

# Where is the Land of Opportunity?

## The Geography of Intergenerational Mobility in the U.S.

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*The opinions expressed in this paper are those of the authors alone and do not necessarily reflect the views of the Internal Revenue Service or the U.S. Treasury Department. This work is a component of a larger project examining the effects of eliminating tax expenditures on the budget deficit and economic activity. Results reported here are contained in the SOI Working Paper “The Economic Impacts of Tax Expenditures: Evidence from Spatial Variation across the U.S.,” approved under IRS contract TIRNO-12-P-00374.*

# Introduction

- United States traditionally hailed as “land of opportunity”
  - Chances of succeeding do not depend heavily on parent’s income
- Vast literature has investigated whether this is true empirically [Hauser et al. 1975, Behrman and Taubman 1985, Becker and Tomes 1986, Solon 1992, Zimmerman 1992, Mulligan 1997, Solon 1999, Mazumder 2005]
- Results debated partly due to limitations in data [Black and Devereux 2011]
  - Ex: Mazumder (2005) uses SIPP-SSA sample with 3,000 obs. and imputed earnings for up to 60% of parents

# This Paper

- We study intergenerational mobility in the U.S. using administrative data on 40 million children
- We show that the question of whether the U.S. is the “land of opportunity” does not have a clear answer
  - Substantial variation in intergenerational mobility *within* the U.S.
  - Some lands of opportunity and some lands of persistent inequality

# Outline

1. National Statistics
2. Geographical Variation in Intergenerational Mobility
3. Correlates of Spatial Differences in Mobility

# Data

- Data source: IRS Databank [Chetty, Friedman, Hilger, Saez, Yagan 2011]
  - Selected de-identified data from 1996-2012 income tax returns
  - Includes non-filers via information forms (e.g. W-2's)

# Sample Definition

- Primary sample: Current U.S. citizens in 1980-81 birth cohorts
  - 6.3 million children, age 30-32 in 2012
- Expanded sample: 1980-1991 birth cohorts for robustness checks
  - 40 million children, age 20-32 in 2012

# Linking Children to Parents

- Parent(s) defined as first person(s) who claim child as a dependent
  - Most children are linked to parents based on tax returns in 1996
- We link approximately 95% of children to parents

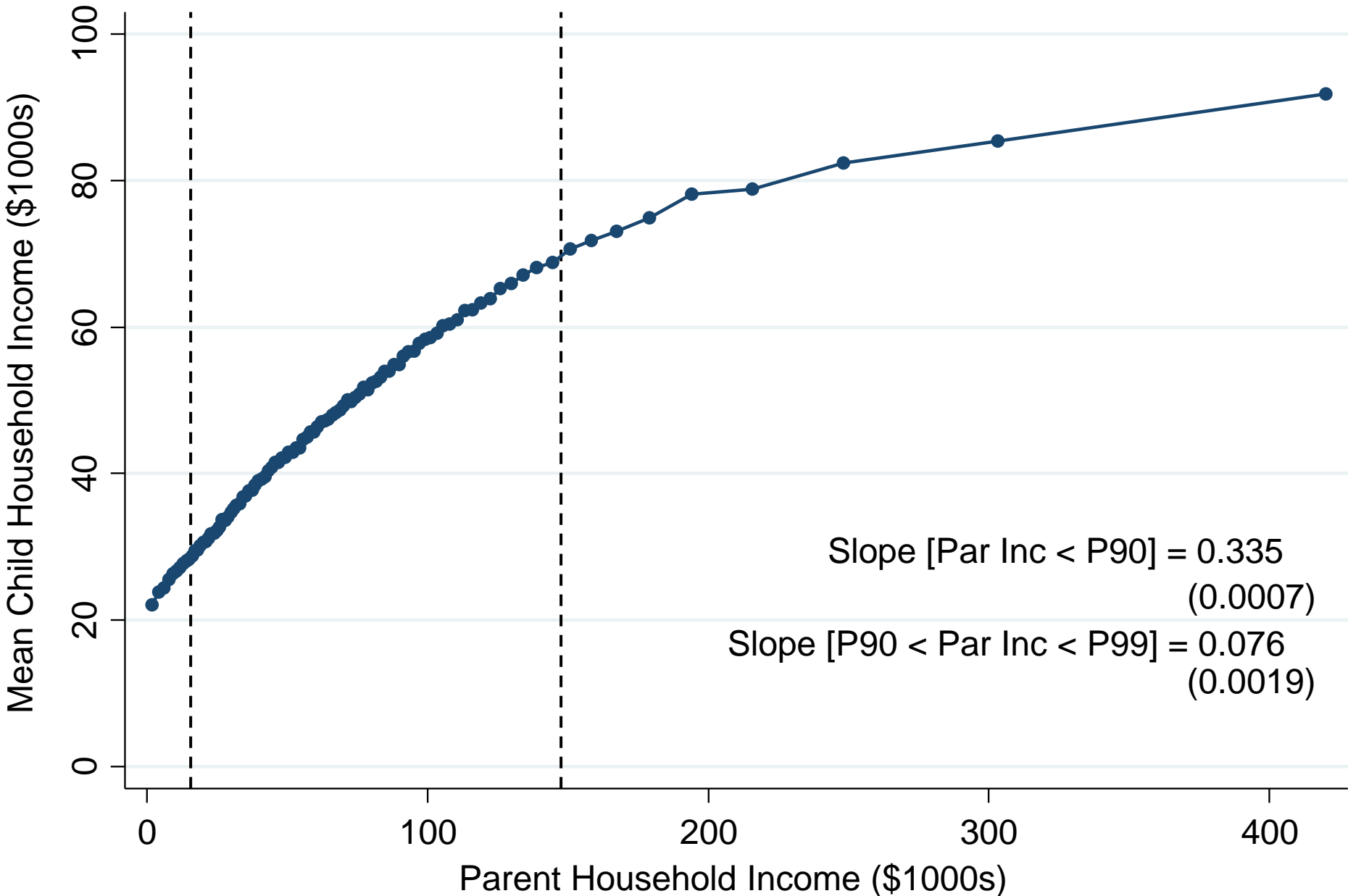
# Income Definitions

- Parent Income: mean pre-tax household income (AGI+SSDI) between 1996-2000
- Child Income: mean pre-tax household income between 2010-2012
- For non-filers, use W-2 wage earnings + SSDI + UI income
  - If no 1040 and no W-2, code income as 0
- These **household** level definitions capture total resources in the household
  - Spatial patterns very similar using individual income but IGE magnitudes lower, especially for daughters [Chadwick and Solon 2002]

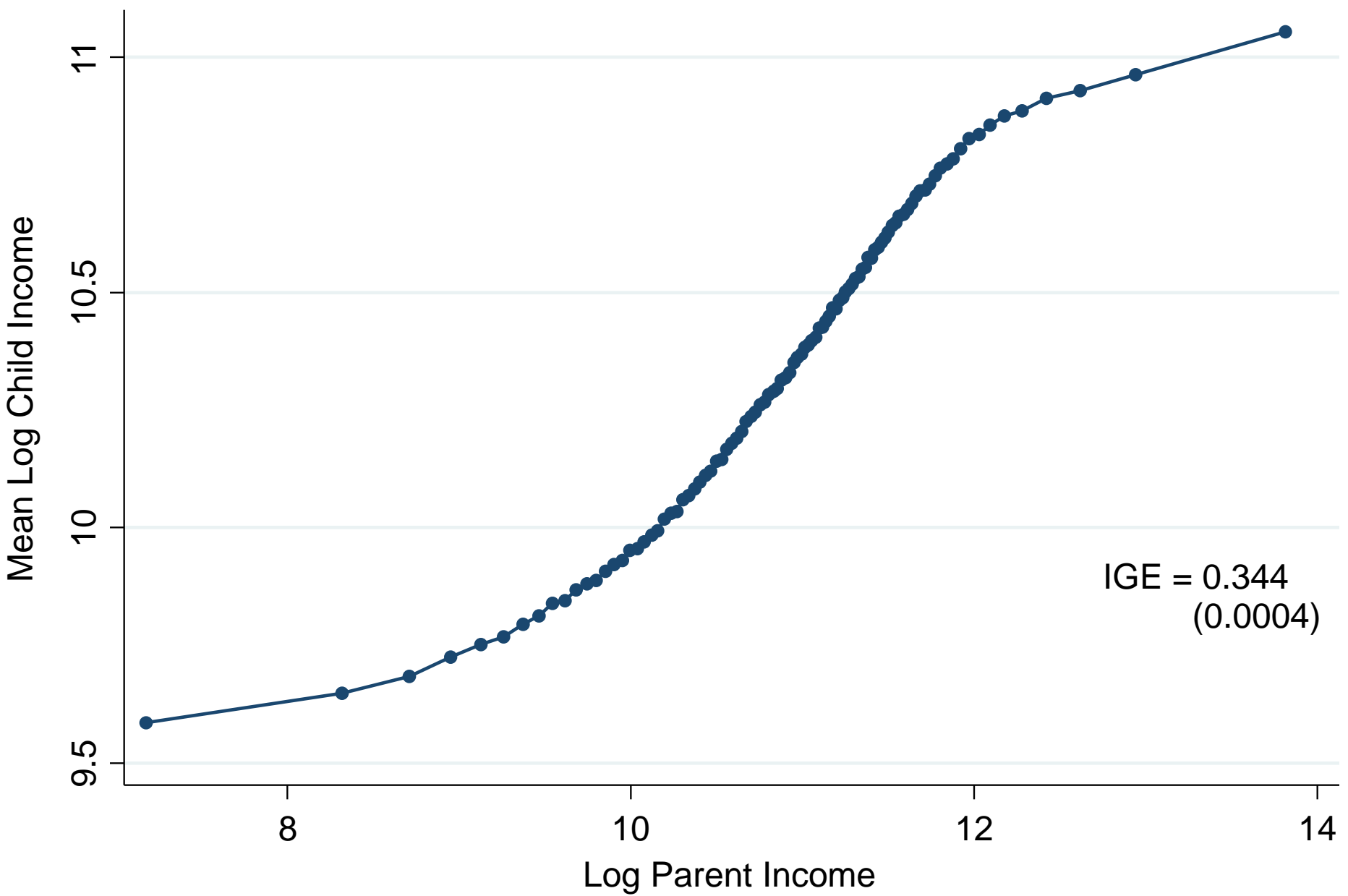


Part 1  
National Statistics

# Mean Child Household Income at Age 30 vs. Parent Household Income

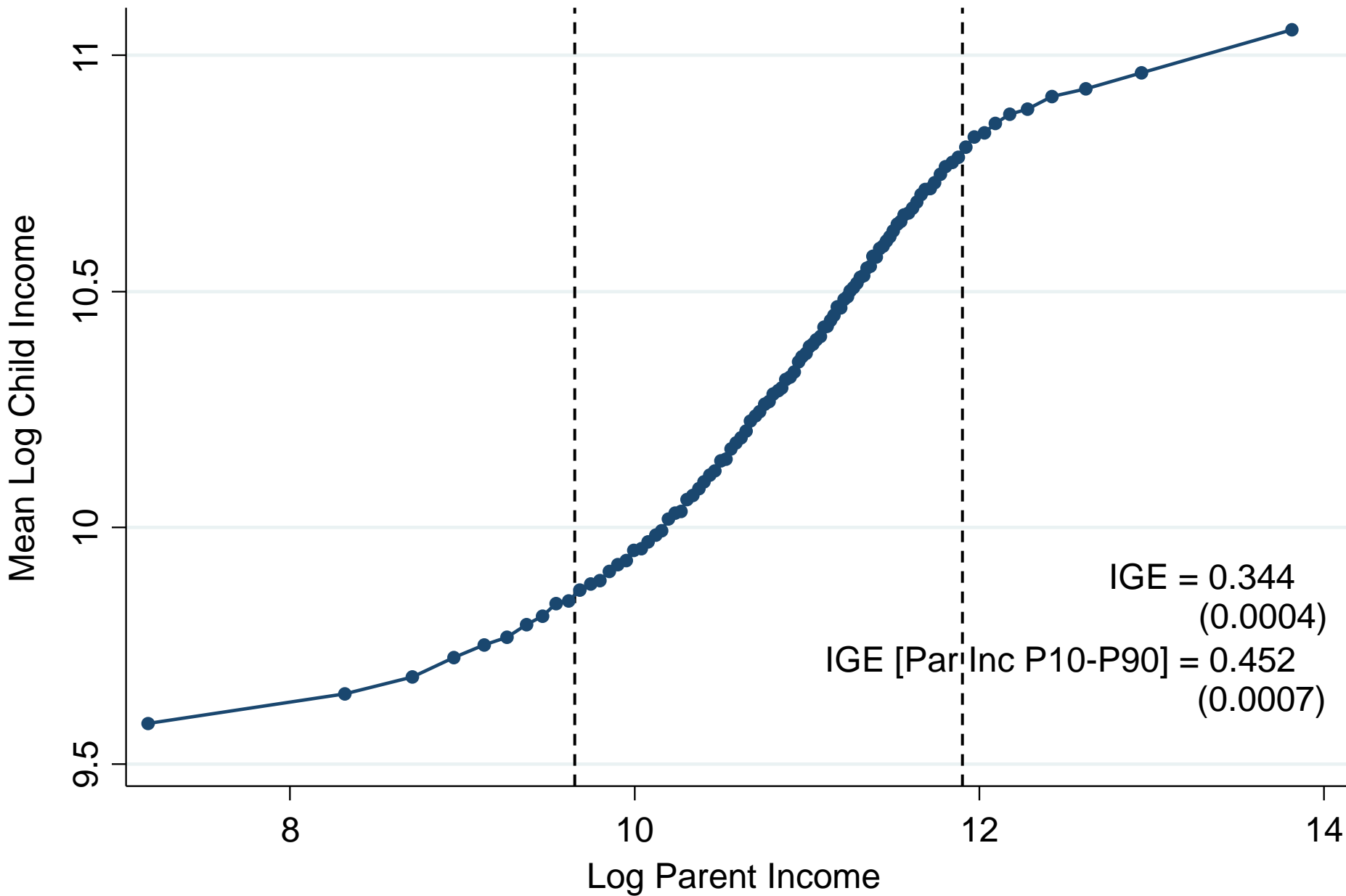


# Mean Log Child Income vs. Log Parent Income (Excluding 0's)

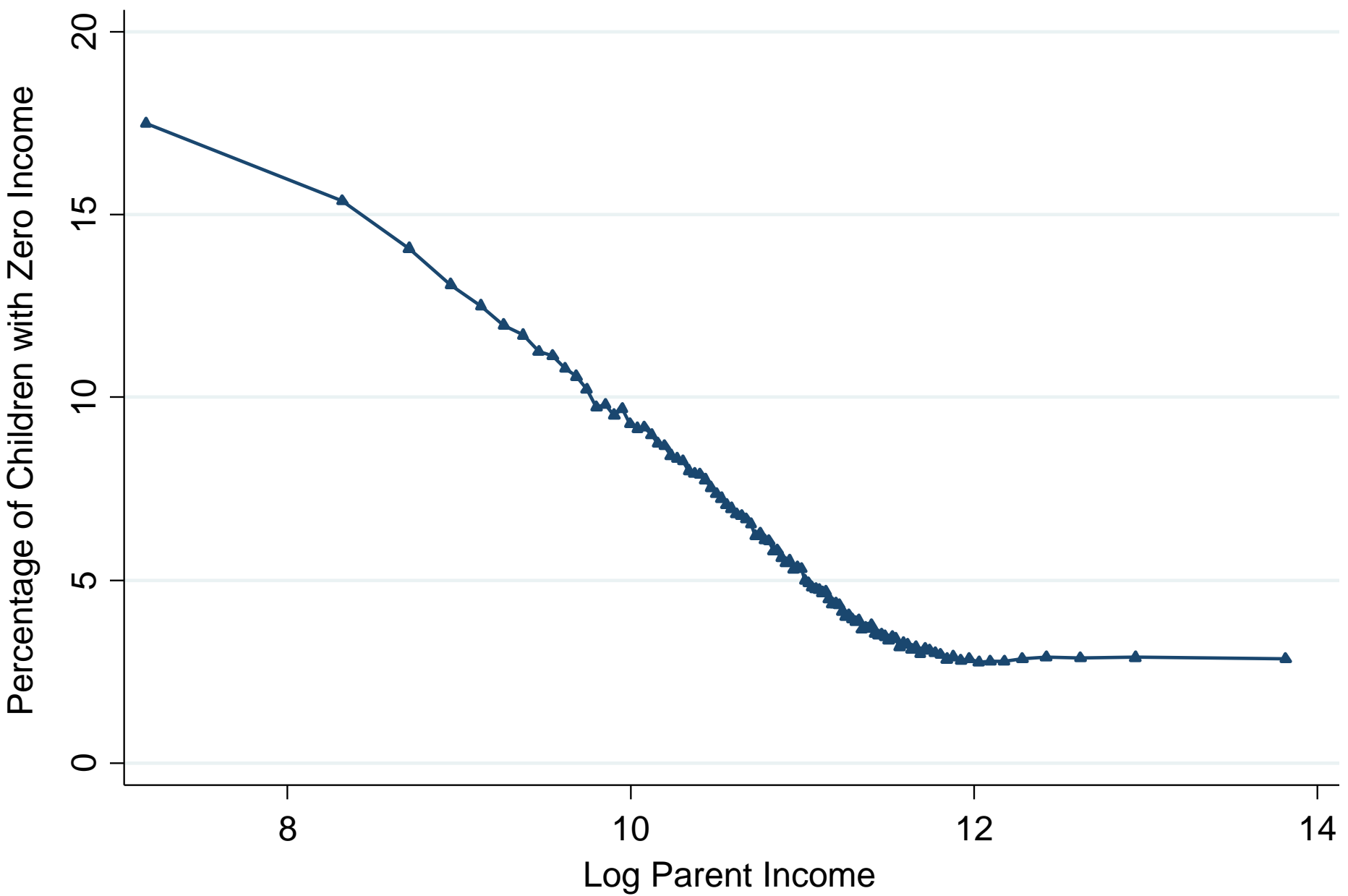


IGE = 0.344  
(0.0004)

# Mean Log Child Income vs. Log Parent Income (Excluding 0's)

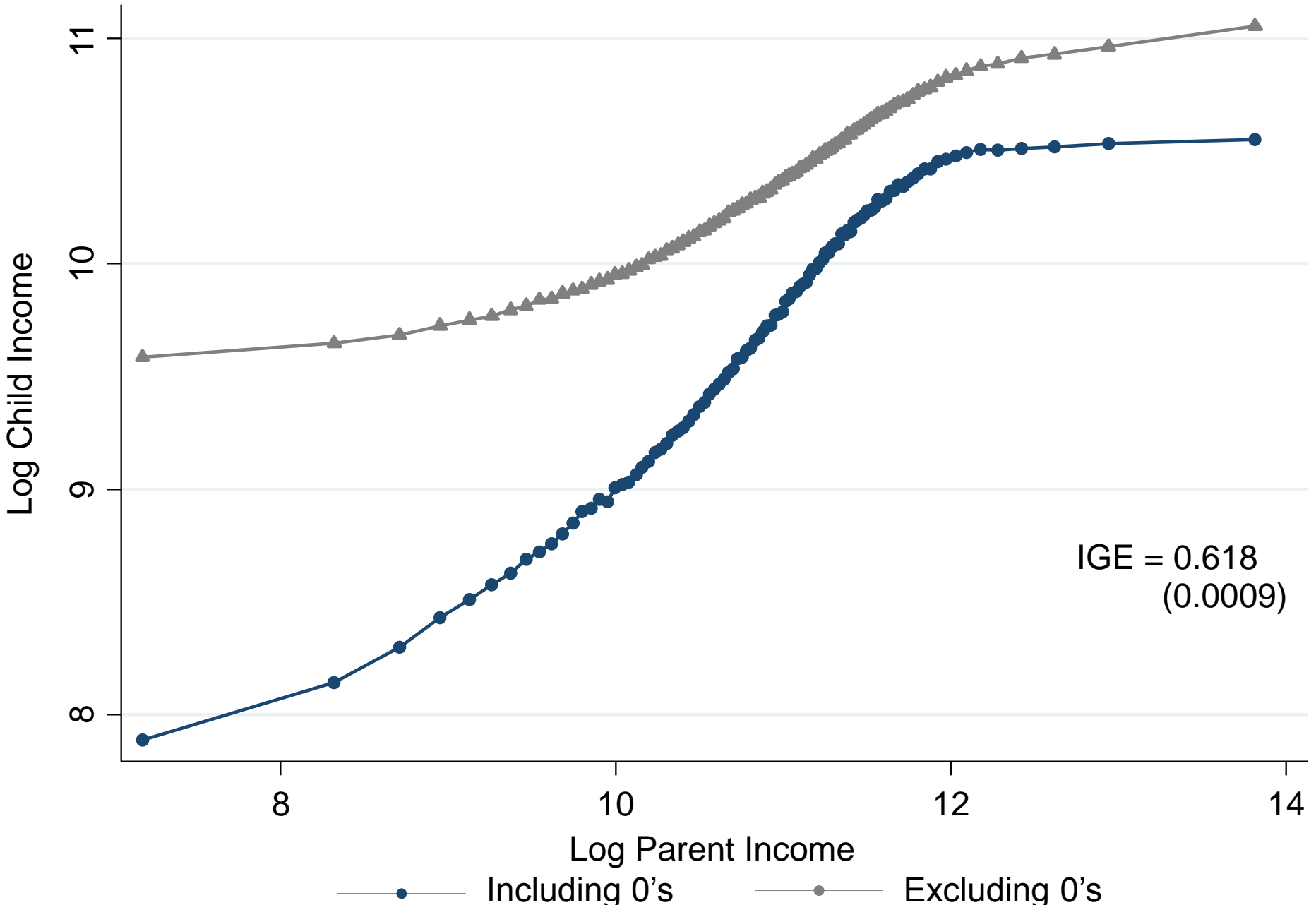


# Fraction of Children with Zero Income vs. Log Parent Income



# Mean Log Child Income vs. Log Parent Income

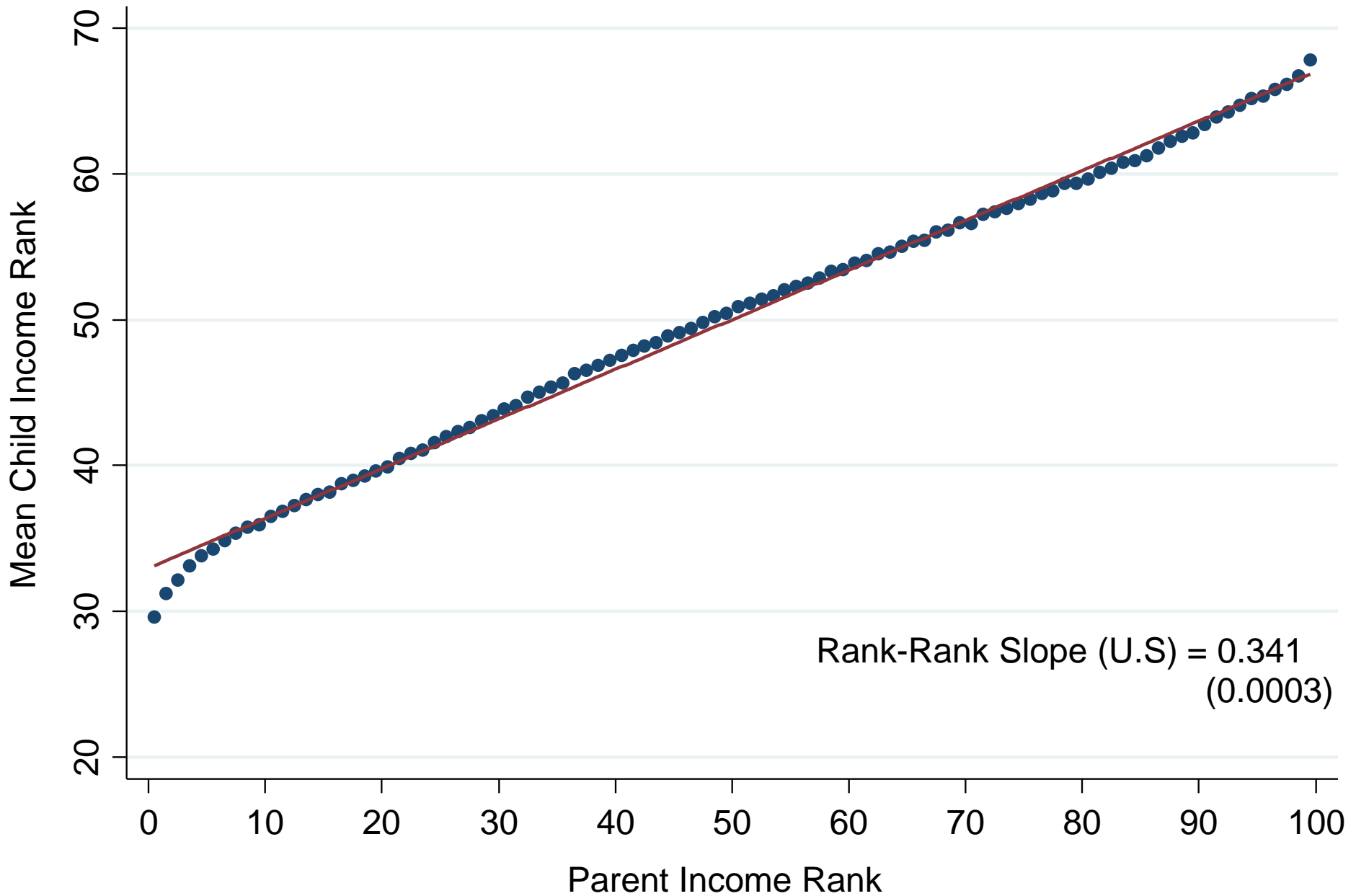
## Income of Non-Working Children Coded as \$1



