Intergenerational Transmission of Family Influence

Sadegh Eshaghnia[1] James J. Heckman[1] Rasmus Landersø[2]
Rafeh Qureshi[3]

[1]University of Chicago
[2]Rockwool Foundation
[3]University of Wisconsin-Madison

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Introduction

Conventional Approach to Intergenerational Mobility

- Focuses on IGE of income and concentrates on certain age windows (Becker & Tomes, 1979, 1986; Chetty et al., 2017; Corak, 2006; Mazumder, 2005; Solon, 1992, 1999).

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- Abstracts from timing considerations within life cycle stages.
- Focuses on realized lifetime incomes across generations using snapshots of life cycles in practice due to data limitations.
- Implicitly invokes (limited) stationarity across generations.
- Ignores uncertainty and credit constraints.

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- Income expectations that govern child investment decisions not the same as the realizations of those expectations.
- We select IGEs of life-cycle measures that are most predictive of important childhood outcomes.

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- Analyze intergenerational mobility of lifetime measures and its driving forces.

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  - Education mediates around 70% of the intergenerational dependence and changes across generations.
  - Strong dependence in lifetime resource across generations even in a generous welfare state with substantial social benefits and social insurance and redistribution through taxes and transfers.
- Lifetime absolute mobility has been greatly underestimated by traditional measures, especially for the affluent.
  - Current generations are better off than previous ones after accounting for uncertainty and credit markets.

Data

Data Sources

- We use full population register data from Denmark from 1980–2019. The data include:
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- We impute consumption for the full adult population based on information from the Danish Household Expenditure Survey.

Measures of Resources

Welfare Measures

Table: Definitions of Welfare and Income Indicators

		Variable
Traditional Snapshot Measures	(1)	Wage Income
	(2)	**Income with Transfers**
	(3)	Income without Transfers
	(4)	**Disposable Income**
	(5)	Family Measures (Husband and Wife or Cohabitants)
	(6)	Equivalized Family Measures
	(7)	Household Consumption
	(8)	Survey Imputed Consumption
	(9)	Survey Imputed Consumption with Equivalence Scale
Lifetime Measures	(10)	**Expected Present Discounted Value**
	(11)	Realized Present Discounted Value
	(12)	**Expected Lifetime Wealth**
	(13)	Realized Lifetime Wealth
	(14)	Equivalized Lifetime Measures

Expected PDV

Present Discounted Value of Future Income (PDV):

$$\text{PDV}_{i,t} = \mathbb{E}_{i,t}\left[\sum_{\tau=1}^{T-t} \beta^{\tau} y_{i,t+\tau} \,\middle|\, \underbrace{\mathcal{I}_{i,t}}_{\substack{\text{Information} \\ \text{set for} \\ \text{individual } i \\ \text{in period } t}}\right] \tag{1}$$

Expected Lifetime Wealth

- Approximates value function (Huggett & Kaplan, 2016).
- Expected lifetime wealth at period t:

$$\mathrm{LW}_{i,t} = \mathbb{E}_{i,t}\left[\sum_{\tau=1}^{T-t} s_{i,t+\tau} y_{i,t+\tau} \middle| \mathcal{I}_{i,t}\right]. \tag{2}$$

$$s_{i,t+1} = \mathbb{E}_{i,t}\left[\beta \frac{U_c(c_{i,t+1})}{U_c(c_{i,t})} \mid \mathcal{I}_{i,t}\right].$$

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- Accounts for uncertainty and credit constraints.
  - The expected future consumption for individuals with credit constraints or significant precautionary savings is higher compared to current consumption $\rightarrow$ lower SDF.

SDF, Credit Constraints, Earnings Uncertainty, and Interest Rates

- Household Euler Equation:

$$\mathbb{E}_{i,t}\left[\beta\frac{U_c(c_{i,t+1})}{U_c(c_{i,t})}(1+r_{i,t+1})(1+\underbrace{\lambda_{i,t}}_{\substack{\text{Lagrange multiplier on borrowing constraint}}})\right]=1. \quad (3)$$

- CRRA utility function:

$$U(c_{i,t})=\frac{c_{i,t}^{1-\rho}-1}{1-\rho}.$$

Identifying and Estimating Information Sets

Table: Specification Tests ($\mathcal{Z}$ Is the Final Proxy for Information Set)

		(1)	(2)
Panel A: Full Population			
		y_{50}	$y_{50} - \mathbb{E}(y_{50} \mid \mathcal{Z}_{30})$
Consumption (Age 30)	β_{OLS}	0.35	0.03
	T-stat	(37.50)	(0.72)

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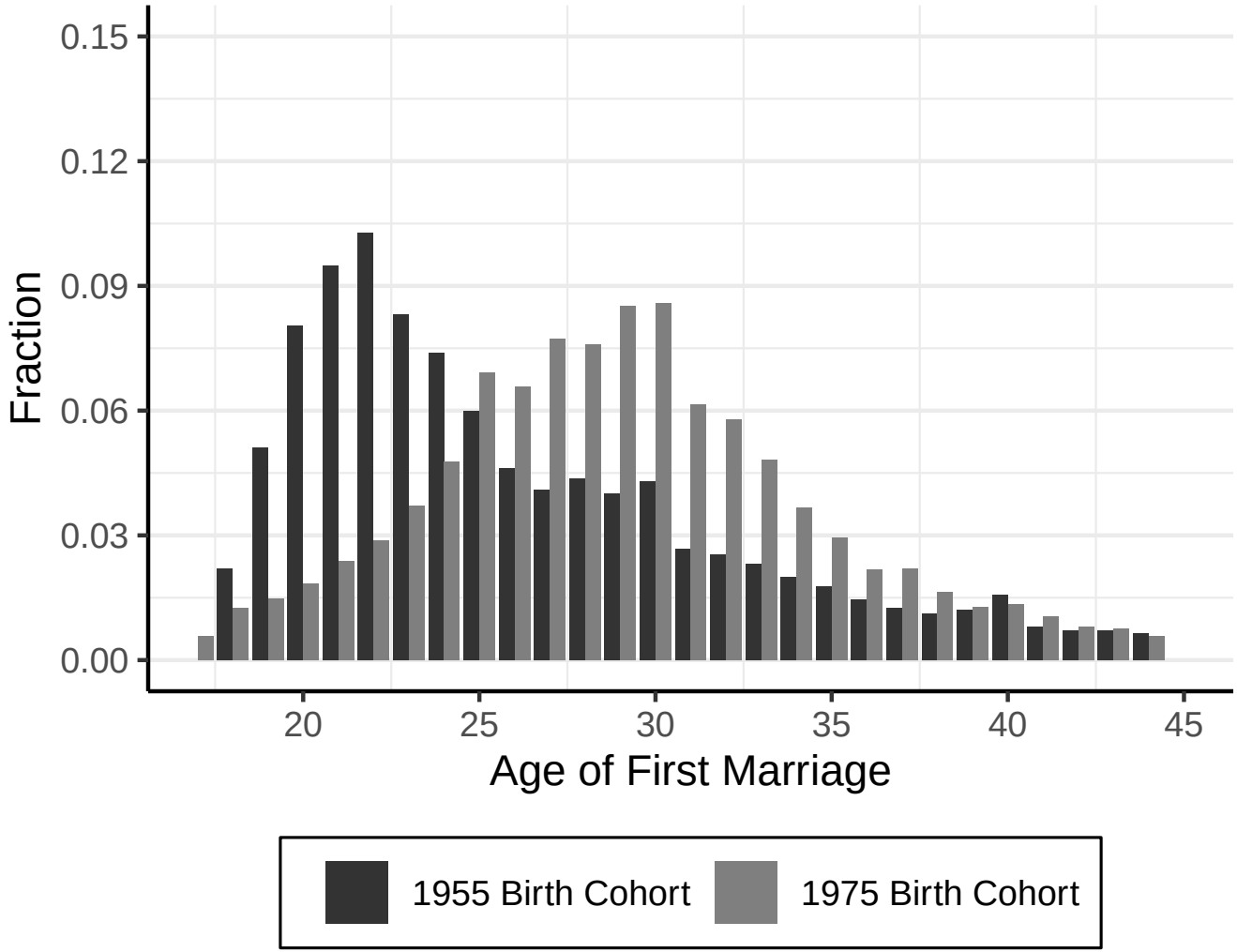
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Disposable Income (Age 30)	β_{OLS}	0.10	-0.00
	T-stat	(14.75)	(-0.12)
Wage Income (Age 30)	β_{OLS}	0.18	0.01
	T-stat	(31.49)	(1.57)
College Attainment	β_{OLS}	0.32	-0.04
	T-stat	(11.91)	(-0.80)
Years of Schooling	β_{OLS}	2.04	-0.09
	T-stat	(15.28)	(-0.39)

Link to Full Test Results Link to Final Set

Nonstationarity across Cohorts

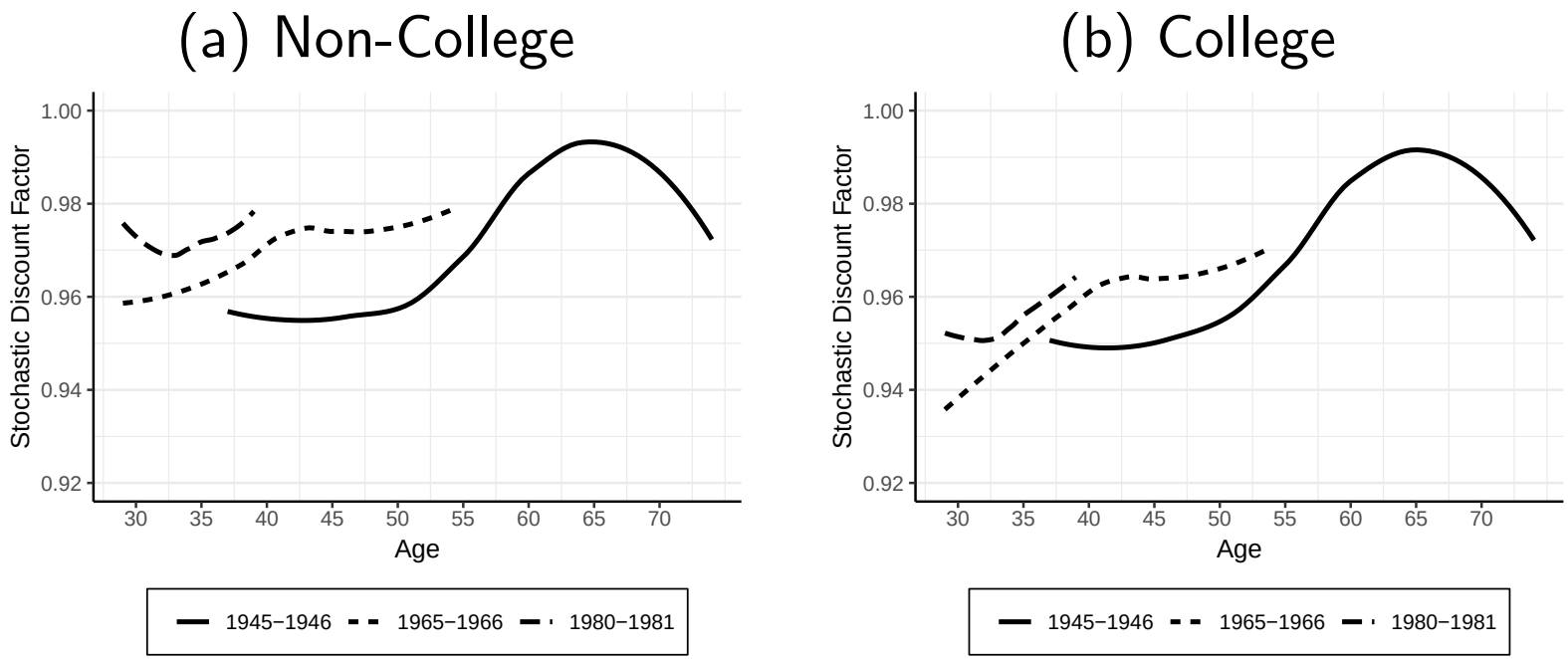
Changes in Timing of Family Formation



Link to Nonstationary Life Cycles

SDF

Figure: SDF across Cohorts



Welfare Measures and Children's Life Outcomes

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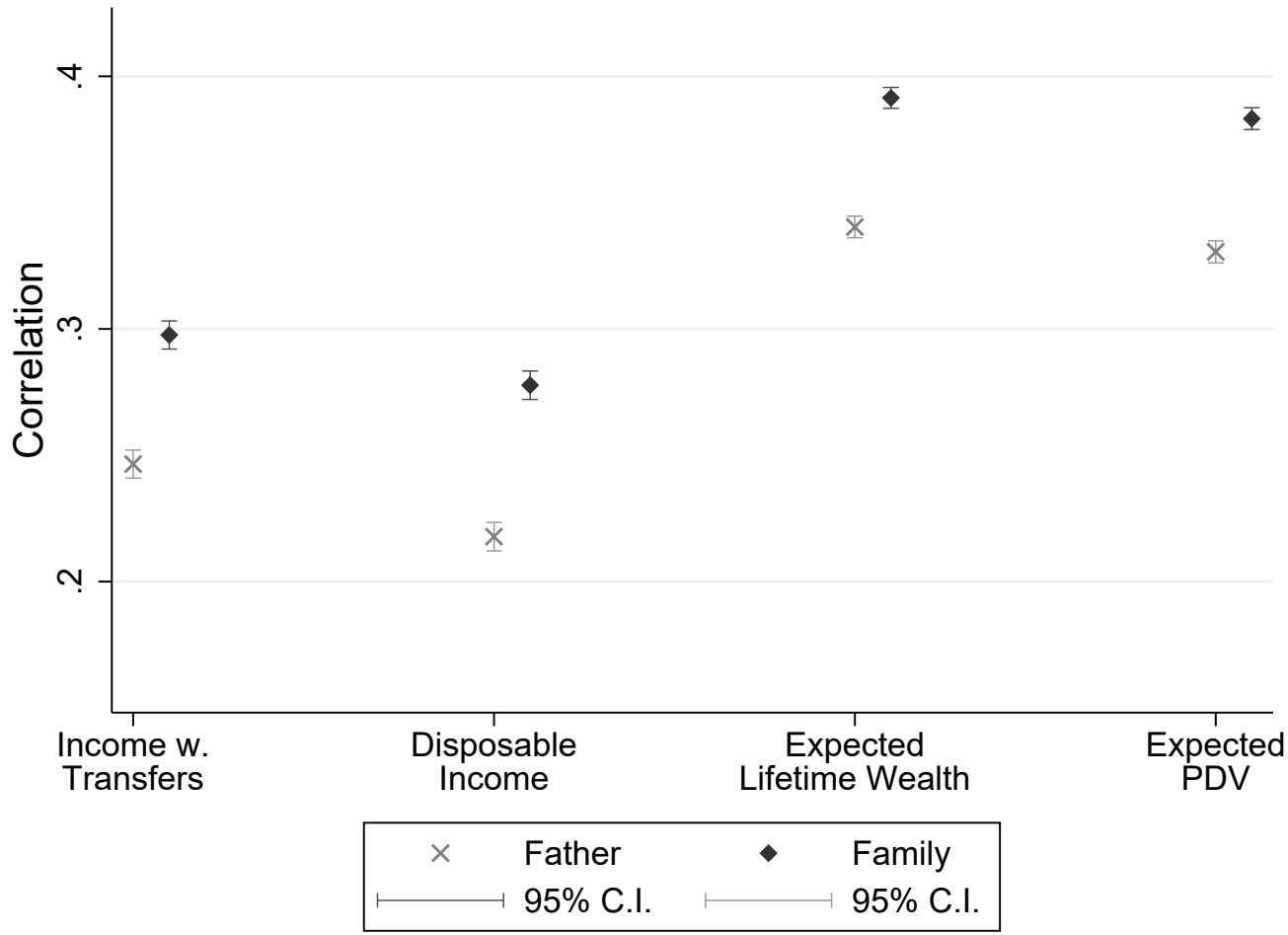
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- There are much stronger correlations for the parents' expected lifetime measures.
- The correlations between test scores and expected lifetime measures of parents range between 0.30 and 0.40, while the corresponding correlations for the traditional measures of income are around 50% lower ranging between 0.10 and 0.25.

