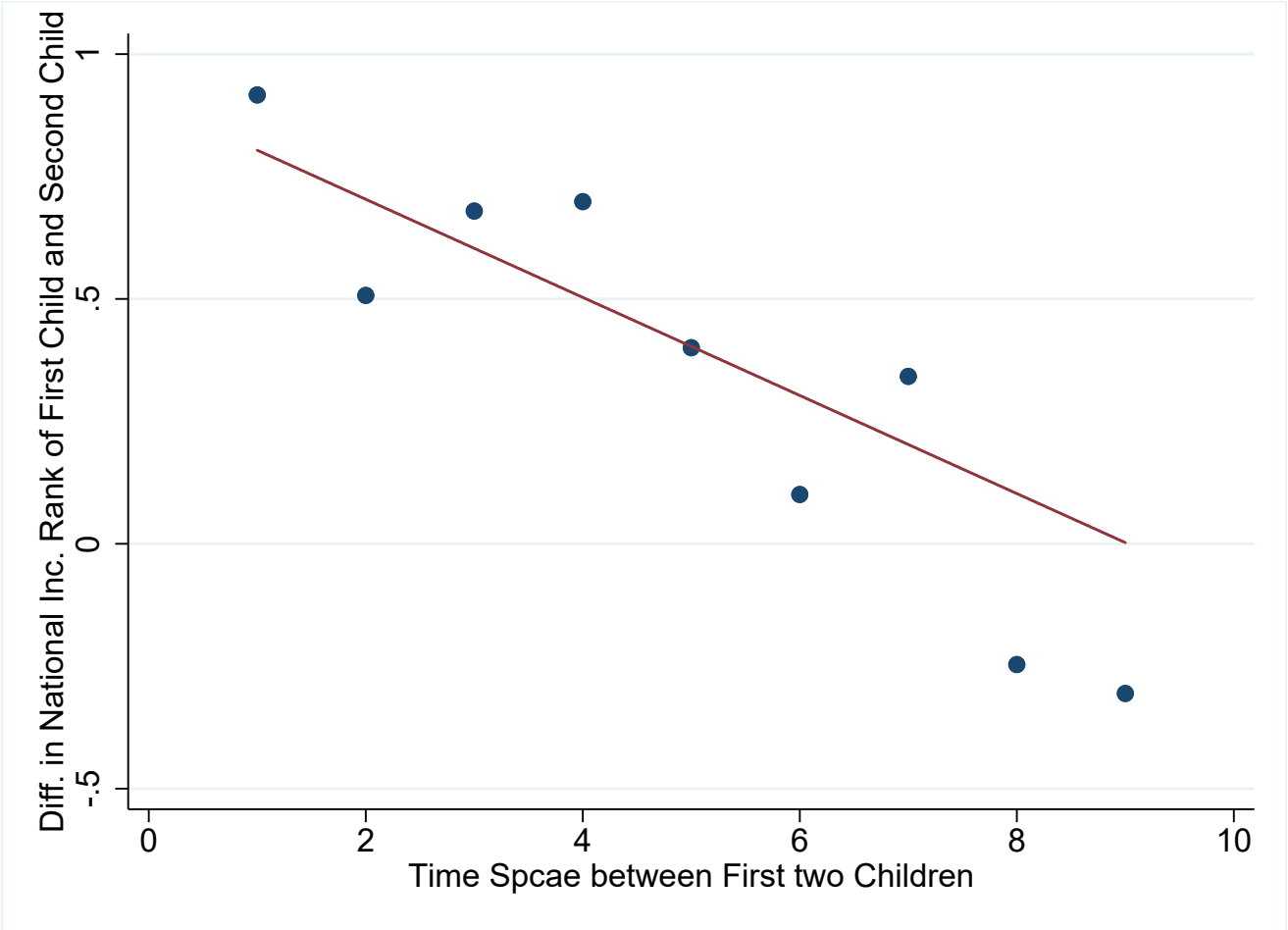
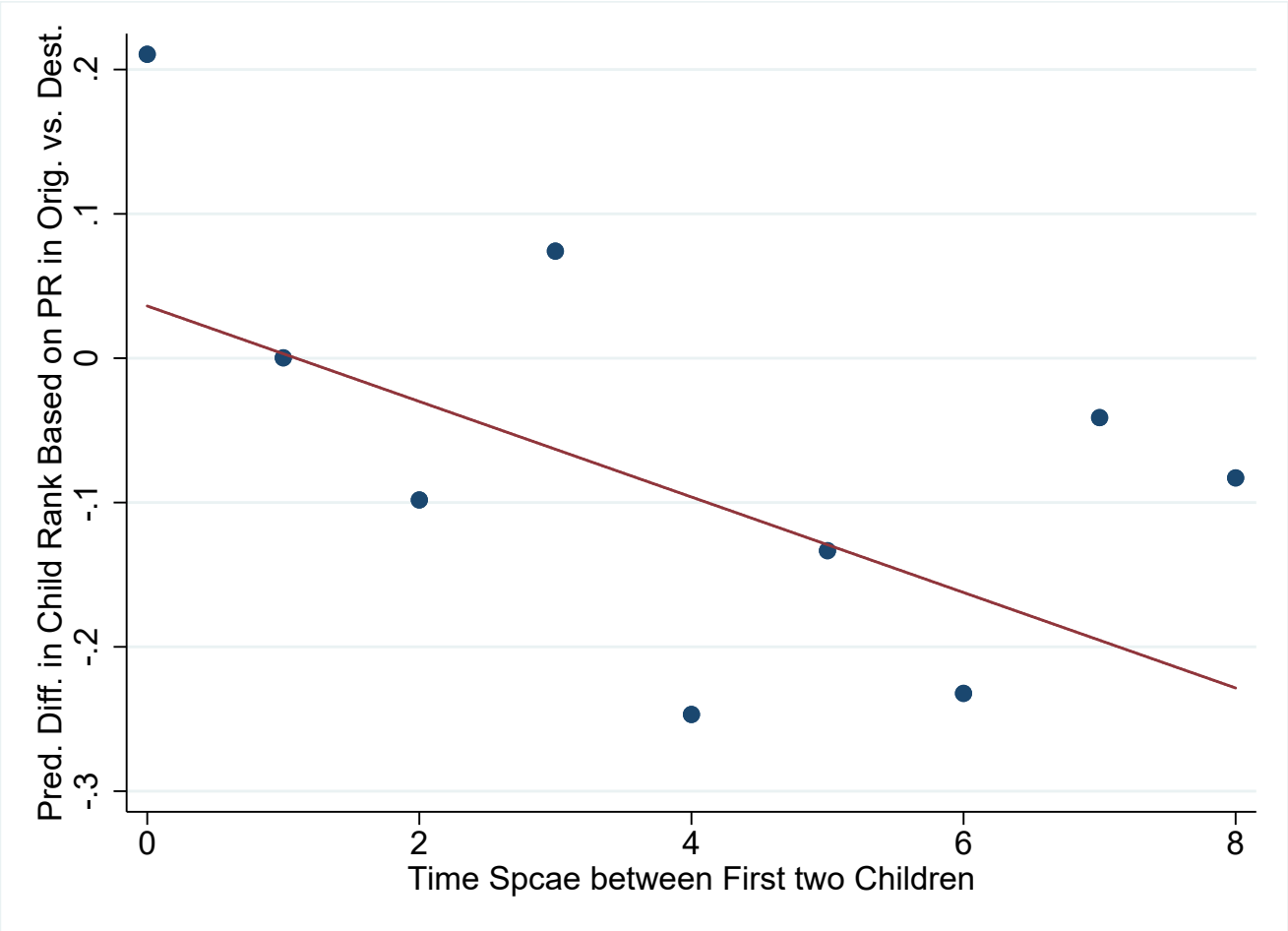


Figure: Time Space and Choices of Destination Neighborhood



Discussion of the Identification Assumption

Identification Assumption

Exposure effect at age m: the impact of spending year m of one's childhood in an area where PR's outcomes are 1 pp higher

Thought experiment: randomly assign children to new nbhd d starting at age m for the rest of childhood. The best linear predictor of children's outcomes y_i in the experimental sample, based on the PR's outcomes in CZ d ($\bar{y}_{pds}$):

$$y_i = \alpha_m + \beta_m \bar{y}_{pds} + \theta_i \quad (3)$$

Random assignment: $\theta \perp \bar{y}_{pds}$

Exposure effect at m: $\gamma_m = \beta_m - \beta_{m+1}$, the effect on y_i of spending the year from age m to age m + 1 in the destination

Observational data: $b_m = \beta_m + \delta_m$

Bias $= \delta_m = \frac{cov(\theta_i, \bar{y}_{pds})}{var(\bar{y}_{pds})}$: parent inputs & unobserved det. of children's outcomes covary with PR's outcomes

Exposure Effects- Constant-in-Age Selection Assumption

Bias $= \delta_m = \frac{cov(\theta_i, \bar{y}_{pds})}{var(\bar{y}_{pds})}$

ASSUMPTION 1 (A.1): Selection effects do not vary with the child's age at move: $\delta_m = \delta$ for all m.

Under A.1, we obtain consistent estimates of exposure effects:

$$\gamma_m = (\beta_m + \delta_m) - (\beta_{m+1} + \delta_{m+1}) = b_m - b_{m+1}$$

Even in observational data because the selection effects δ cancel out when estimating the exposure effect.

Rules out differential preferences among parents by age of child for local amenities, such as school quality, that are not fully captured in adult income percentile rank $\bar{y}_{pds}$

What if Assumption A.1 Is violated?

Under A.1:

$$\gamma_m = (\beta_m - \beta_{m+1}) + (\delta_m - \delta_{m+1}) = b_m - b_{m+1}$$

If A.1 is violated:

1. If sorting decreases in child's age:
   $\delta_m > \delta_{m+1} \quad \forall m \in \{\underline{m}, ..., \overline{m}\} \Rightarrow$ equ (3) overestimates the exposure effect, γ_m
2. If sorting becomes stronger as age increases:
   $\delta_m < \delta_{m+1} \quad \forall m \in \{\underline{m}, ..., \overline{m}\} \Rightarrow$ equ (3) underestimates the exposure effect, γ_m.
3. Unclear if sorting not monotonically changes over the age support exploited for the estimation.

Parental Selection based on Education

Chetty (2018) estimates:

$$y_i = \alpha + \beta_m \Delta_{odps} + \epsilon_i, \quad (4)$$

Parent's education level is one of the omitted variables affecting both child's outcome and quality of the move across NBHDs.