# Rank-Rank Specification

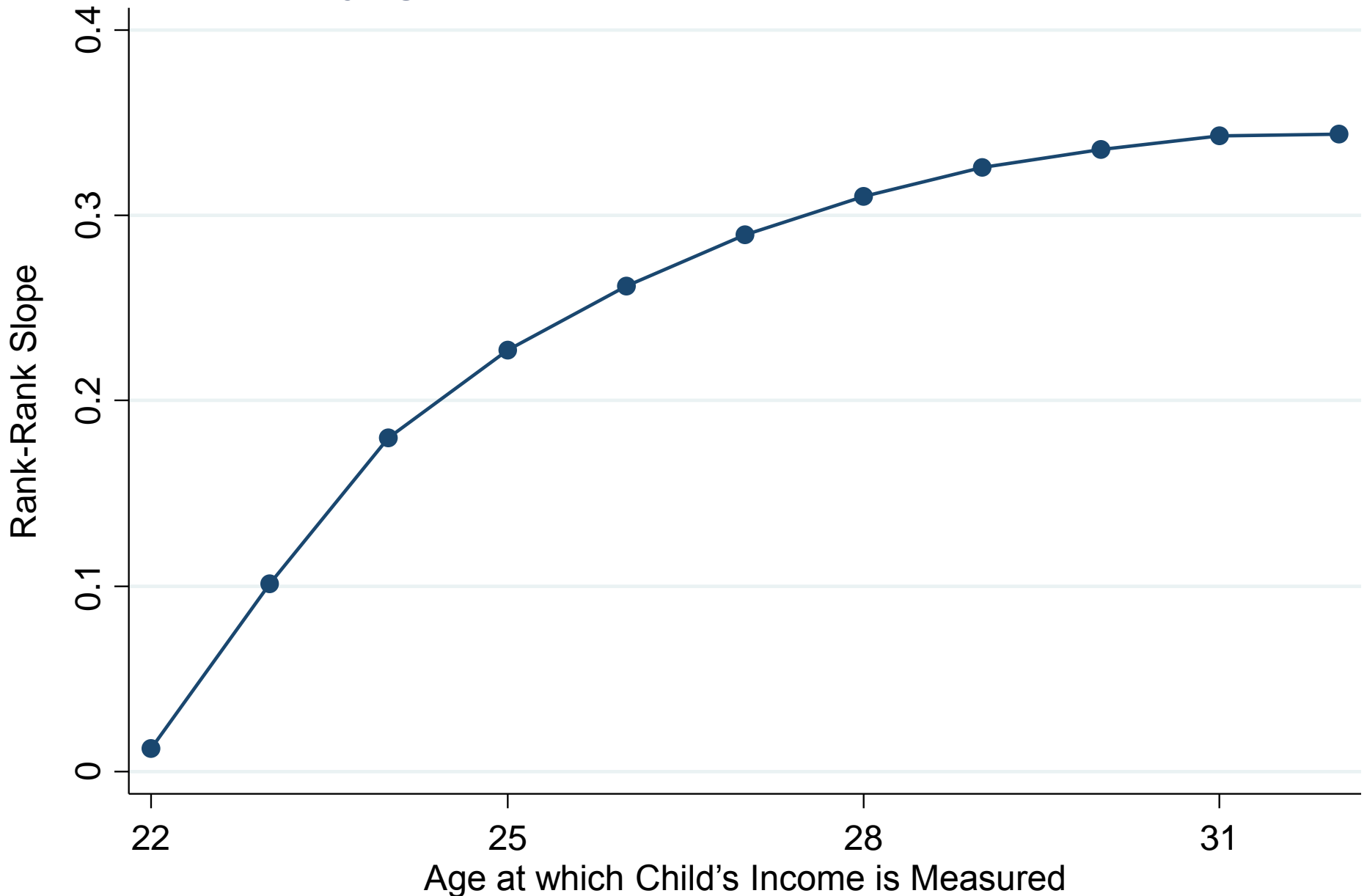
- To handle zeros and non-linearity, we use a *rank-rank* specification (similar to Dahl and DeLeire 2008)
  - Rank children based on their incomes relative to other children same in birth cohort
  - Rank parents of these children based on their incomes relative to other parents in this sample

# Mean Child Percentile Rank vs. Parent Percentile Rank

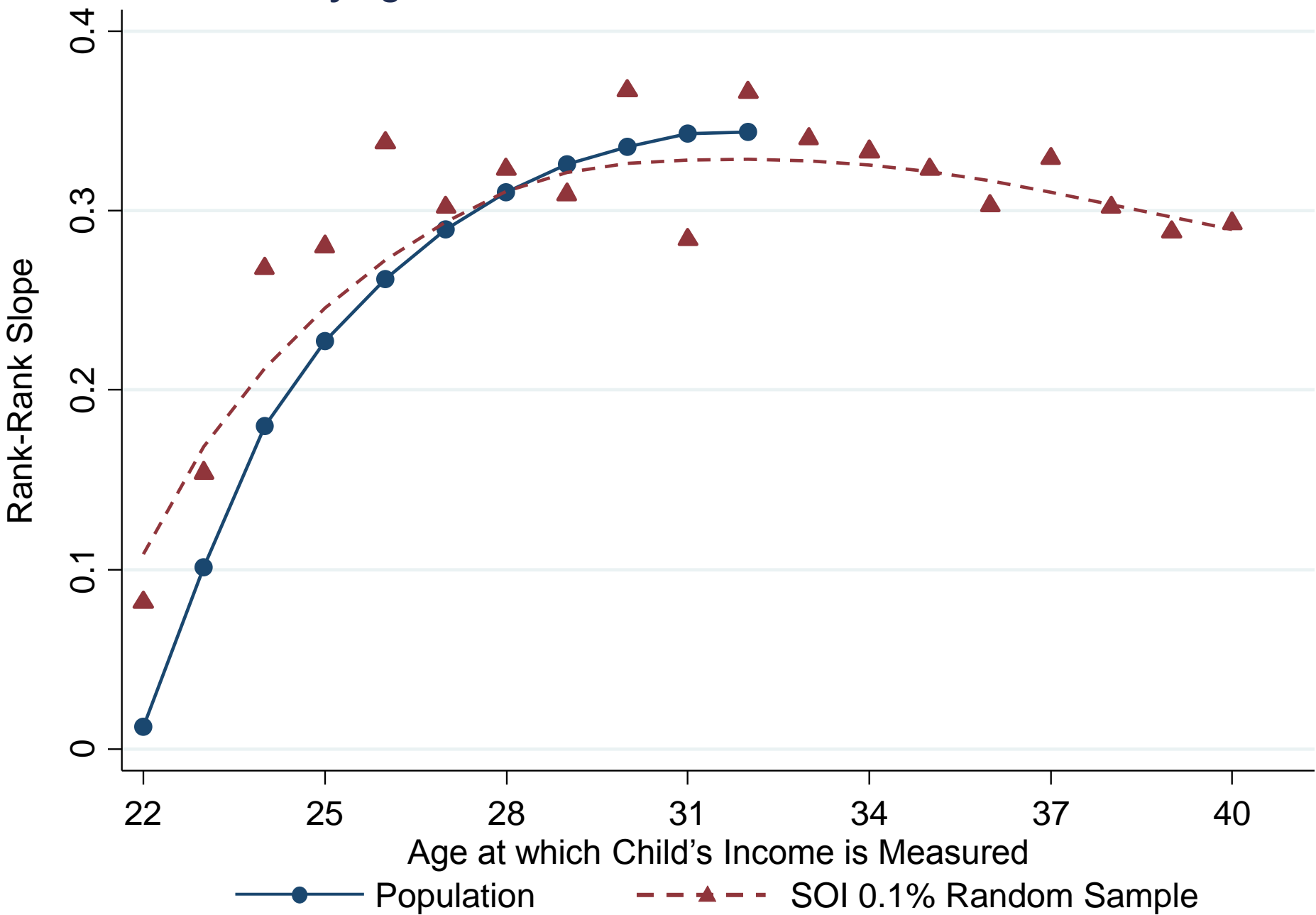




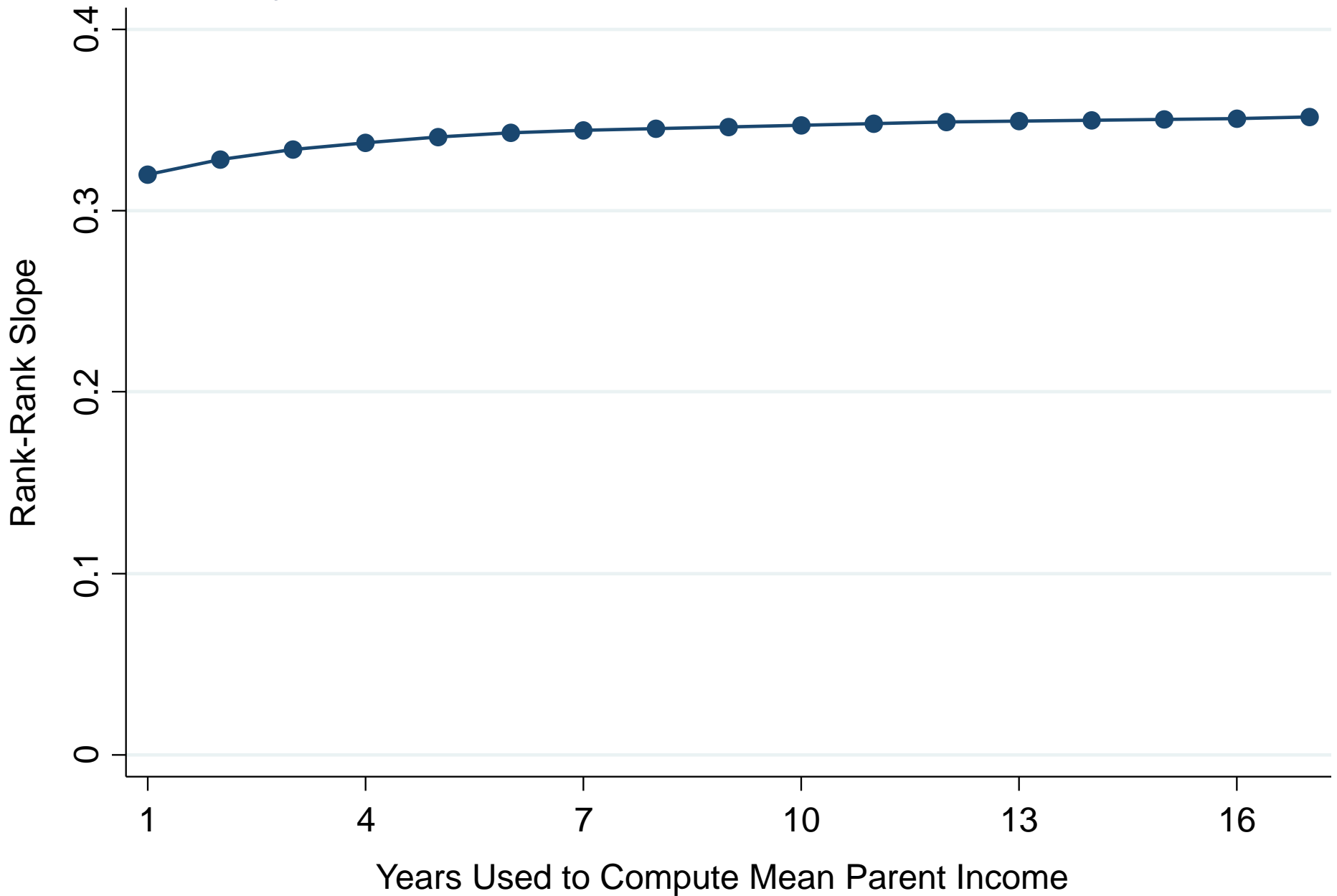
# Lifecycle Bias: Intergenerational Income Correlation by Age at Which Child's Income is Measured



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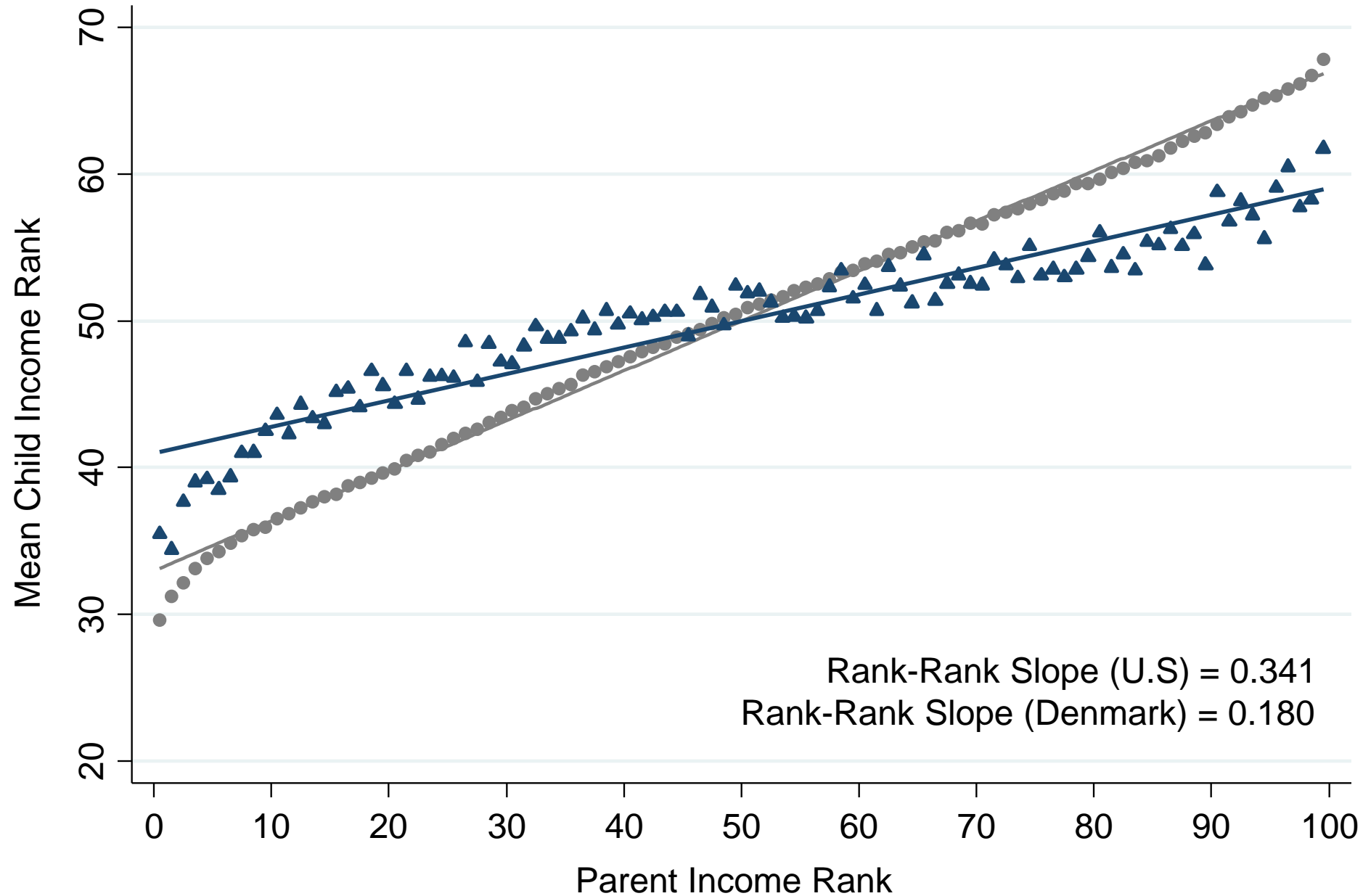
## Attenuation Bias: Rank-Rank Slopes by Number of Years Used to Measure Parent Income



## Part 2

# Geographical Variation

# Intergenerational Mobility in the United States vs. Denmark



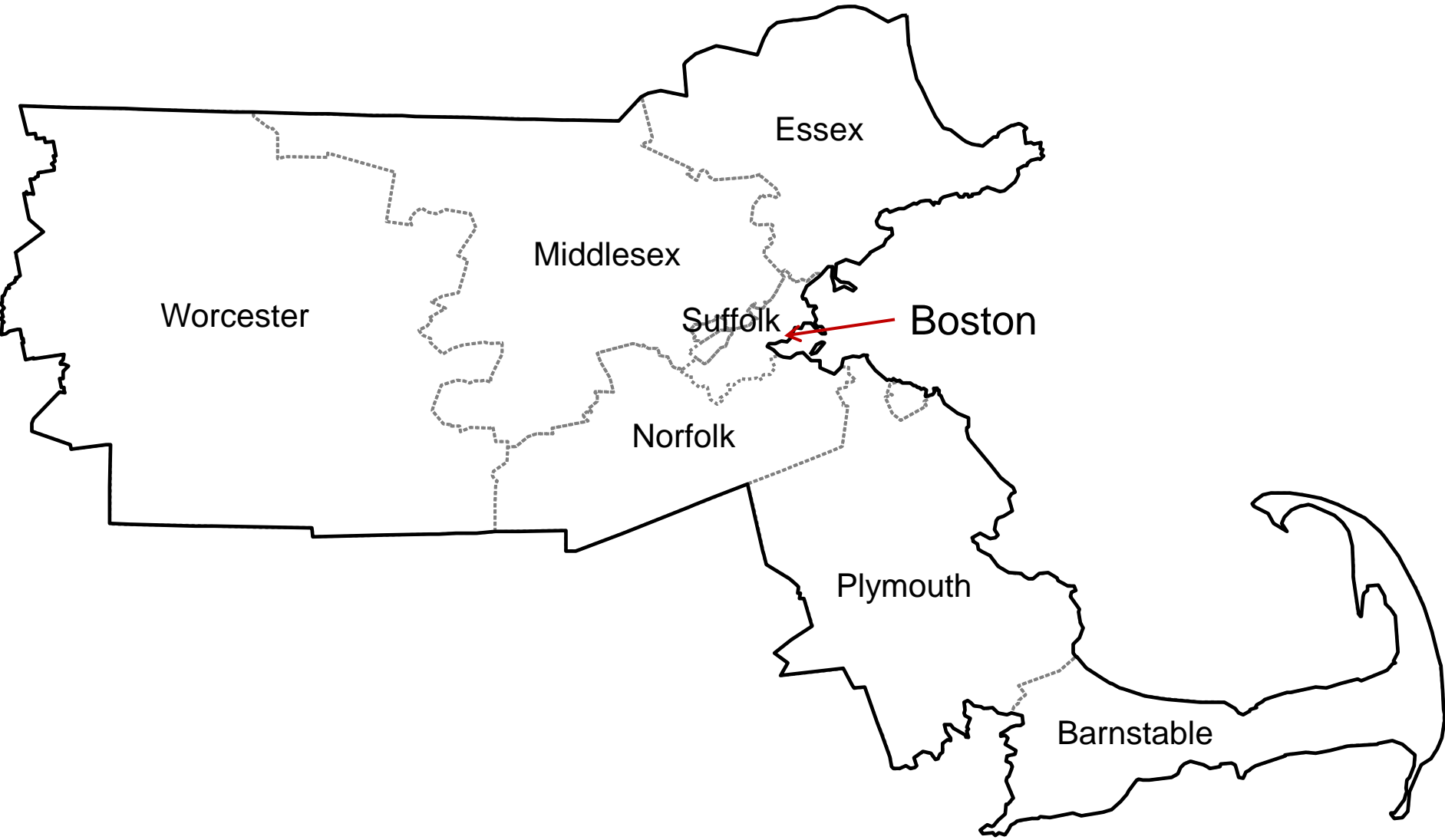
Rank-Rank Slope (U.S) = 0.341  
Rank-Rank Slope (Denmark) = 0.180

—▲— Denmark [Boserup, Kreiner, Kopczuk 2013]    —●— United States

# Geographical Variation within the U.S.

- We study variation in intergenerational mobility at the level of Commuting Zones (CZ's)
  - CZ's are aggregations of counties based on commuting patterns in 1990 census [Tolbert and Sizer 1996, Autor and Dorn 2012]
  - Similar to metro areas but cover rural areas as well

# The Boston Commuting Zone



# Geographical Definitions

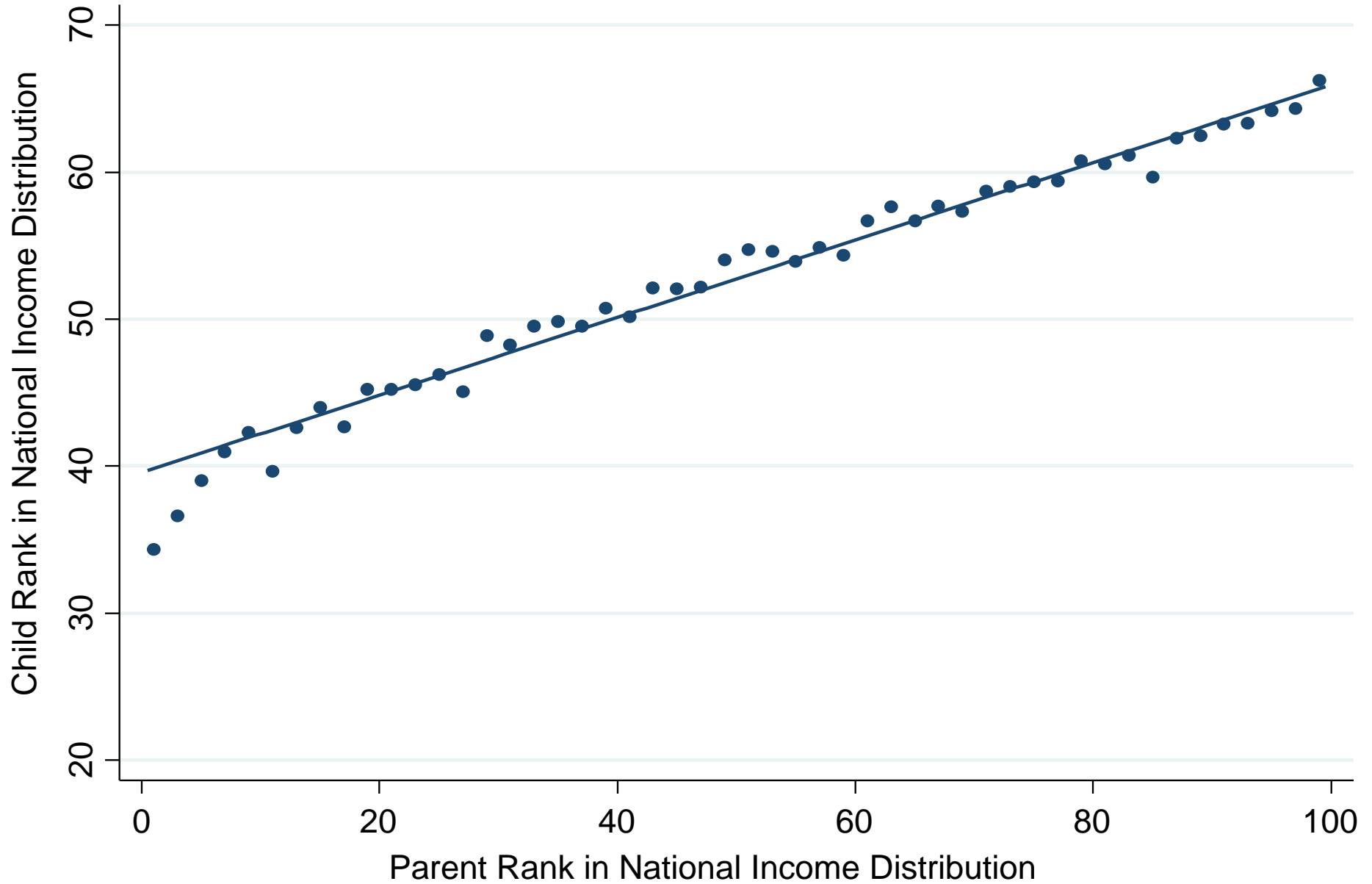
- Divide children into locations based on where they grew up
  - CZ from which parents filed tax return when they first claimed the child as a dependent
  - Permanently assign child to this CZ, no matter where she lives now
- For 1980 cohort, this is typically location when child is age 16
  - Verify using younger cohorts that measuring location at earlier ages yields very similar results



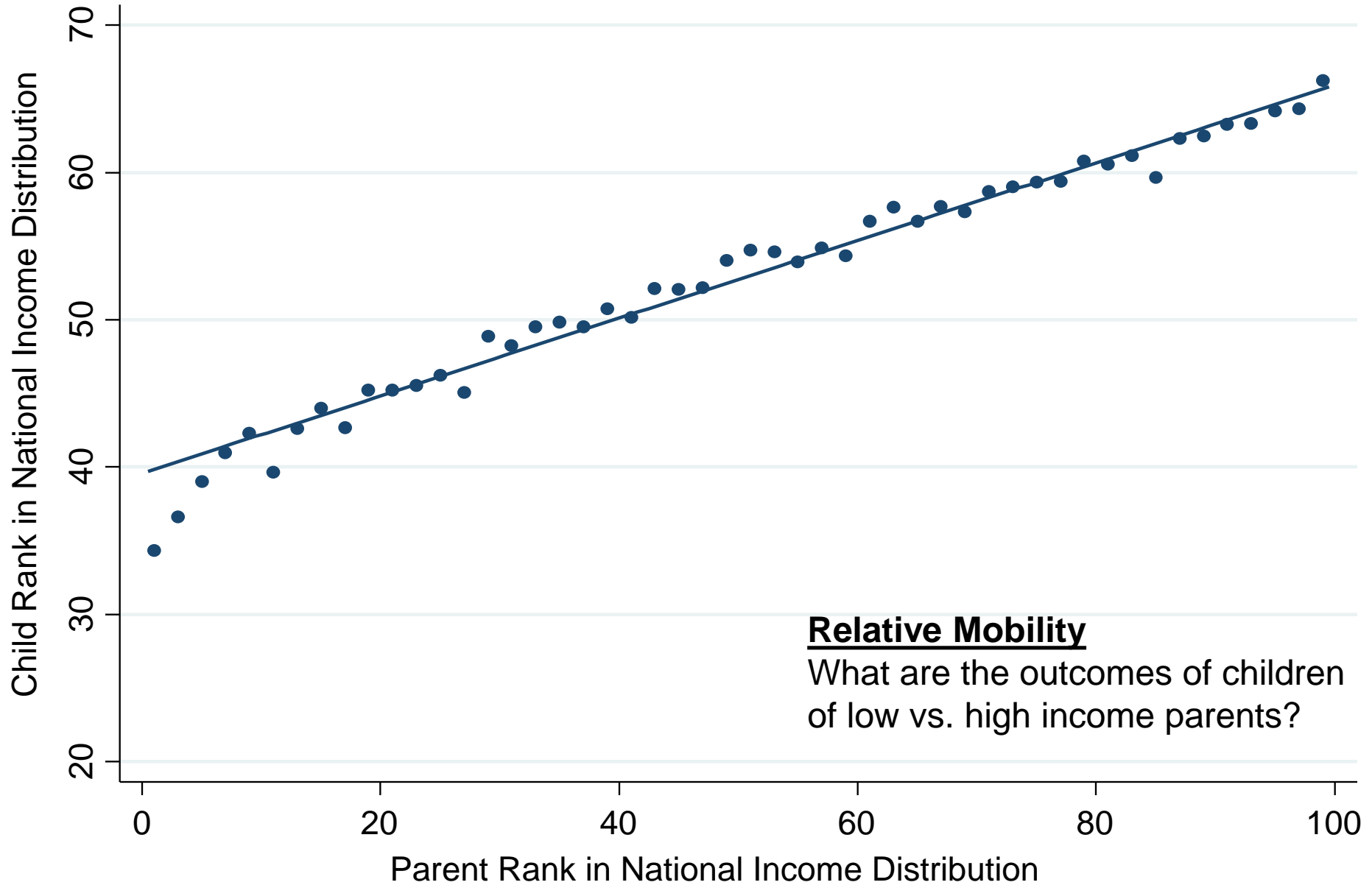
# Defining Income Ranks

- In every CZ, we measure parent and child incomes using ranks in the *national* income distribution
  - This allows us to identify both relative and absolute mobility
- Important because more relative mobility is not necessarily desirable from a normative perspective