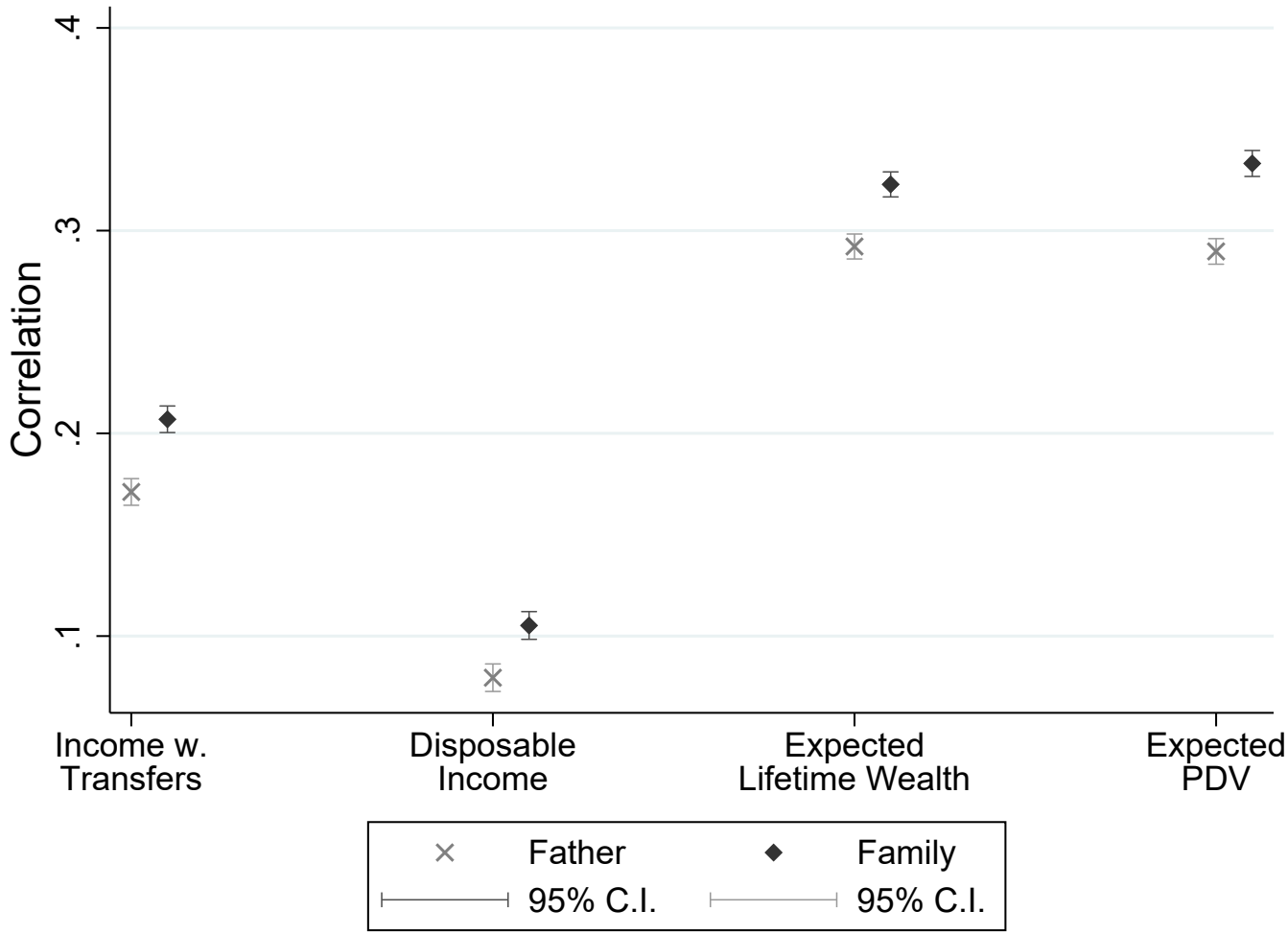
Parental Resources and Child Outcomes

Two measures of parental resources: father and family (father + mother)



(a) Mathematics Problem Solving

Parental Resources and Child Outcomes, Cont'd

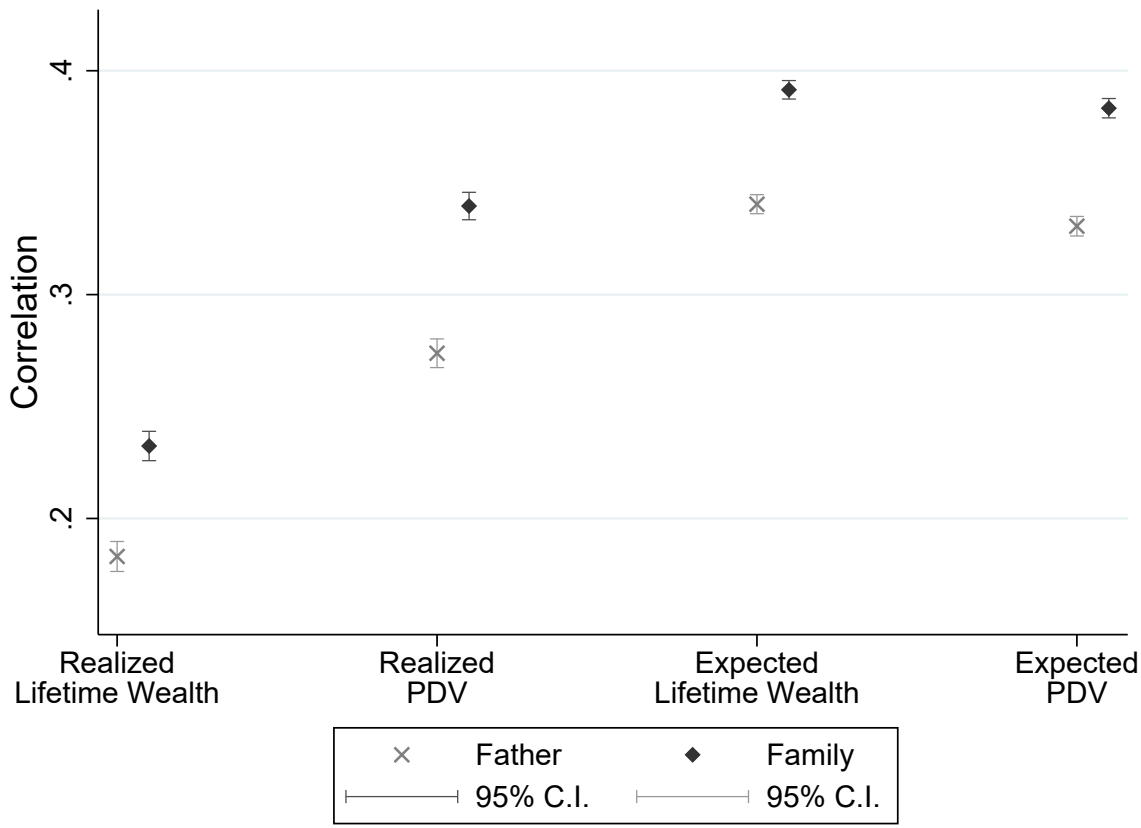


(b) College Attainment

Other Measures Education, Crime, Fertility By-Age Results

Parental Resources and Child Outcomes, Cont'd

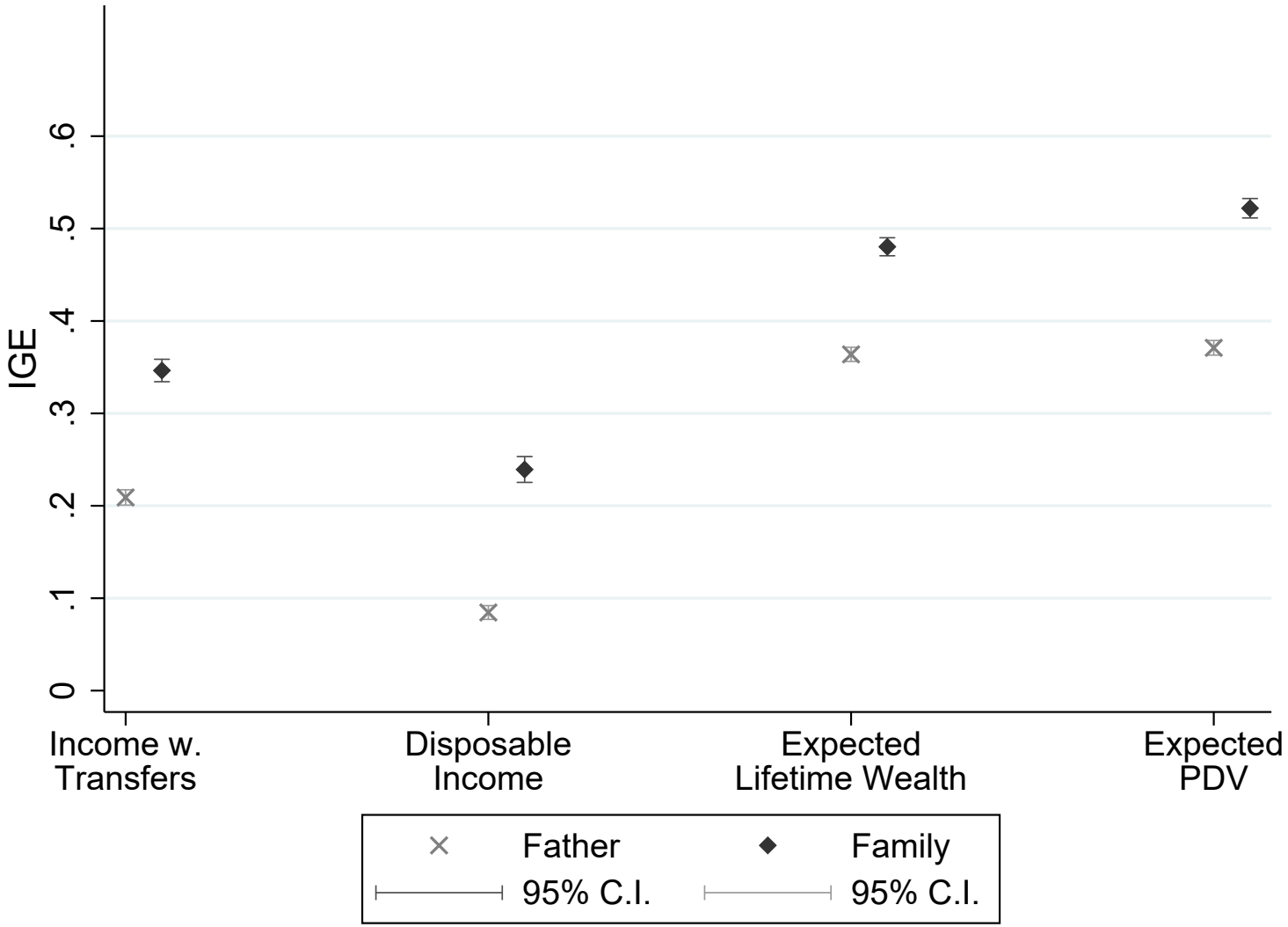
Expected lifetime measures significantly better predict children's outcomes even if adjusting snapshot measures for measurement errors.



(c) Mathematics Problem Solving

Estimates of Intergenerational Mobility

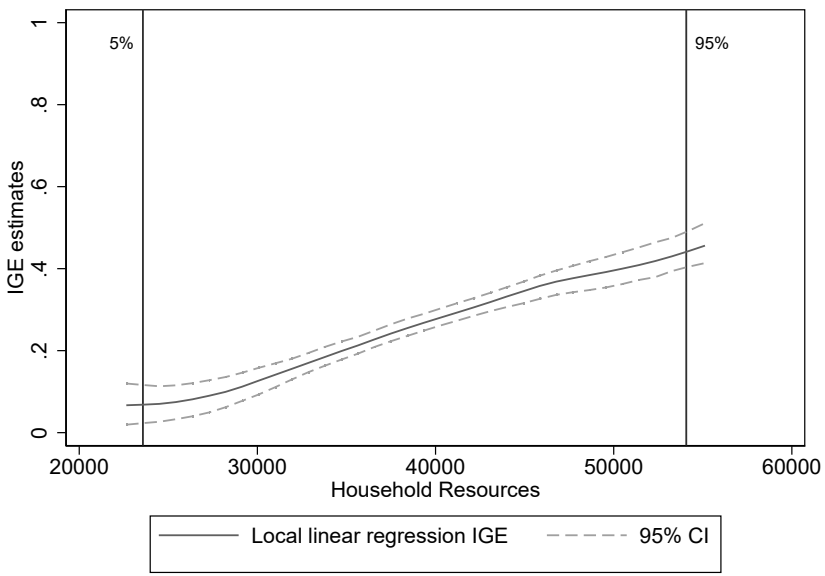
Log-Log IGE Estimates, Parents and Children, Ages 30-35



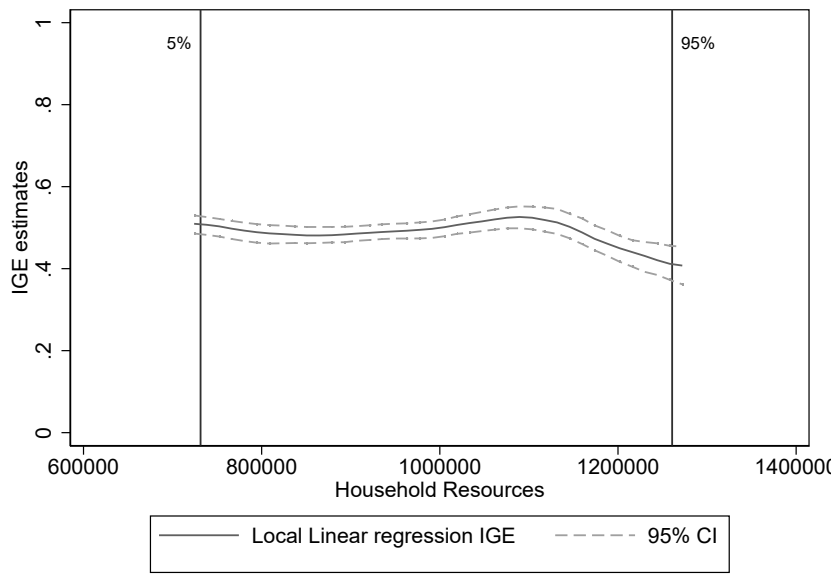
Other Measures Rank-Rank Additional IGEs Cross-Sectional Inequality

Non-Linear IGEs

Traditional measures not only overestimate intergenerational mobility, but do so predominantly for disadvantaged families.



(a) Disposable Income



(b) Expected Lifetime Wealth

Link to Other Measures Link to Realized Values

Decomposition of IGEs

A Simple Linear Decomposition Exercise

- Regression specification:

$$y_{i,t}^k = \lambda^k + (\beta^k)' X_{i,t}^k + \mu_i^k + \epsilon_{i,t}^k. \tag{4}$$

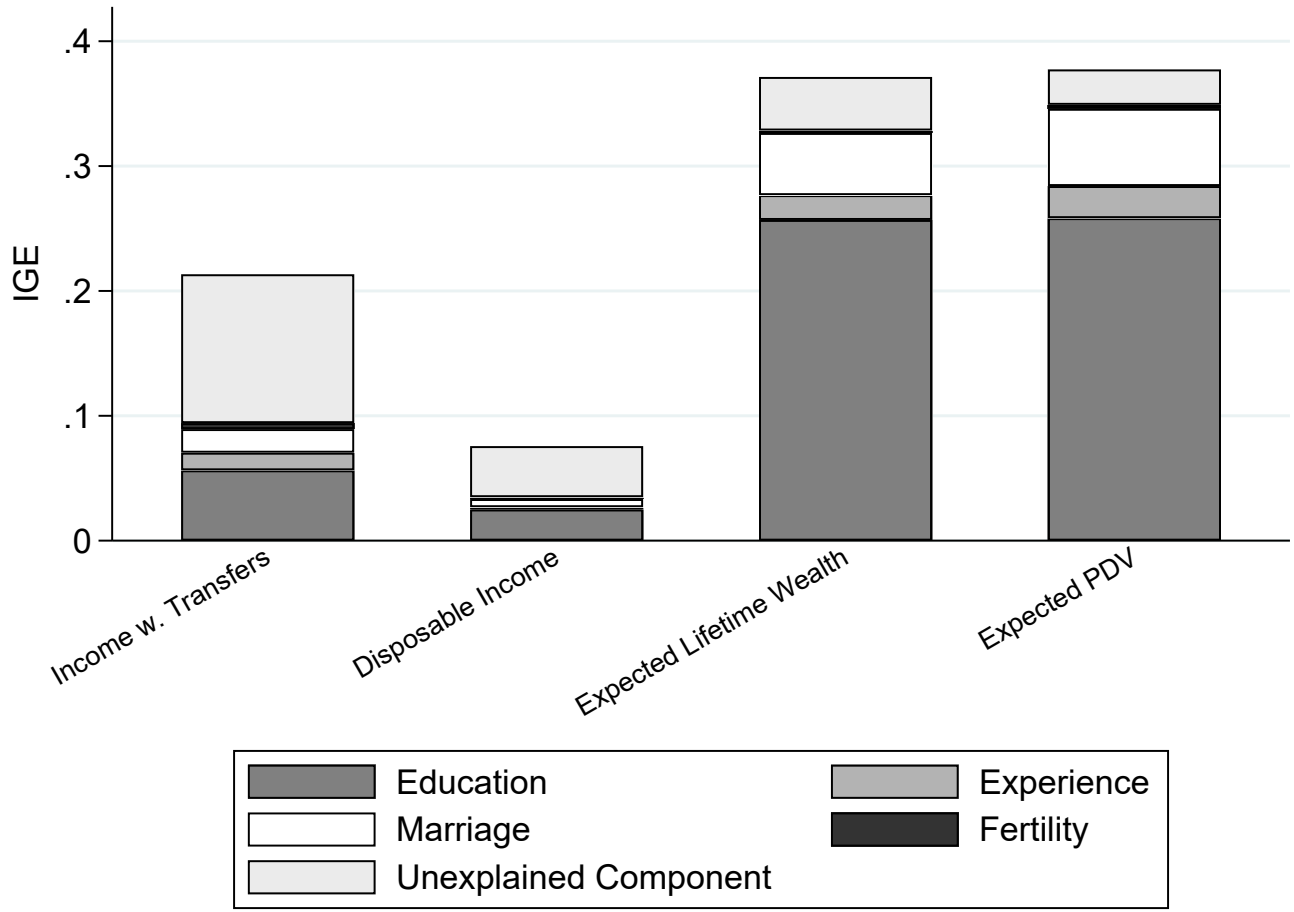
- $k \in \{p, c\}$.
- Average log-income ages 30 to 35:

$$\overline{y}_i^k = \lambda^k + (\beta^k)' \overline{X}_i^k + \mu_i^k + \overline{\epsilon}_i^k.$$