Let's assume that the true model is as follows:

$$y_i = \alpha + \beta_m \Delta_{odps} + \beta_e edu_i^p + u_i, \quad (5)$$

Then,

$$Plim\ \hat{\beta}_m = \beta_m + \beta_e \frac{cov(edu_i^p, \Delta_{pds})}{var(\Delta_{pds})}$$

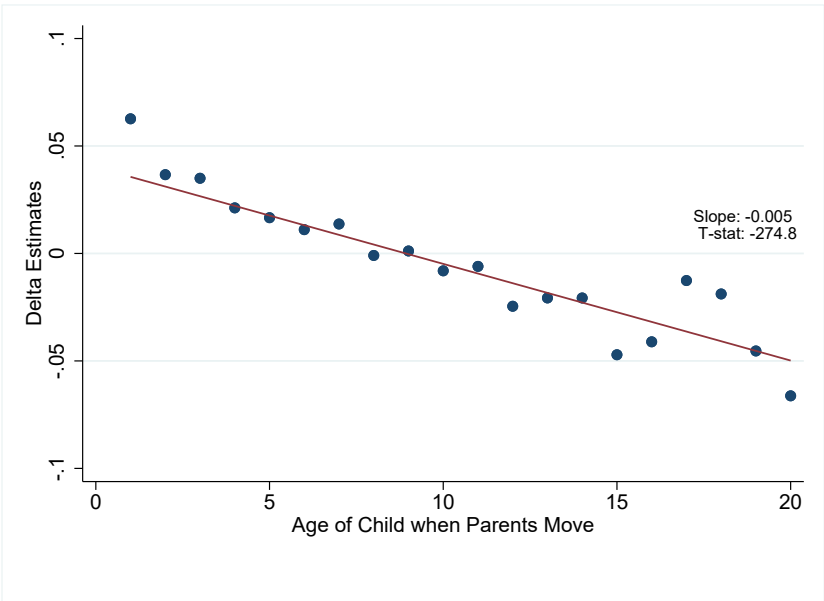
$$= \beta_m + \beta_e \delta_m$$

$$Plim\ \hat{\gamma}_m = (\beta_m - \beta_{m+1}) + \beta_e(\delta_m - \delta_{m+1})$$

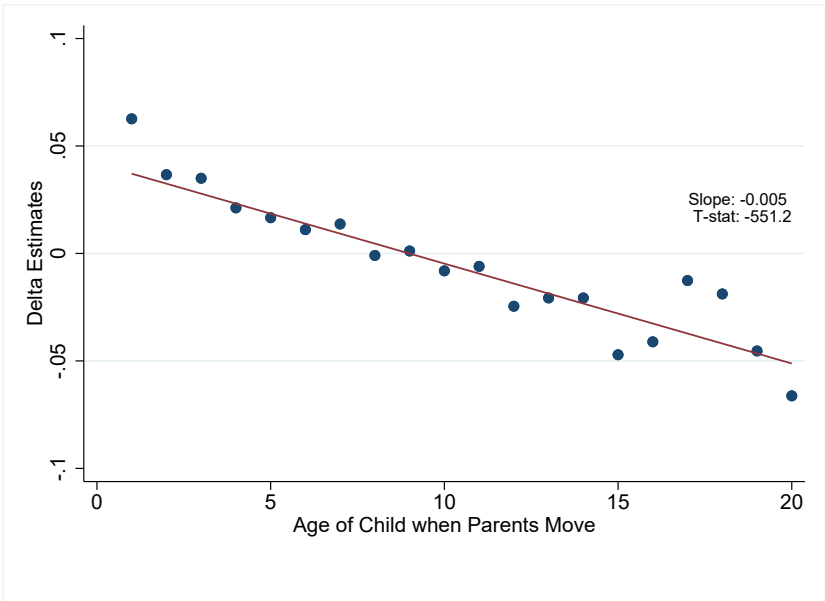
Intensity of Sorting by Age of Child at Move

Figure: Intensity of Sorting b/w Parent's Education and Quality of Move

(a) Owners



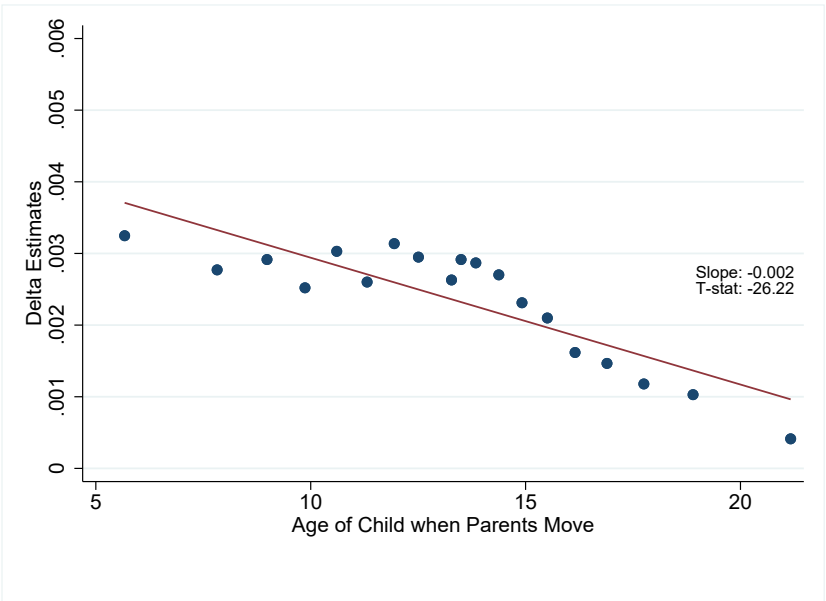
(b) Renters



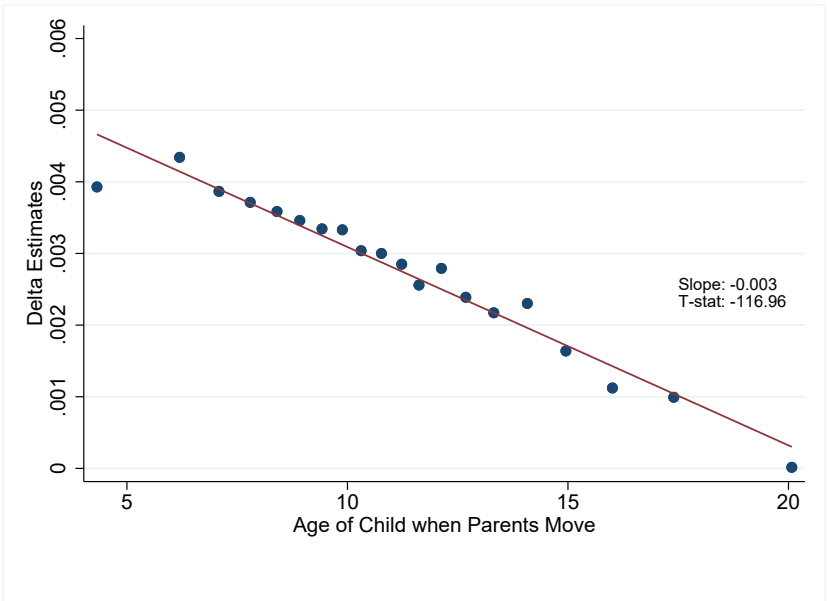
Intensity of Sorting by Age of Child at Move

Figure: Intensity of Sorting b/w Family Structure and Quality of Move

(a) Owners

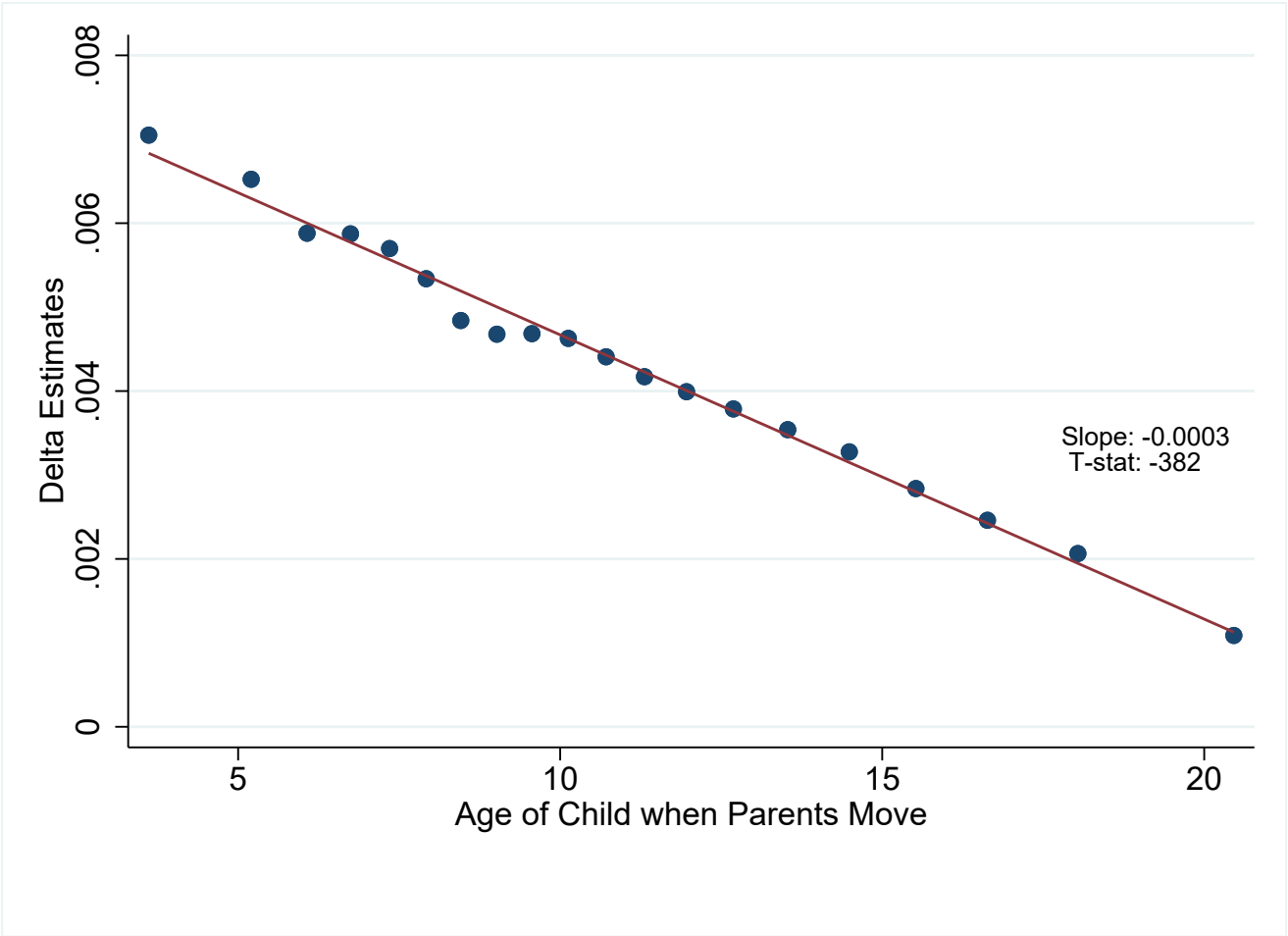


(b) Renters



Intensity of Sorting by Age of Child at Move

Figure: Intensity of Sorting b/w Ownership Status and Quality of Move



Back-of-the-envelope Calculation of the Bias

To evaluate the size of the bias, $\beta_e(\delta_m - \delta_{m+1})$:

1. Using equ (5), obtain some estimates for β_e: $\hat{\beta}_e \in [0.82, 1.15]$
2. Using the slope of covariance term (between parents' education level and quality of the move) over age of child, obtain an estimate for $(\delta_m - \delta_{m+1})$: $(\delta_m - \delta_{m+1}) \approx 0.005$