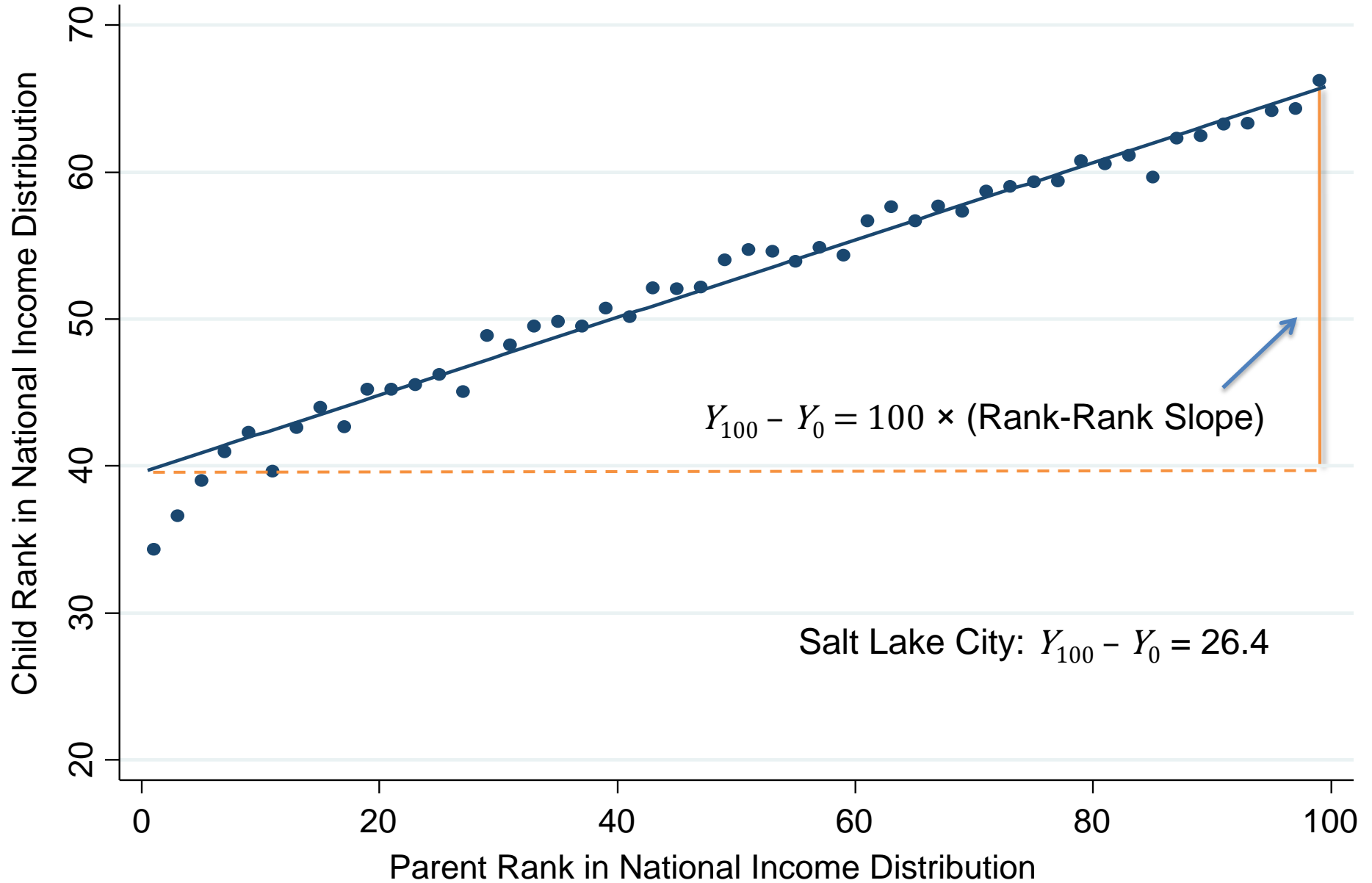
# Intergenerational Mobility in Salt Lake City



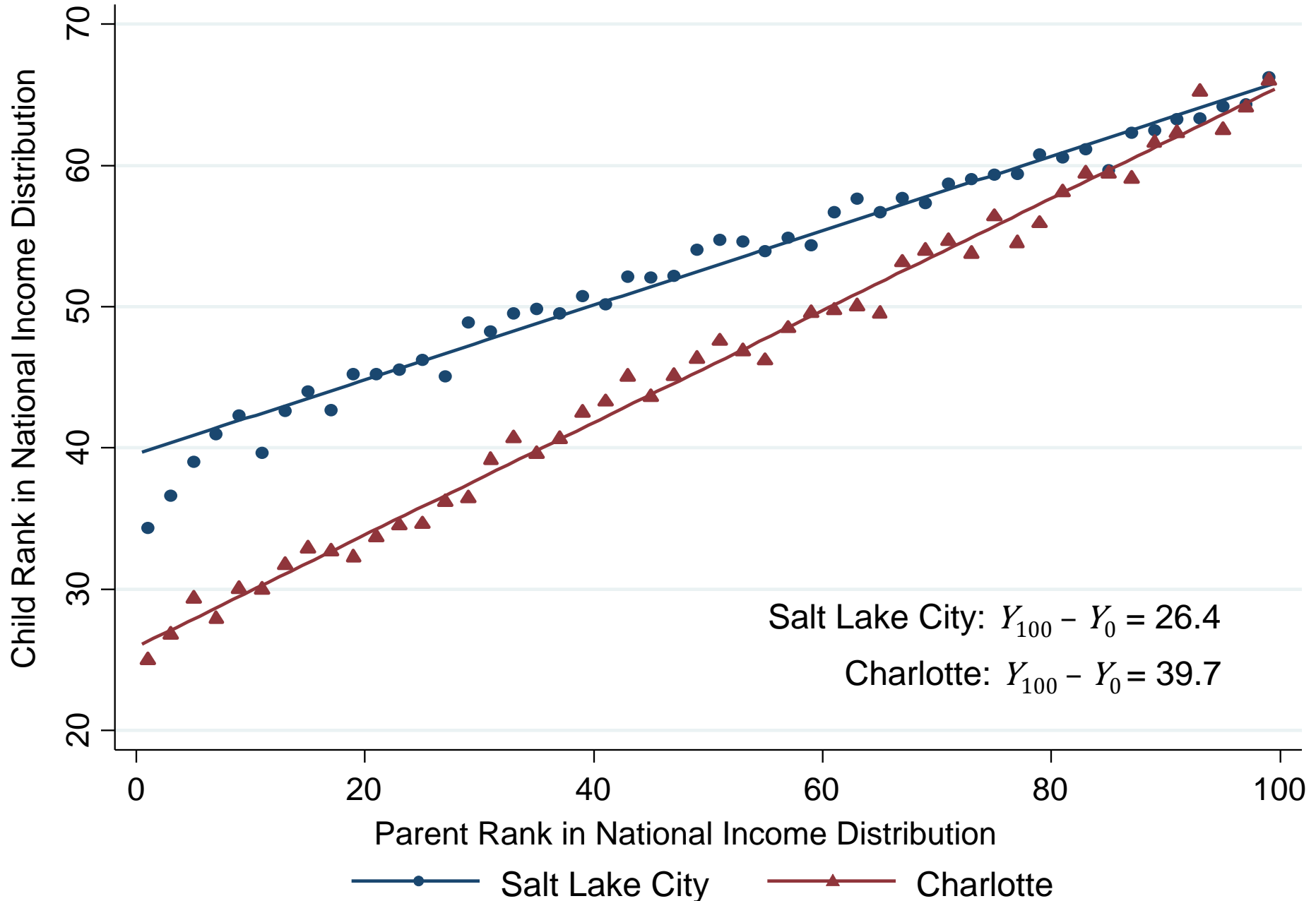
# Intergenerational Mobility in Salt Lake City



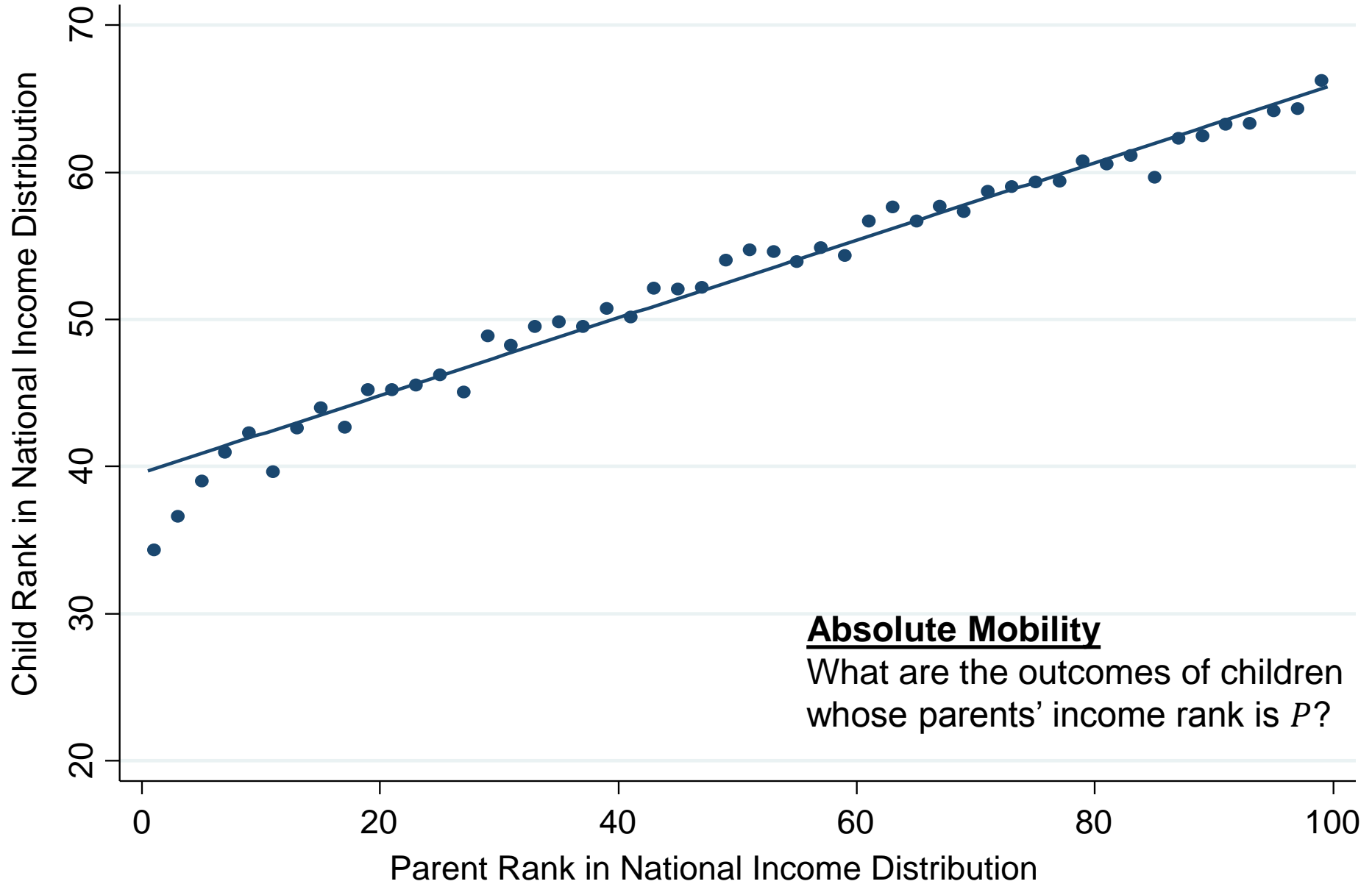
# Intergenerational Mobility in Salt Lake City



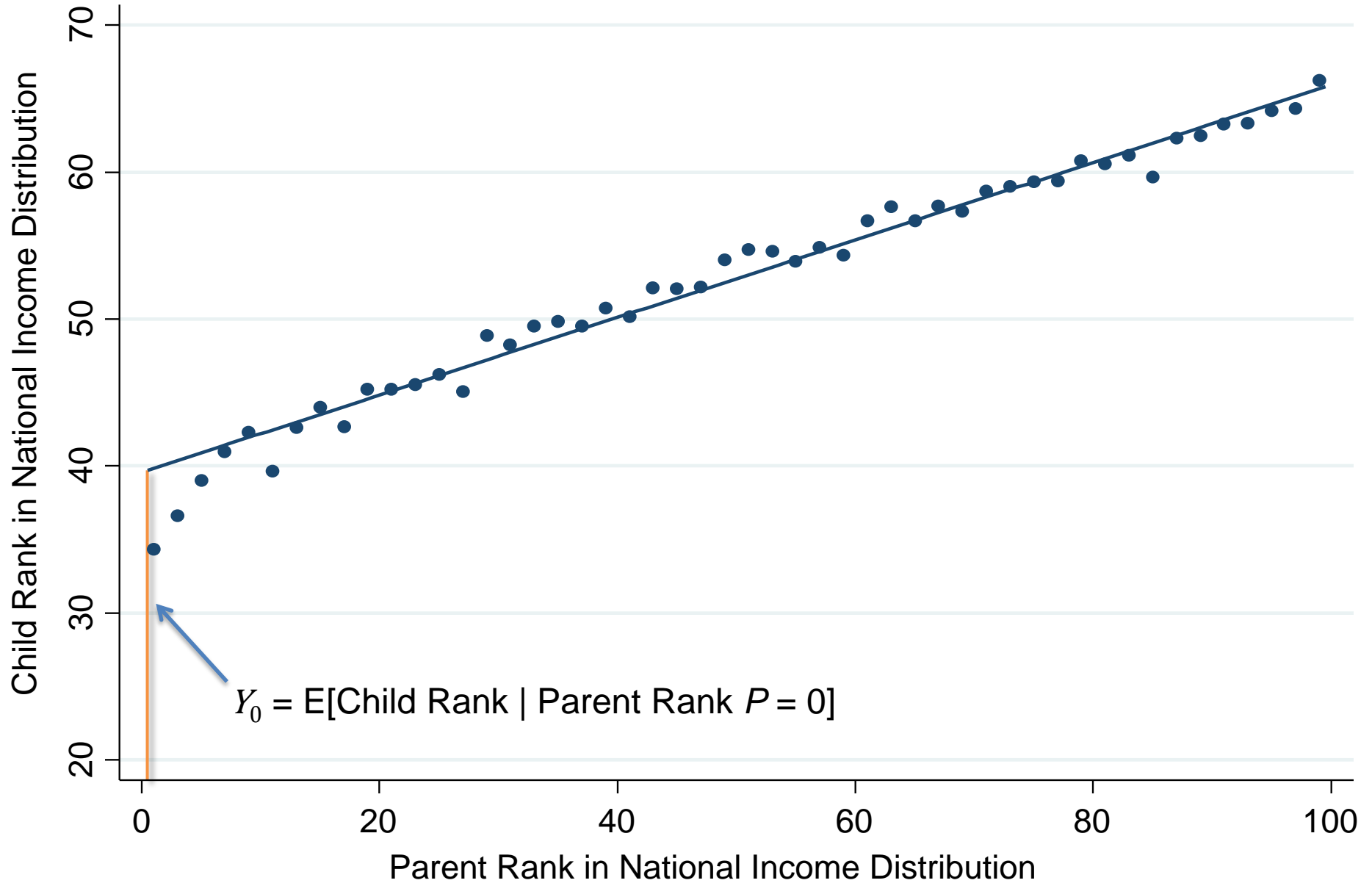
# Intergenerational Mobility in Salt Lake City vs. Charlotte



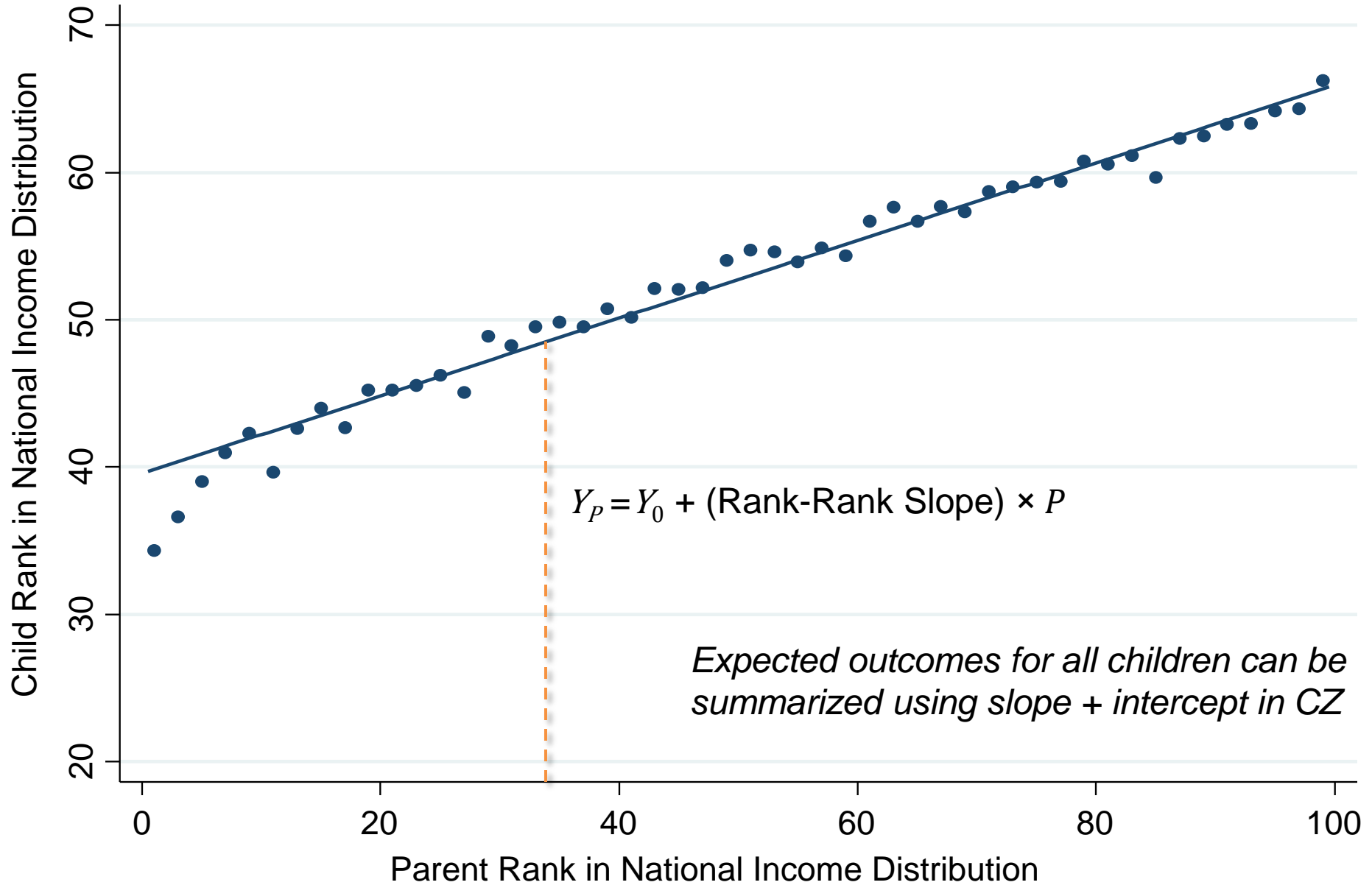
# Intergenerational Mobility in Salt Lake City