- Decompose intergenerational covariance of log-income into components:

$$\text{Cov}(\overline{y}_i^c, \overline{y}_i^p) = \text{Cov}\left((\beta^c)' \overline{X}_i^c, \overline{y}_i^p\right) + \text{Cov}(\mu_i^c, \overline{y}_i^p). \tag{5}$$

Decomposition Results

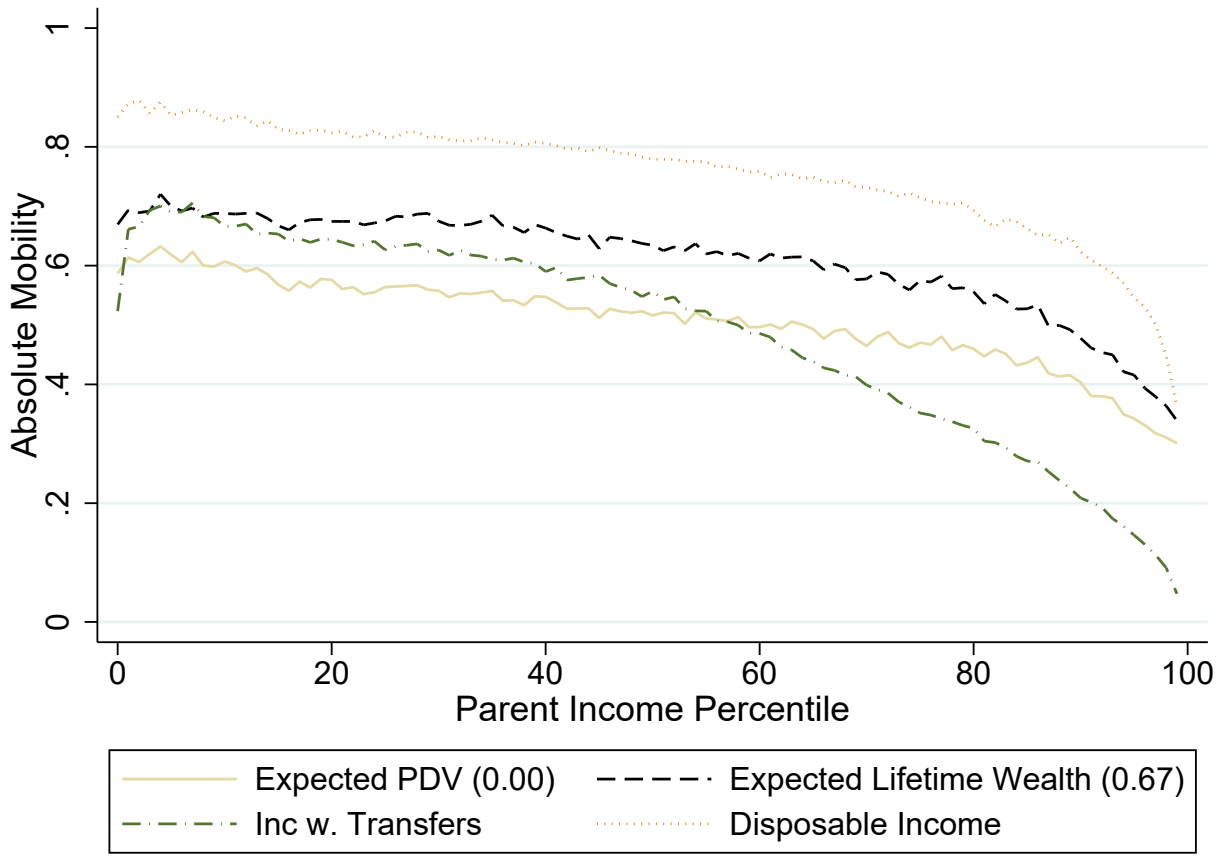


Link to Covariance Share Link to Other Measures

Absolute Mobility

Father-Son Absolute Upward Mobility

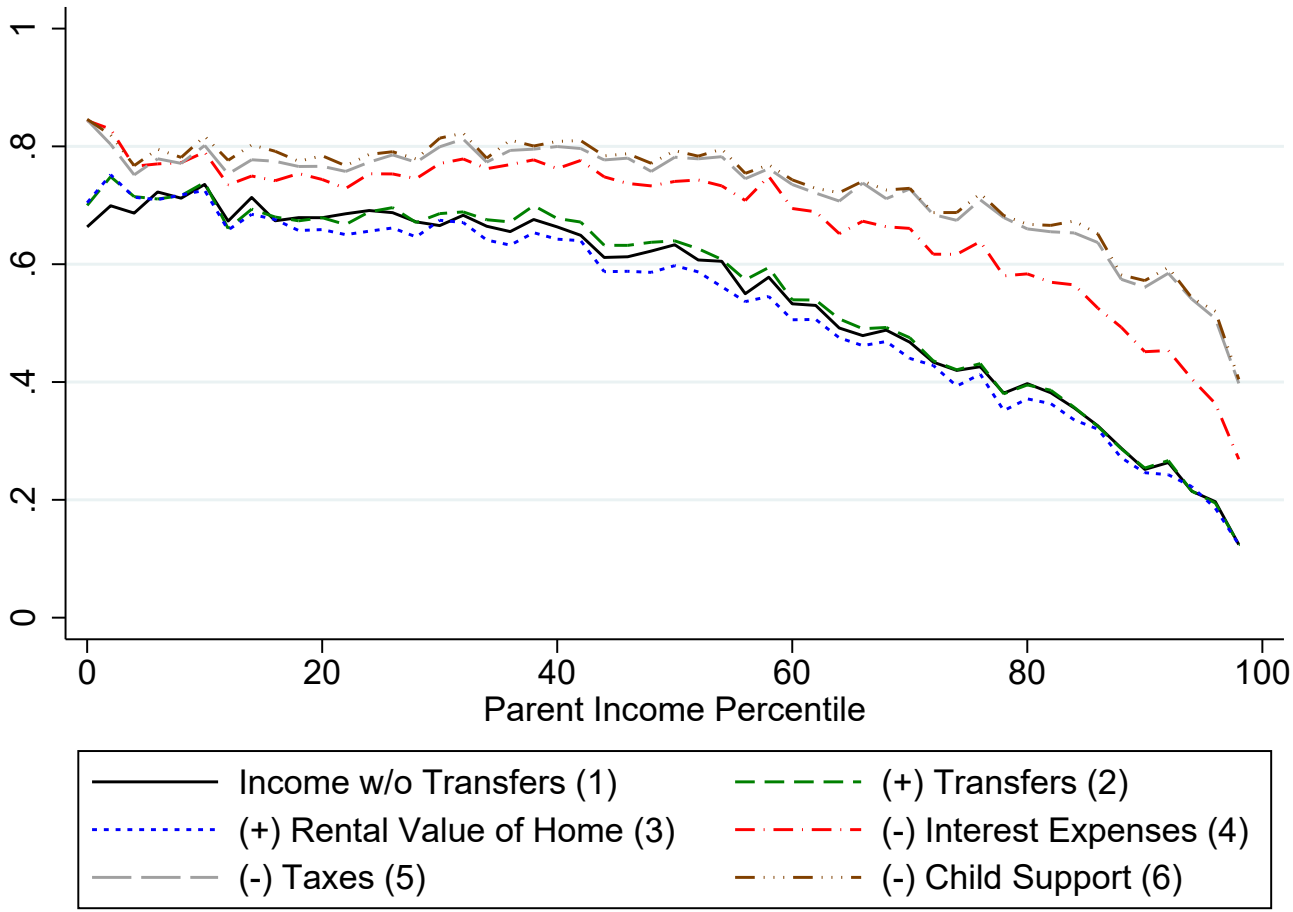
Absolute mobility is higher for lifetime wealth than income with transfers, especially for affluent families.



Link to All Measures

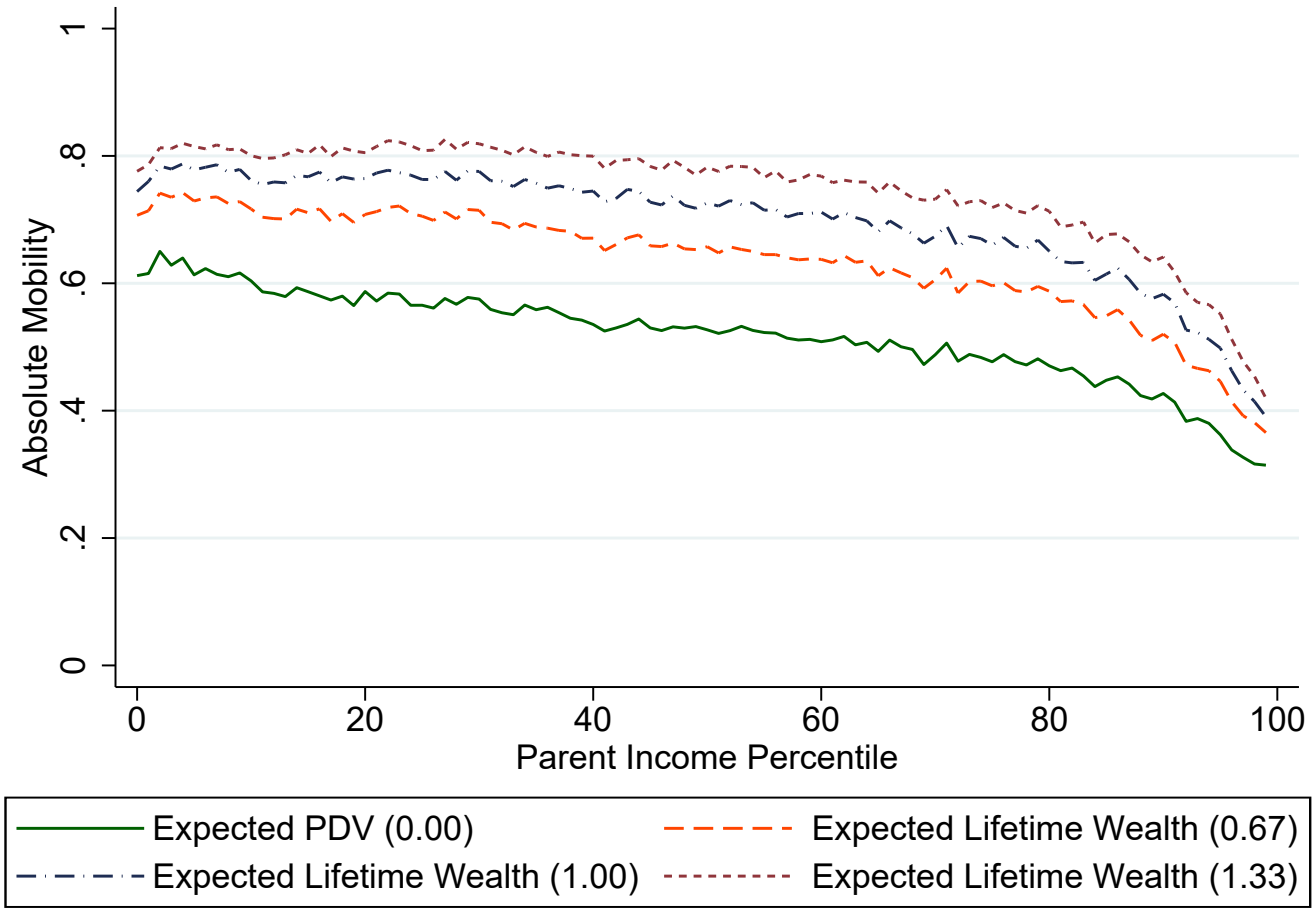
Father-Son Absolute Mobility of Disposable Income

Taxes and interest expenses play a big role in the absolute mobility of disposable income.



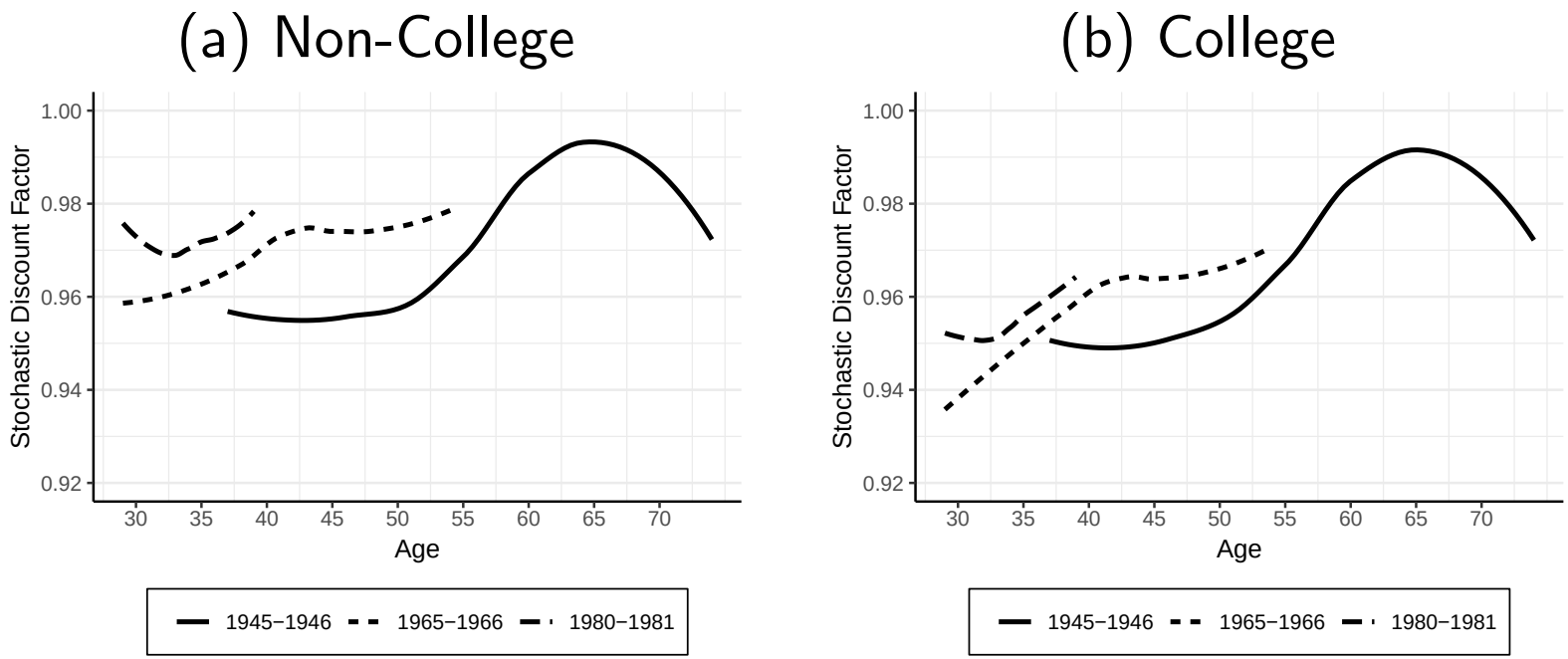
Absolute Mobility in Lifetime Wealth and Risk Aversion

Welfare improvements for the later generation have been larger, the more risk-averse are agents.