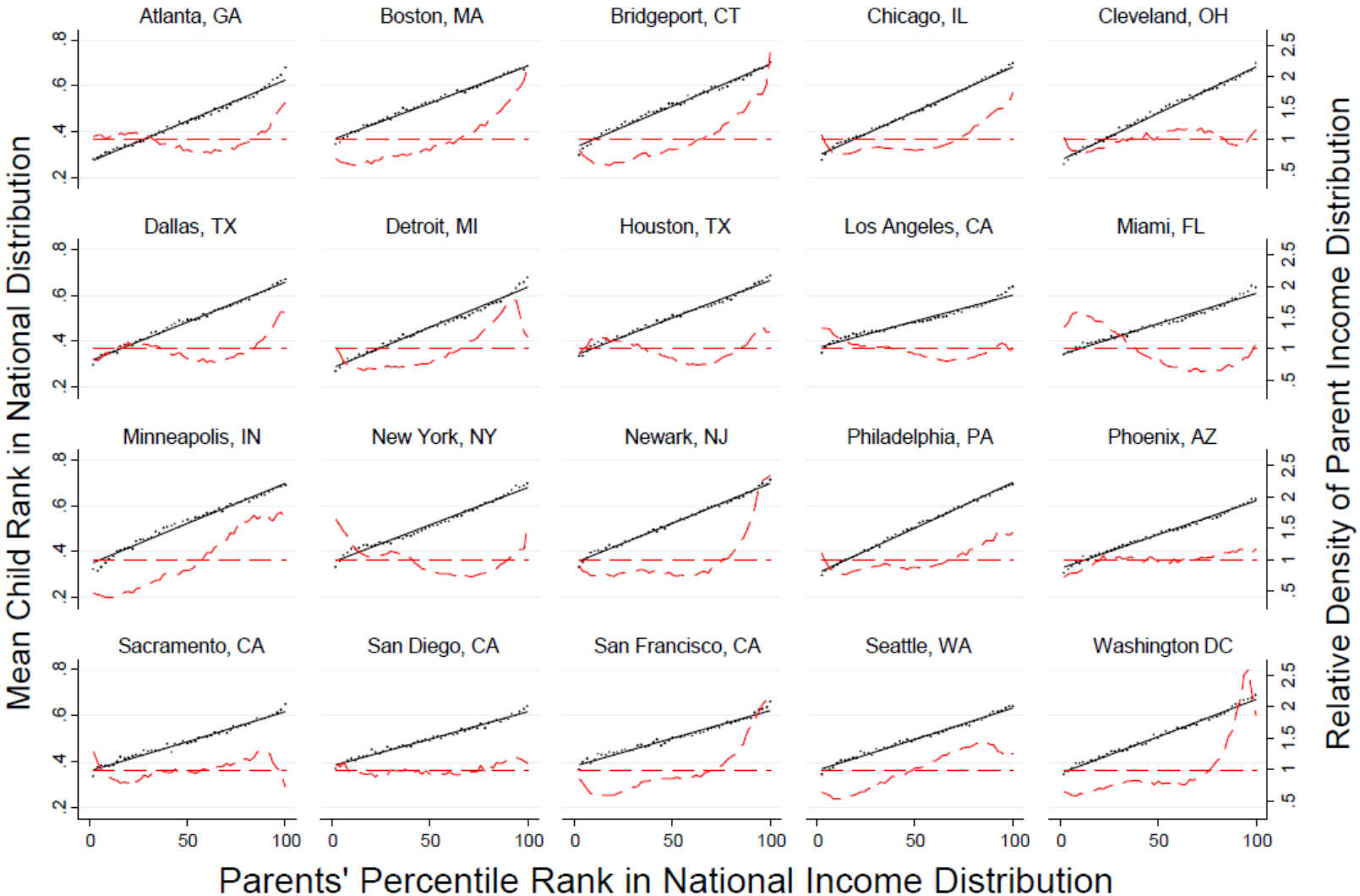
Conclusion

- Recent studies have exploited quasi-experimental strategies to identify the causal impact of NBHDs to outcomes of children.
- One of the main challenges in estimating the causal impact of NBHDs on child is the endogeneity of NBHD quality.
- We investigated the main identifying assumptions of recent studies in the literature.
- Parental sorting into NBHDs has an important lifecycle gradient; it is not orthogonal to age of children at move.
- The constant-in-age selection effects assumption in recent empirical works is violated, leading researchers to overestimate the impact of NBHD on child outcomes.

Thanks!

Appendix

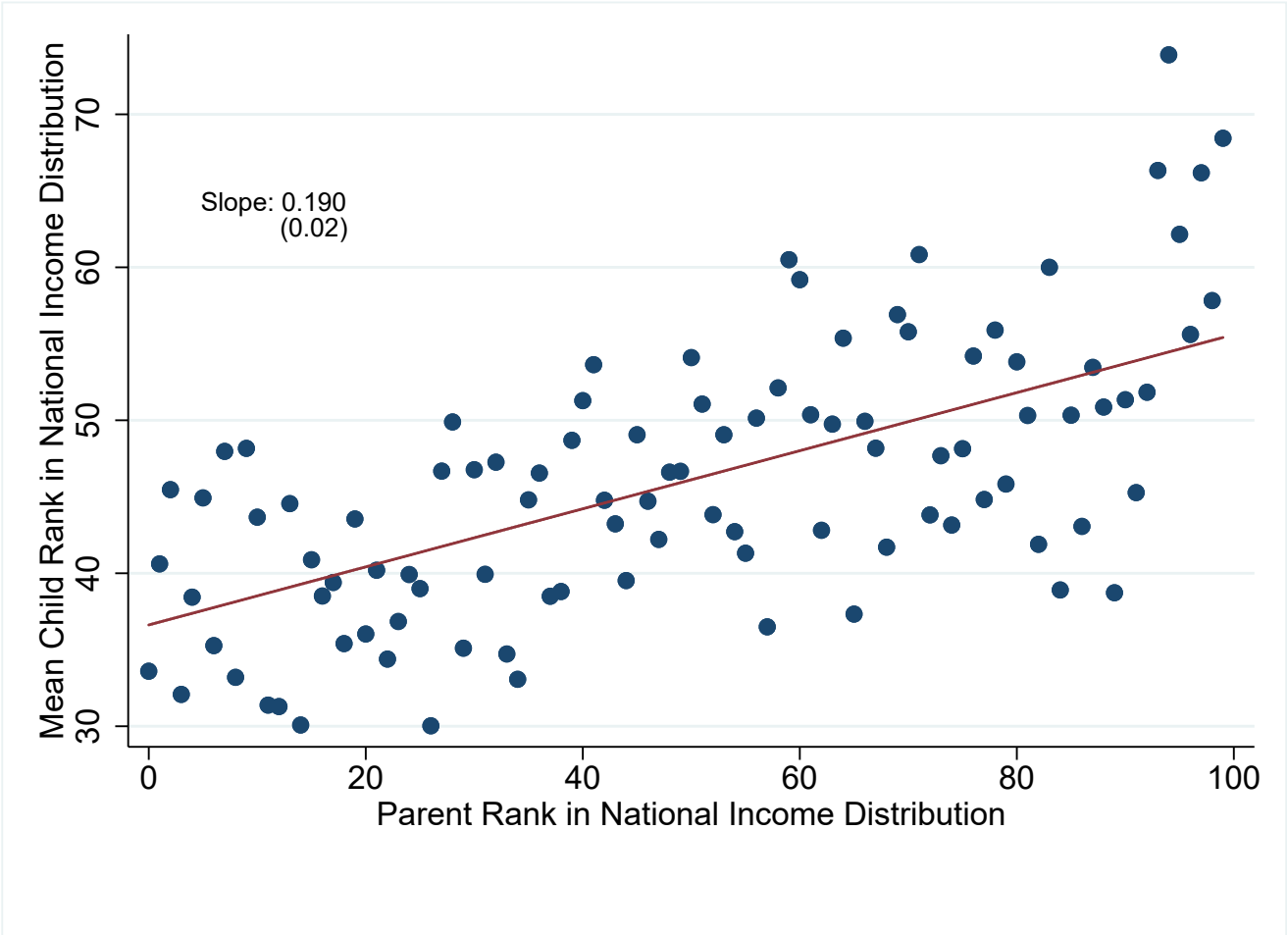
Geographical Variation in Outcomes of PR- across CZs



back

Mean Income Ranks for Children of PR of Copenhagen

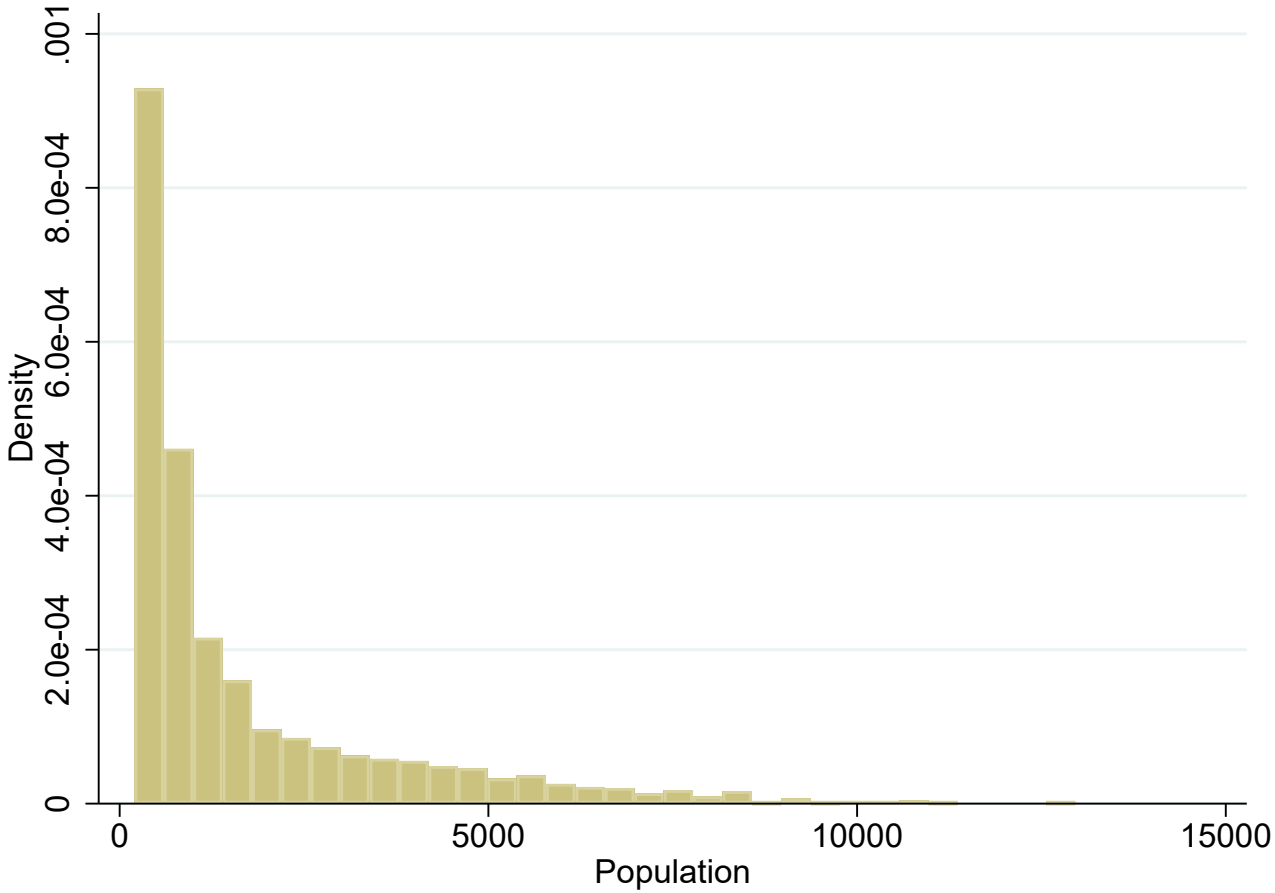
Figure: Mean Child Inc. Rank vs Parent Inc. Rank for Children