# Intergenerational Mobility in Salt Lake City

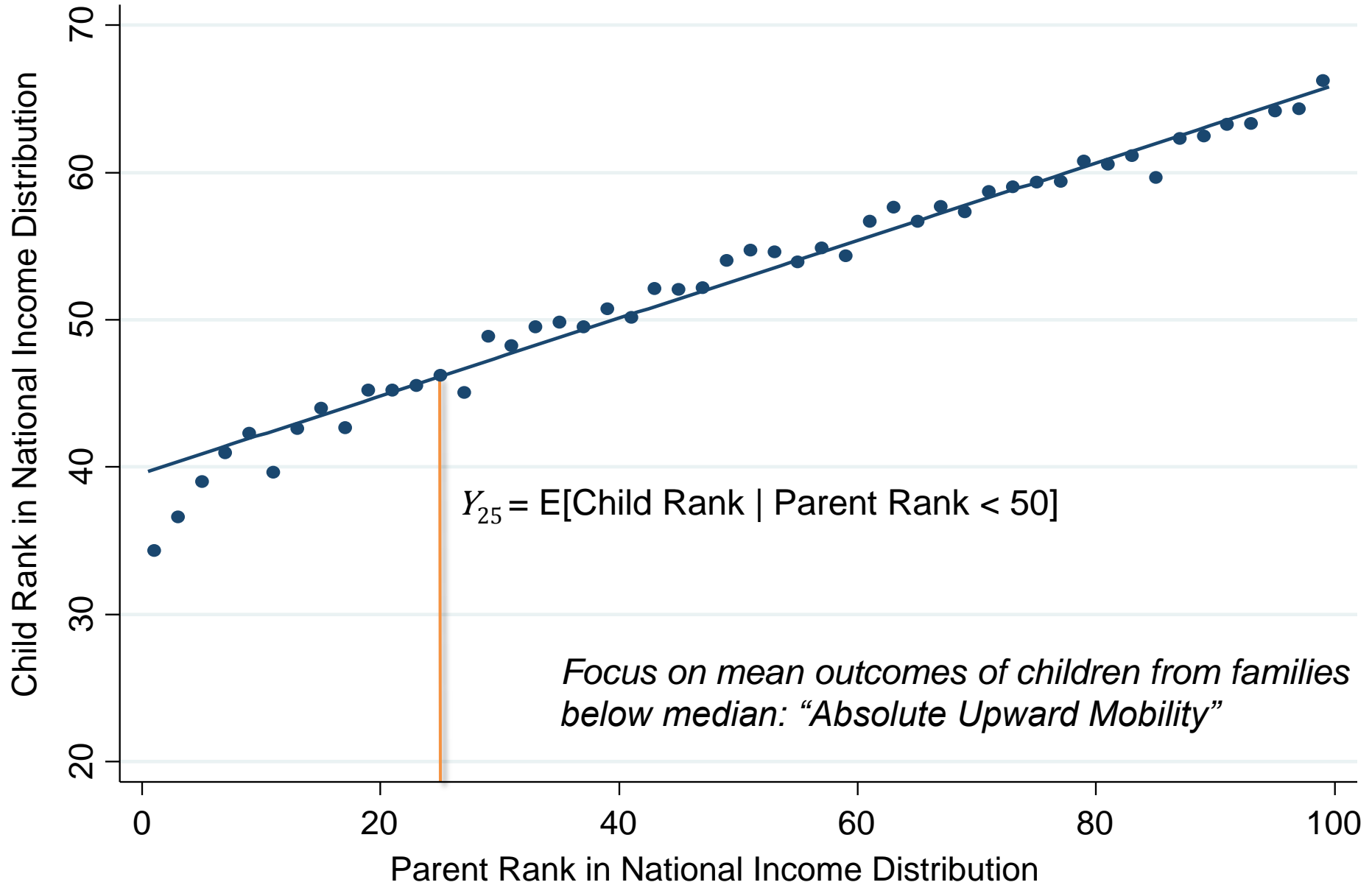


# Intergenerational Mobility in Salt Lake City

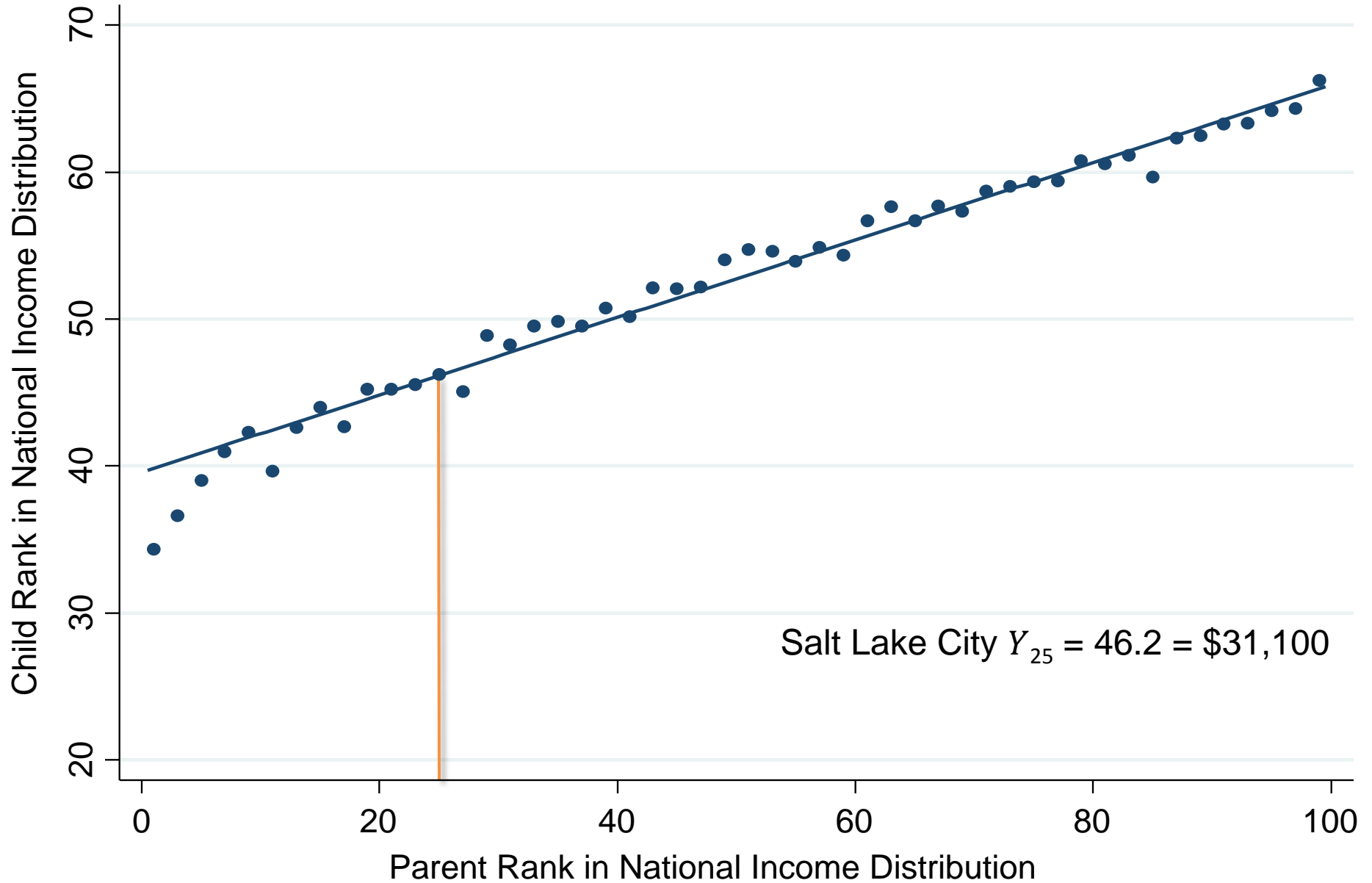




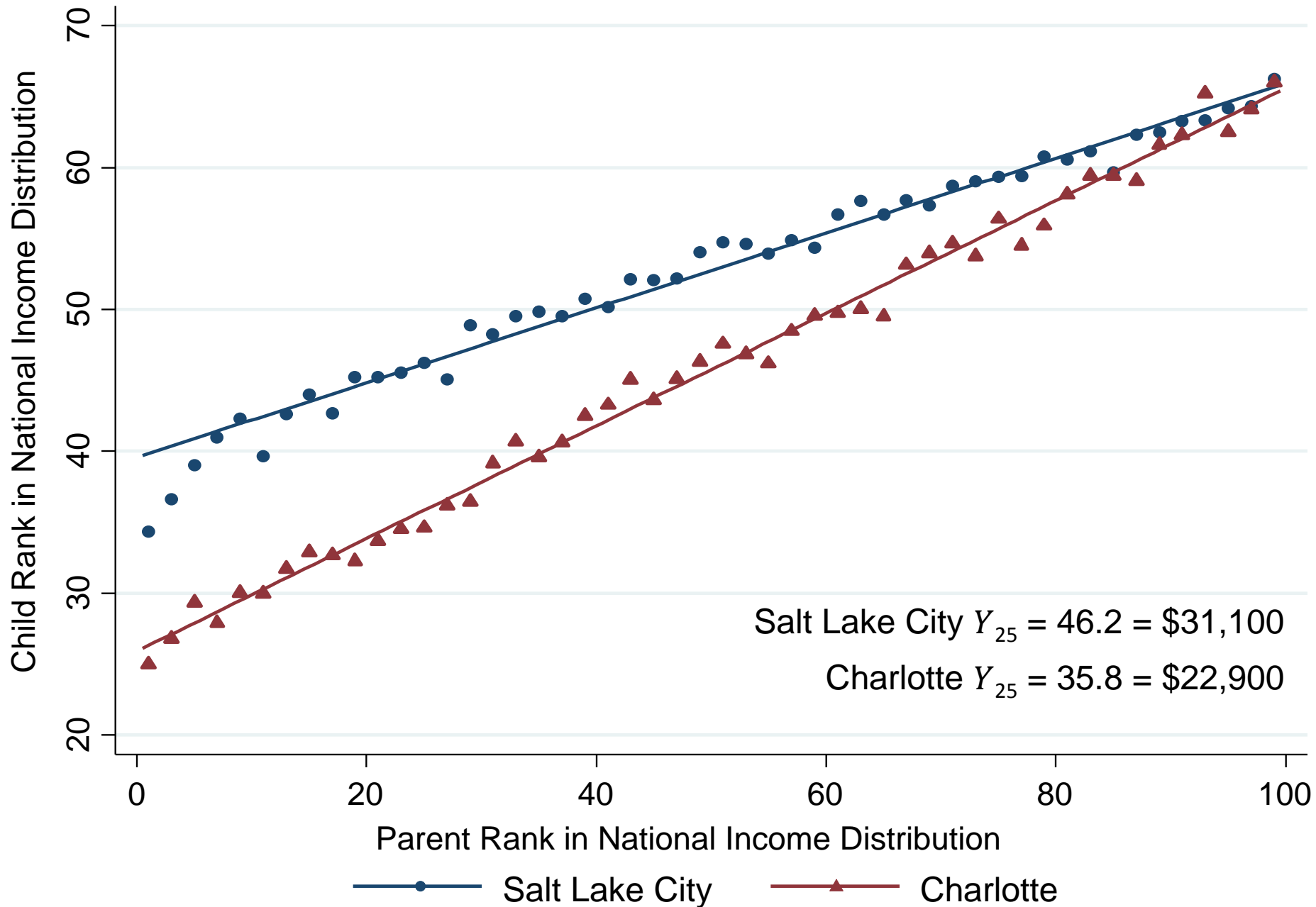
# Intergenerational Mobility in Salt Lake City



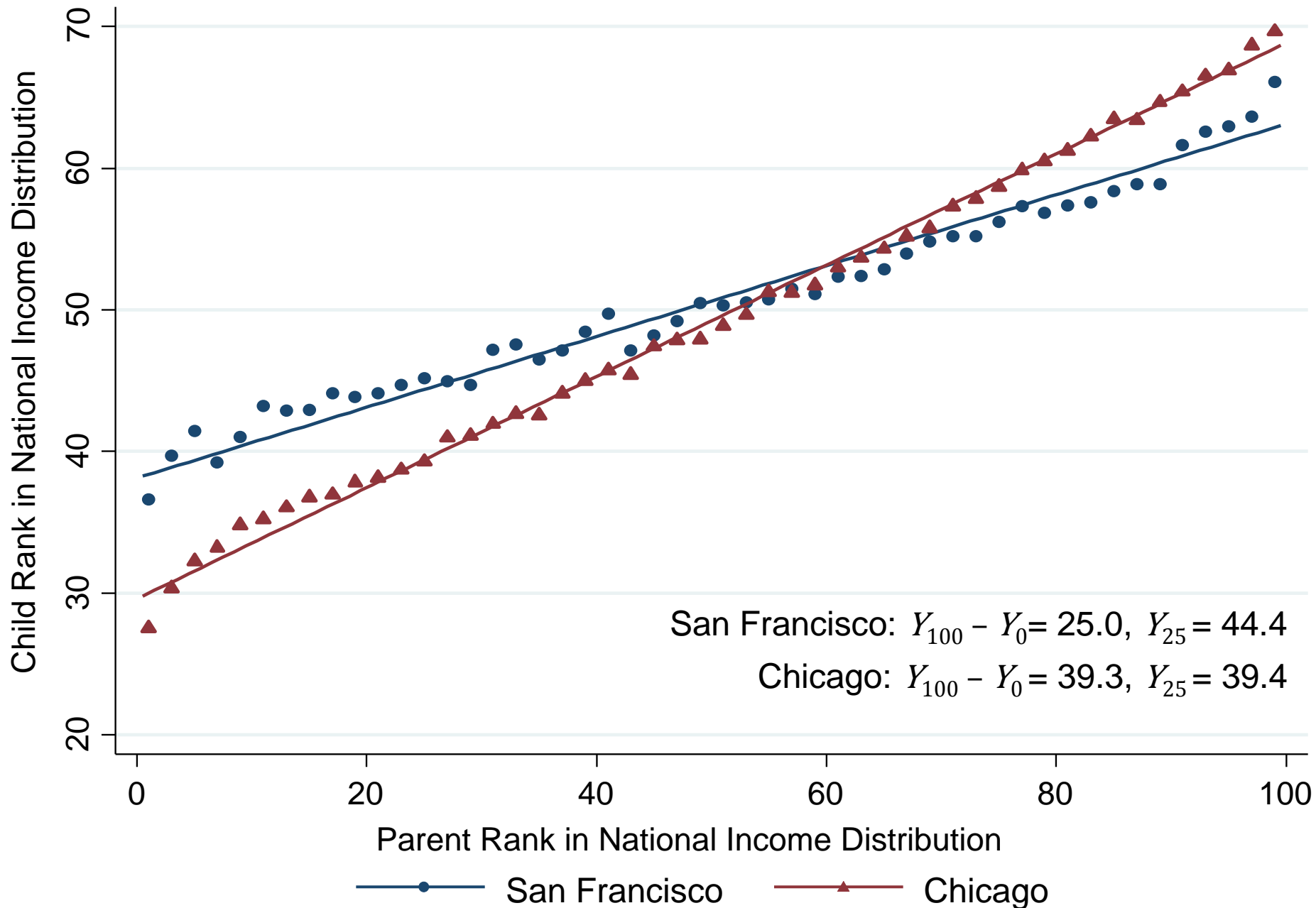
# Intergenerational Mobility in Salt Lake City



# Intergenerational Mobility in Salt Lake City vs. Charlotte



# Intergenerational Mobility in San Francisco vs. Chicago



# Mobility Estimates by CZ

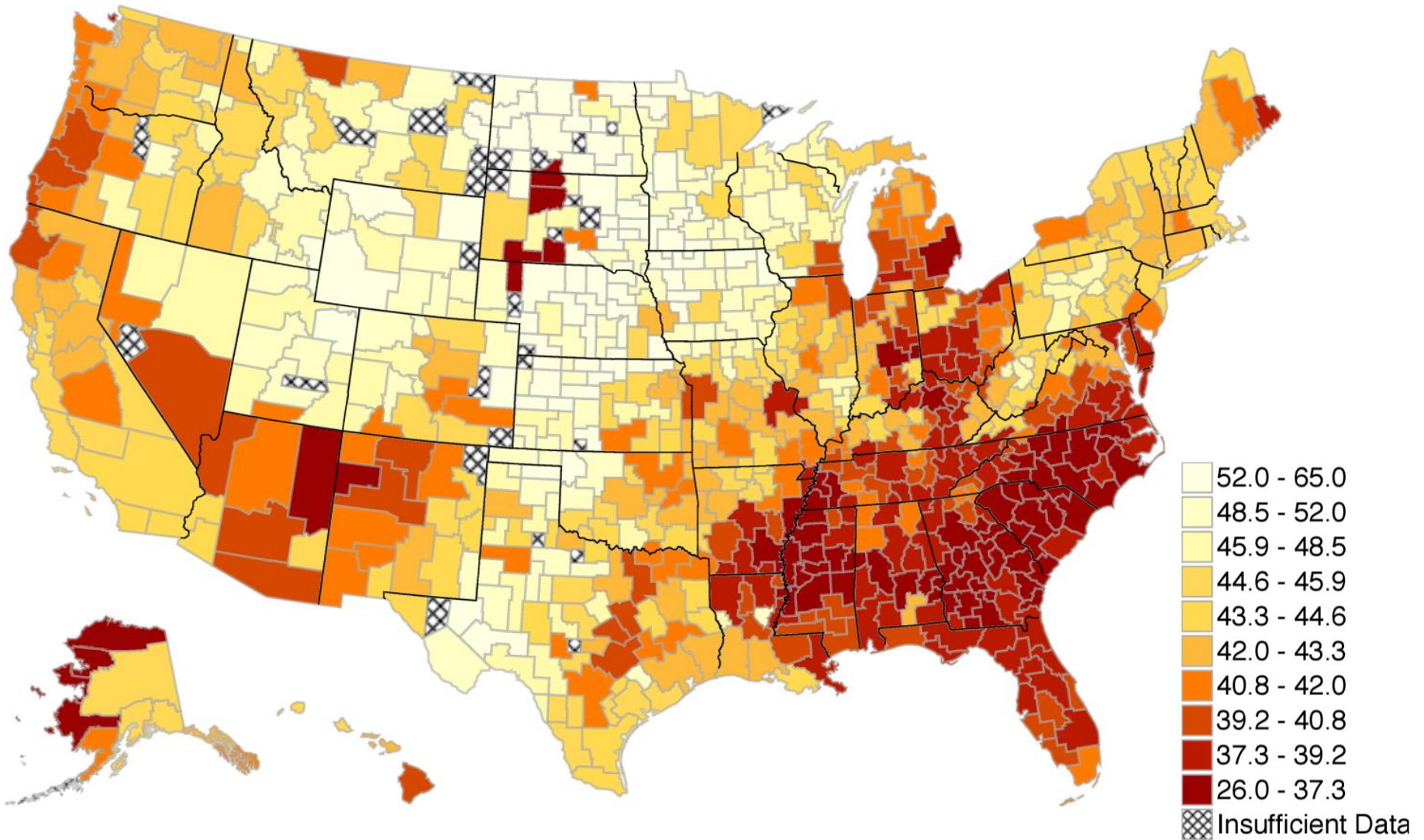
- In each CZ, regress child national rank on parent national rank in micro data:

$$Rank_{\text{child}} = \alpha + \beta Rank_{\text{parent}}$$

- Relative mobility =  $100 \times \beta$
- Absolute upward mobility =  $\alpha + 25 \times \beta$

# The Geography of Upward Mobility in the United States

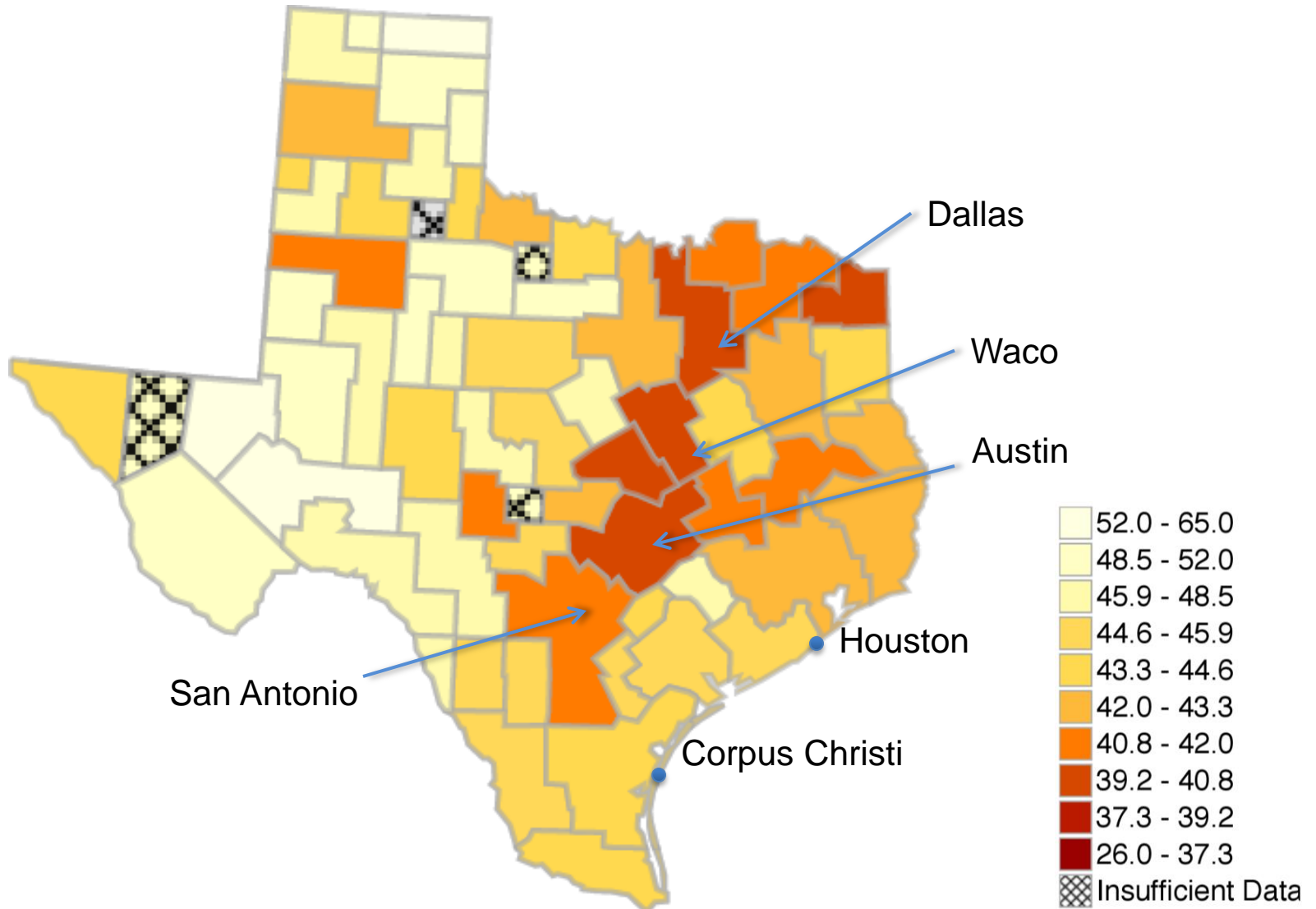
Mean Child Percentile Rank for Parents at 25<sup>th</sup> Percentile ( $Y_{25}$ )



*Note: Lighter Color = More Absolute Upward Mobility*

# The Geography of Upward Mobility in Texas

Mean Child Percentile Rank for Parents at 25<sup>th</sup> Percentile ( $Y_{25}$ )



*Note: Lighter Color = More Absolute Upward Mobility*

## Highest Absolute Mobility In The 50 Largest CZs

Upward Mobility Rank	CZ Name	$Y_{25}$	$Y_{100} - Y_0$	P(Child in Q5  Parent in Q1)
1	Salt Lake City, UT	46.2	0.264	10.83%
2	Pittsburgh, PA	45.2	0.359	9.51%
3	San Jose, CA	44.7	0.235	12.93%
4	Boston, MA	44.6	0.322	10.49%
5	San Francisco, CA	44.4	0.250	12.15%
6	San Diego, CA	44.3	0.237	10.44%
7	Manchester, NH	44.2	0.296	10.02%
8	Minneapolis, MN	44.2	0.338	8.52%
9	Newark, NJ	44.1	0.350	10.24%
10	New York, NY	43.8	0.330	10.50%

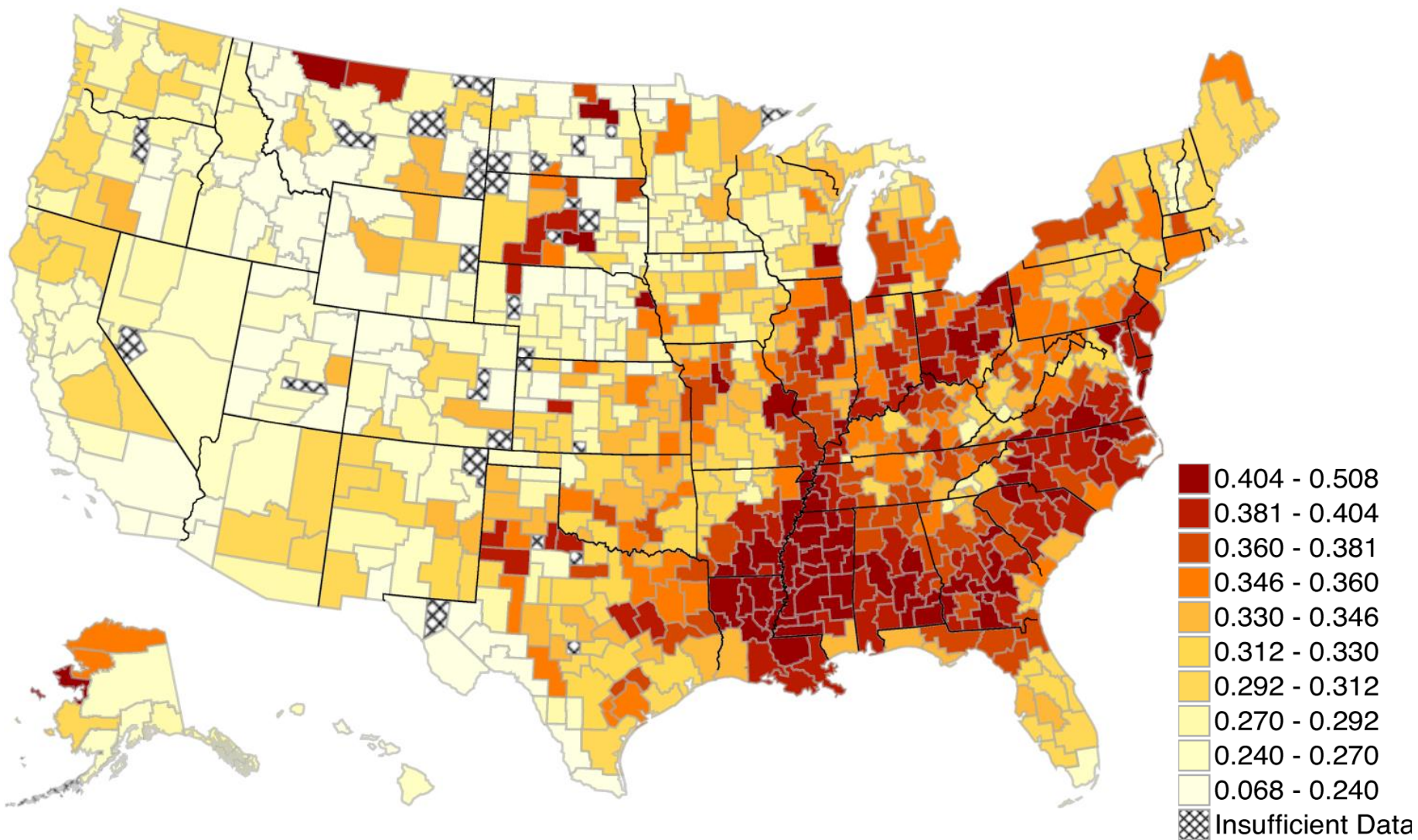


## Lowest Absolute Mobility In The 50 Largest CZs

Upward Mobility Rank	CZ Name	$Y_{25}$	$Y_{100} - Y_0$	P(Child in Q5  Parent in Q1)
41	Nashville, TN	38.2	0.357	5.73%
42	New Orleans, LA	38.2	0.397	5.12%
43	Cincinnati, OH	37.9	0.429	5.12%
44	Columbus, OH	37.7	0.406	4.91%
45	Jacksonville, FL	37.5	0.361	4.92%
46	Detroit, MI	37.3	0.358	5.46%
47	Indianapolis, IN	37.2	0.398	4.90%
48	Raleigh, NC	36.9	0.389	5.00%
49	Atlanta, GA	36.0	0.366	4.53%
50	Charlotte, NC	35.8	0.397	4.38%

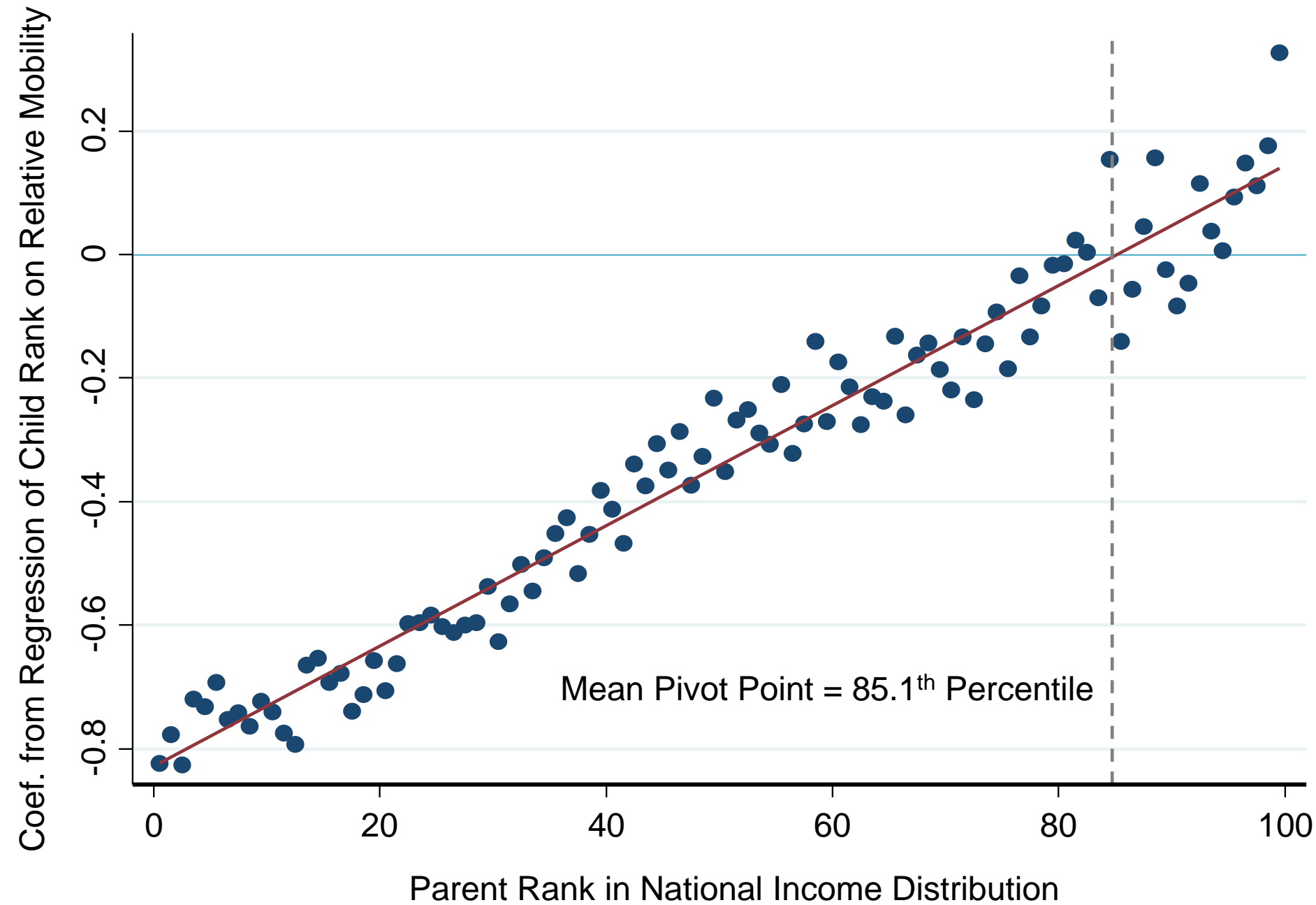
# Relative Mobility Across Areas in the U.S.