Changes in Welfare across Generations

Figure: SDF across Cohorts



Summary and Conclusions

Conclusions

1. Nonstationarity of life cycles across cohorts.
2. Build and estimate a life-cycle model accounting for the IG differences in life cycles, uncertainty, and credit constraints.
3. Age-specific life-cycle measures of social mobility that are most predictive of child outcomes.
4. Life-cycle relative mobility $<$ Proxy relative mobility (currently used proxies overstate relative mobility).
5. Life-cycle absolute mobility $>$ Proxy absolute mobility.
6. Credit market reforms play a big role in abs. mobility patterns.
7. Even in a generous welfare state with substantial social benefits and social insurance and redistribution through taxes and transfers, there is strong dependence in lifetime resources and welfare across generations.

Appendix

Identifying and Estimating Information Sets

- $Y_t =$ outcome at t.
- $\mathcal{I}_t =$ relevant information known and acted on at t.
- $W_t =$ not known and/or acted on at t.

$$Y_t = \mathcal{I}_t\beta + W_t\Gamma + U_t$$
$$U_t(\mathcal{I}_t, W_t)$$

- Test: $\mathcal{I}_t$ properly specified if $\beta \neq 0$, $\Gamma = 0$.
- $U_{t+j} = Y_{t+j} - E(Y_{t+j} \mid \mathcal{I}_t), \quad j > 0.$
- Correct information set: U_{t+j} not predicted by $\mathcal{I}_t$.
- New information arrives later.

Table: Specification Tests ($\mathcal{Z}^j$ Is the Candidate Proxy for Information Set)

		(1)	(2)
Panel A: Full Population			
		y_{50}	$y_{50} - \mathbb{E}(y_{50} \mid \mathcal{Z}_{30}^1)$
Consumption (Age 30)	β_{OLS}	0.35	0.25
	T-stat	(37.50)	(4.88)
Panel B: Main Sample, Child Outcomes			
		y_{50}	$y_{50} - \mathbb{E}(y_{50} \mid \mathcal{Z}_{30}^1)$
Disposable Income (Age 30)	β_{OLS}	0.10	0.07
	T-stat	(14.75)	(10.89)
Wage Income (Age 30)	β_{OLS}	0.18	0.10
	T-stat	(31.49)	(19.10)
College Attainment	β_{OLS}	0.32	0.15
	T-stat	(11.91)	(5.53)
Years of Schooling	β_{OLS}	2.04	1.23
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Continues

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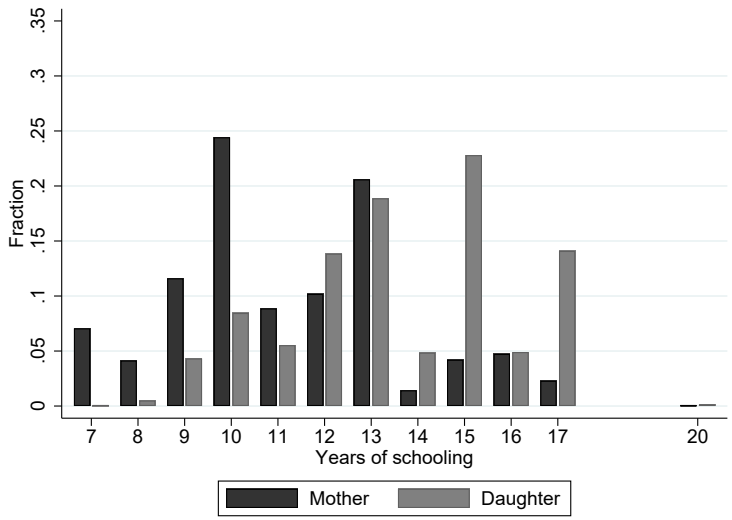
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Final Information Set

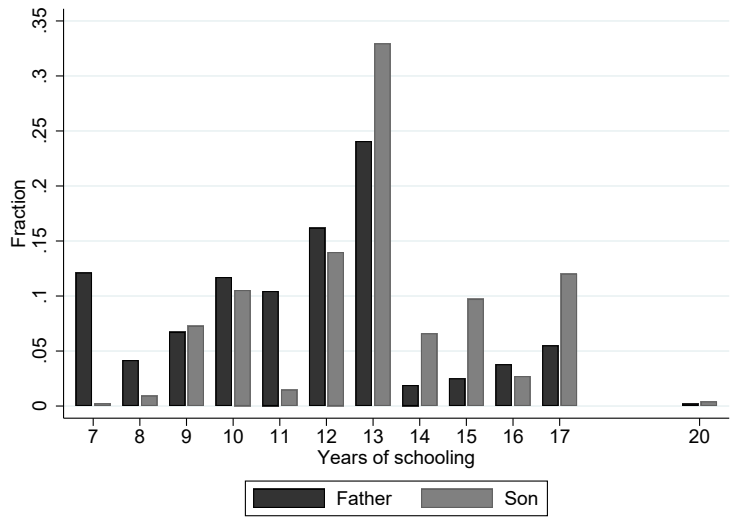
Our final information set includes info on, birth year, gender, education level (primary school, high school, college, and university), employment status, cohabitation, number of children, quartiles for mean income level, quartiles for mean income growth, quartiles for mean consumption level, quartiles for mean consumption growth, quartiles for the standard deviation of consumption, and homeownership status.

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Figure: Distributions of Years of Schooling for Parents and Children

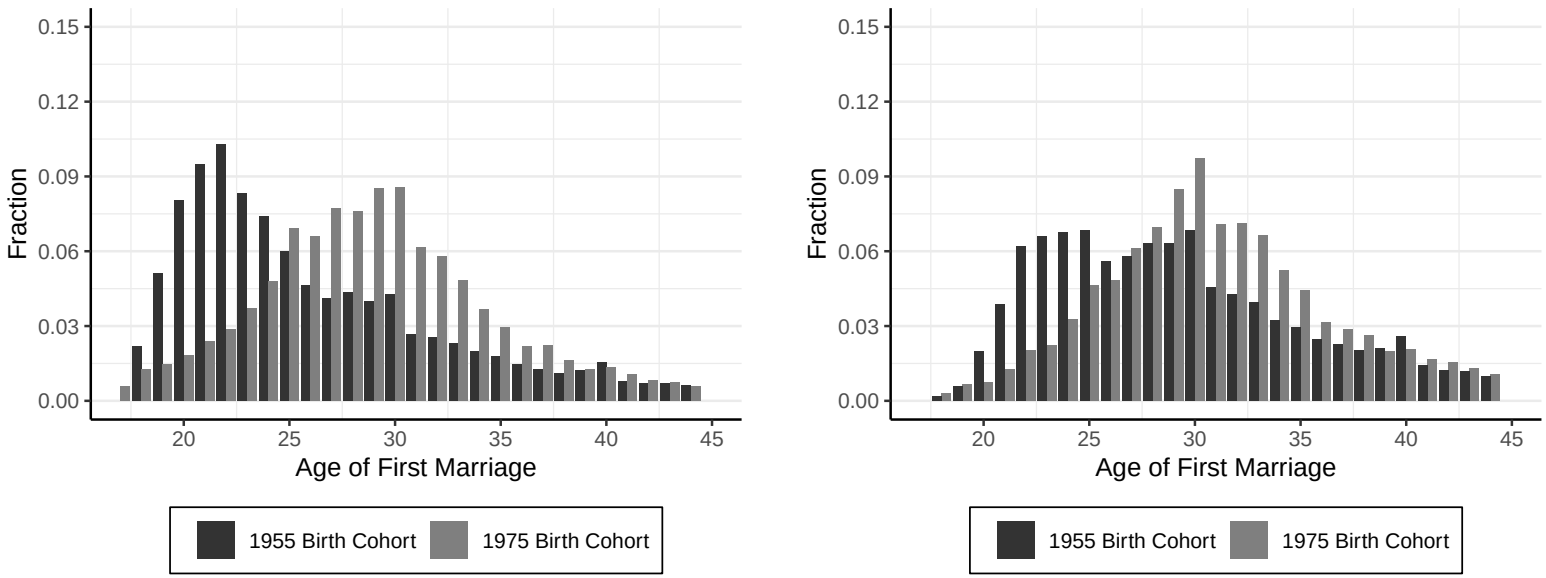


(a) Females



(b) Males

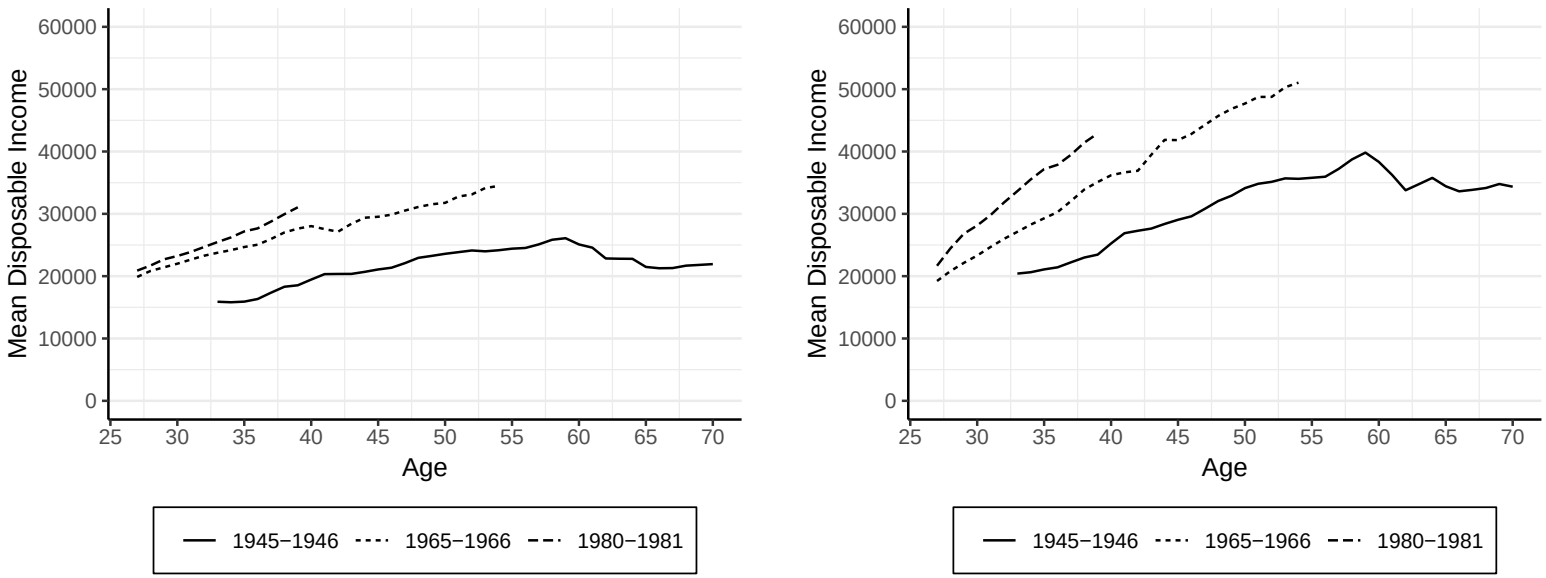
Figure: Timing of Key Life Events across Generations



(a) Females

(b) Males

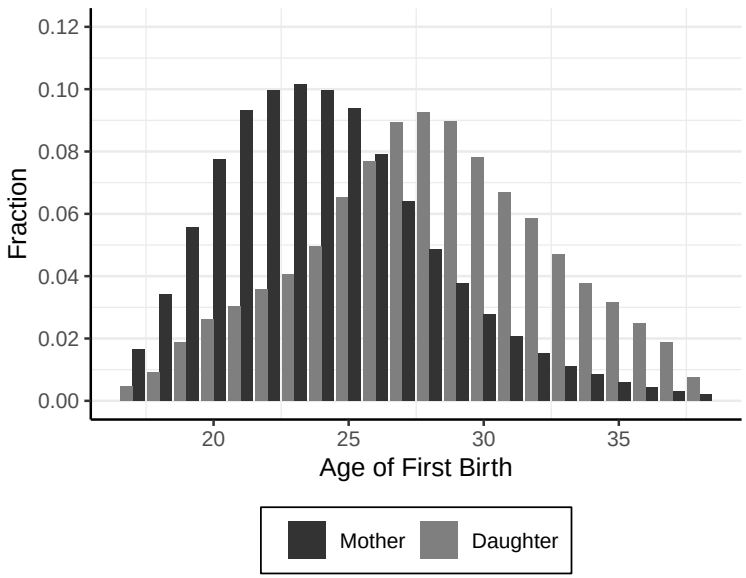
Figure: Income across Cohorts



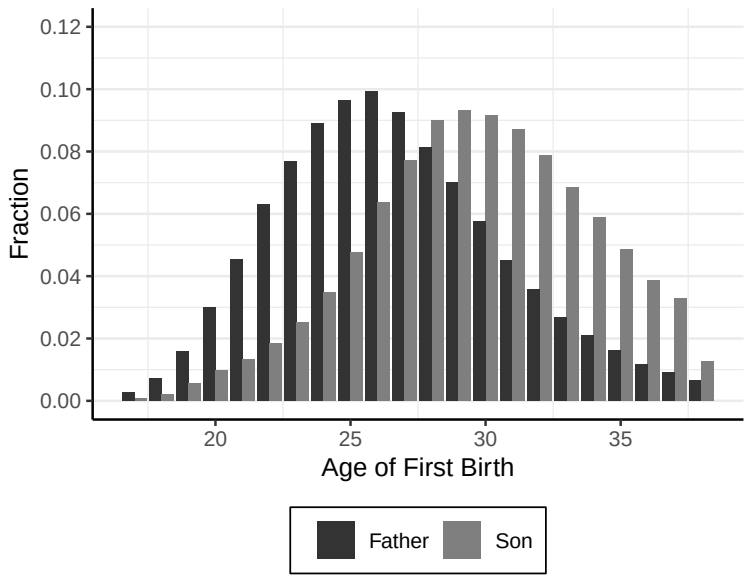
(a) Non-College

(b) College

Figure: Timing of Key Life Events across Generations, Cont'd

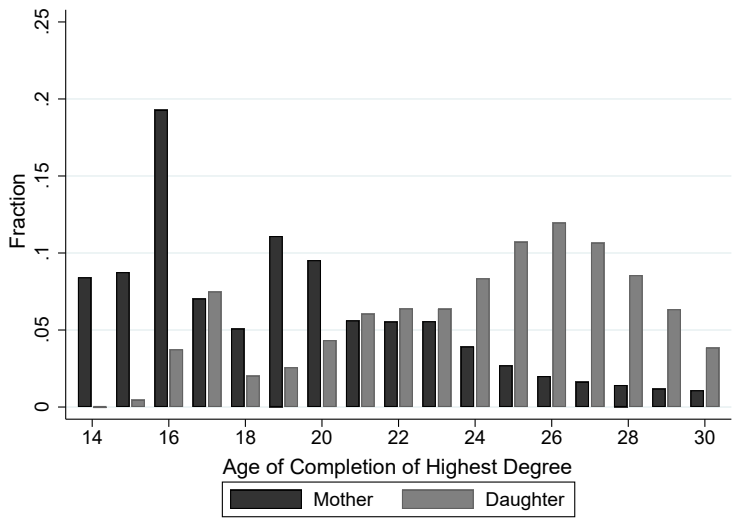


(a) Females

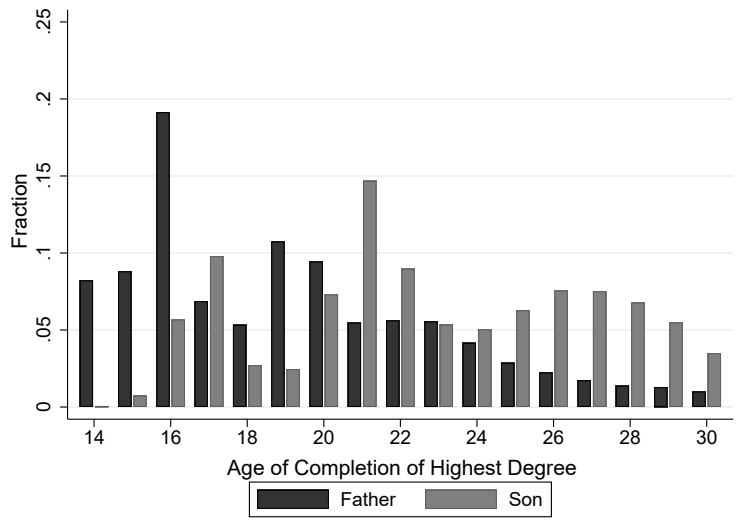


(b) Males

Figure: Timing of Key Life Events across Generations, Cont'd



(a) Females



(b) Males

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Comparing Measures

Table: Correlations of Income and Welfare Measures

	Wage Income	Income without Transfers	Income with Transfers	Disposable Income
Income without Transfers	0.55	–	0.98	0.42
Income with Transfers	0.50	0.98	–	0.42
Disposable Income	0.55	0.42	0.42	–
Household Consumption	0.45	0.63	0.61	0.38
Realized Lifetime Wealth	0.39	0.30	0.30	0.49
Realized PDV	0.37	0.43	0.42	0.37
Expected Lifetime Wealth	0.48	0.51	0.48	0.36
Expected PDV	0.45	0.45	0.42	0.35