back

Population Distribution

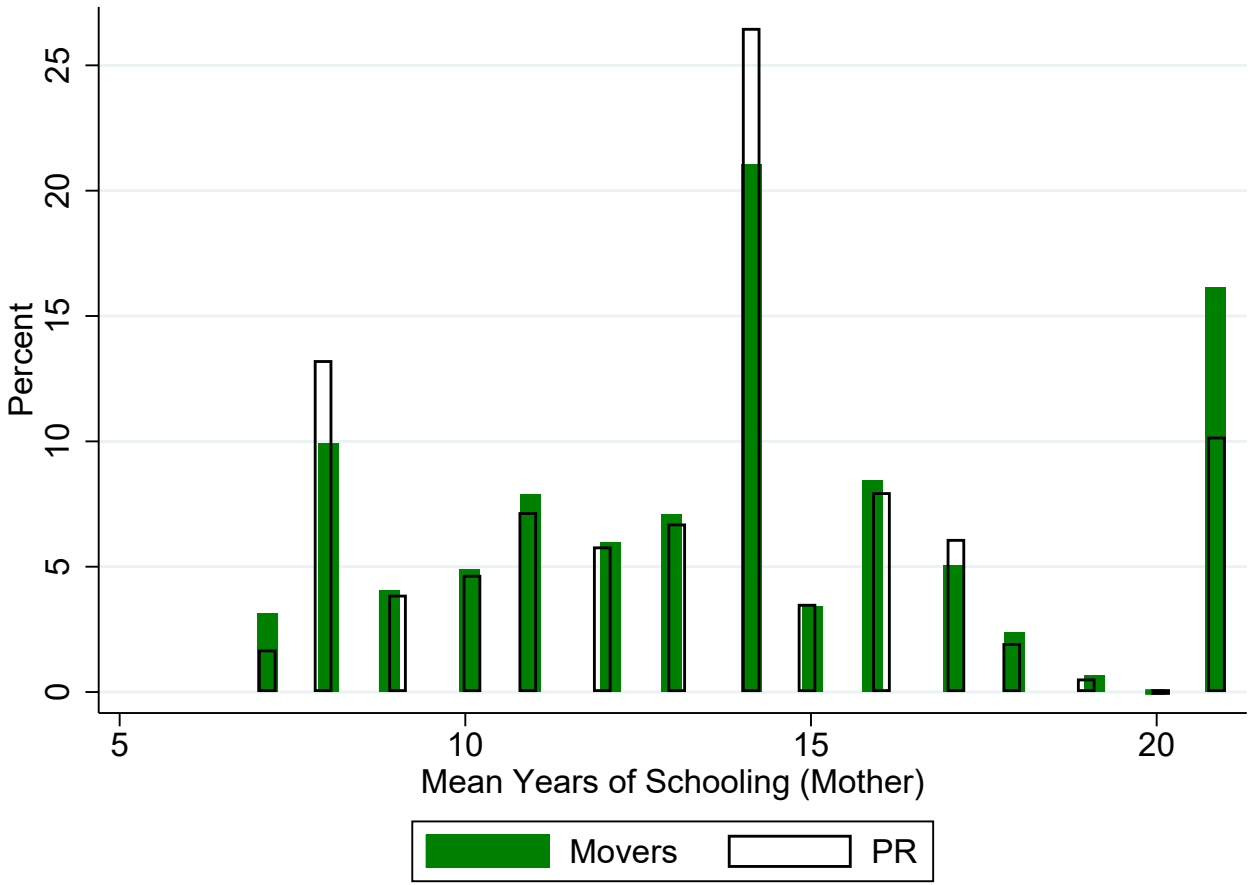
Figure: Distribution of Population (Parish-level)



back

Education Level and PR Status

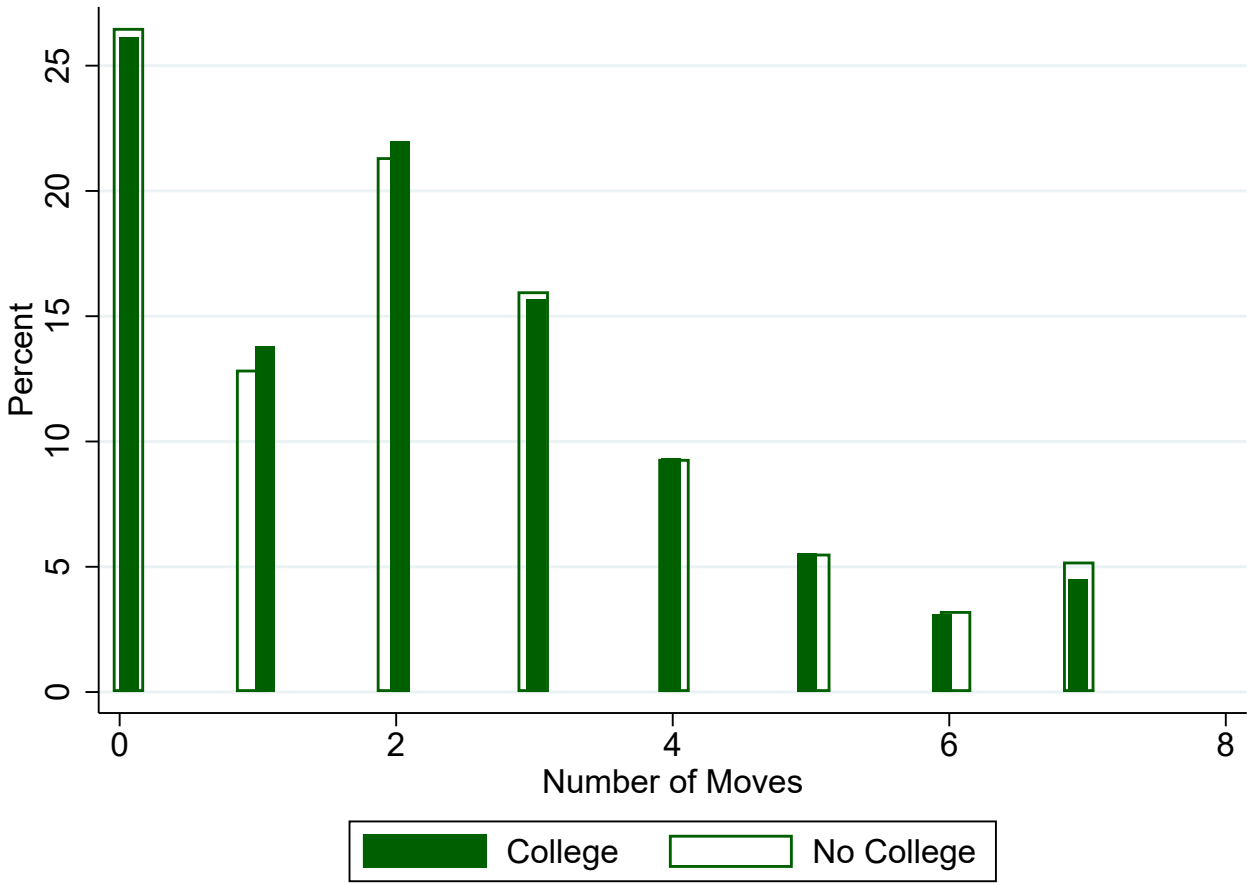
Figure: Distribution of Years of Schooling by Permanent Residence Status



back

Number of Moves

Figure: Number of Moves by Education Level



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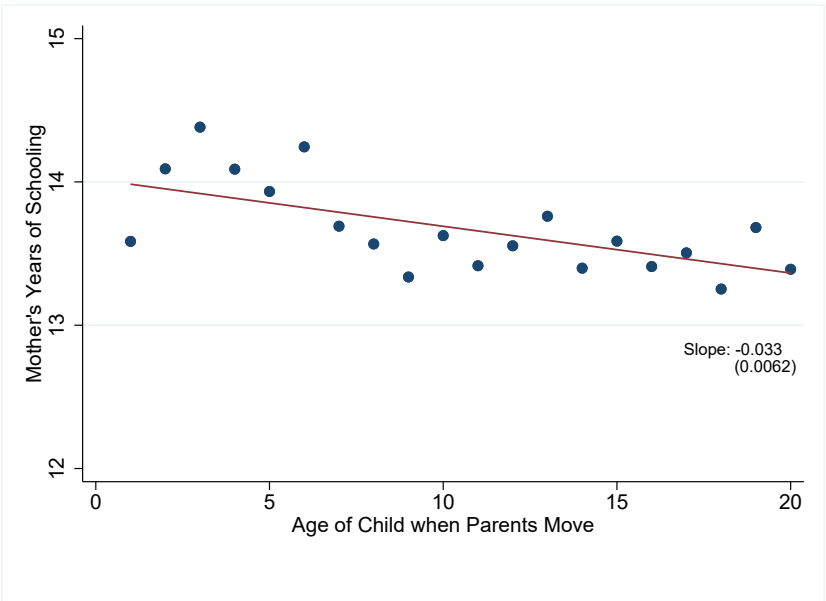
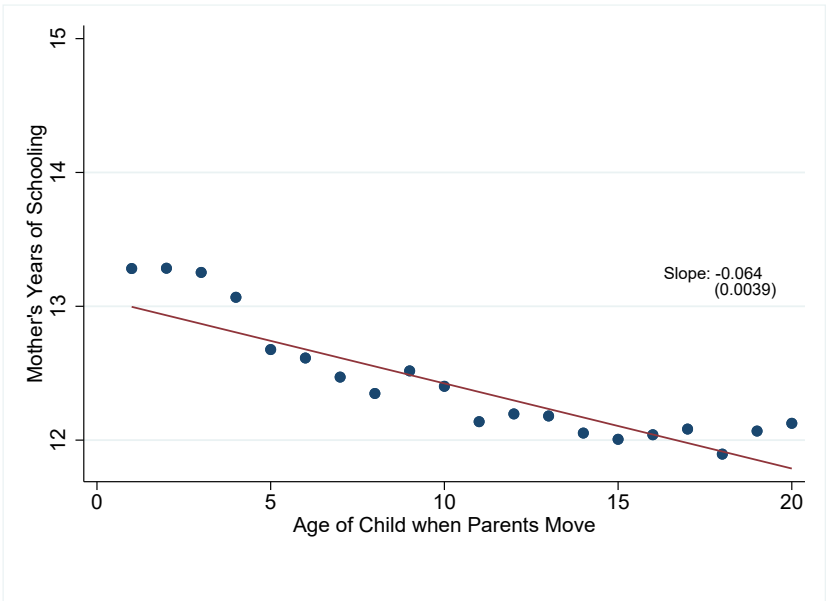
Parental Char. and Age of Child when Parents Move