## Rank-Rank Slopes ( $Y_{100} - Y_0$ ) by Commuting Zone

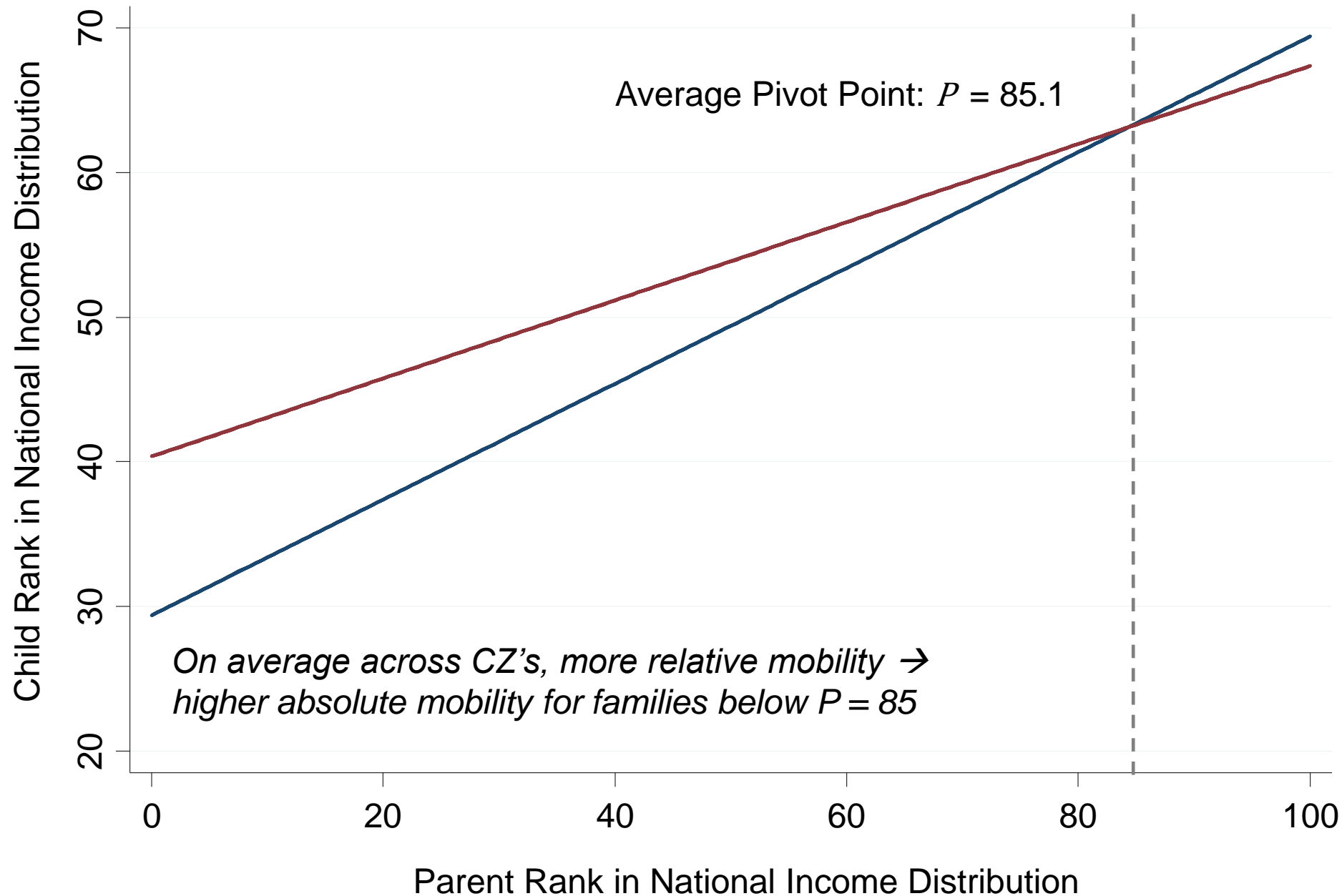


Corr. with baseline  $\bar{y}_{25} = -0.68$  (unweighted),  $-0.61$  (pop-weighted)

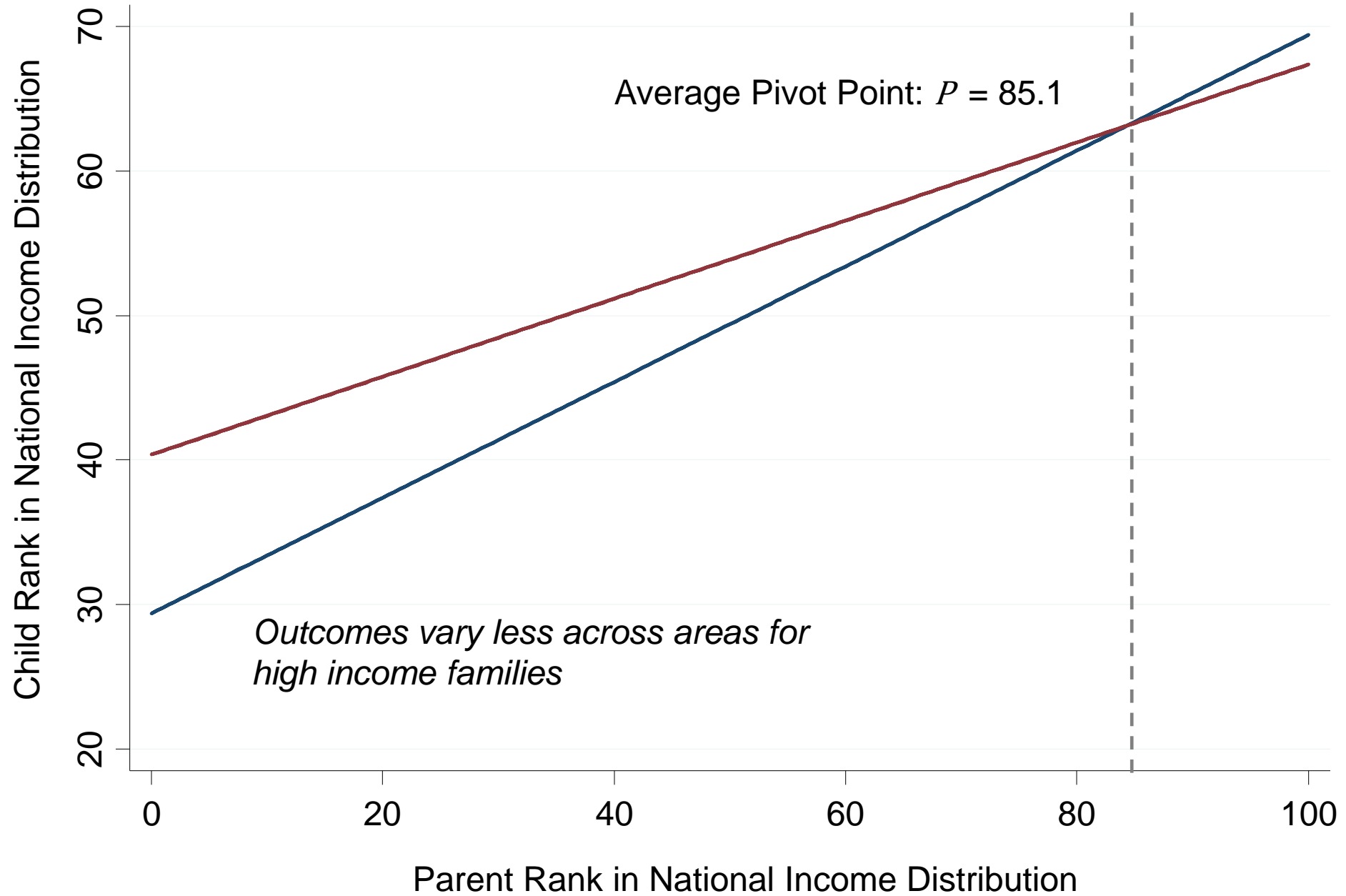
# Mean Relationship between Absolute and Relative Mobility



## Mean Relationship between Absolute and Relative Mobility



# Mean Relationship between Absolute and Relative Mobility



# Stability of Intergenerational Mobility Measures Across Areas

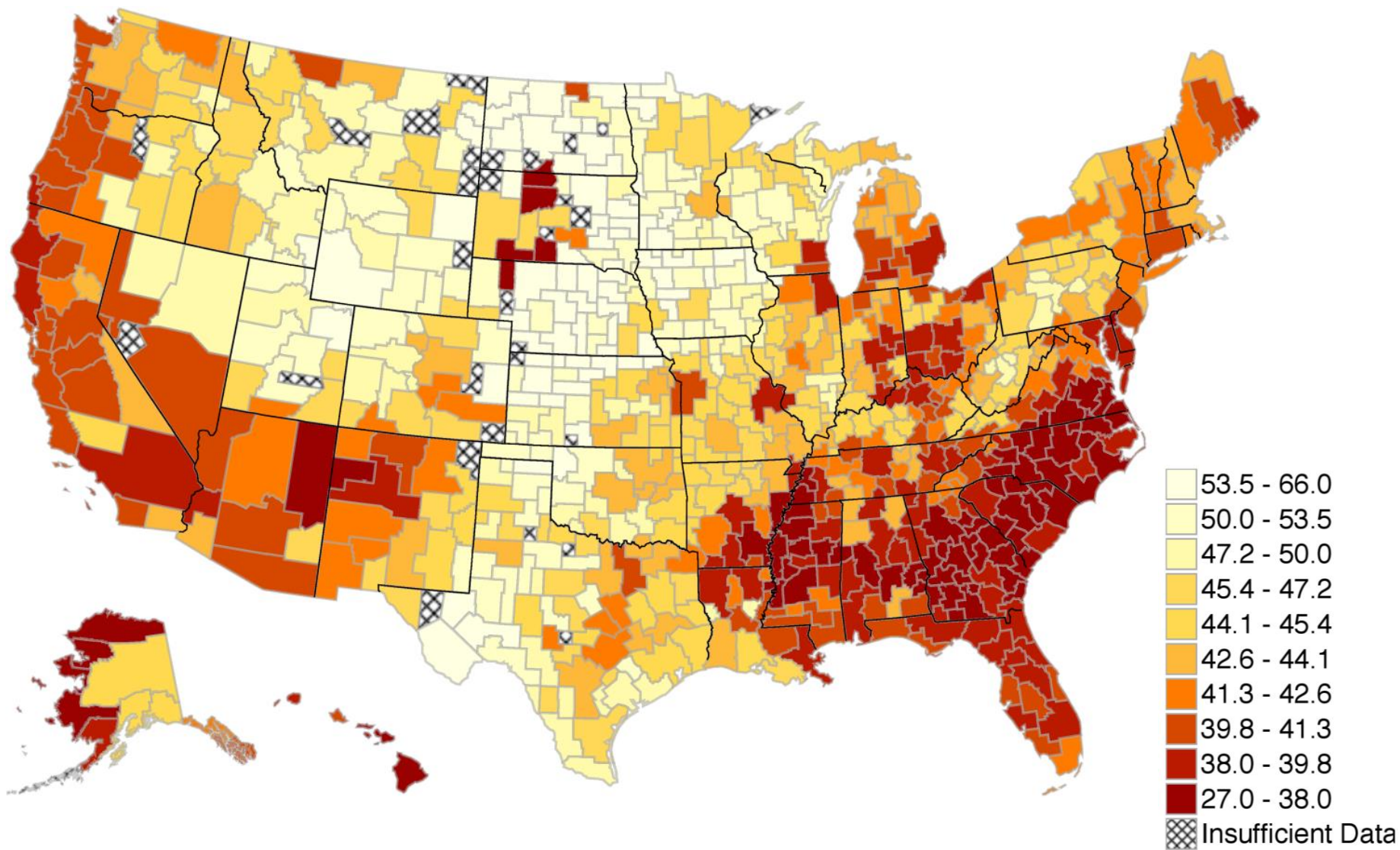
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Alternative Measures	Correlation with Baseline Specification	
	$Y_{25}$	$Y_{100} - Y_0$
Cohort 83-5	0.96	0.96
Cohort 86-88	0.82	0.88
Cost-of-Living Adjusted	0.86	0.99
Indiv. Inc. Male Children	0.96	0.95
Parent Income 2011/12	0.94	0.98
Local Ranks Relative Mobility		0.96
College Attendance (18-21)	0.53	0.72
Teen Birth Rate (Females)	-0.64	-0.68

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# Upward Mobility ( $Y_{25}$ ) Adjusted for Differences in Cost of Living

Parent and Child Income Deflated by Cost of Living Based on ACCRA data



Corr. with baseline  $\bar{y}_{25} = 0.98$  (unweighted),  $0.86$  (pop-weighted)

## Part 3

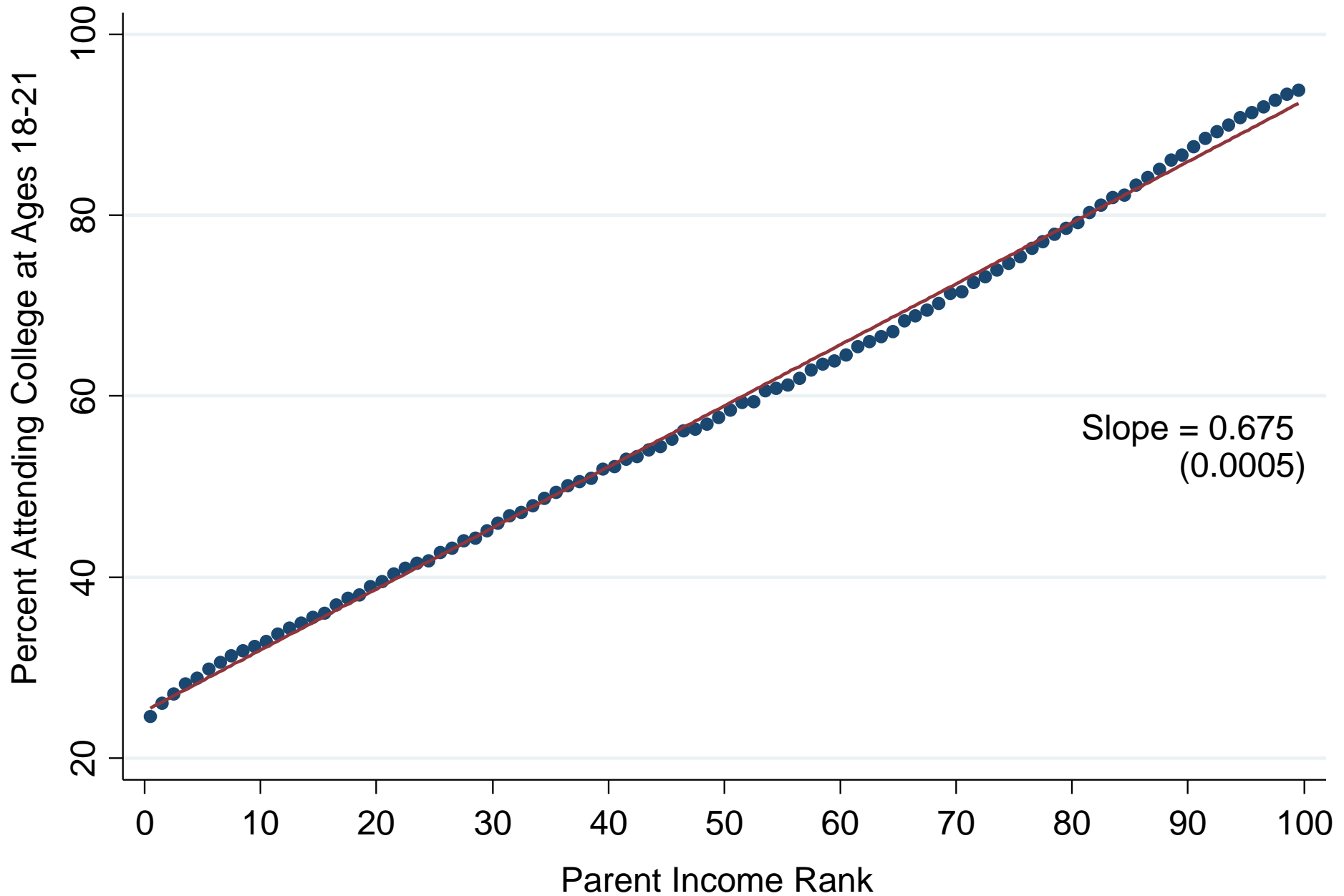
# Correlates of Intergenerational Mobility



# Correlates of Intergenerational Mobility

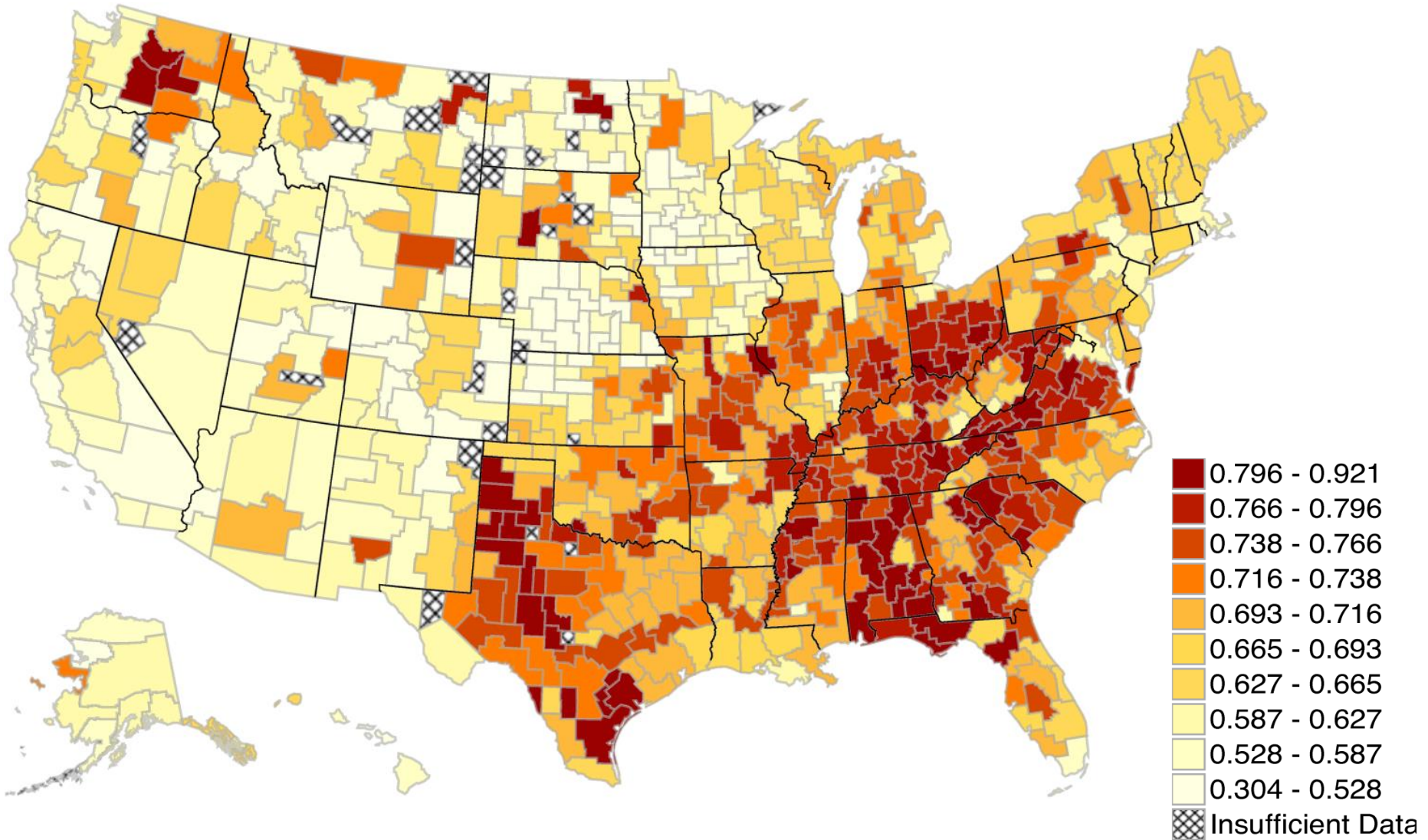
- Correlate differences in mobility with observable factors
  - Focus on hypotheses proposed in sociology and economics literature and public debate
  - Goal: stylized facts to guide search for causal mechanisms
- First clues into potential mechanisms: timing
  - Spatial variation in inequality emerges at very early ages
  - Well before children start working

# College Attendance Rates vs. Parent Income Rank in the U.S.



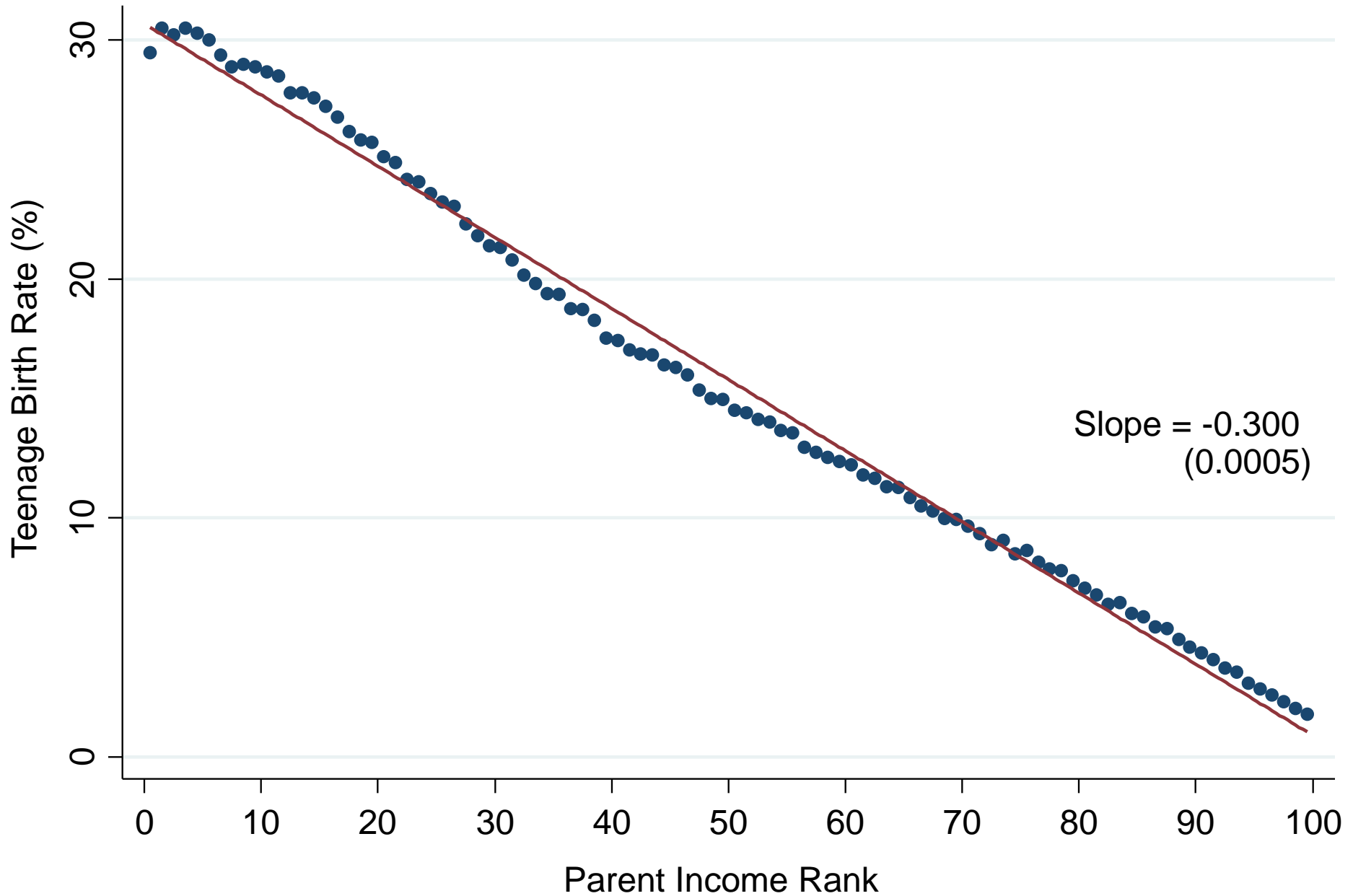
# College-Income Gradients by Area

Slopes from Regression of College Attendance (Age 18-21) on Parent Inc. Rank



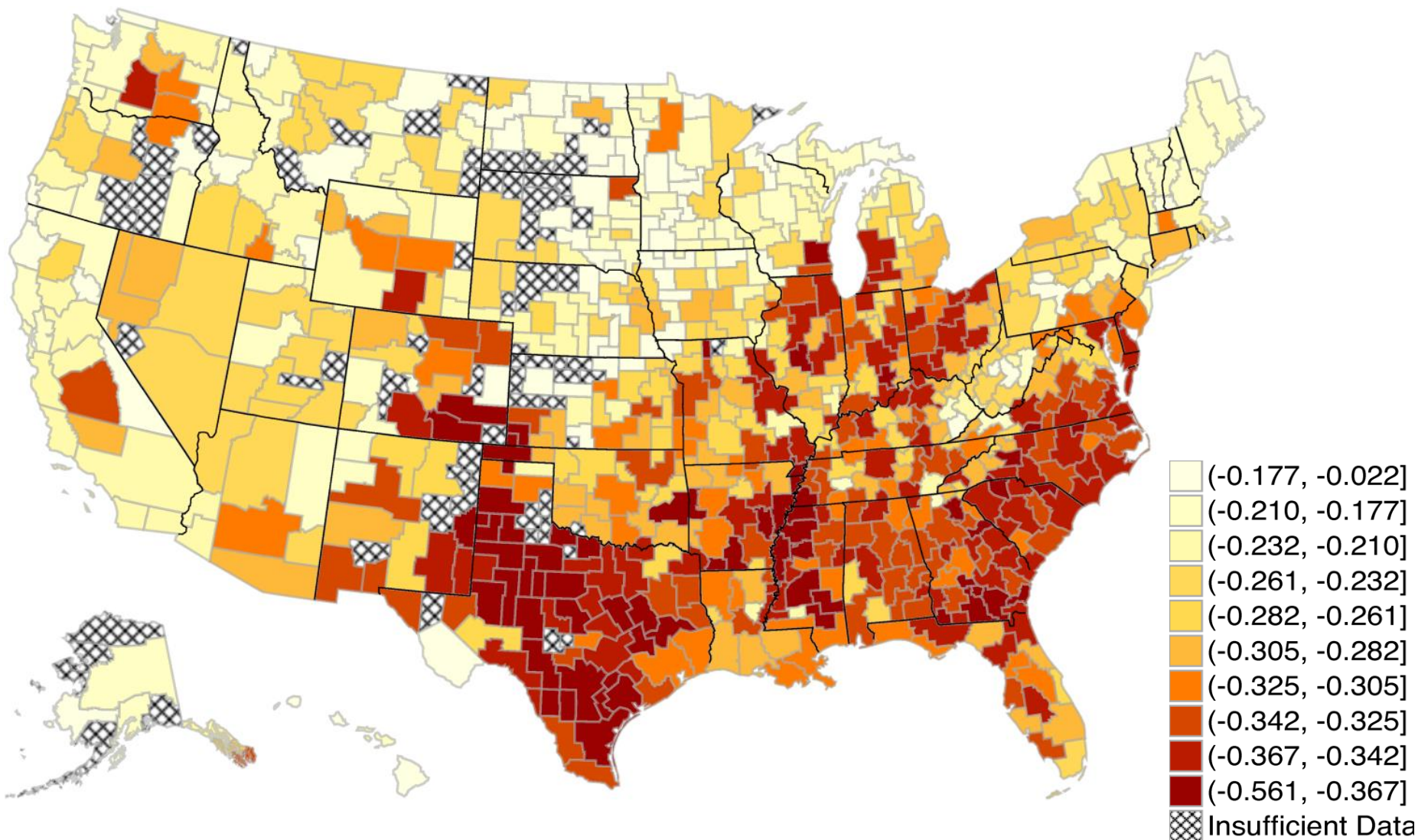
Corr. with baseline  $\bar{y}_{100} - \bar{y}_0 = 0.68$  (unweighted), 0.72 (pop-weighted)