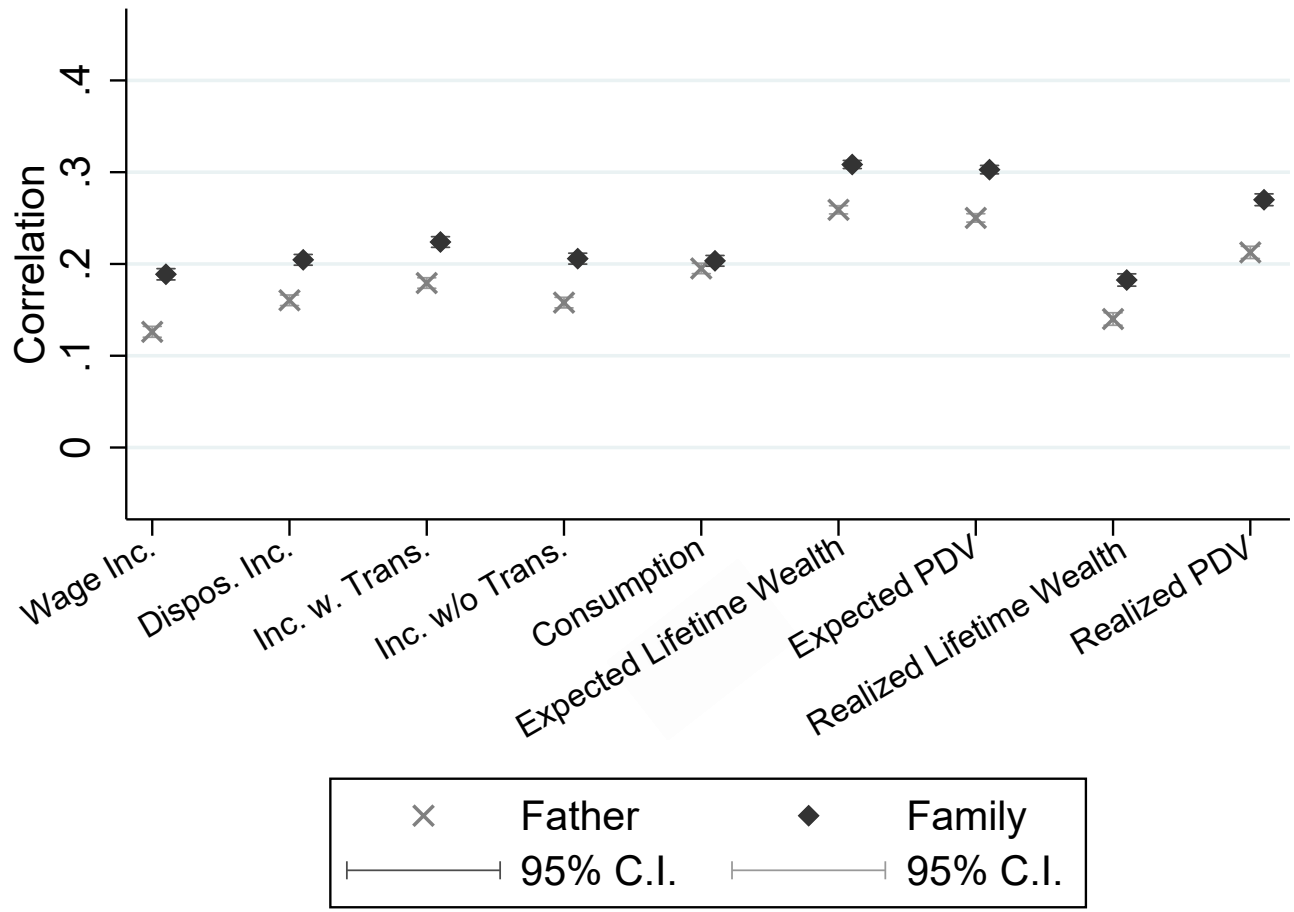
Comparing Measures, Cont'd

Table: Correlations of Income and Welfare Measures, Cont'd

	Household Consumption	Realized Lifetime Wealth	Realized PDV	Expected Lifetime Wealth
Income without Transfers	0.63	0.30	0.43	0.51
Income with Transfers	0.61	0.30	0.42	0.48
Disposable Income	0.38	0.49	0.37	0.36
Household Consumption	–	0.38	0.37	0.39
Realized Lifetime Wealth	0.38	–	0.64	0.35
Realized PDV	0.37	0.64	–	0.42
Expected Lifetime Wealth	0.39	0.35	0.42	–
Expected PDV	0.38	0.30	0.39	0.96

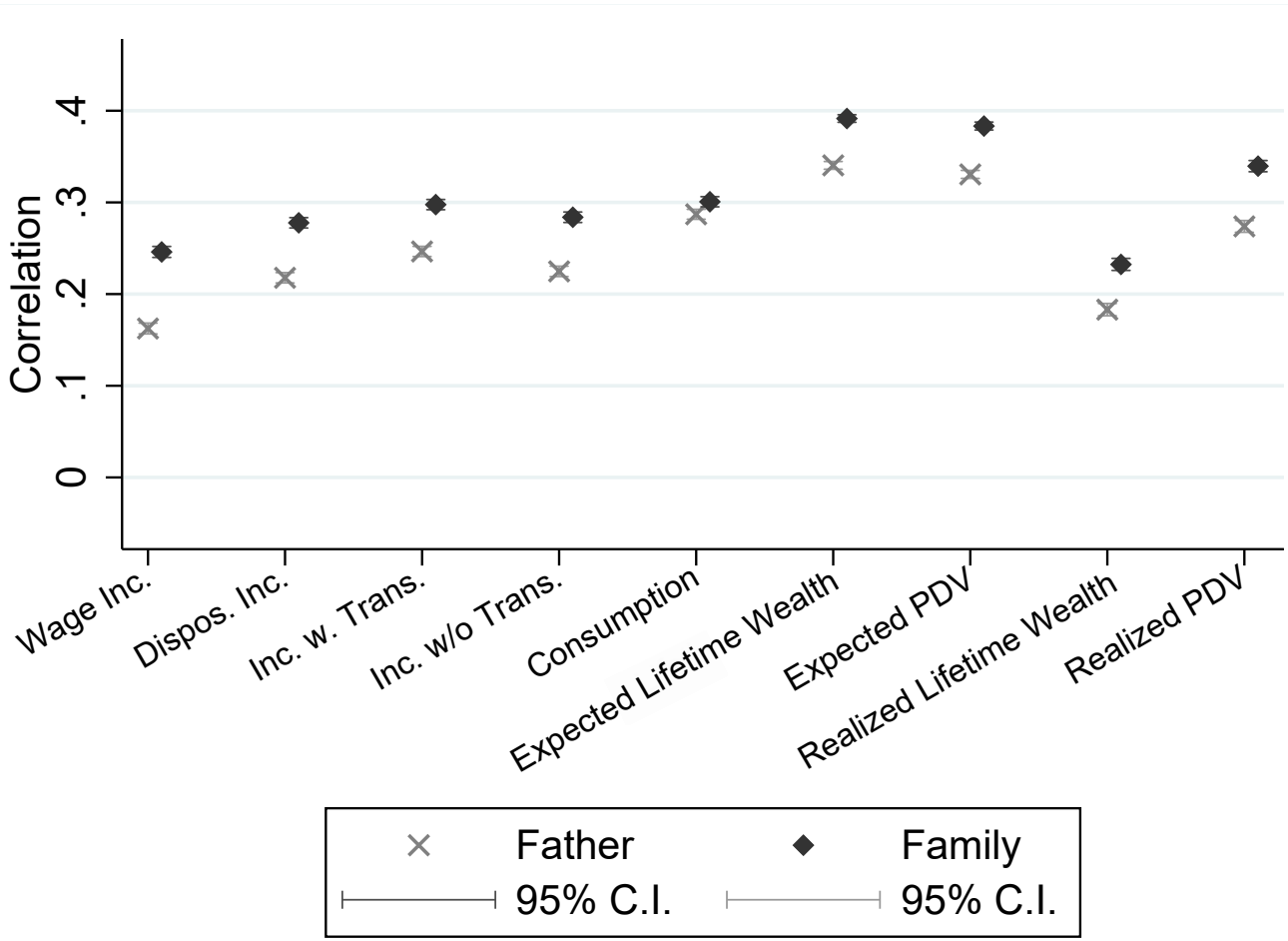
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Figure: Parents' Resources and Children's Outcomes, Cont'd



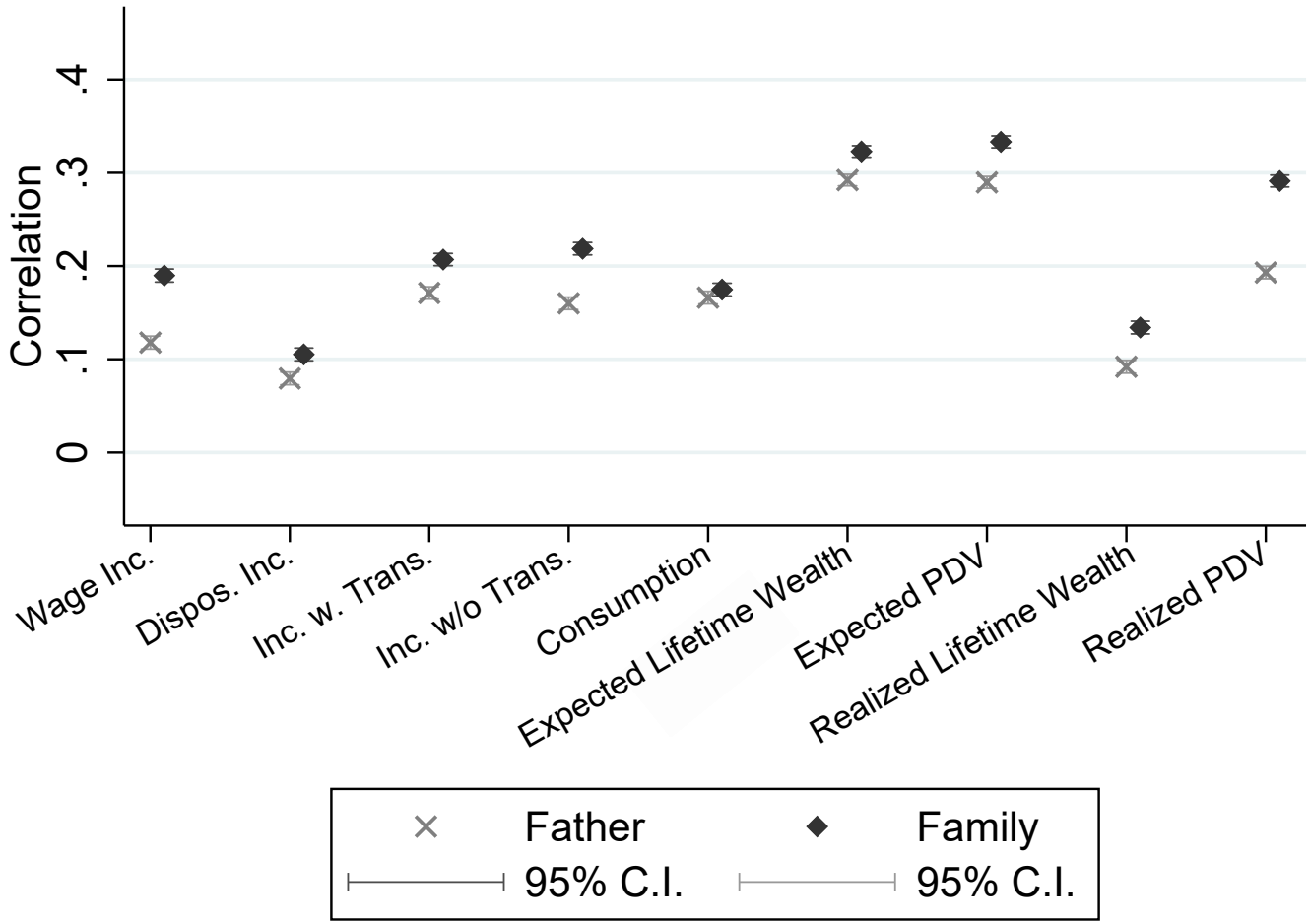
(a) Danish Reading

Parental Resources and Child Outcomes



(b) Mathematics Problem Solving

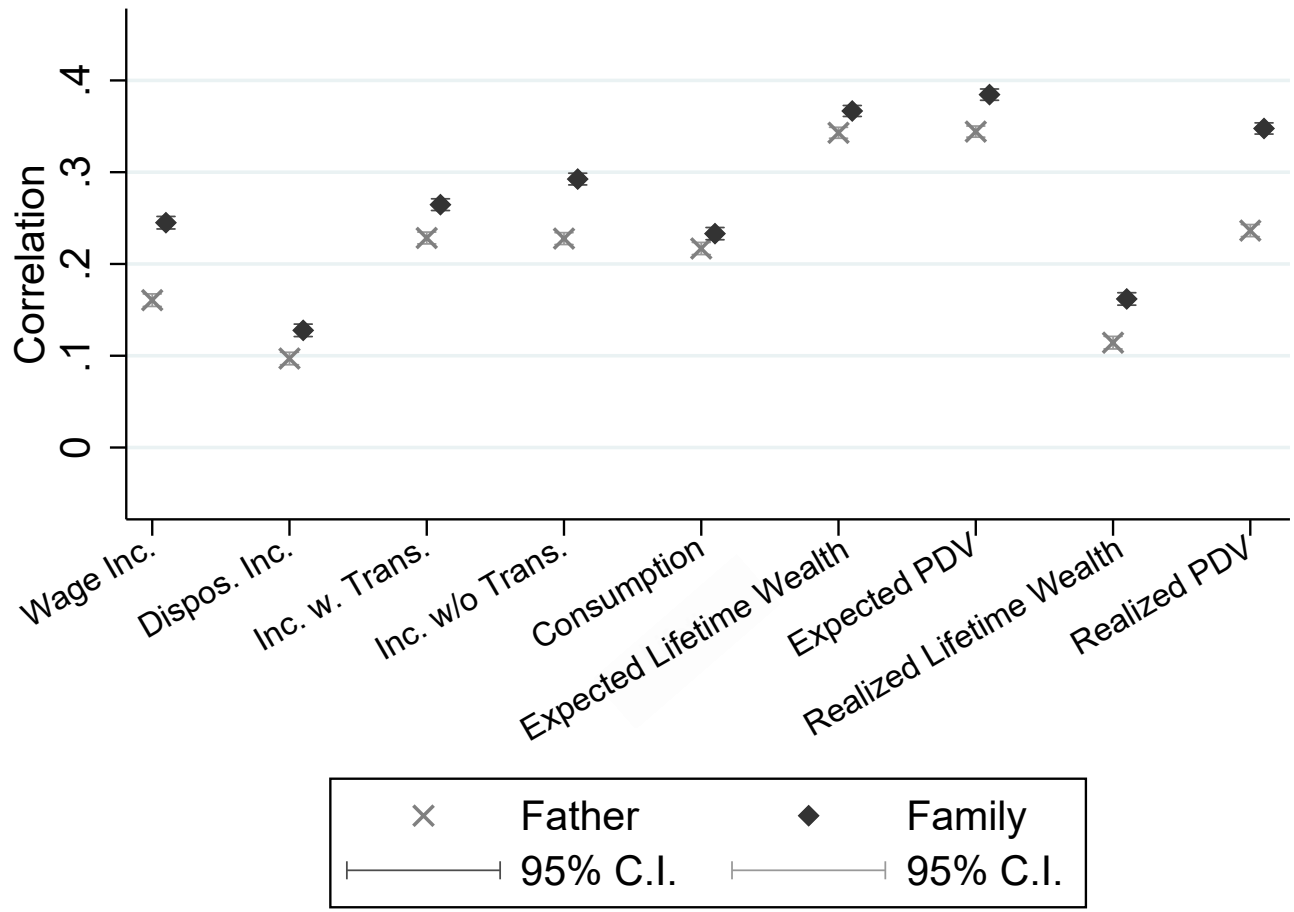
Parental Resources and Child Outcomes, Cont'd