Figure: Age of Child at Move and Parental Edu. by Ownership Status

(a) Owners



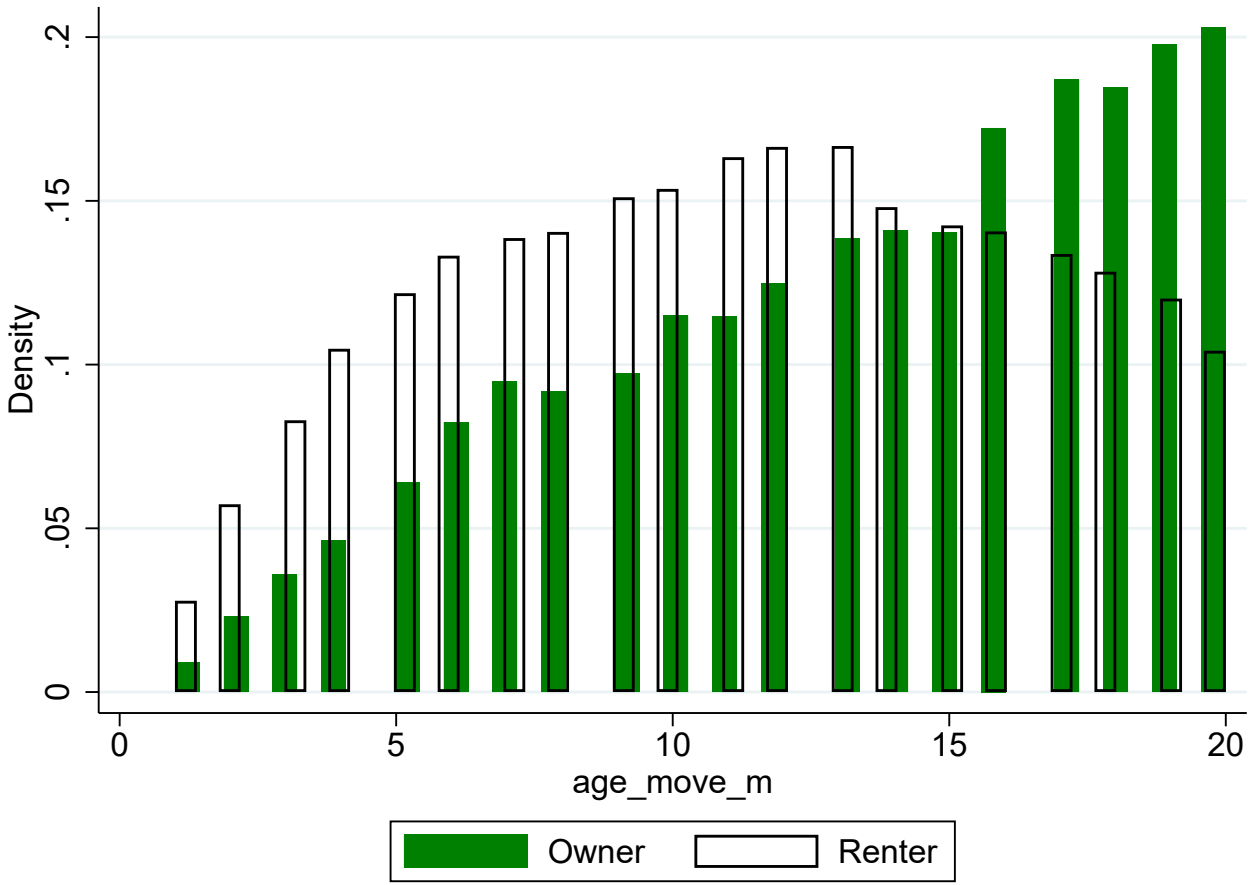
(b) Renters



back

Distribution of Age of Child at Move- by Ownership Status

Figure: Timing of Moves across Neighborhoods by Home Ownership

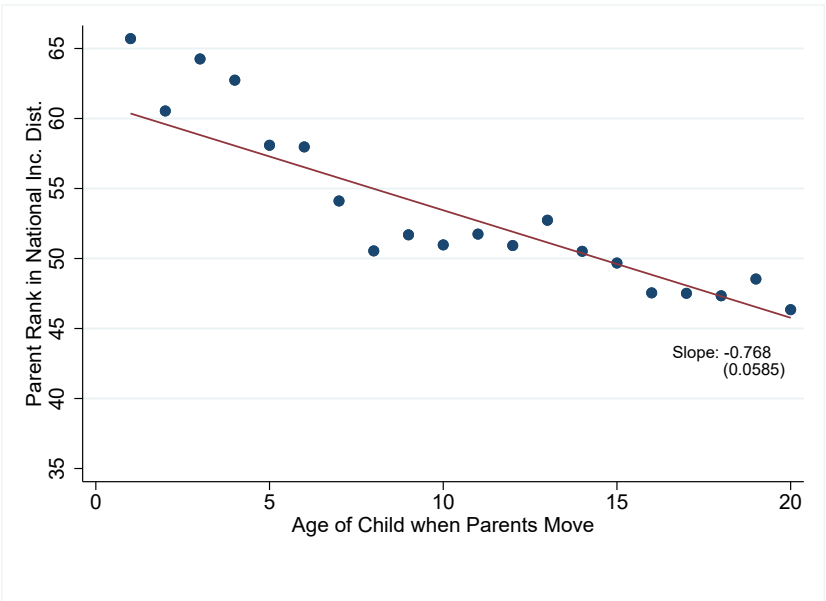


back

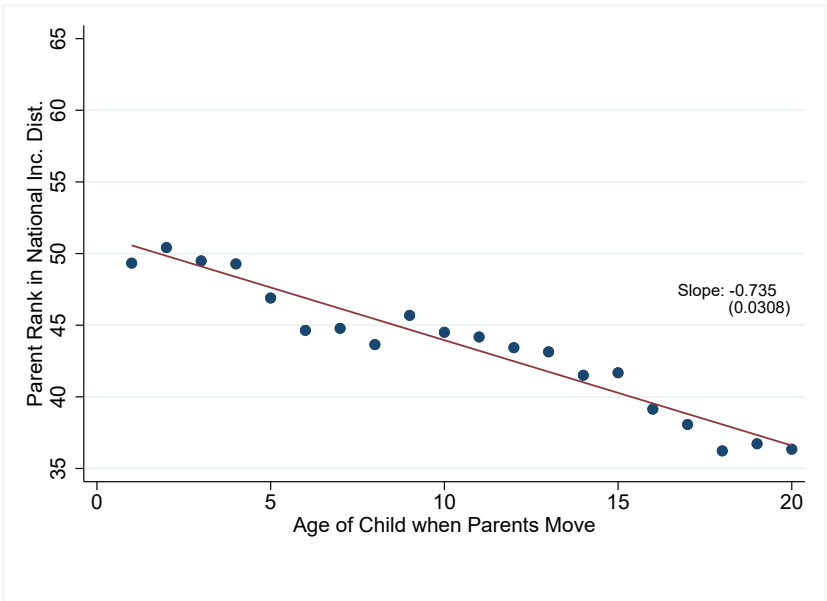
Parental Disposable Inc. by Ownership Status

Figure: Parental Income Rank and Age of Child when Parents Move

(a) Owners



(b) Renters

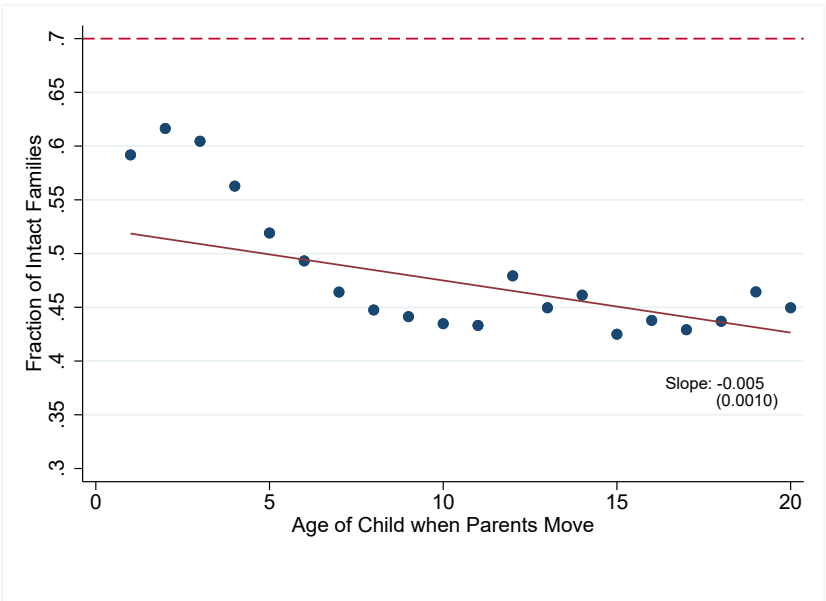


back

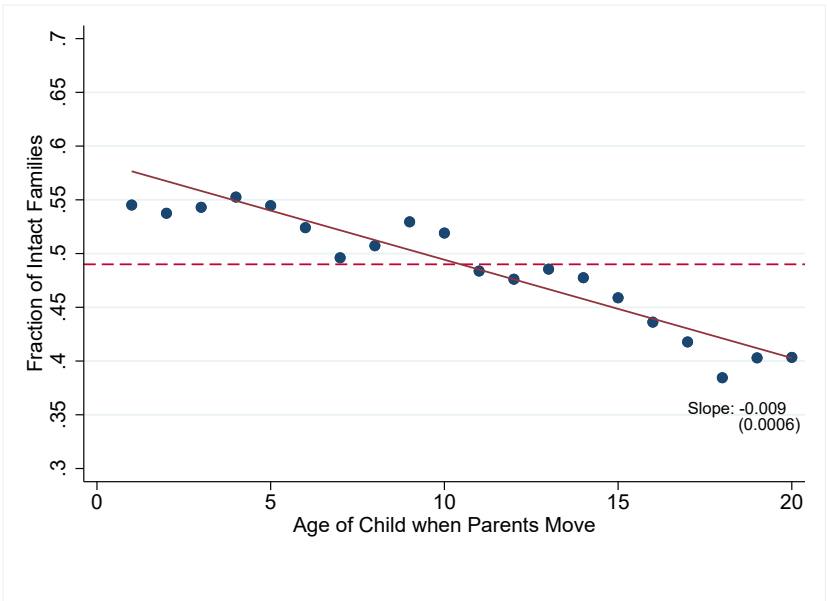
Parental Family Structure and Age of Child at Move