# Teenage Birth Rates for Females vs. Parent Income Rank in the U.S.



# Teenage Birth Gradients by Area

Slopes from Regression of Teenage Birth on Parent Inc. Rank



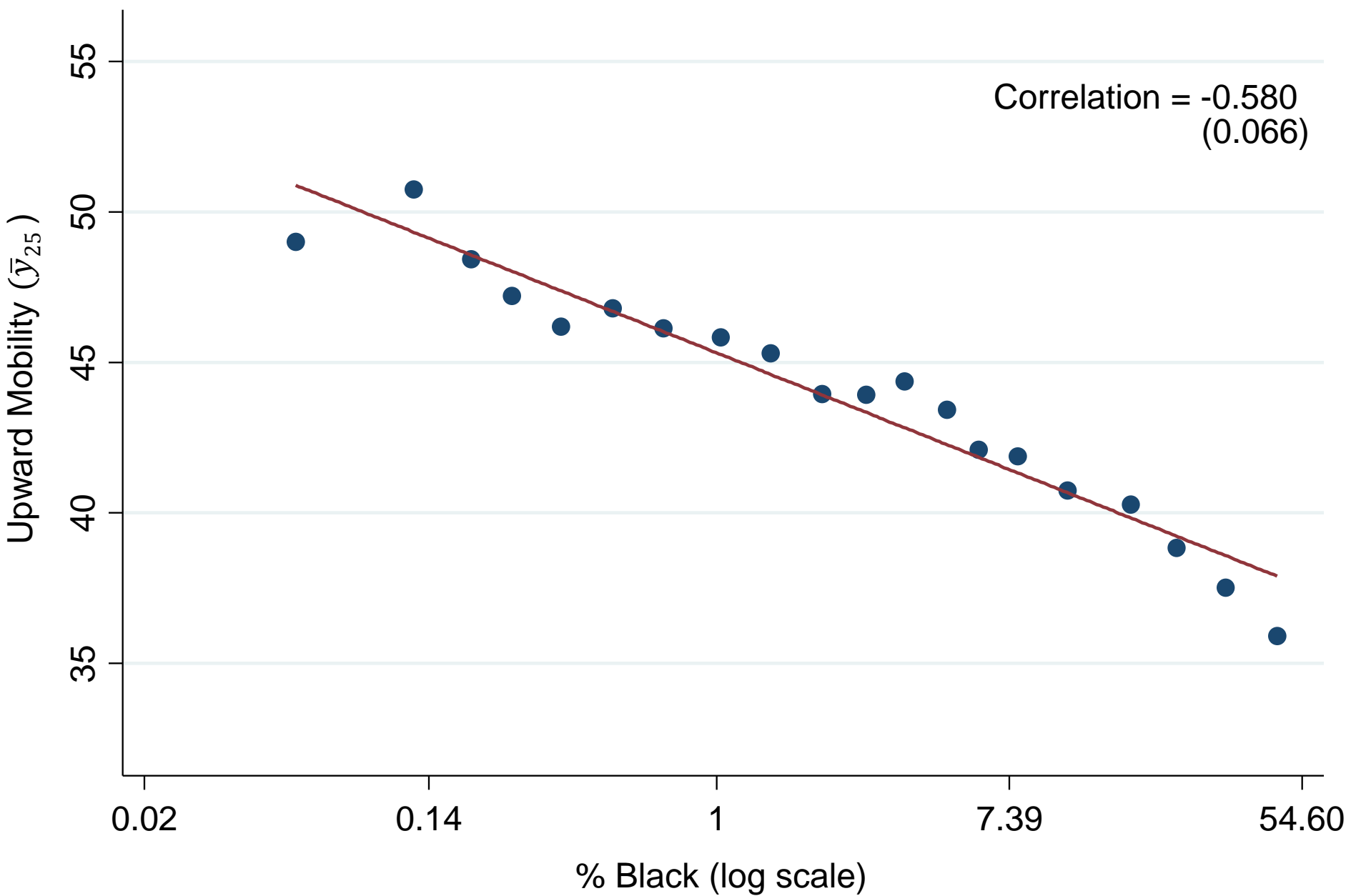
Corr. with baseline  $\bar{y}_{100} - \bar{y}_0 = -0.58$  (unweighted),  $-0.68$  (pop-weighted)

# Correlates of Intergenerational Mobility

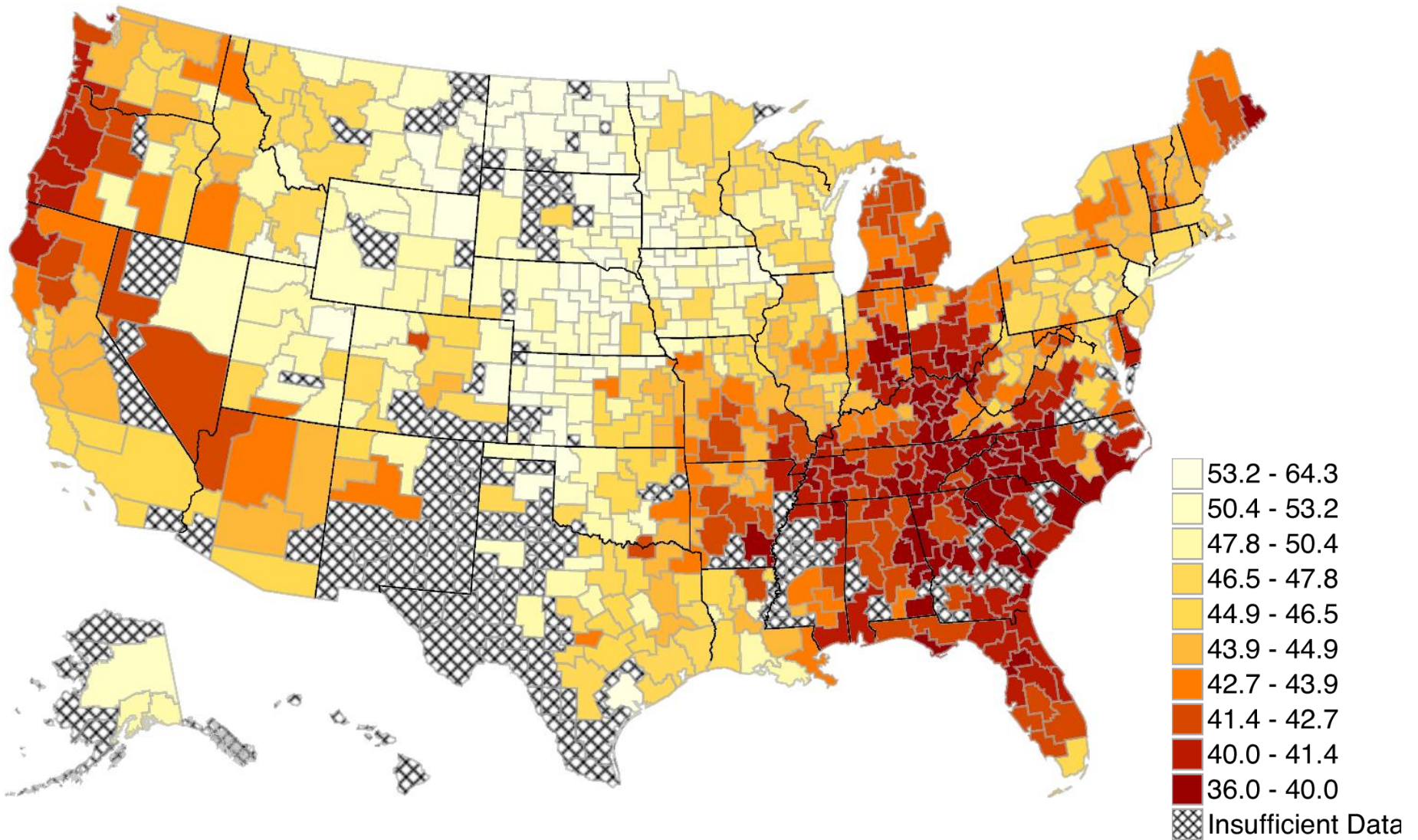
- Early emergence of gradients points to factors that affect children when growing up (or anticipatory responses to later factors)
  - E.g. schools or family characteristics [e.g., Mulligan 1999]
- Start by exploring racial differences
  - Most obvious pattern from map: upward mobility lower in areas with larger African-American population

# Absolute Upward Mobility vs. Fraction Black in CZ

Correlation = -0.580  
(0.066)



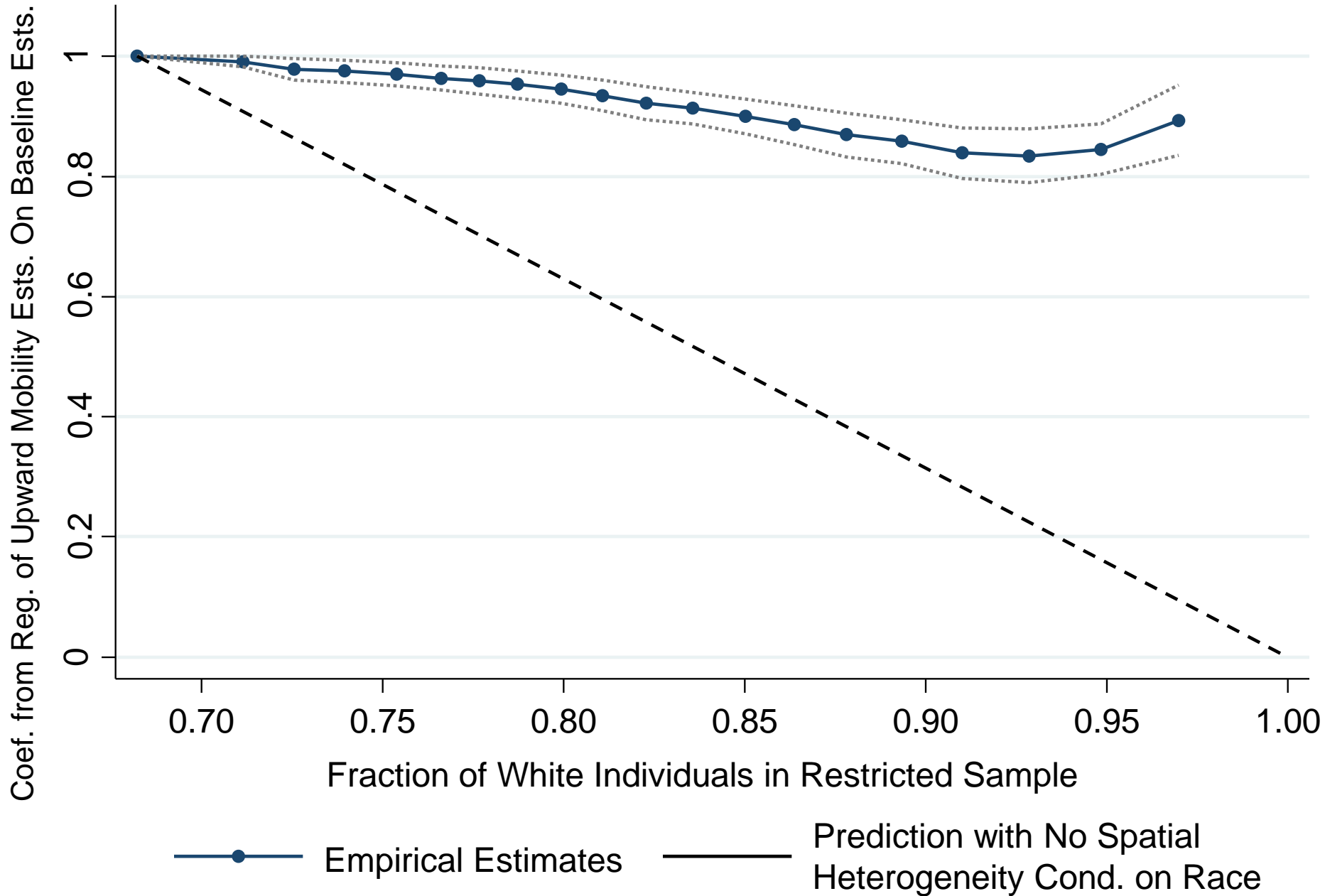
# Upward Mobility ( $Y_{25}$ ) for ZIP-5's with $\geq 80\%$ White Residents



Corr. with baseline  $\bar{y}_{25} = 0.91$  (unweighted), 0.73 (pop-weighted)



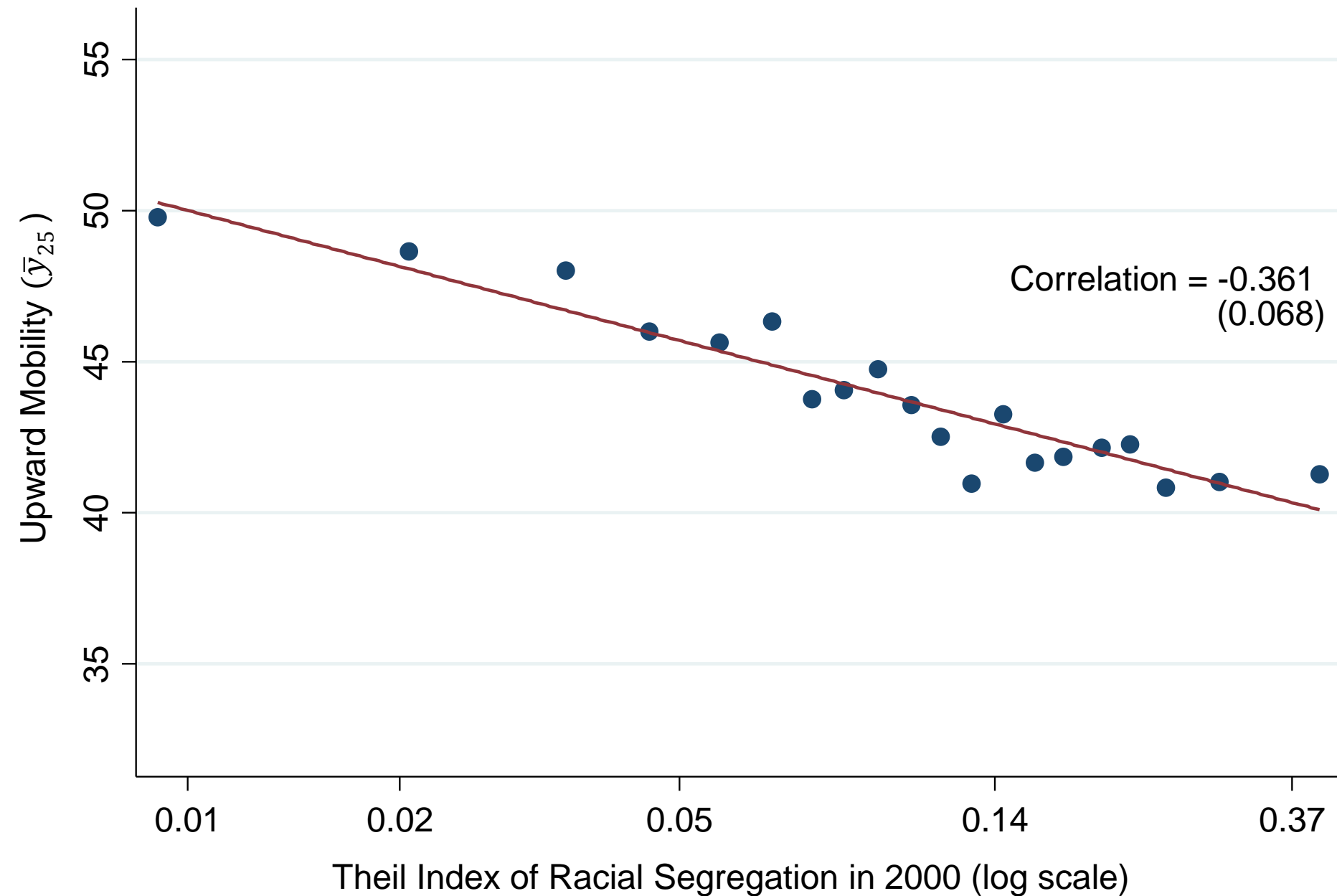
# White Upward Mobility vs. Overall Upward Mobility at Varying ZIP-5 Race Thresholds



# Race and Upward Income Mobility

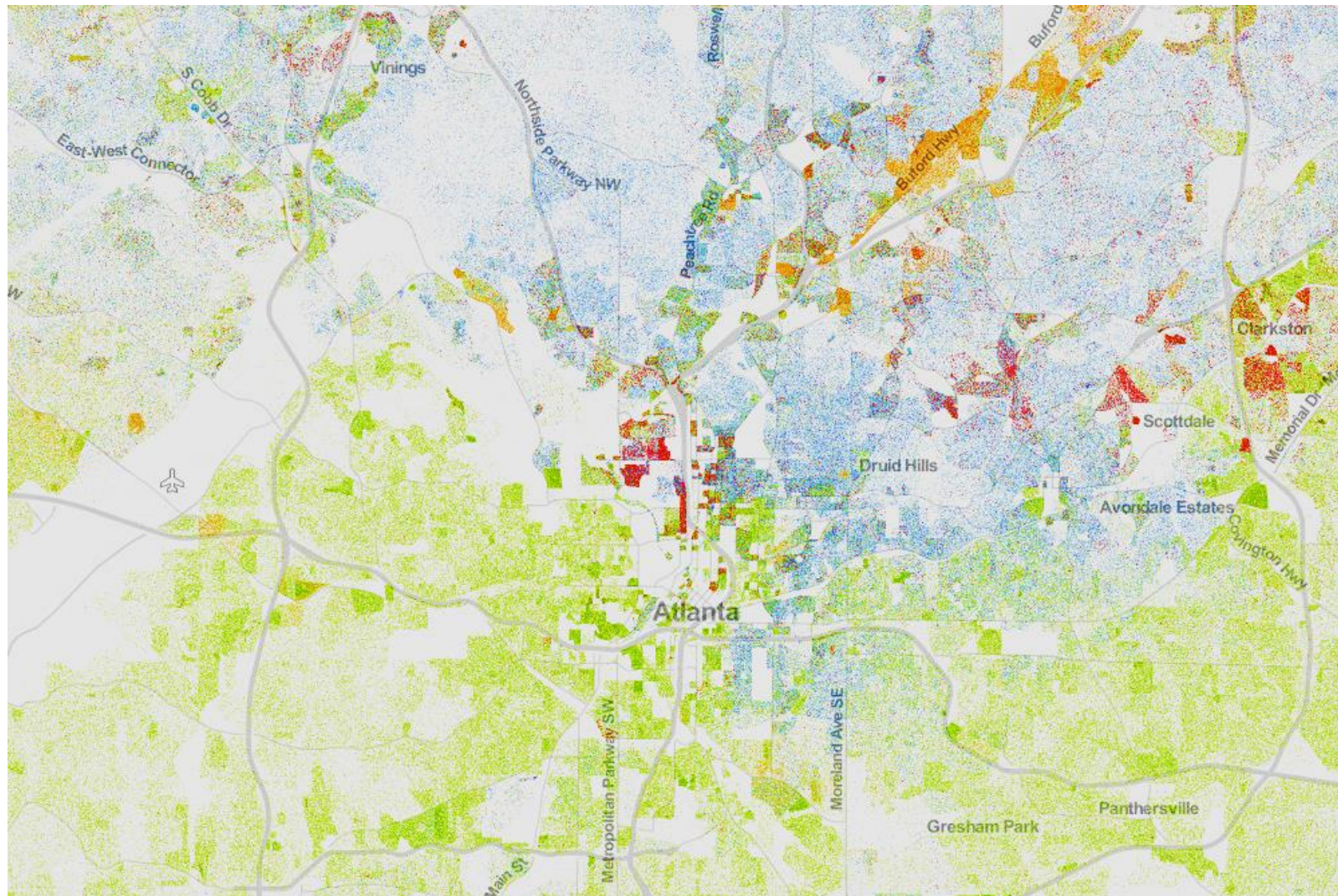
- Racial shares matter at community level for *both* blacks and whites
- One potential mechanism: racial and income segregation
  - Historical legacy of greater segregation in areas with larger African-American population
  - Racial segregation is associated with greater income segregation
  - Such segregation could affect both low-income blacks and whites [Wilson 1987, Massey and Denton 1988, Cutler and Glaeser 1997, Graham and Sharkey 2013]

# Absolute Upward Mobility vs. Racial Segregation



# Racial Segregation in Atlanta

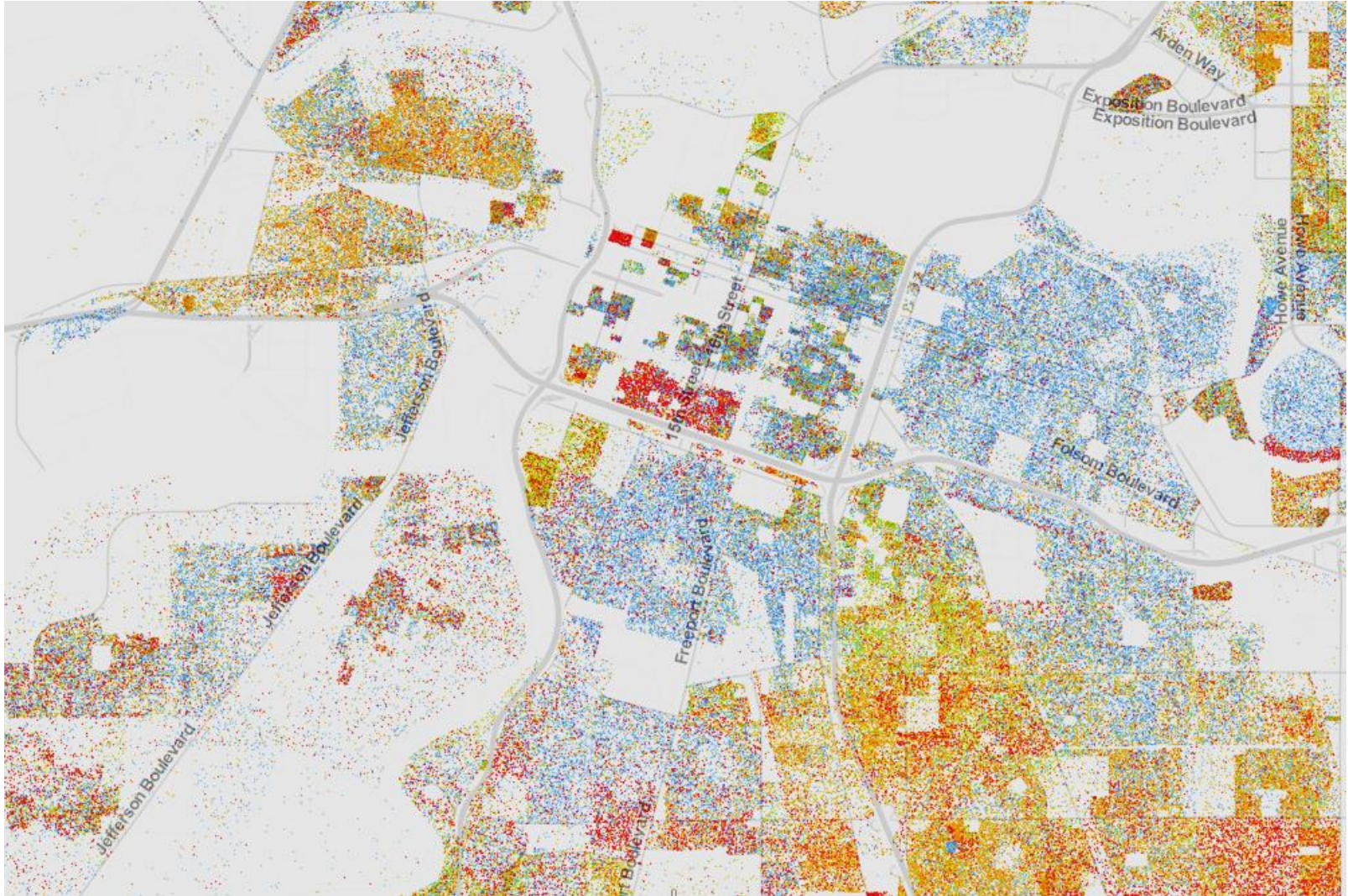
Whites (blue), Blacks (green), Asians (red), Hispanics (orange)



Source: Cable (2013) based on Census 2010 data

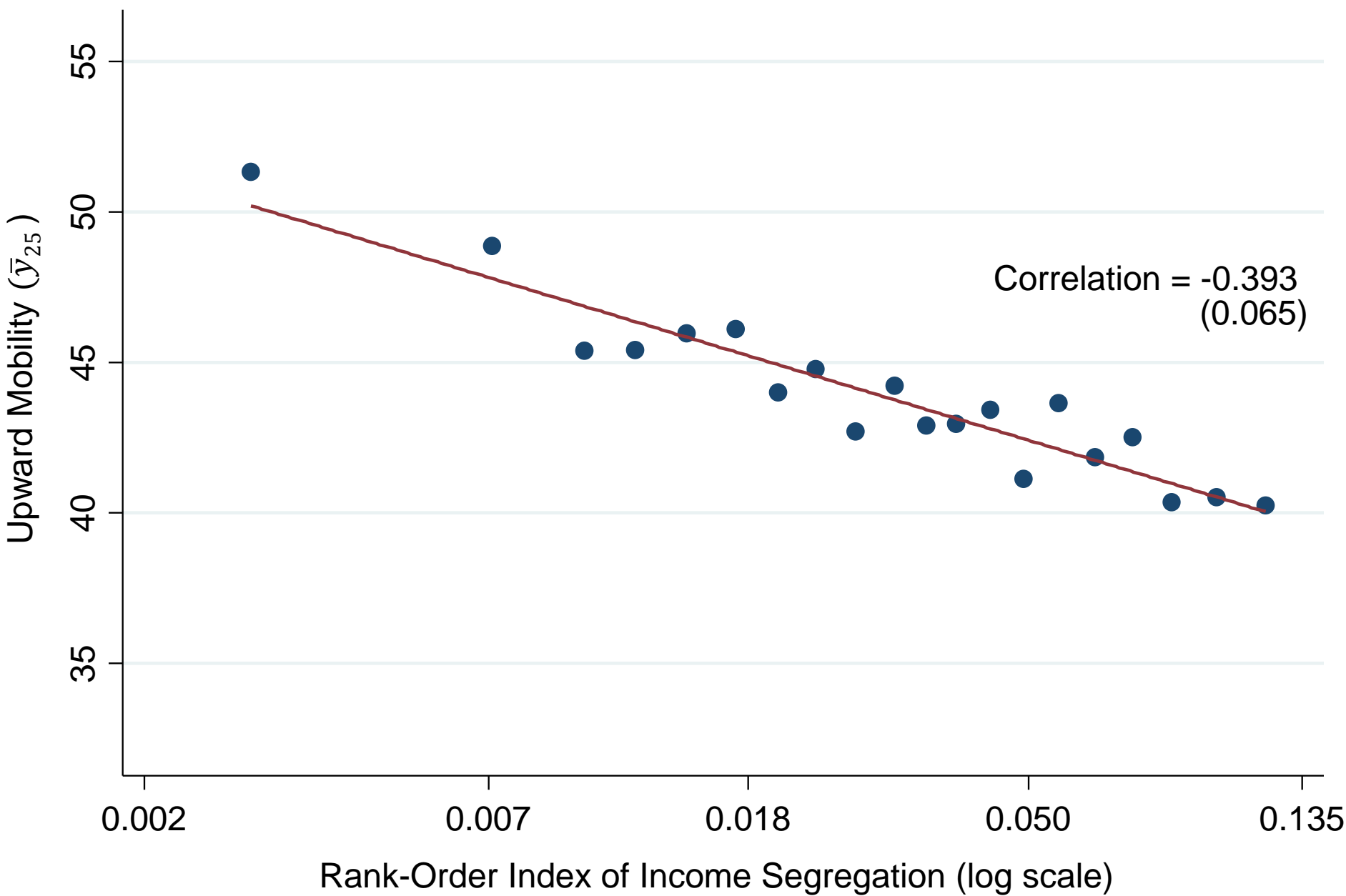
# Racial Segregation in Sacramento

Whites (blue), Blacks (green), Asians (red), Hispanics (orange)