(c) College Attainment

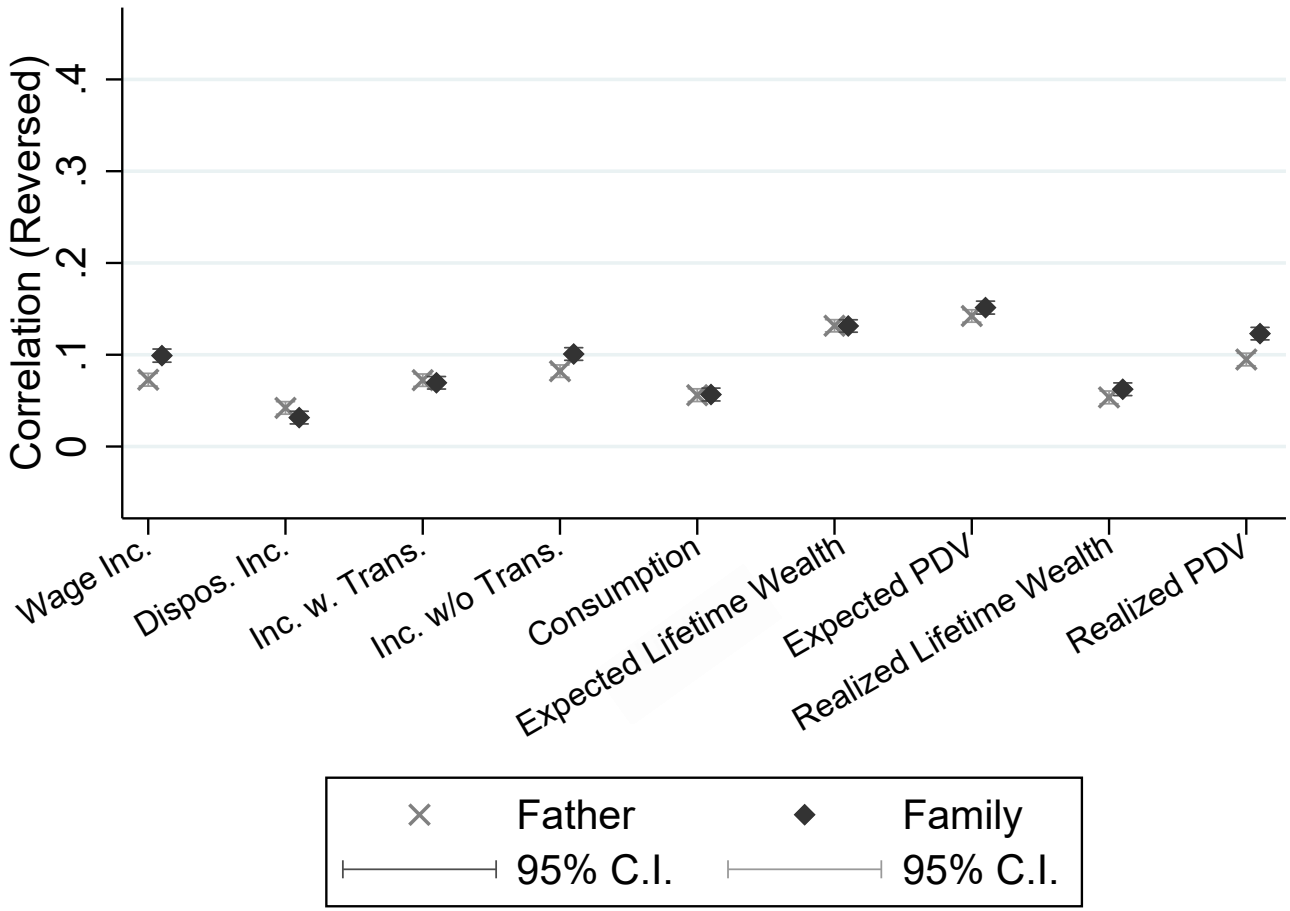
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Figure: Parents' Resources and Children's Outcomes, Cont'd



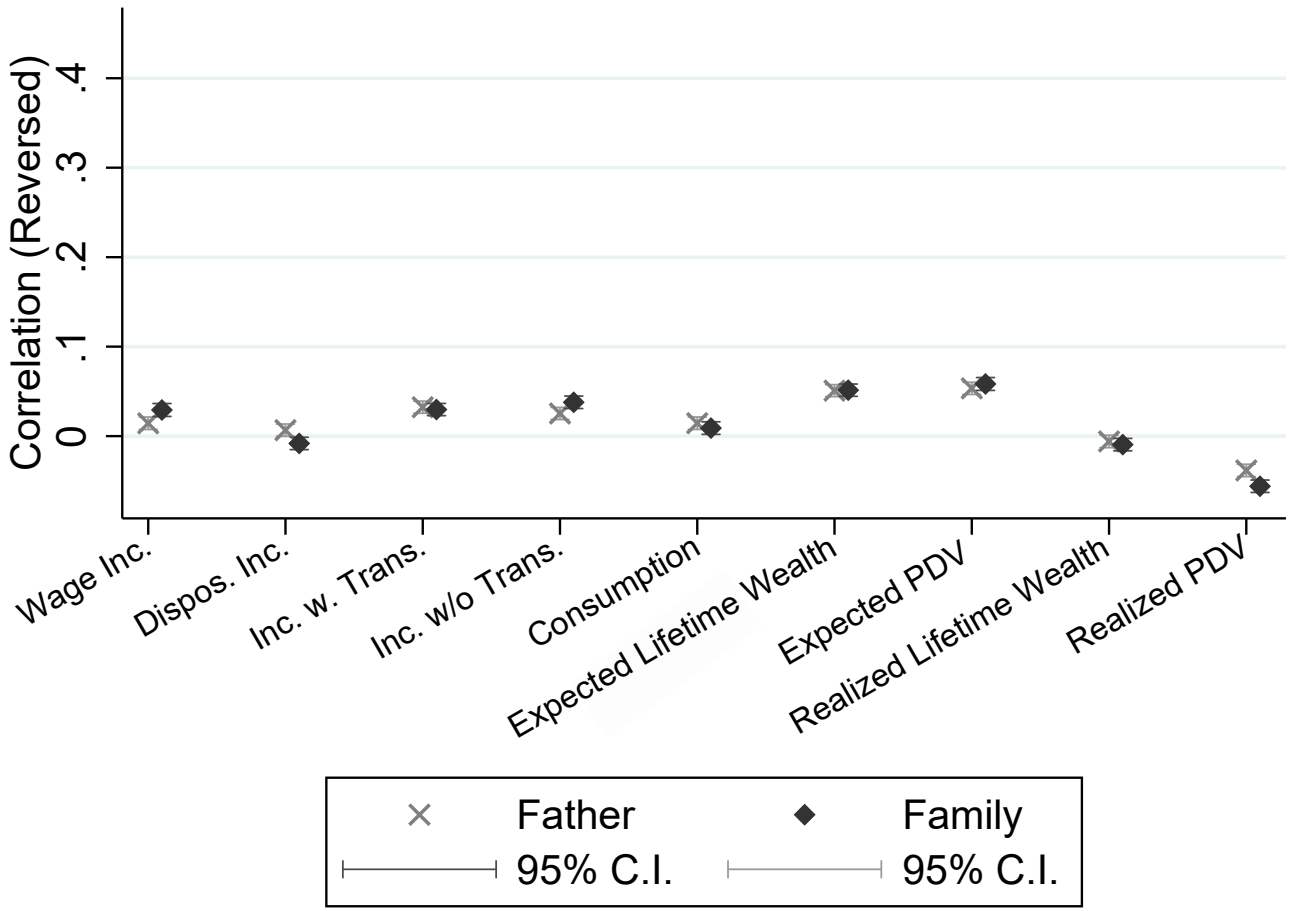
(d) Years of Education

Figure: Parents' Resources and Children's Outcomes, Cont'd



(e) Criminal Behavior (Reversed)

Figure: Parents' Resources and Children's Outcomes, Cont'd

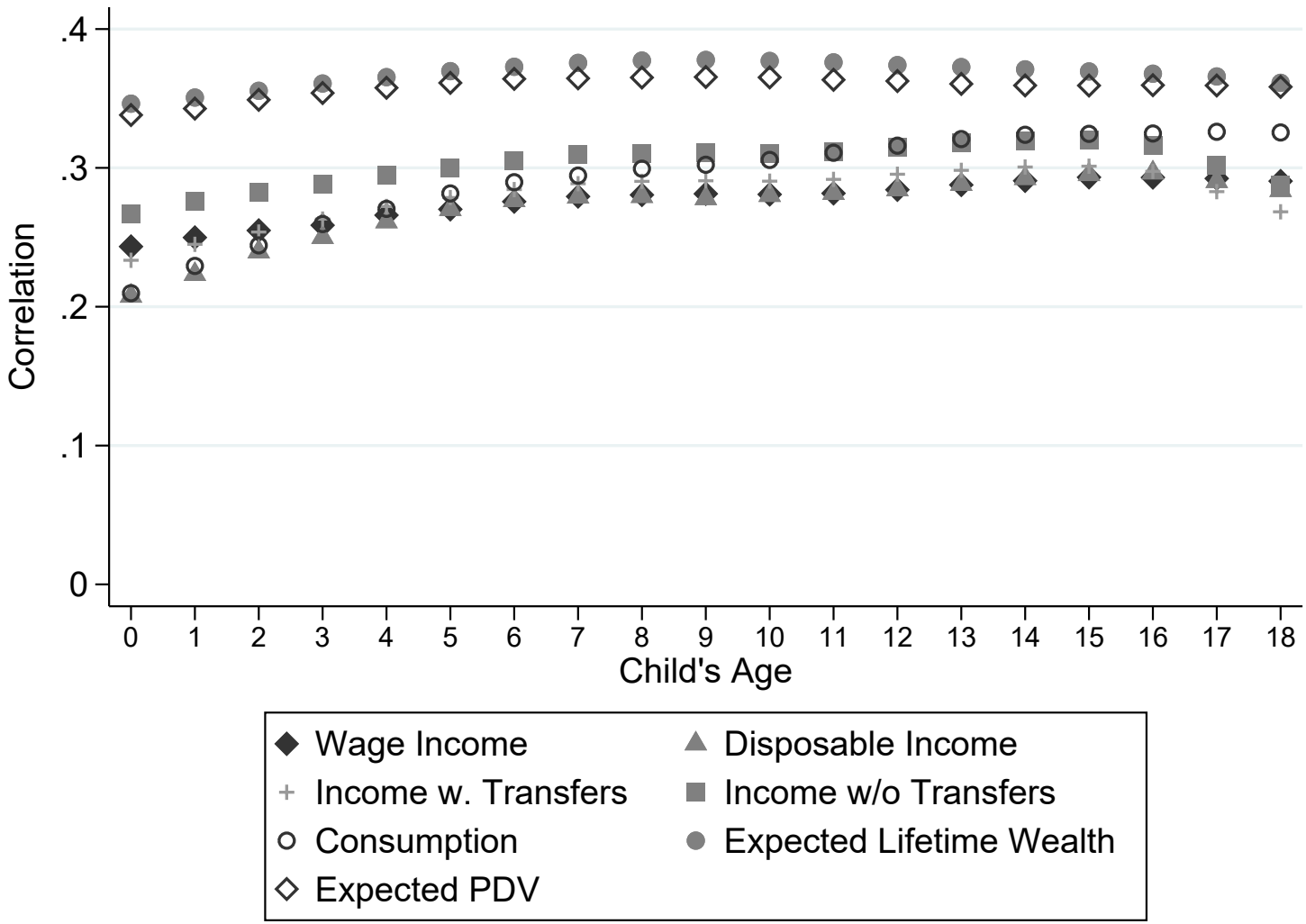


(f) Having a Child by Age 20 (Reversed)

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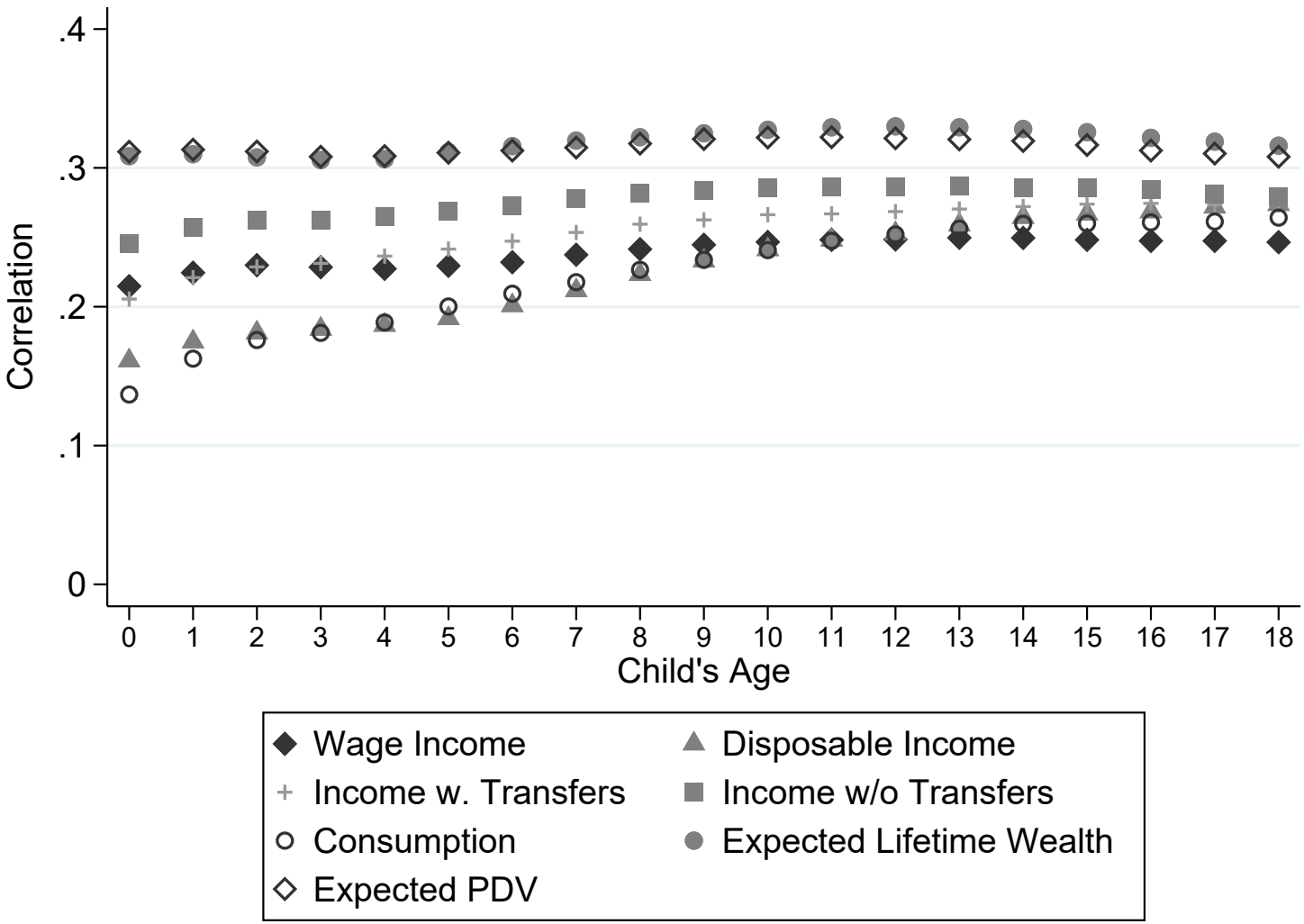
Parental Resources and Child Outcomes, by Child's Age

Figure: Mathematics Problem Solving



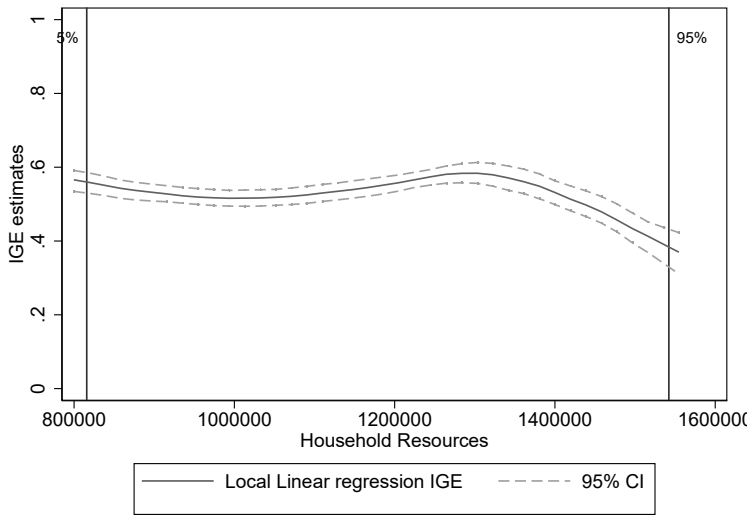
Parental Resources and Child Outcomes, by Child's Age