Figure: Fraction of Intact Families and Age of Child when Parents Move

(a) Owners



(b) Renters

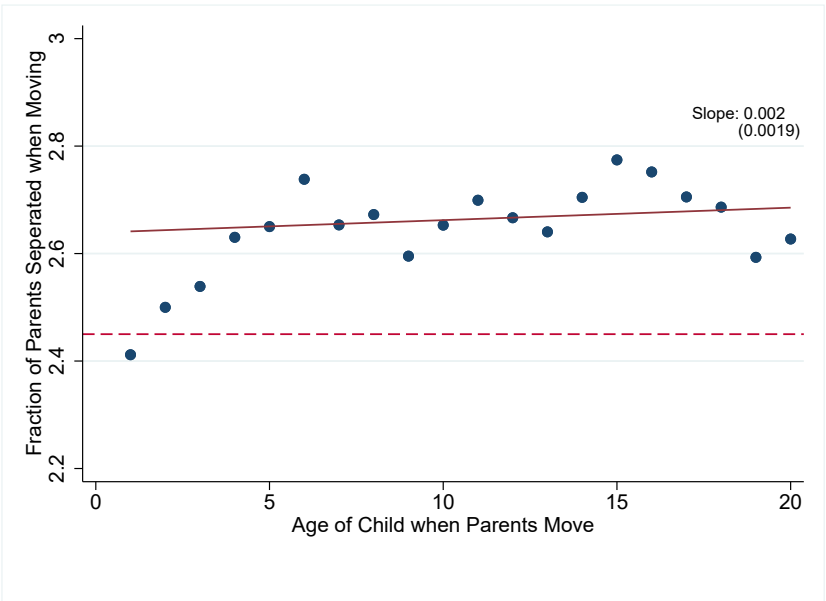


back

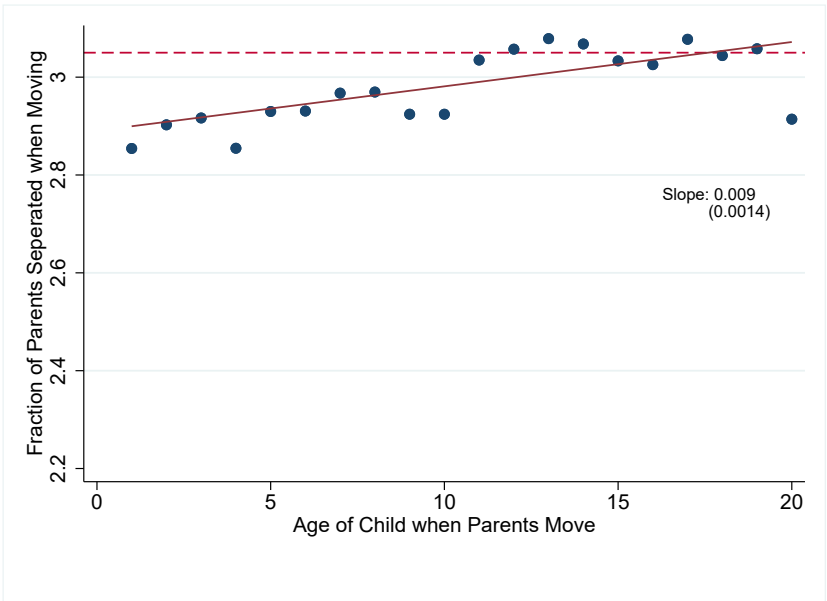
Family Size and Age of Child at Move

Figure: Average Family Size and Age of Child when Parents Move

(a) Owners



(b) Renters

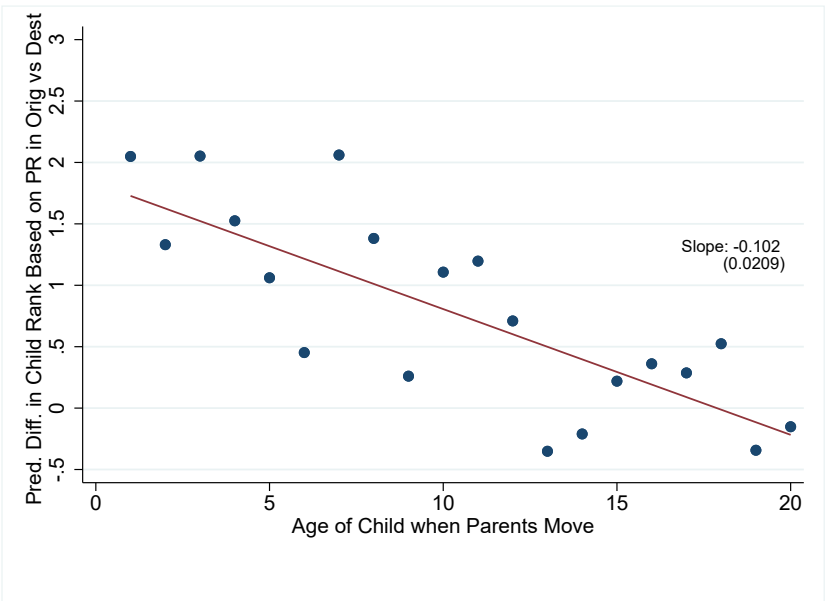


▸ back

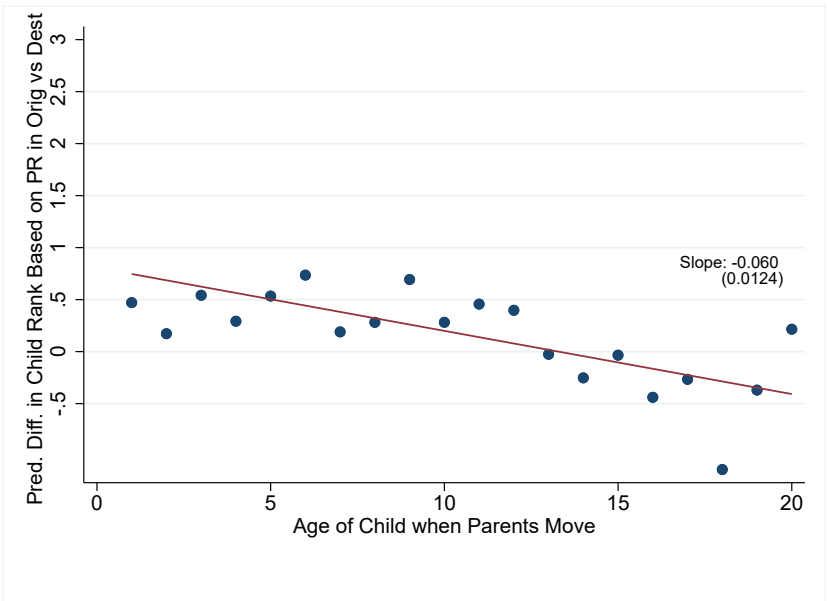
The Quality of Moves and Age of Child at Move

Figure: The Quality of Moves by Ownership Status

(a) Owners



(b) Renters

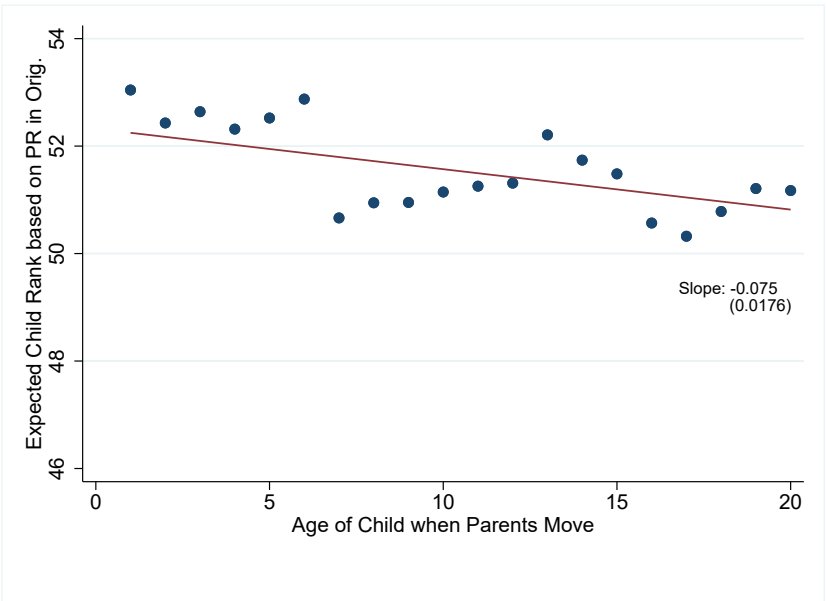


▸ back

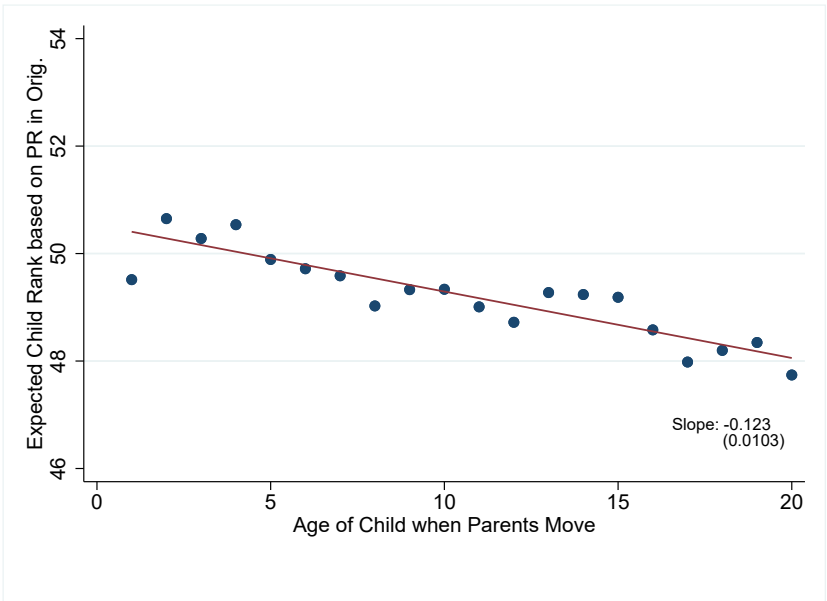
The Quality of Origin and Age of Child at Move