Source: Cable (2013) based on Census 2010 data

# Absolute Upward Mobility vs. Income Segregation



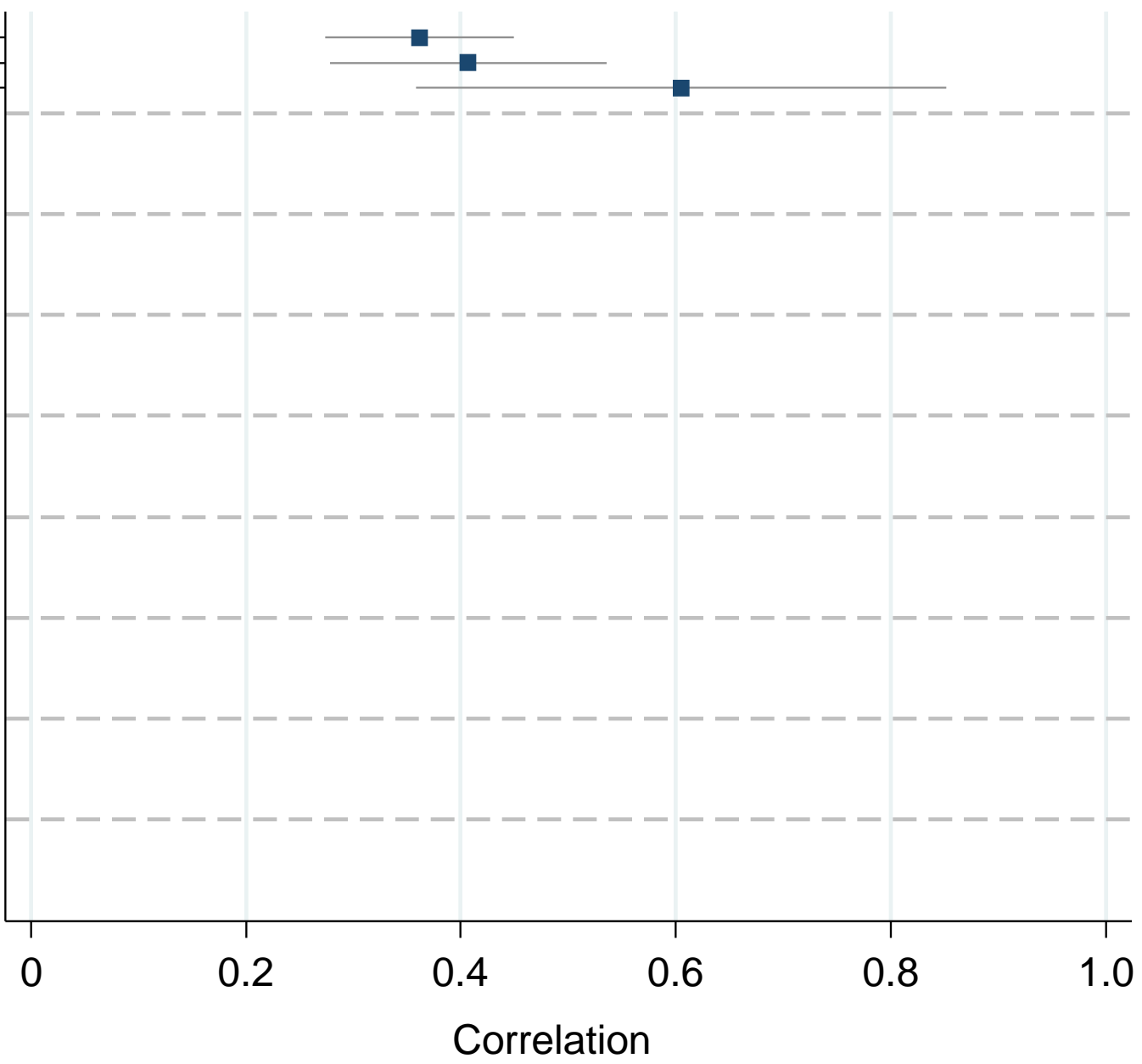
# Intergenerational Mobility and Segregation

	Dep. Var.:		Upward Mobility $Y_{25}$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Racial Segregation	-0.361 (0.045)	-0.360 (0.068)					
Income Segregation			-0.393 (0.065)				-0.058 (0.090)
Segregation of Poverty (<p25)				-0.508 (0.155)	-0.408 (0.166)		
Segregation of Affluence (>p75)				0.108 (0.140)	0.216 (0.171)		
Share with Commute < 15 Mins						0.605 (0.126)	0.571 (0.165)
Urban Areas Only		x			x		
R-Squared	0.131	0.130	0.154	0.167	0.052	0.366	0.368
Observations	709	325	709	709	325	709	709

# Spatial Correlates of Upward Mobility

SEG

Racial Segregation (-)  
Segregation of Poverty (-)  
Frac. < 15 Mins to Work (+)





# Income Distribution and Upward Income Mobility

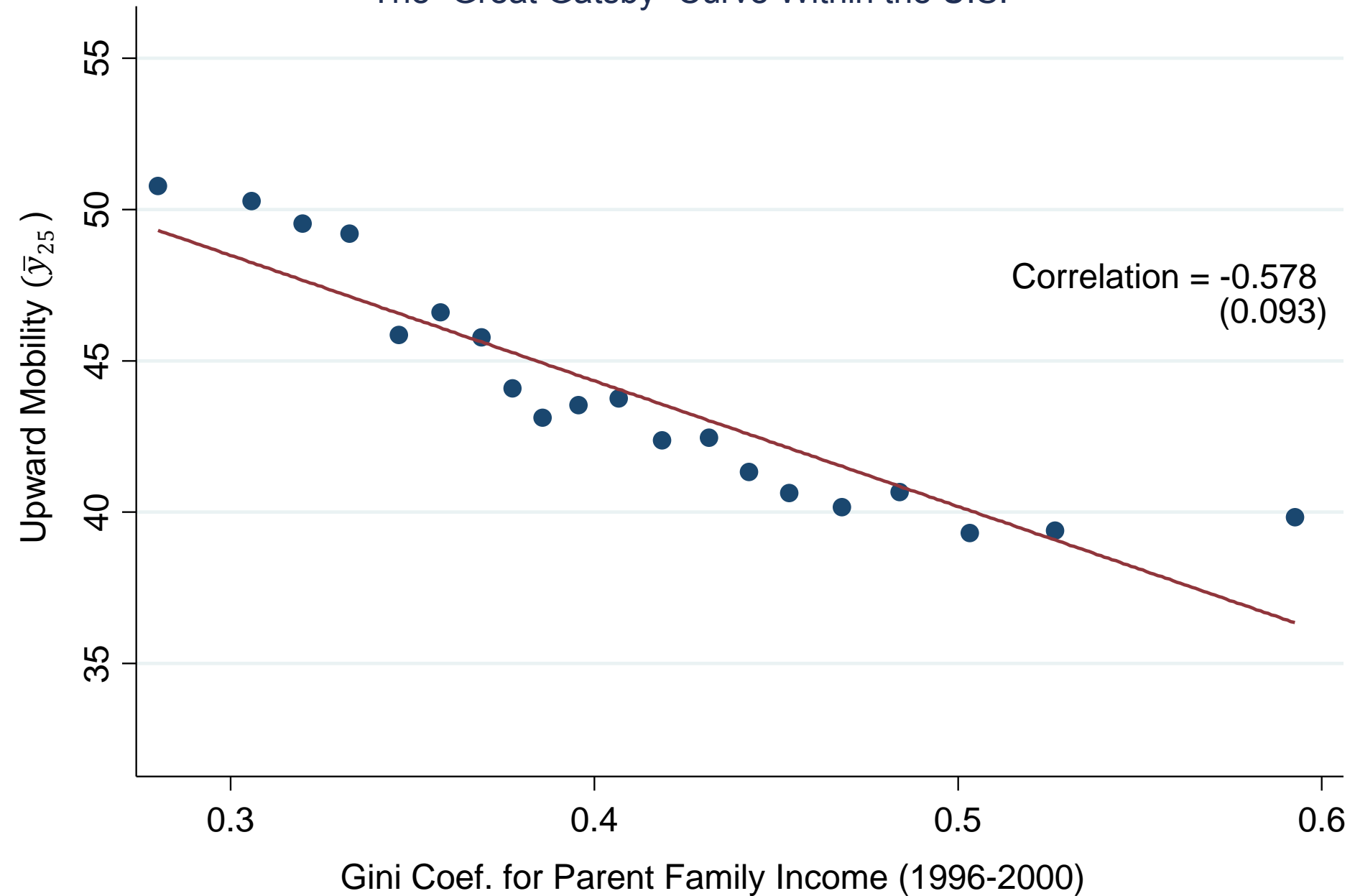
- Next, investigate properties of local income distribution: mean income levels and inequality
  - Many economic channels for link between static income distribution and intergenerational mobility [e.g. Becker and Tomes 1979, Han and Mulligan 2001, Solon 2004]
  - Inequality is negatively correlated with intergenerational mobility across countries [e.g. Corak 2013]

# Absolute Upward Mobility vs. Mean Household Income in CZ

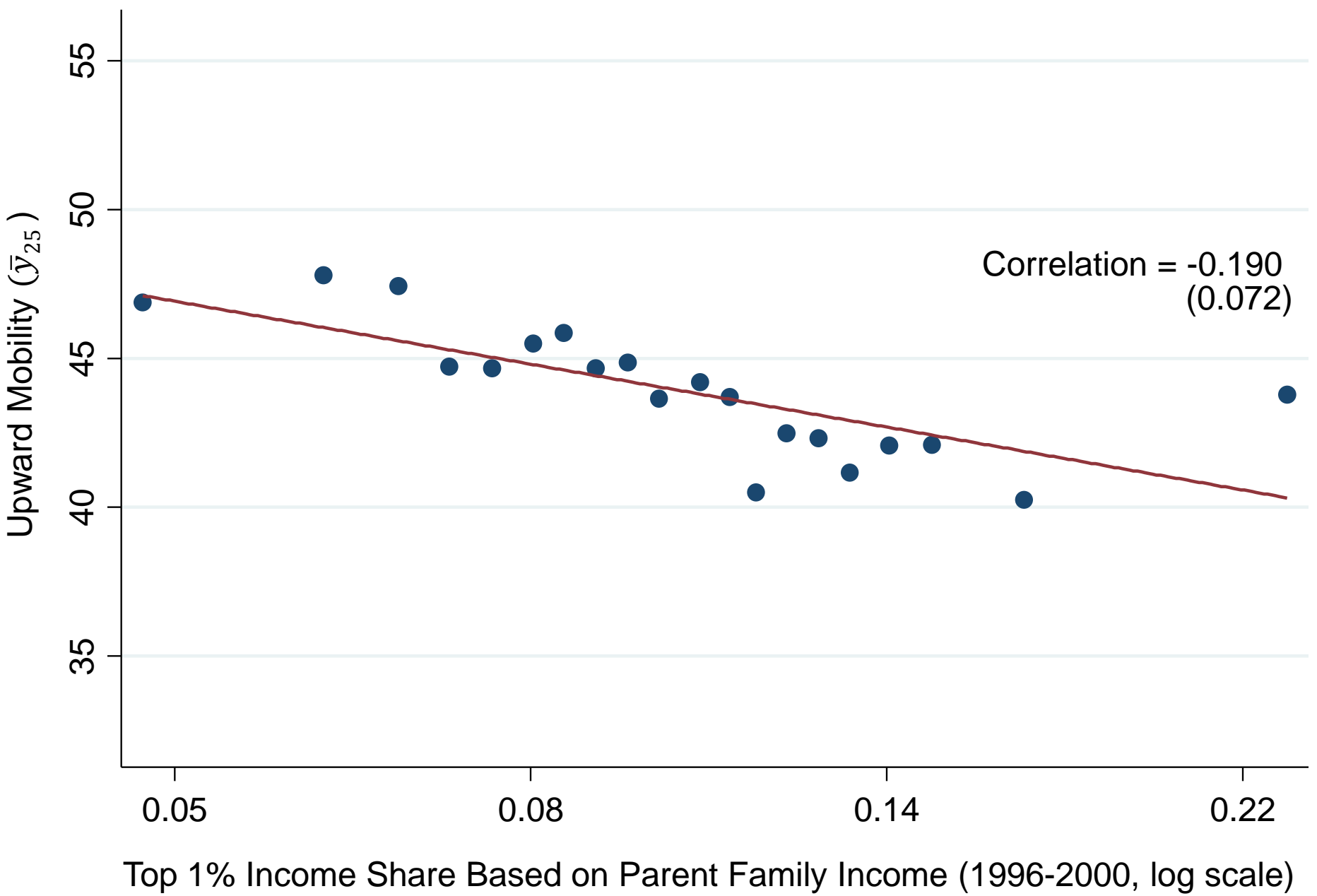


# Upward Mobility vs. Inequality in CZ

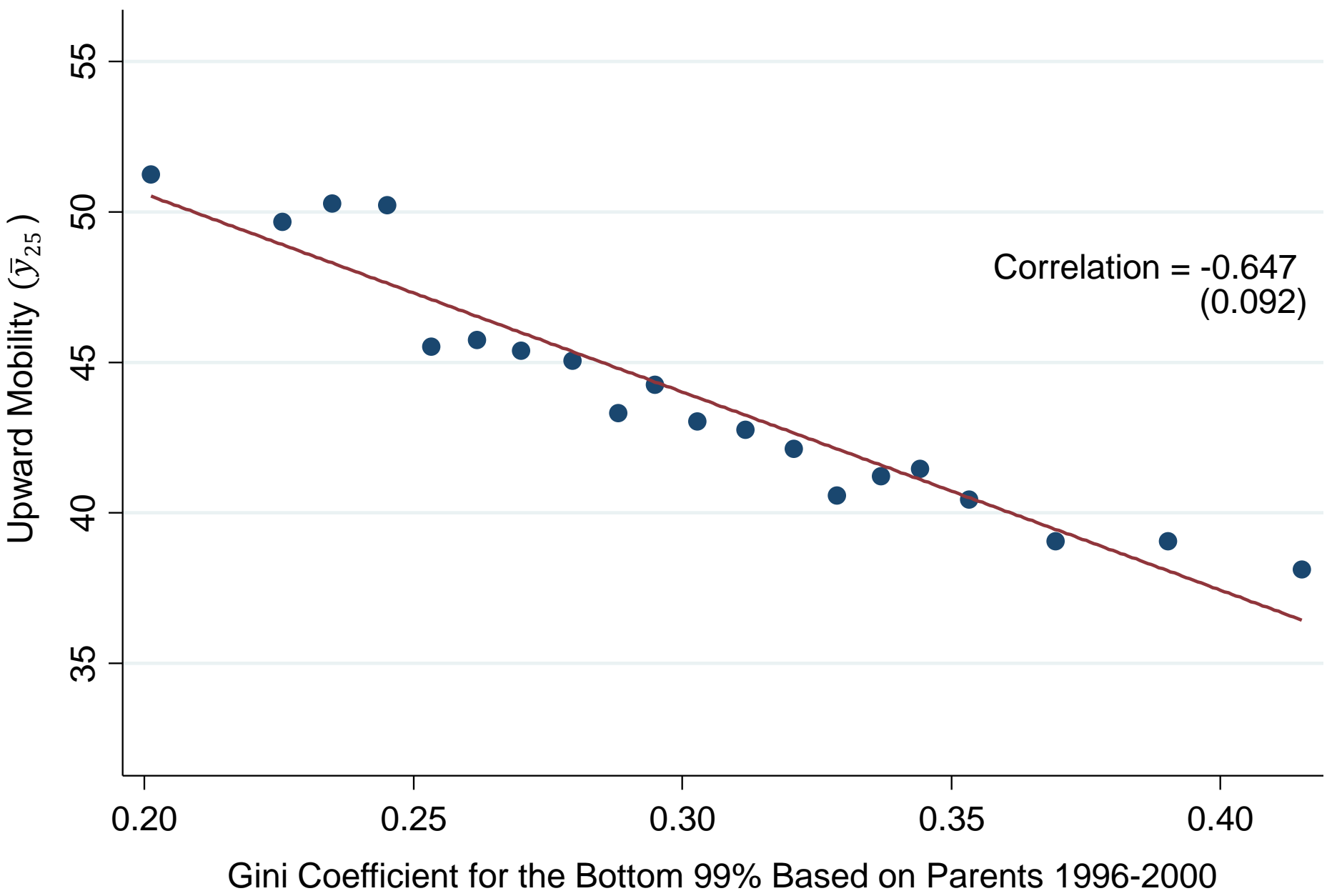
The "Great Gatsby" Curve Within the U.S.



# Upward Mobility vs. Top 1% Income Share in CZ

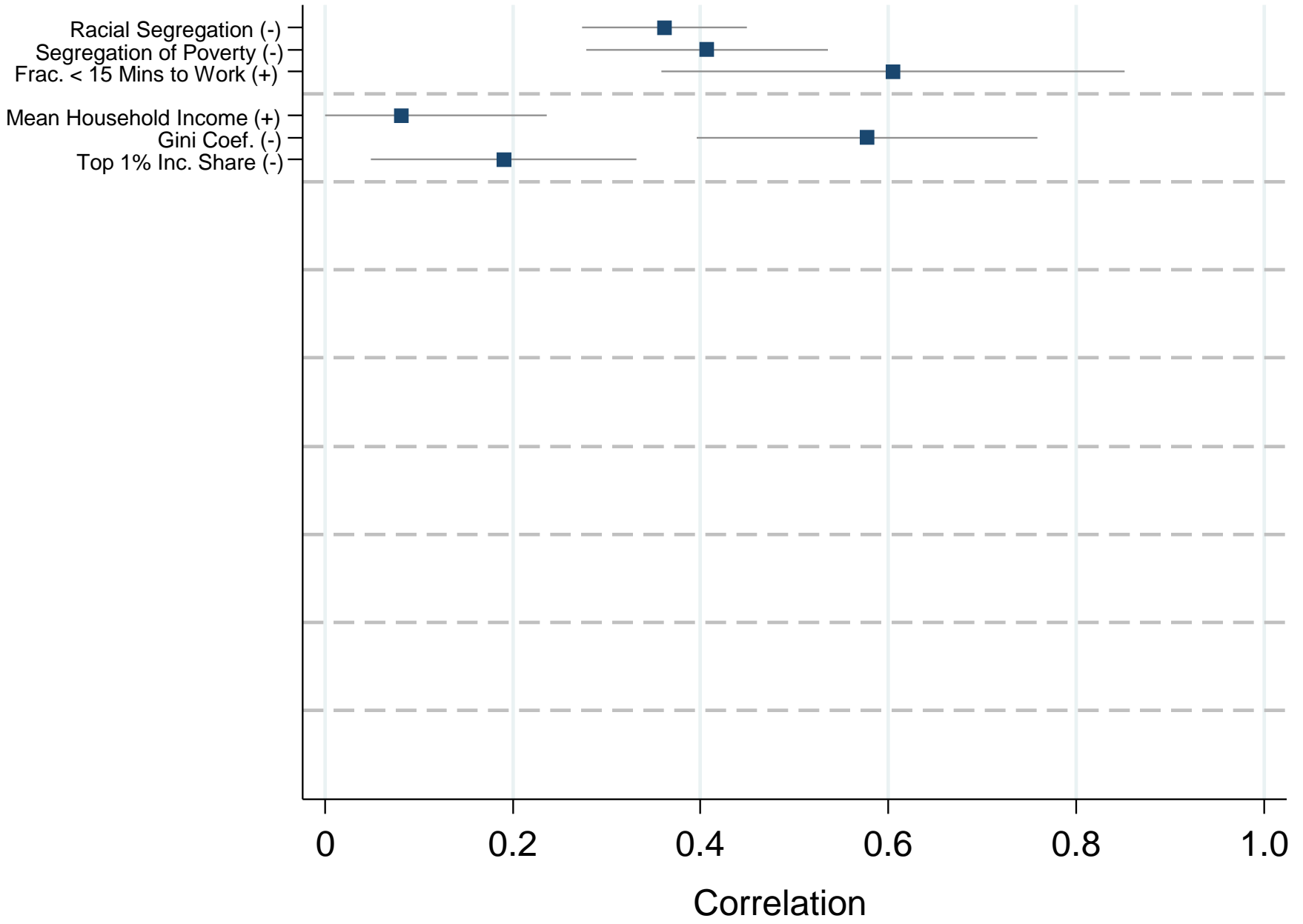


# Upward Mobility vs. Bottom 99% Gini Coefficient



# Spatial Correlates of Upward Mobility

INC  
SEG



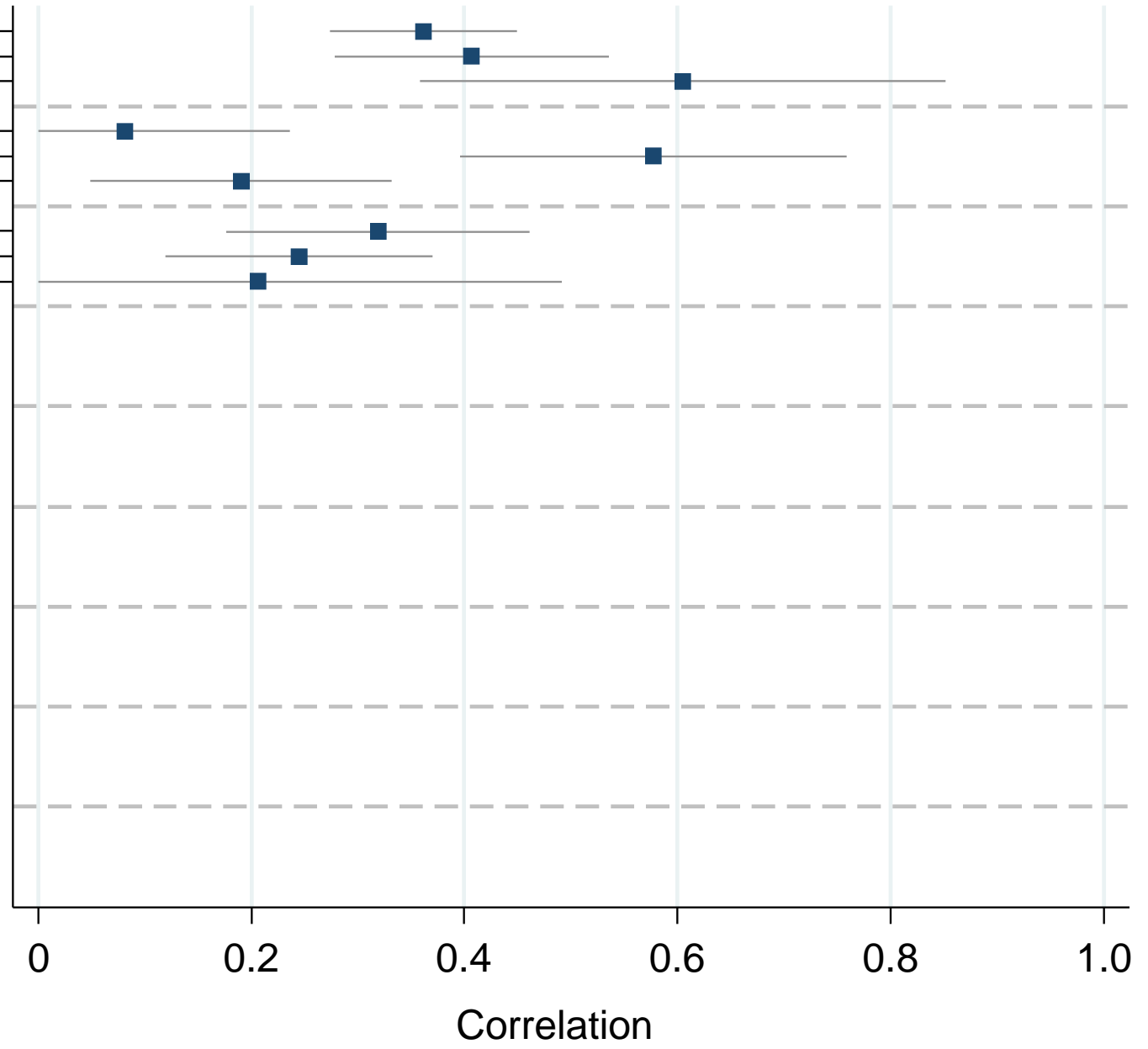
# Absolute Mobility and Inequality: The Great Gatsby Curve

	Variation Across CZs Within U.S.			Variation Across Countries		
	Upward Mobility $Y_{25}$  (1)	Upward Mobility $Y_{25}$  (2)	Upward Mobility $Y_{25}$  (3)	Log-Log Elasticity 1985  (4)	Log-Log Elasticity 1985  (5)	Log-Log Elasticity 2005  (6)
Gini coefficient	-0.578 (0.093)			0.72 (0.22)		
Gini bottom 99%		-0.634 (0.090)	-0.624 (0.113)		0.62 (0.27)	0.78 (0.27)
Top 1% income share		-0.123 (0.035)	0.029 (0.039)		0.30 (0.32)	-0.11 (0.28)
CZ intersects MSA			X			
R-Squared	0.334	0.433	0.380	0.52	0.54	0.53
Number of observations	709	709	325	13	13	12