Figure: College Attainment

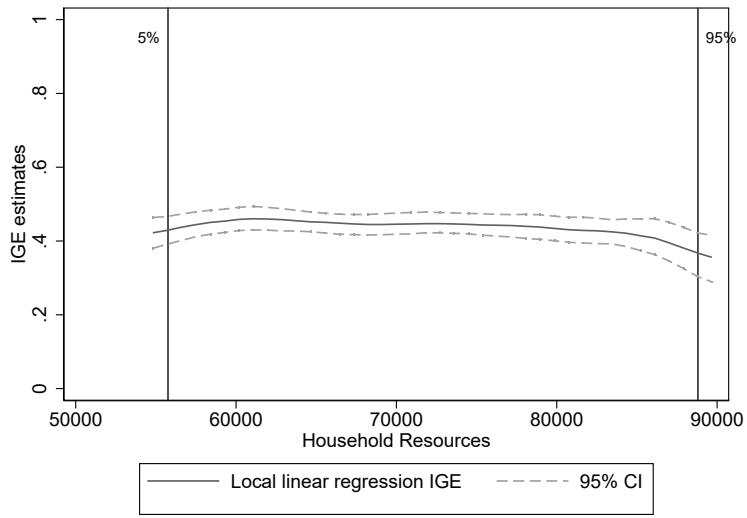


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Non-Linear IGEs, Cont'

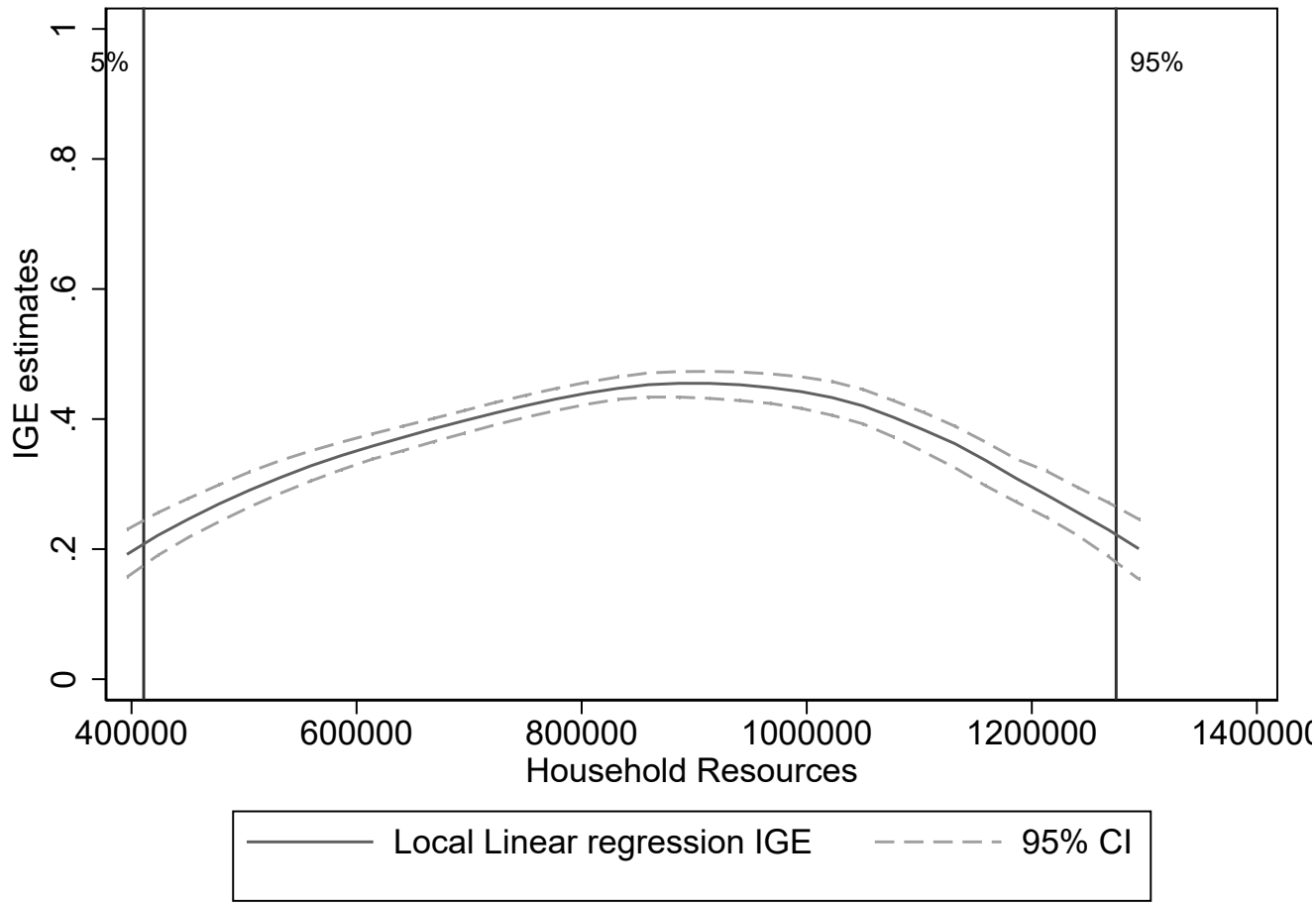


(a) Expected PDV



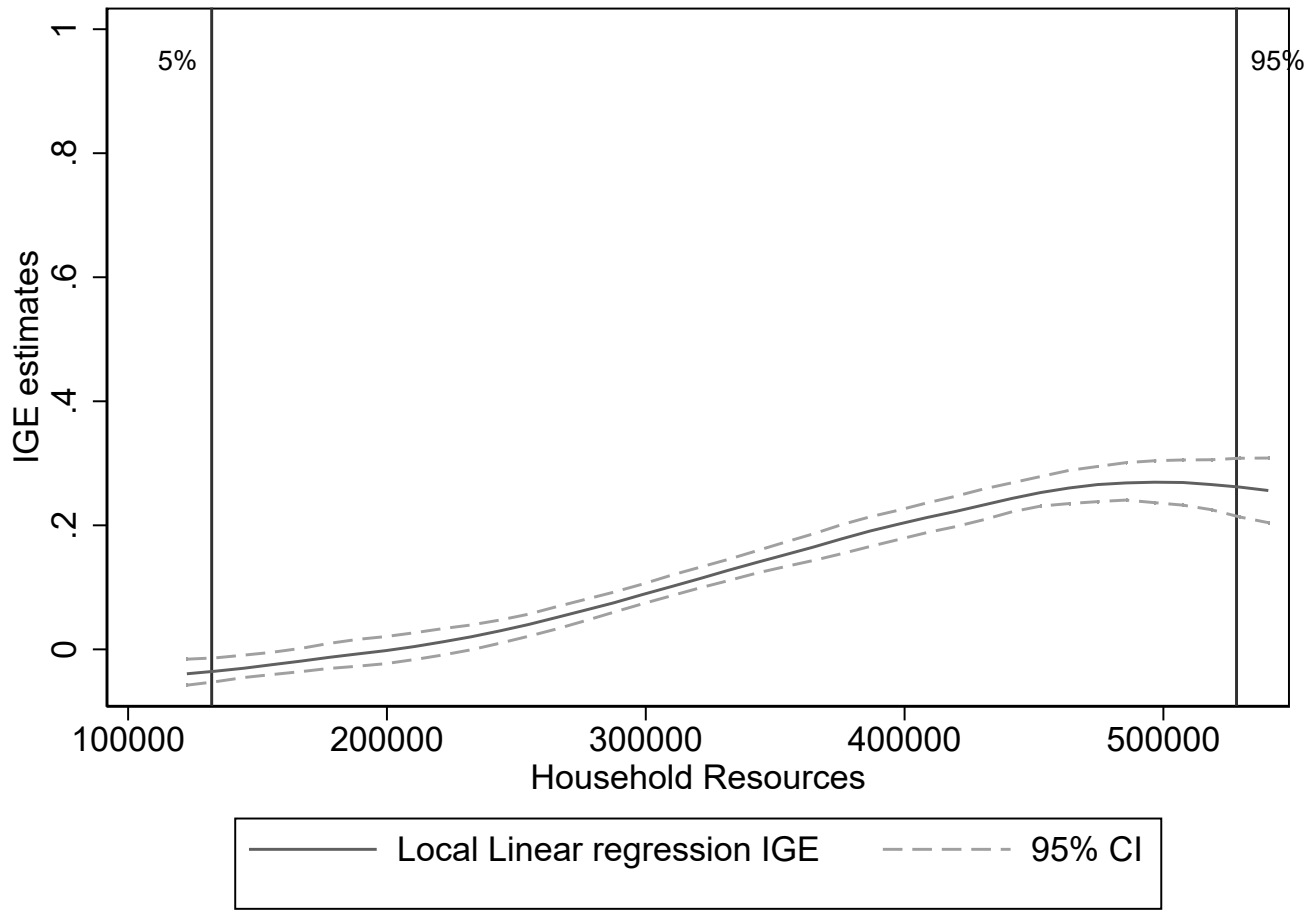
(b) Household Consumption

Figure: Local-Linear IGEs for Lifetime Measures, Cont'd



(c) Realized PDV

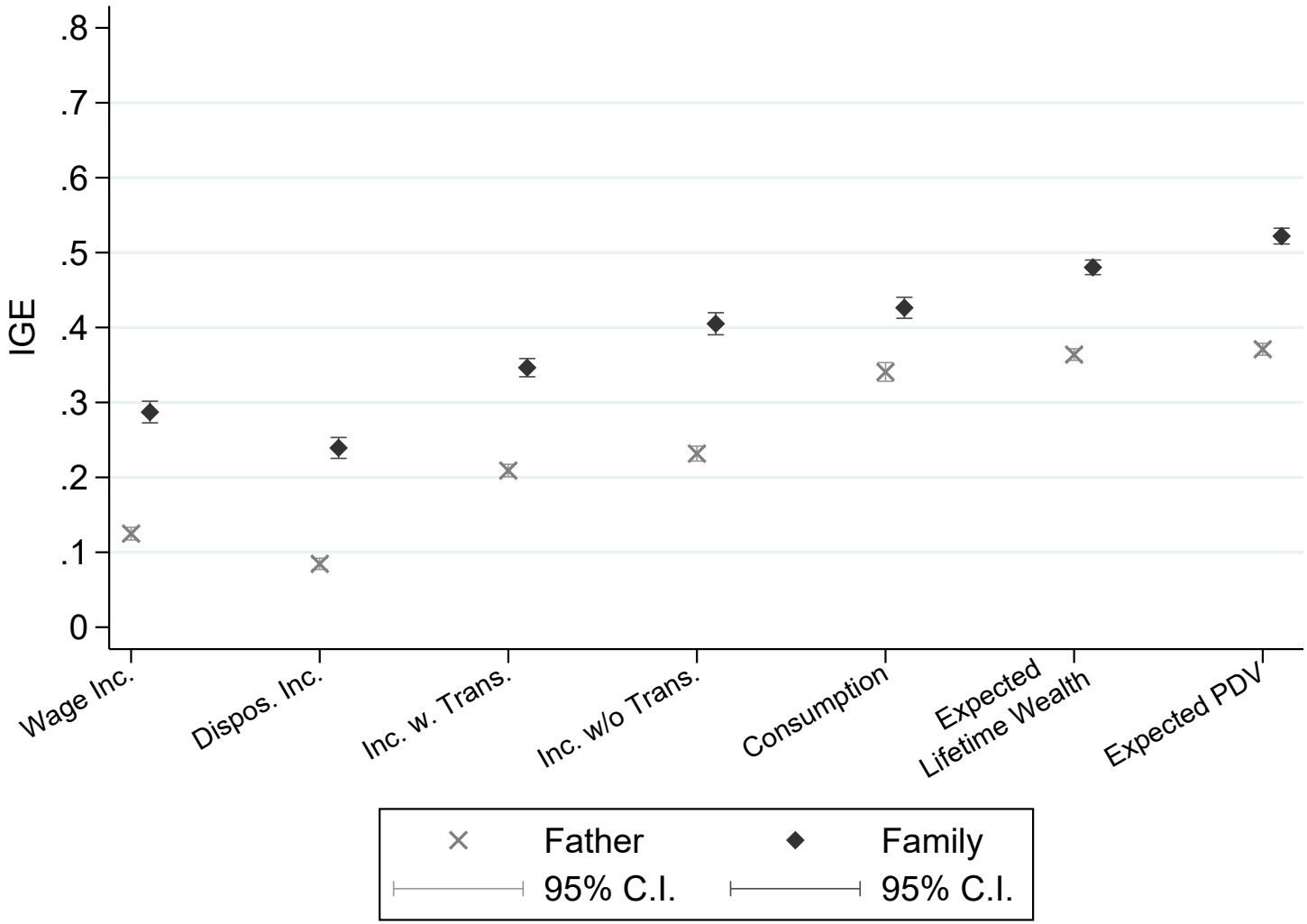
Figure: Local-Linear IGEs for Lifetime Measures, Cont'd



(d) Realized Lifetime Wealth

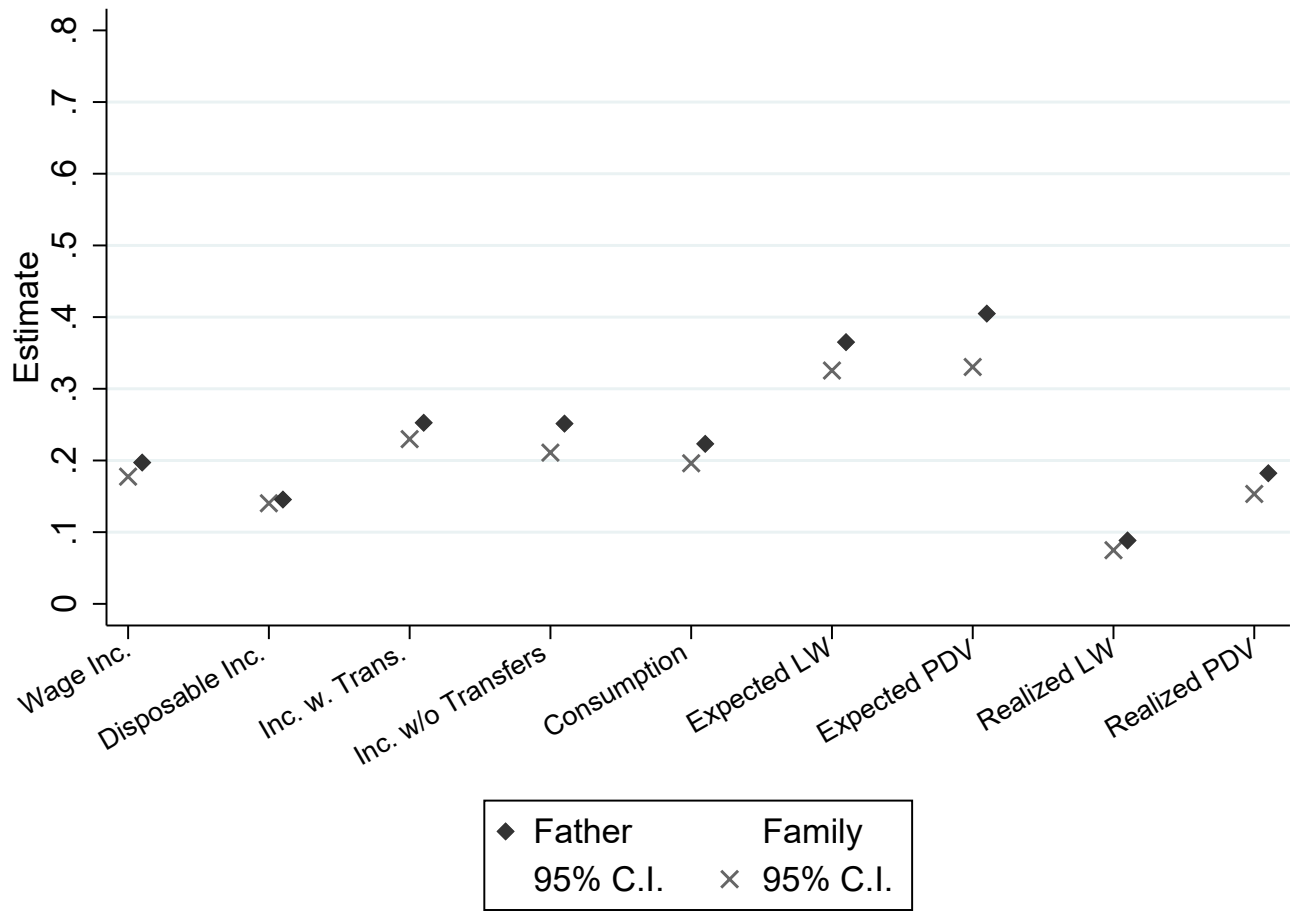
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Log-Log IGE Estimates, Parents and Children, Ages 30-35