Figure: The Quality of Moves by Ownership Status

(a) Owners



(b) Renters

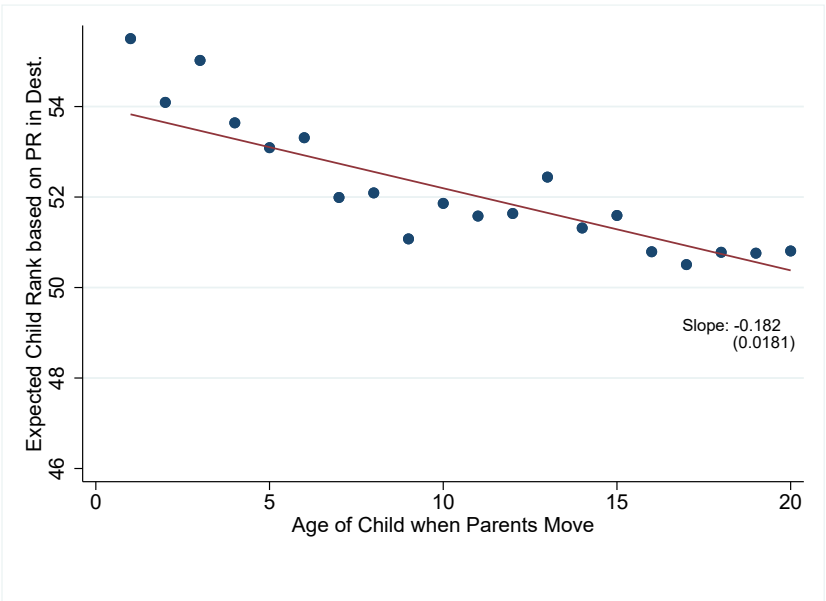


back

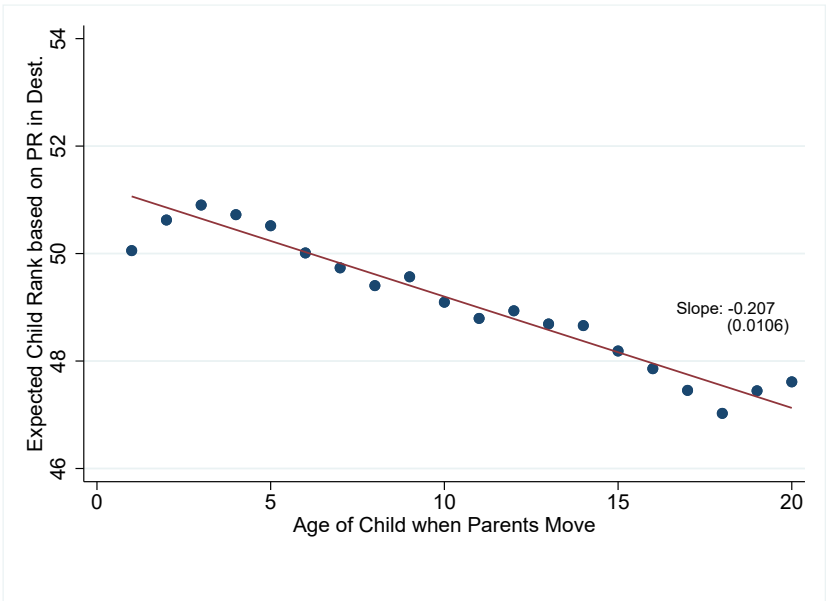
The Quality of Destination and Age of Child at Move

Figure: The Quality of Moves by Ownership Status

(a) Owners



(b) Renters

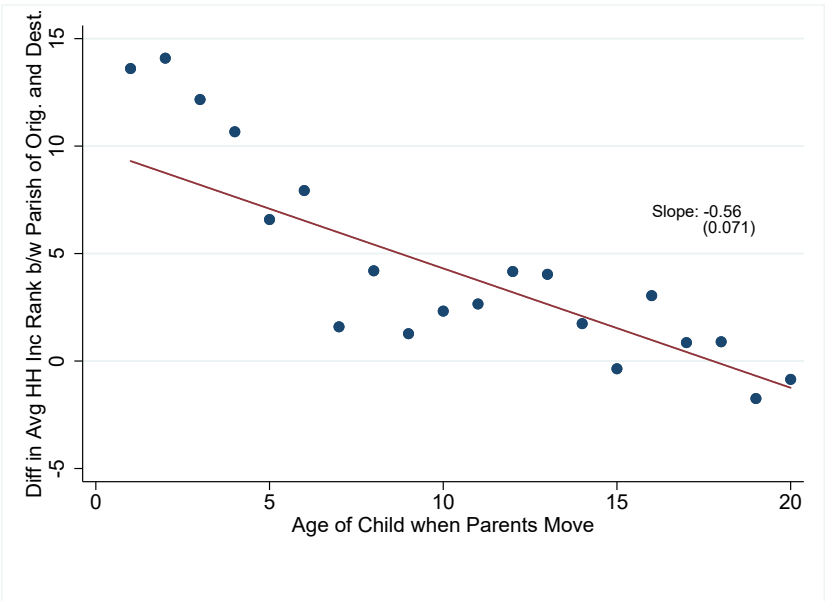


back

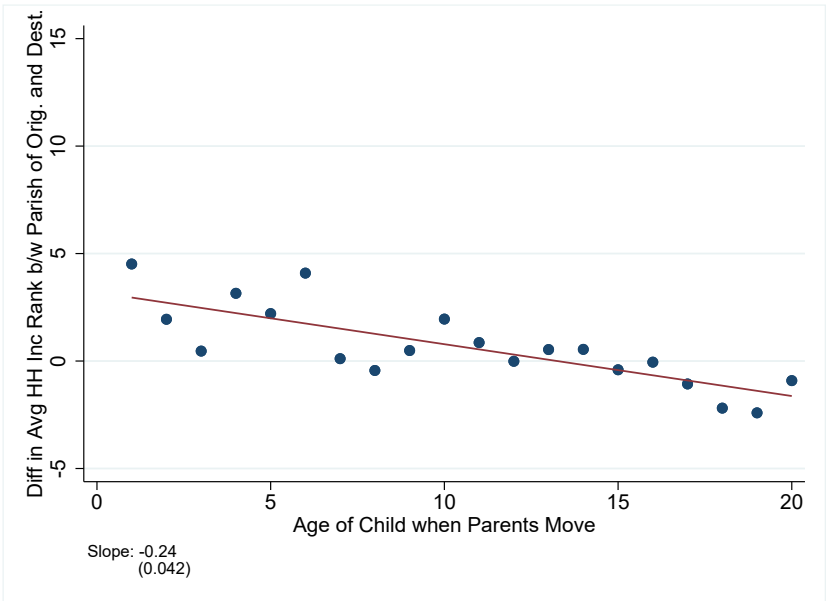
NBHD (Parish) Income Rank and Age of Child at Move

Figure: Change in nbhd Inc Rank and Age of Child

(a) Owners



(b) Renters

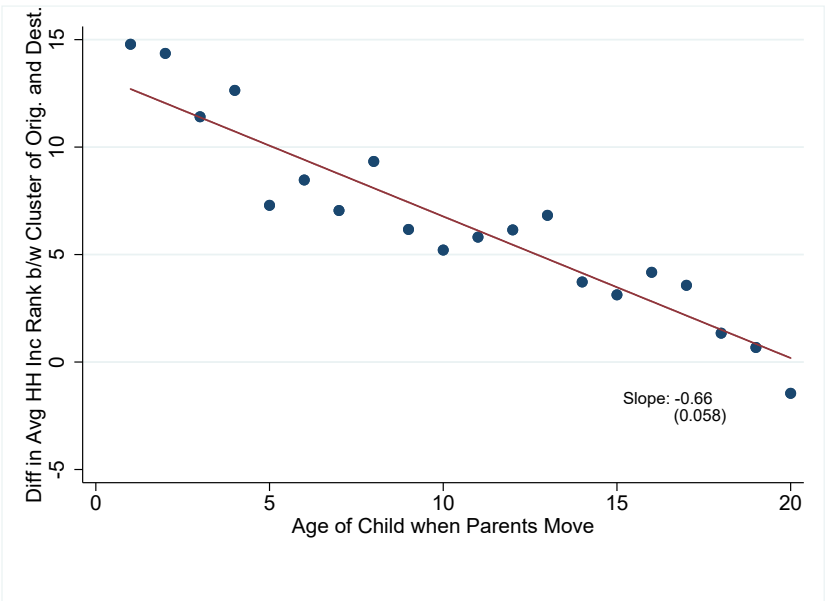


▸ back

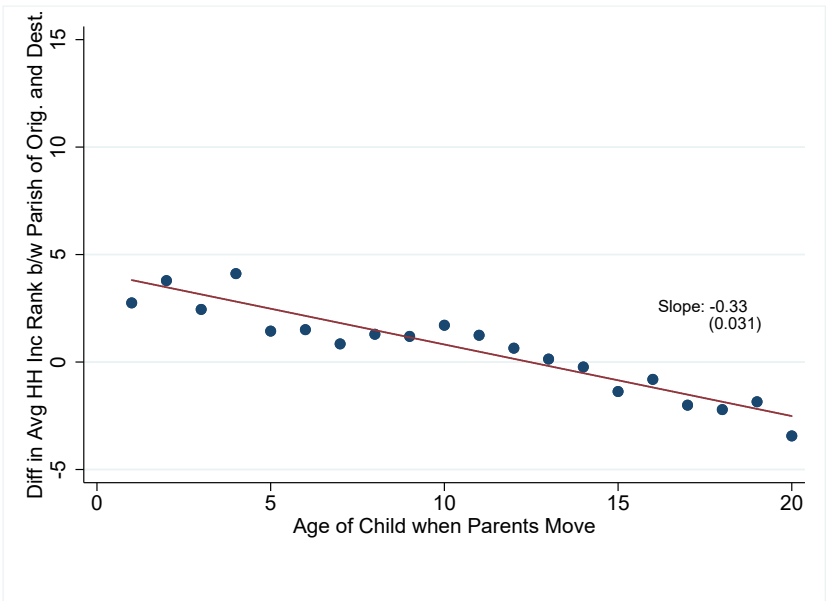
NBHD (Large Clusters) Inc Rank and Age of Child at Move

Figure: Change in nbhd Inc Rank and Age of Child

(a) Owners



(b) Renters

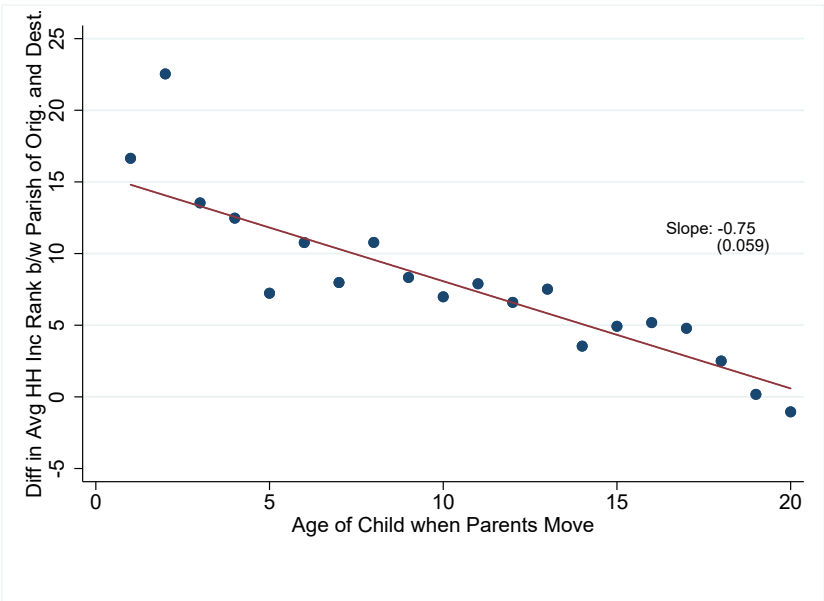


back

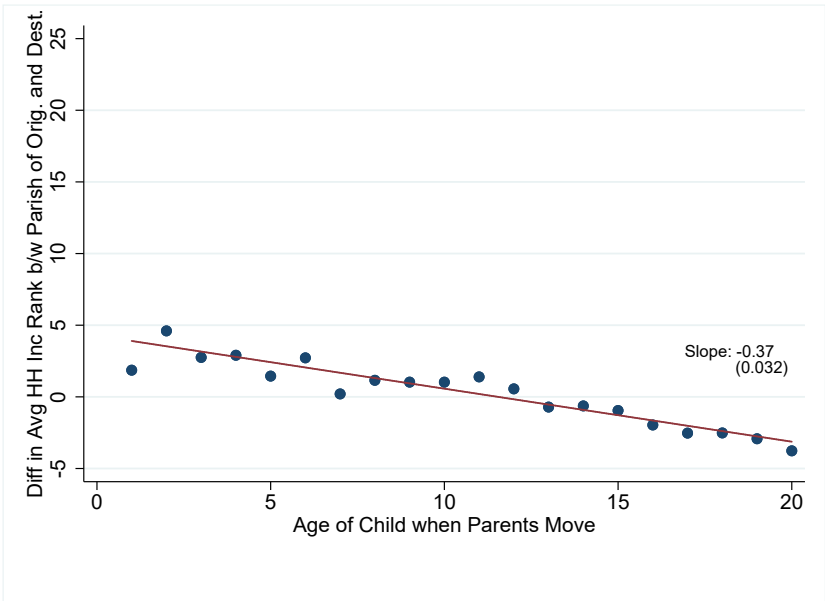
NBHD (Small Clusters) Inc Rank and Age of Child at Move