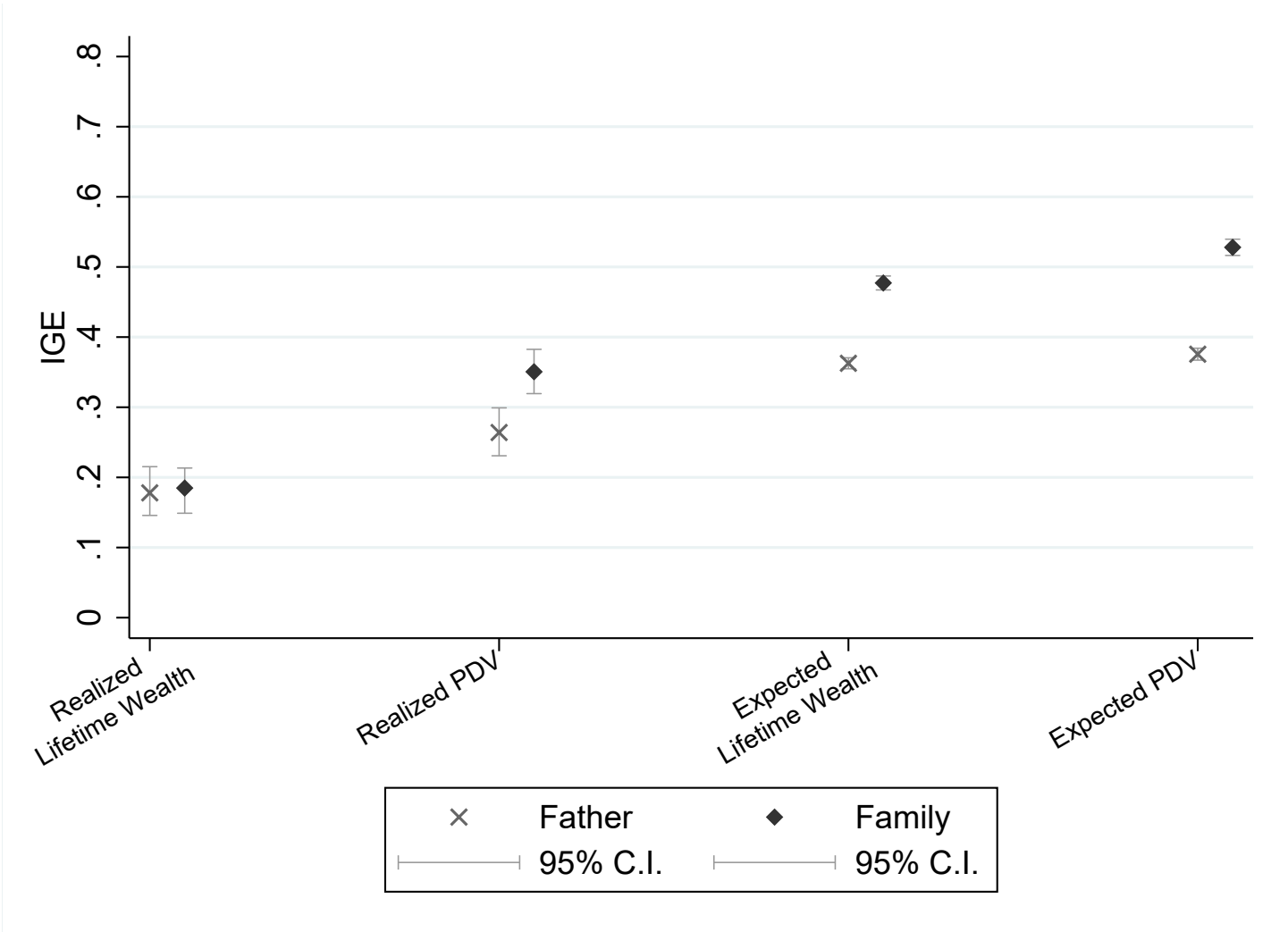
Rank-Rank Version

Figure: Rank-Rank Estimates



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Figure: Log-Log IGE Estimates



IG Correlations and Cross-Sectional Inequality

Table: IGE Estimates (Ages 30–35 of Parents and Children)

	Father-Child IGE $\hat{\beta} = \rho_{\text{child,father}} \frac{sd(\text{child})}{sd(\text{father})}$	**Family-Child IGE** $\hat{\beta} = \rho_{\text{child,family}} \frac{sd(\text{child})}{sd(\text{family})}$
Traditional Measures		
Wage Income	$0.125^{***} = 0.107 \frac{0.930}{0.798}$	$0.287^{***} = 0.148 \frac{0.913}{0.471}$
Disposable Income	$0.085^{***} = 0.078 \frac{0.438}{0.402}$	$0.239^{***} = 0.118 \frac{0.434}{0.215}$
Income with Transfers	$0.209^{***} = 0.170 \frac{0.477}{0.387}$	$0.346^{***} = 0.193 \frac{0.475}{0.264}$
Income without Transfers	$0.232^{***} = 0.162 \frac{0.894}{0.623}$	$0.405^{***} = 0.194 \frac{0.879}{0.420}$
Household Consumption	$0.341^{***} = 0.188 \frac{0.279}{0.154}$	$0.426^{***} = 0.210 \frac{0.279}{0.138}$
Lifetime Measures		
Realized Lifetime Wealth	$0.178^{***} = 0.087 \frac{0.550}{0.258}$	$0.185^{***} = 0.087 \frac{0.550}{0.260}$
Realized PDV	$0.264^{***} = 0.119 \frac{0.603}{0.272}$	$0.351^{***} = 0.156 \frac{0.608}{0.270}$
Expected Lifetime Wealth	$0.364^{***} = 0.305 \frac{0.237}{0.199}$	$0.480^{***} = 0.323 \frac{0.236}{0.158}$
Expected PDV	$0.371^{***} = 0.310 \frac{0.279}{0.233}$	$0.522^{***} = 0.341 \frac{0.277}{0.181}$

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Decomposition Results

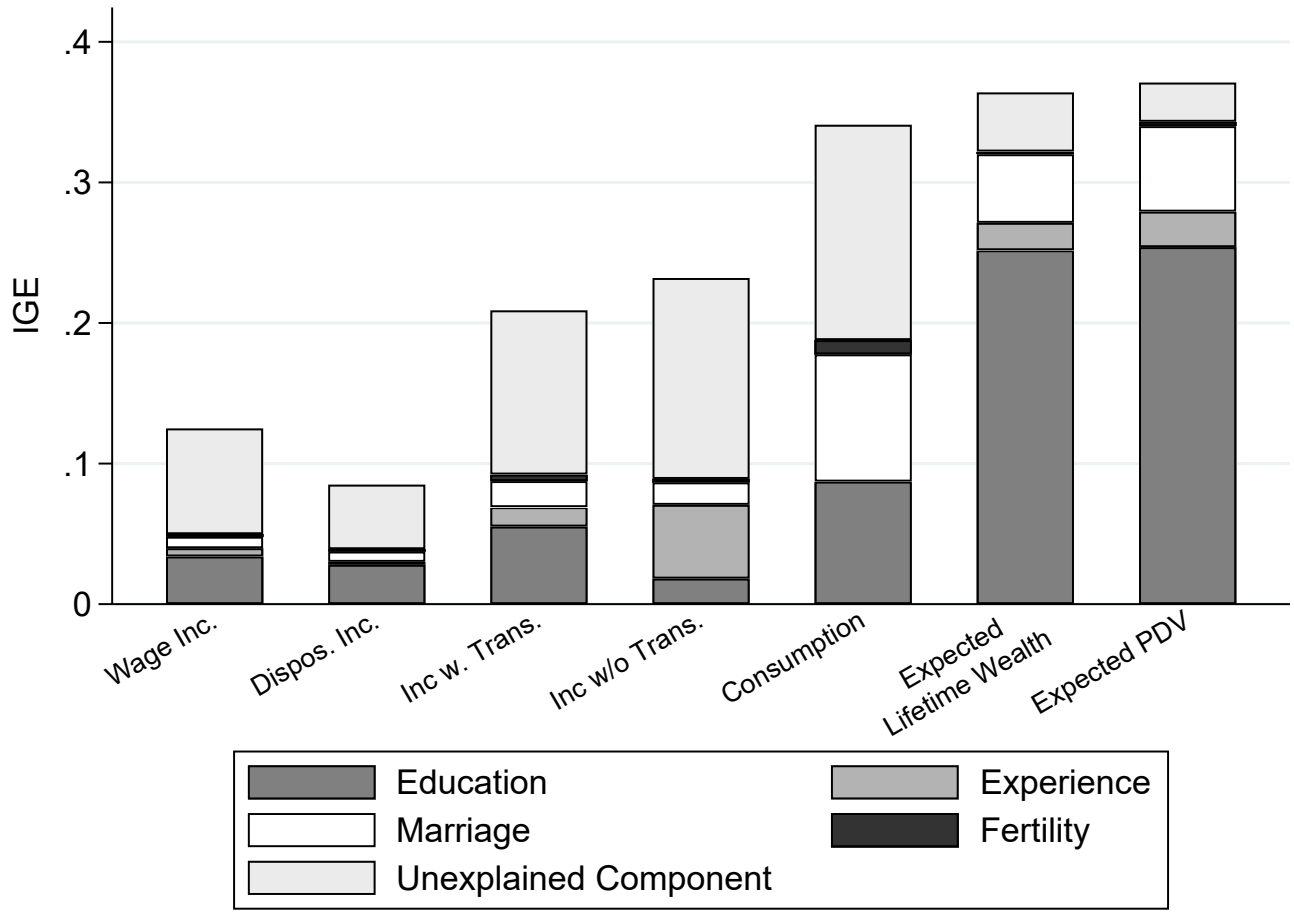
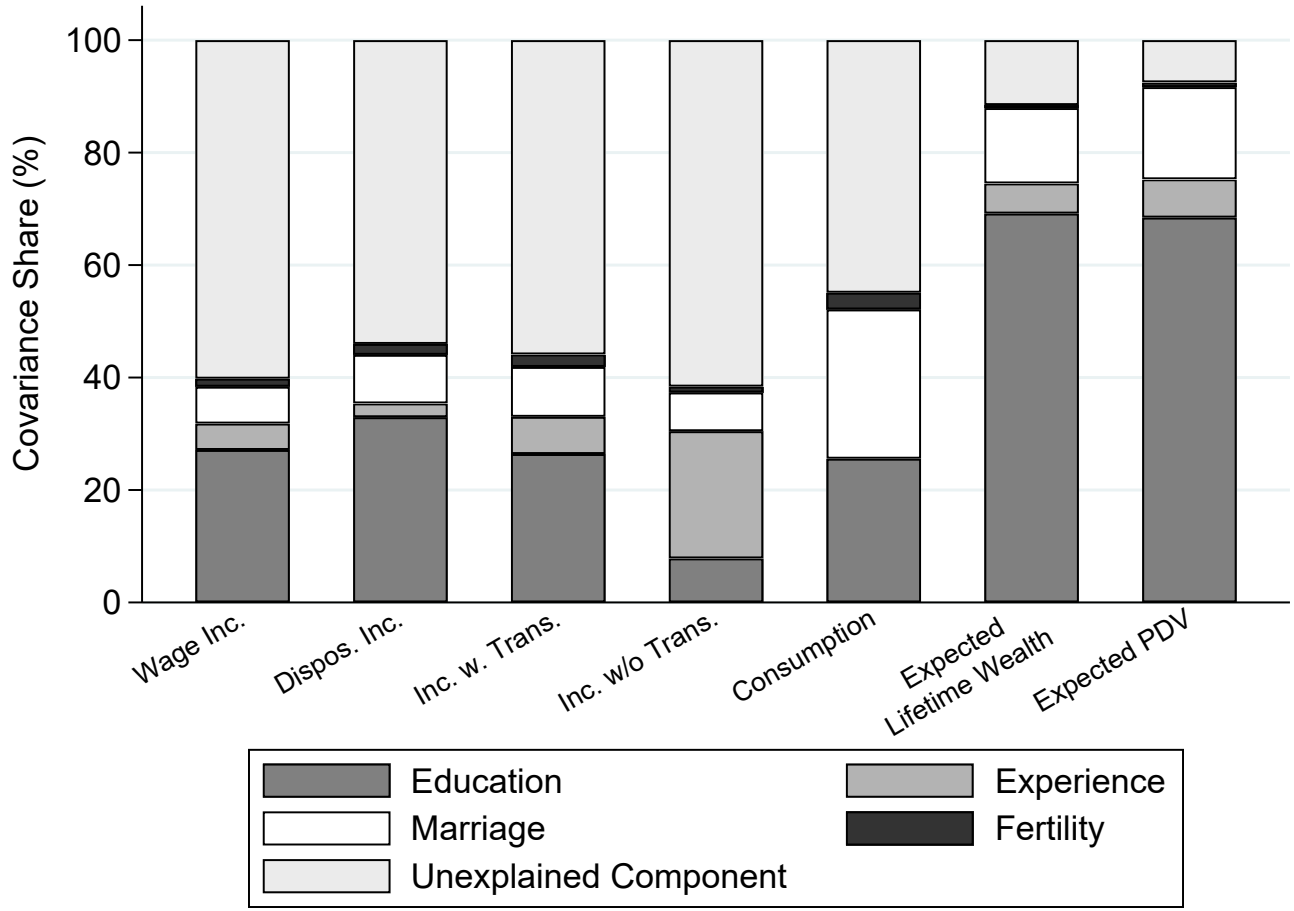
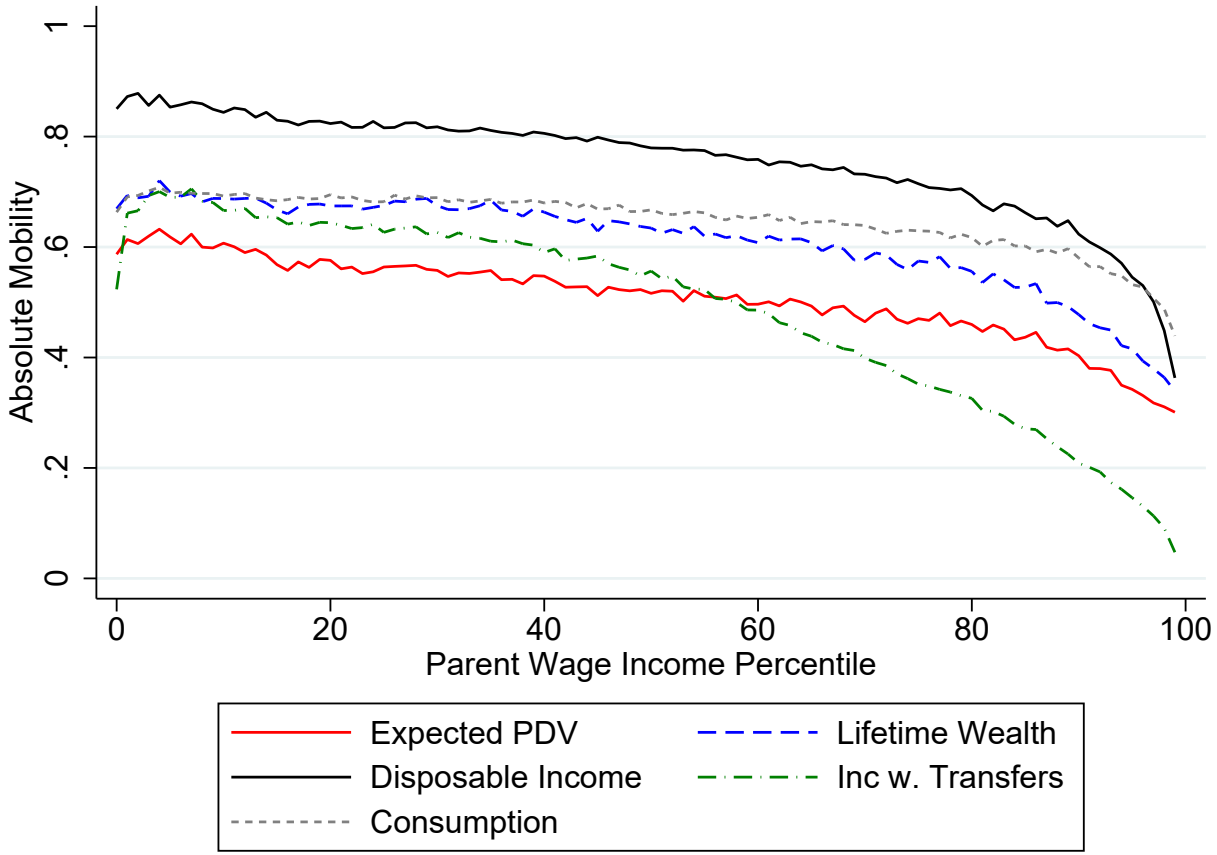


Figure: Decomposition of Covariances



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Father-Son Absolute Upward Mobility



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