Figure: Change in nbhd Inc Rank and Age of Child

(a) Owners



(b) Renters

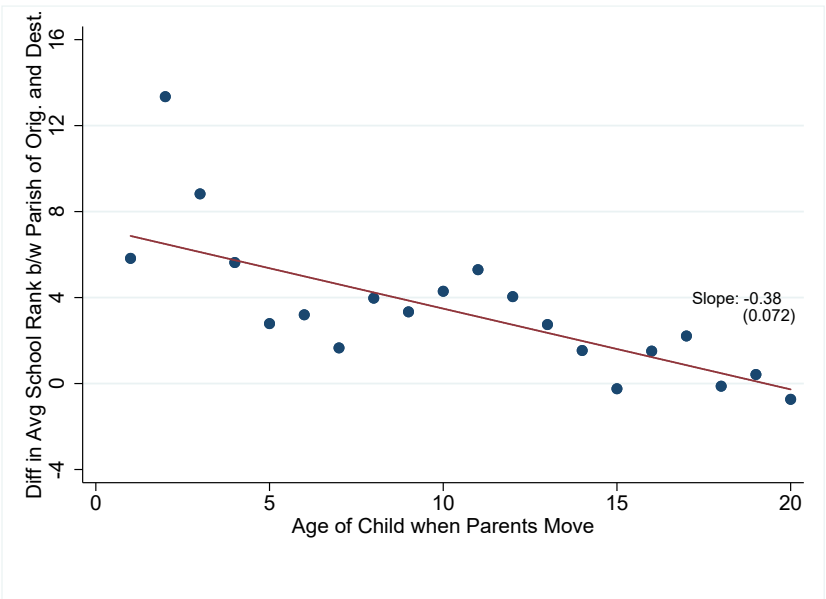


back

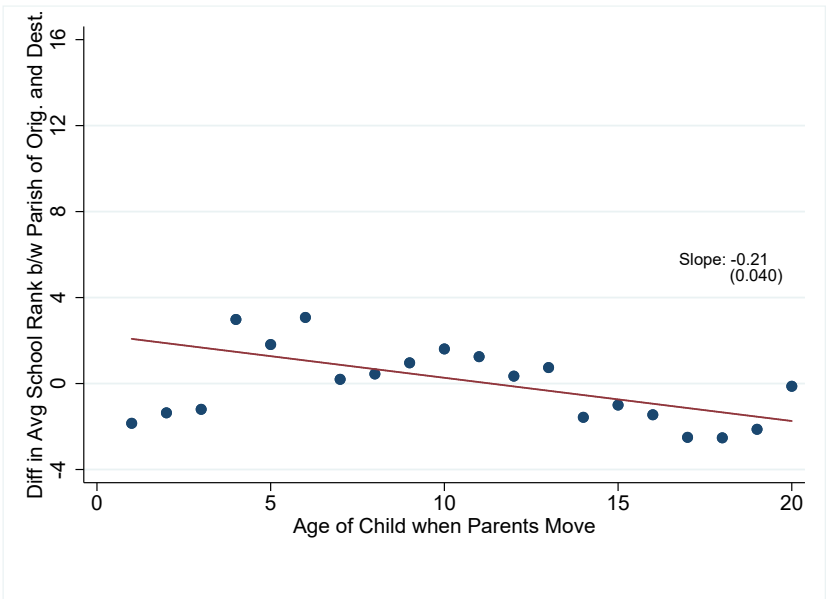
NBHD (Parish) School Quality Rank and Age at Move

Figure: Change in nbhd School Rank (Math Grades) and Age of Child

(a) Owners



(b) Renters

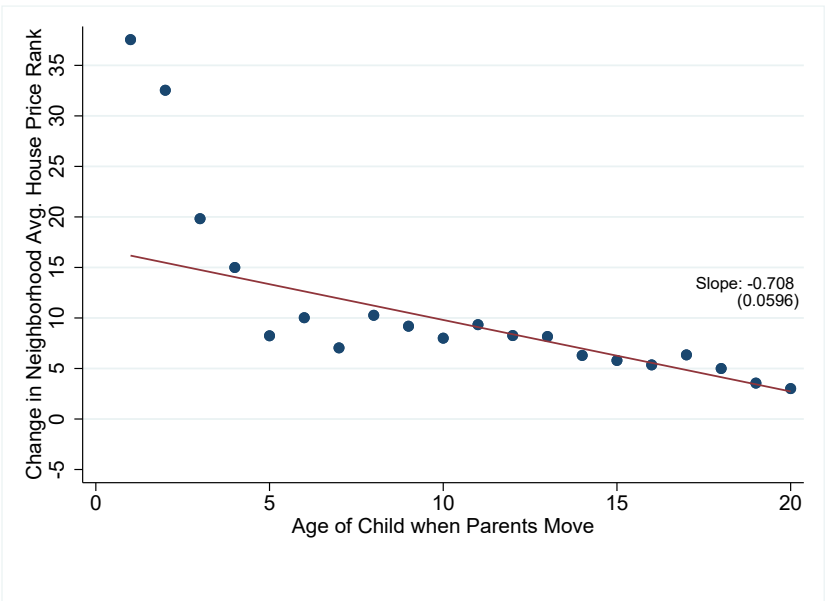


back

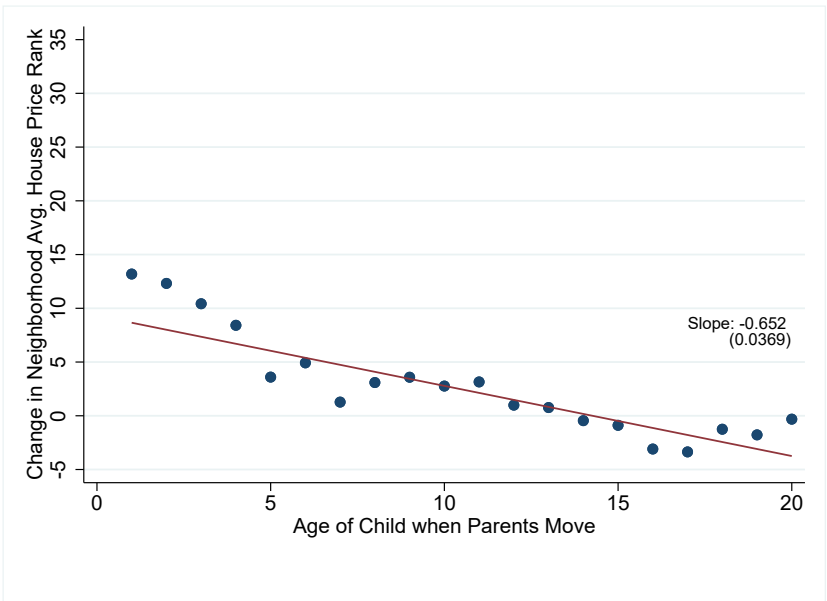
Neighborhood House Price Rank and Age of Child at Move

Figure: Change in nbhd House Price Rank. and Age of Child

(a) Owners



(b) Renters

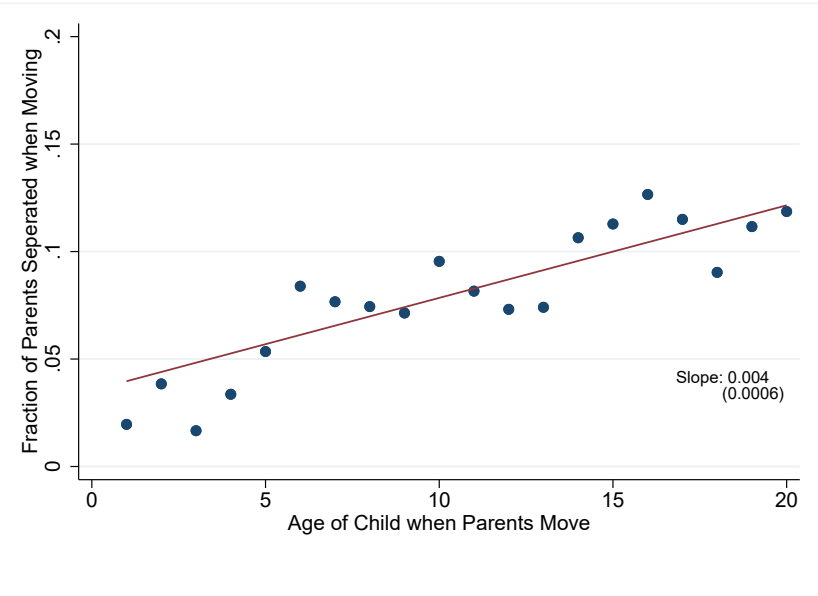


back

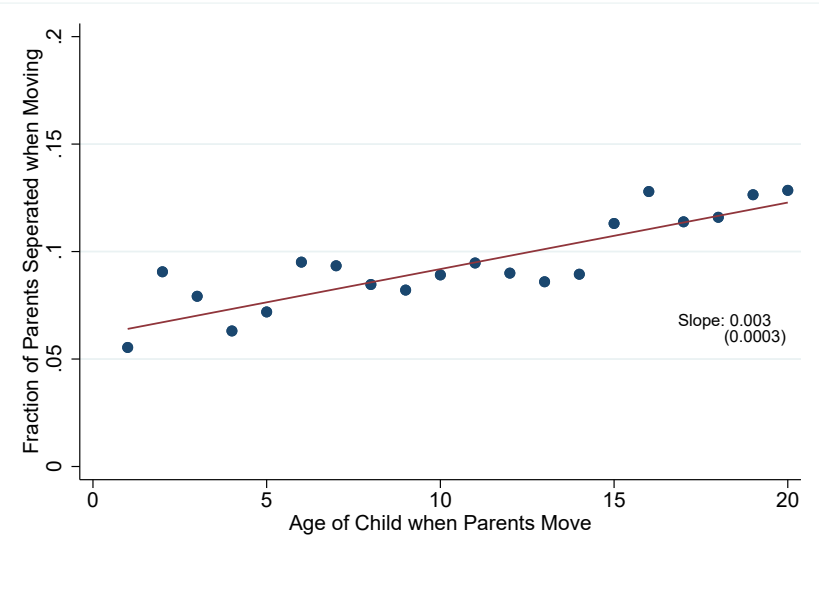
Divorce and Age of Child at Move

Figure: Age of Child at Move & Frac. of Parents Separated when Moving

(a) Owners



(b) Renters



back