# Spatial Correlates of Upward Mobility

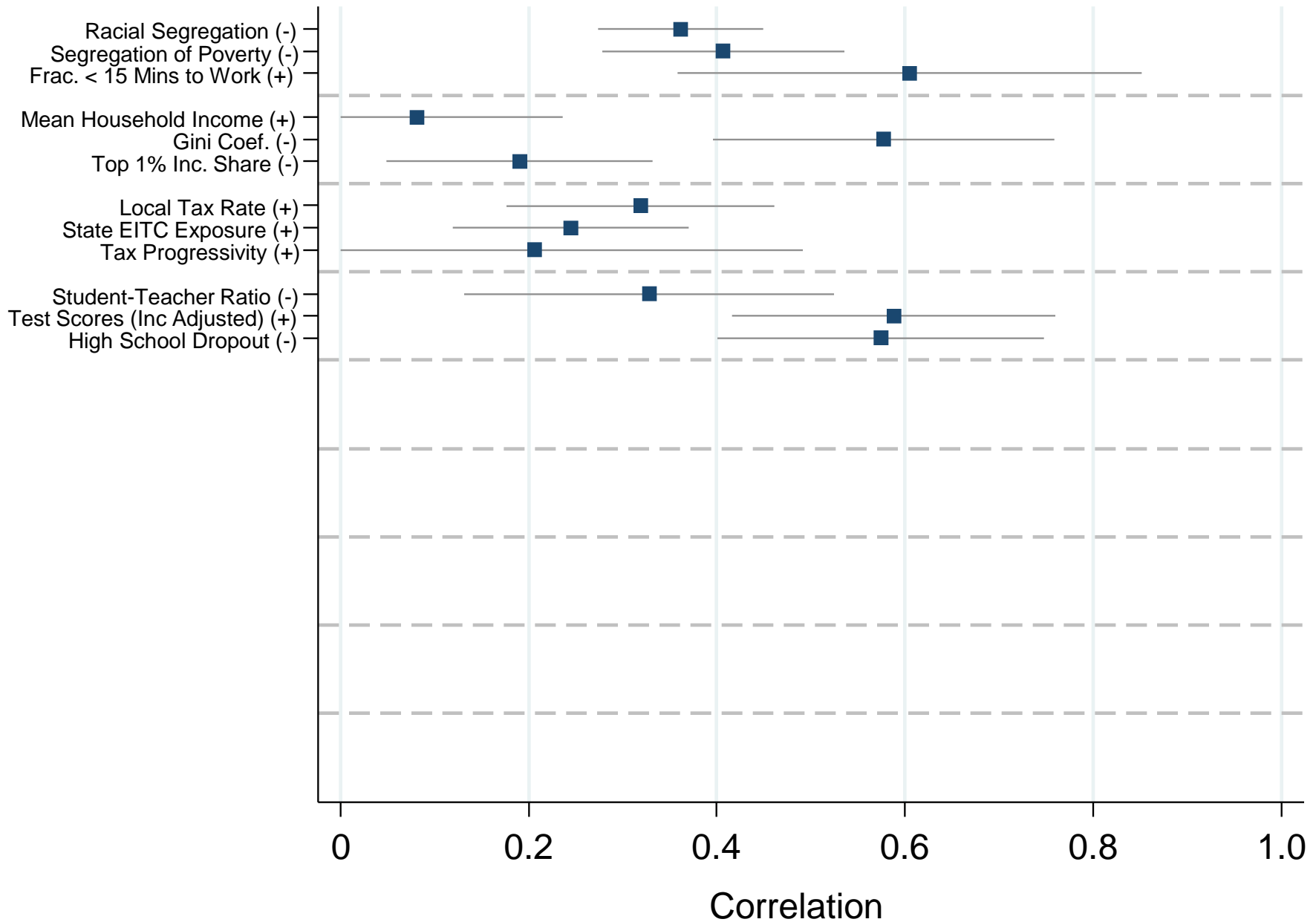
TAX INC SEG

- Racial Segregation (-)
- Segregation of Poverty (-)
- Frac. < 15 Mins to Work (+)
- Mean Household Income (+)
- Gini Coef. (-)
- Top 1% Inc. Share (-)
- Local Tax Rate (+)
- State EITC Exposure (+)
- Tax Progressivity (+)

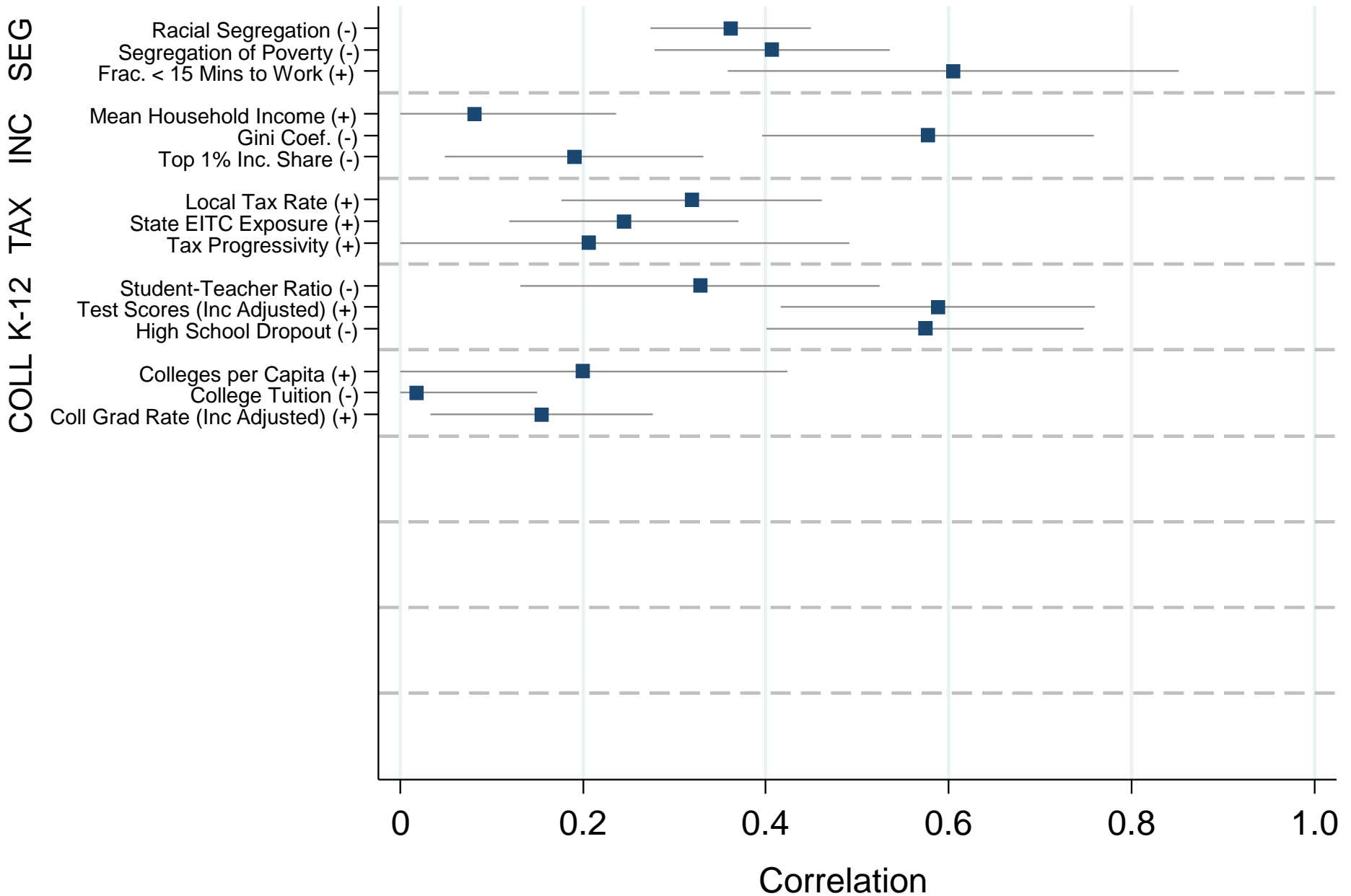




# Spatial Correlates of Upward Mobility

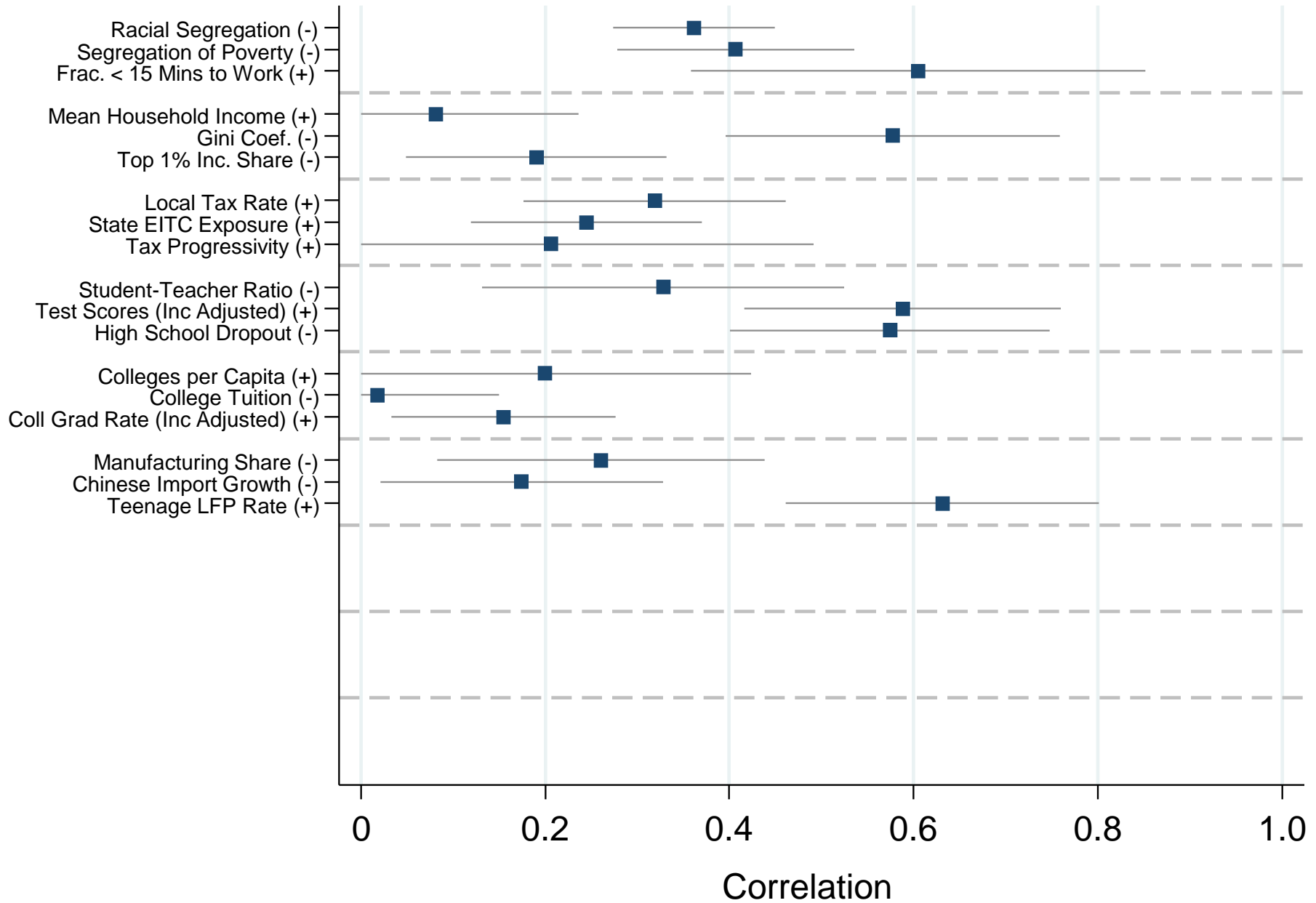


# Spatial Correlates of Upward Mobility



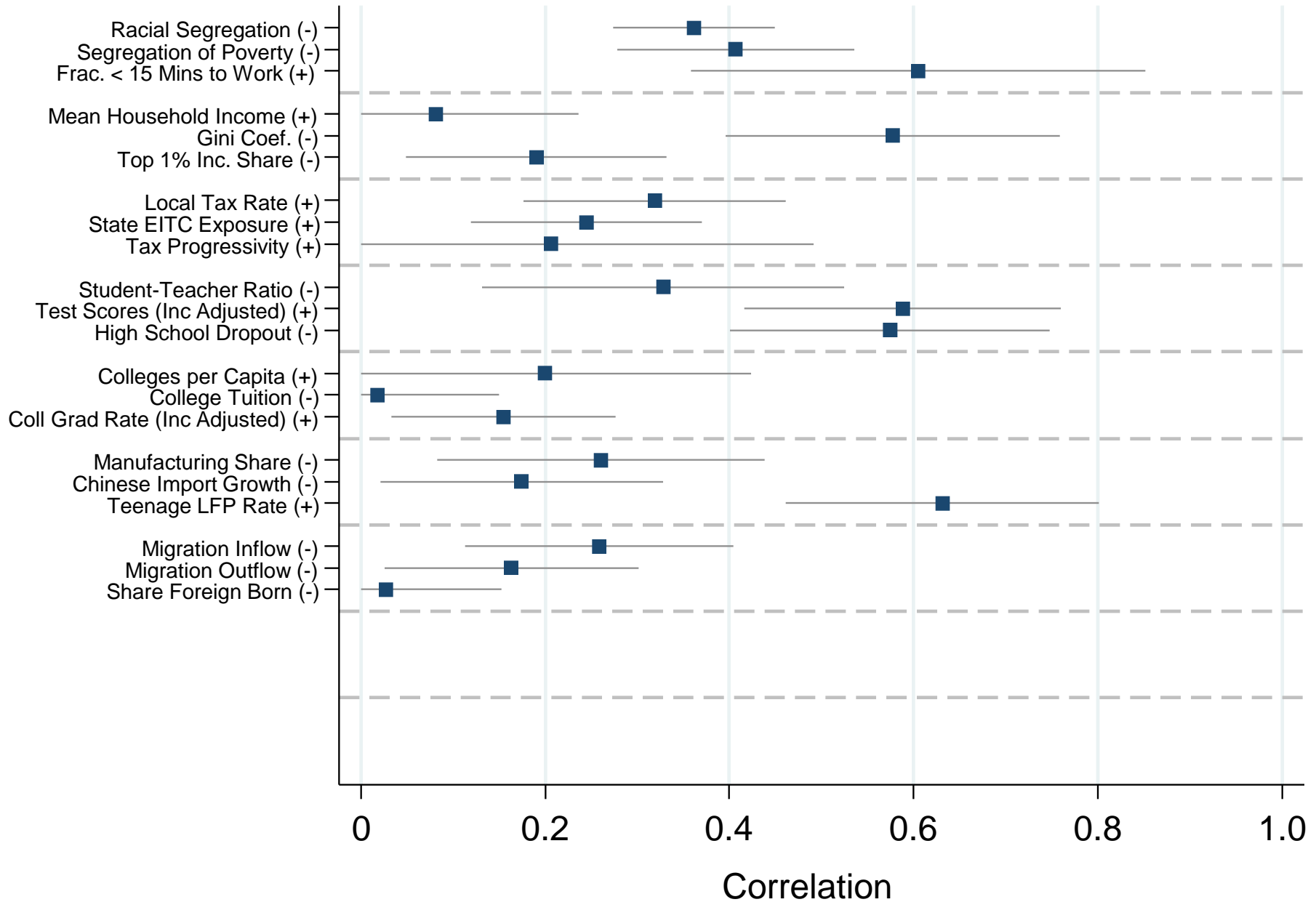
# Spatial Correlates of Upward Mobility

LAB COLL K-12 TAX INC SEG



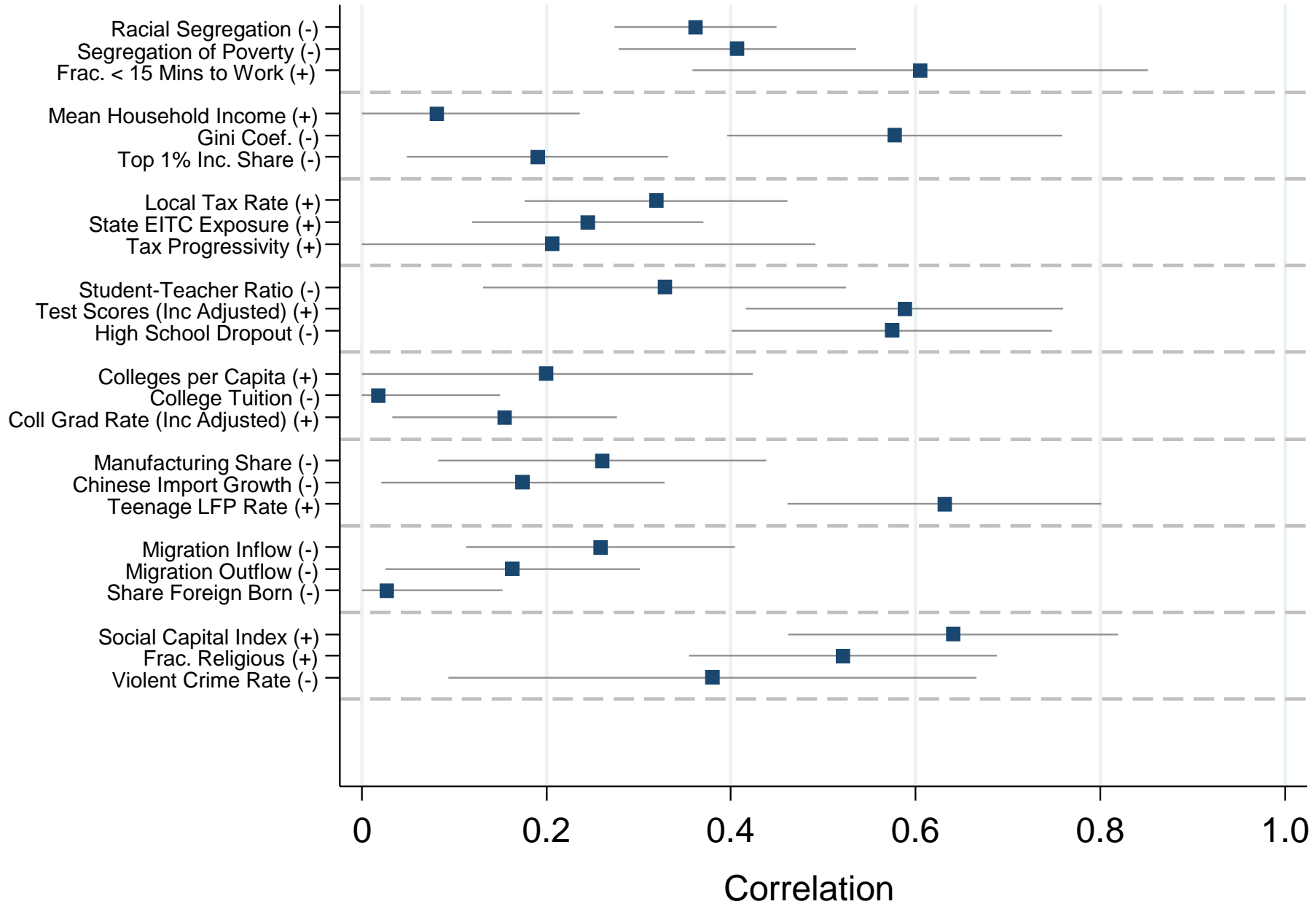
# Spatial Correlates of Upward Mobility

SEG  
INC  
TAX  
K-12  
COLL  
LAB  
MIG



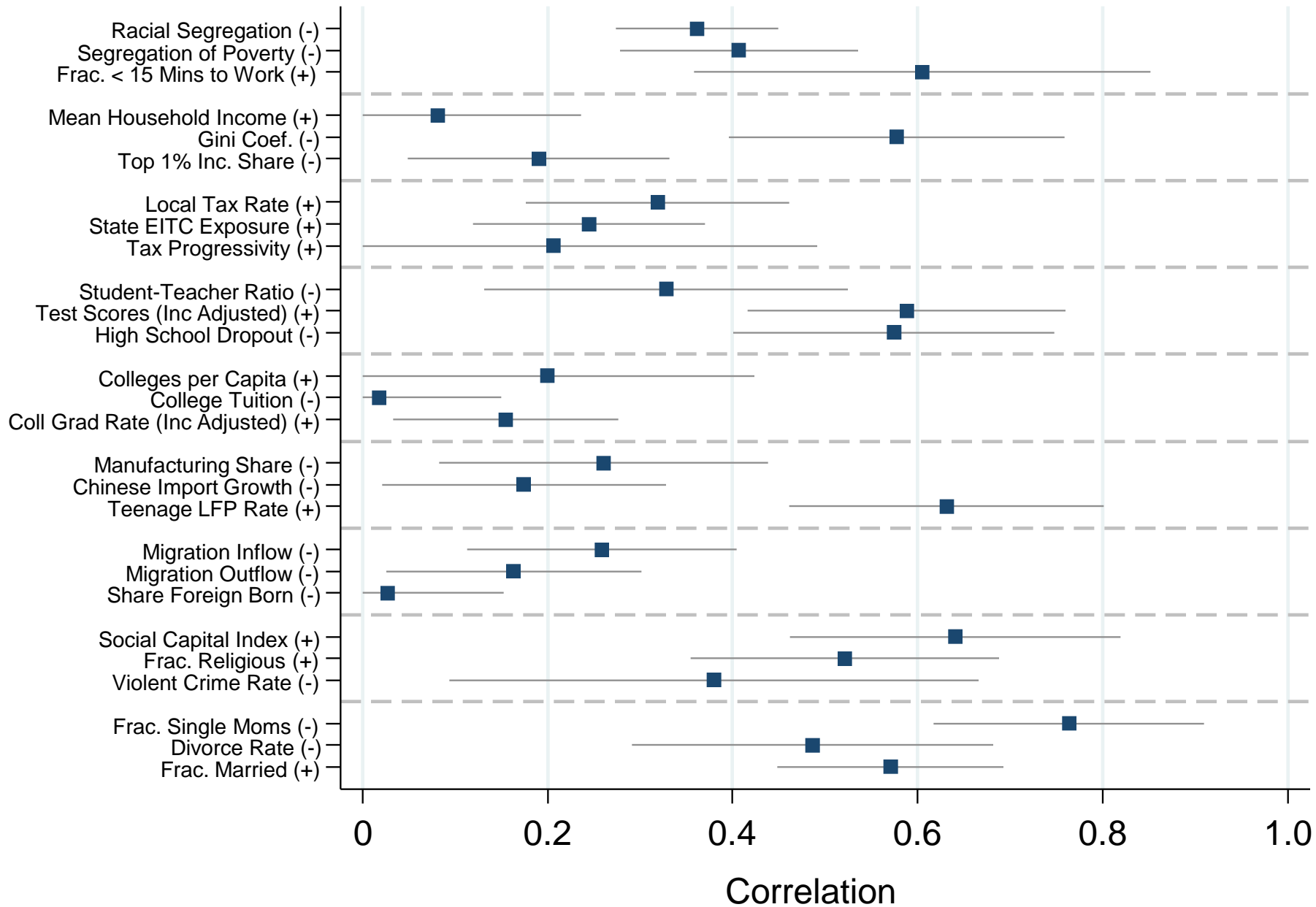
# Spatial Correlates of Upward Mobility

SEG  
INC  
TAX  
K-12  
COLL  
LAB  
MIG  
SOC

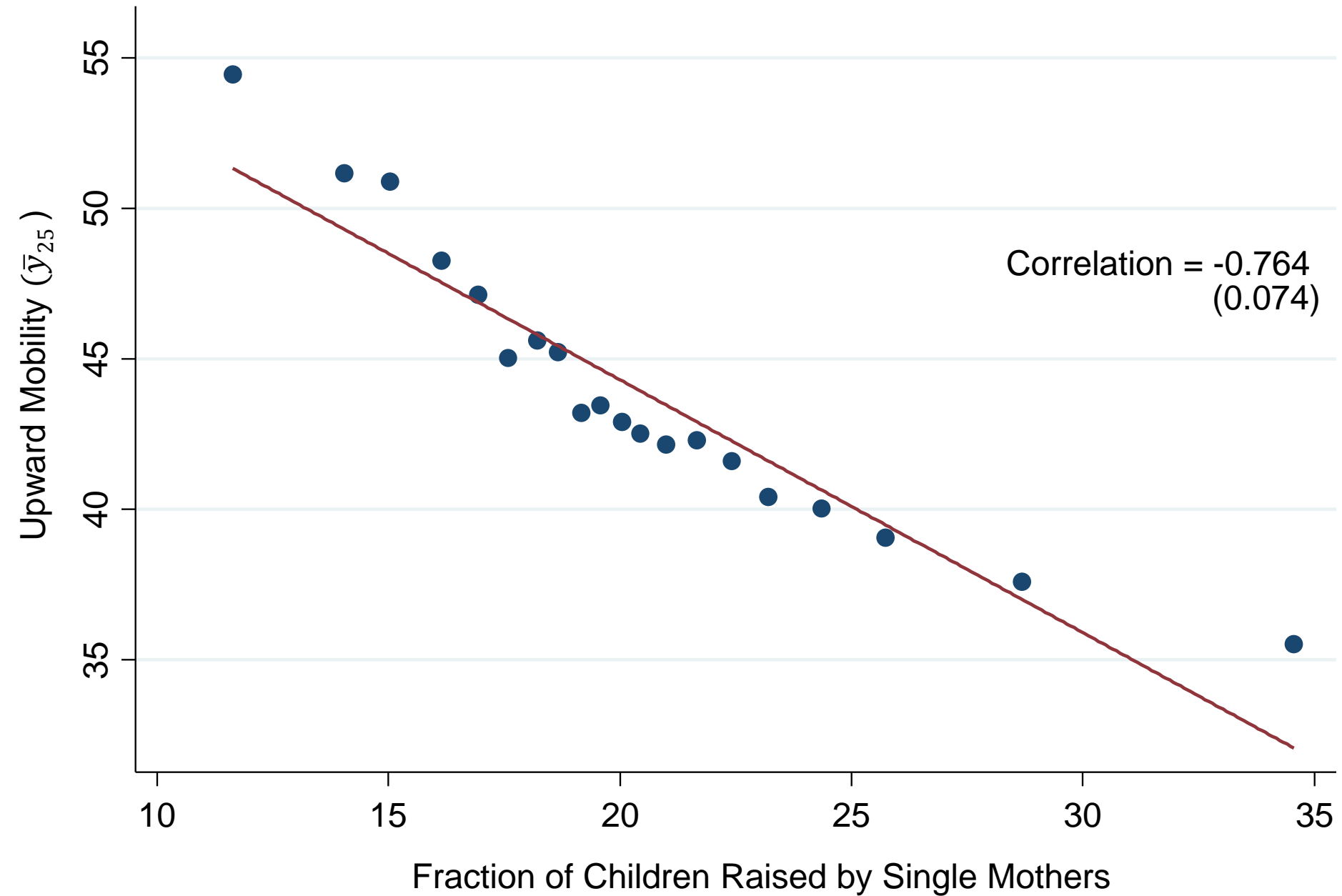


# Spatial Correlates of Upward Mobility

SEG  
INC  
TAX  
K-12  
COLL  
LAB  
MIG  
SOC  
FAM

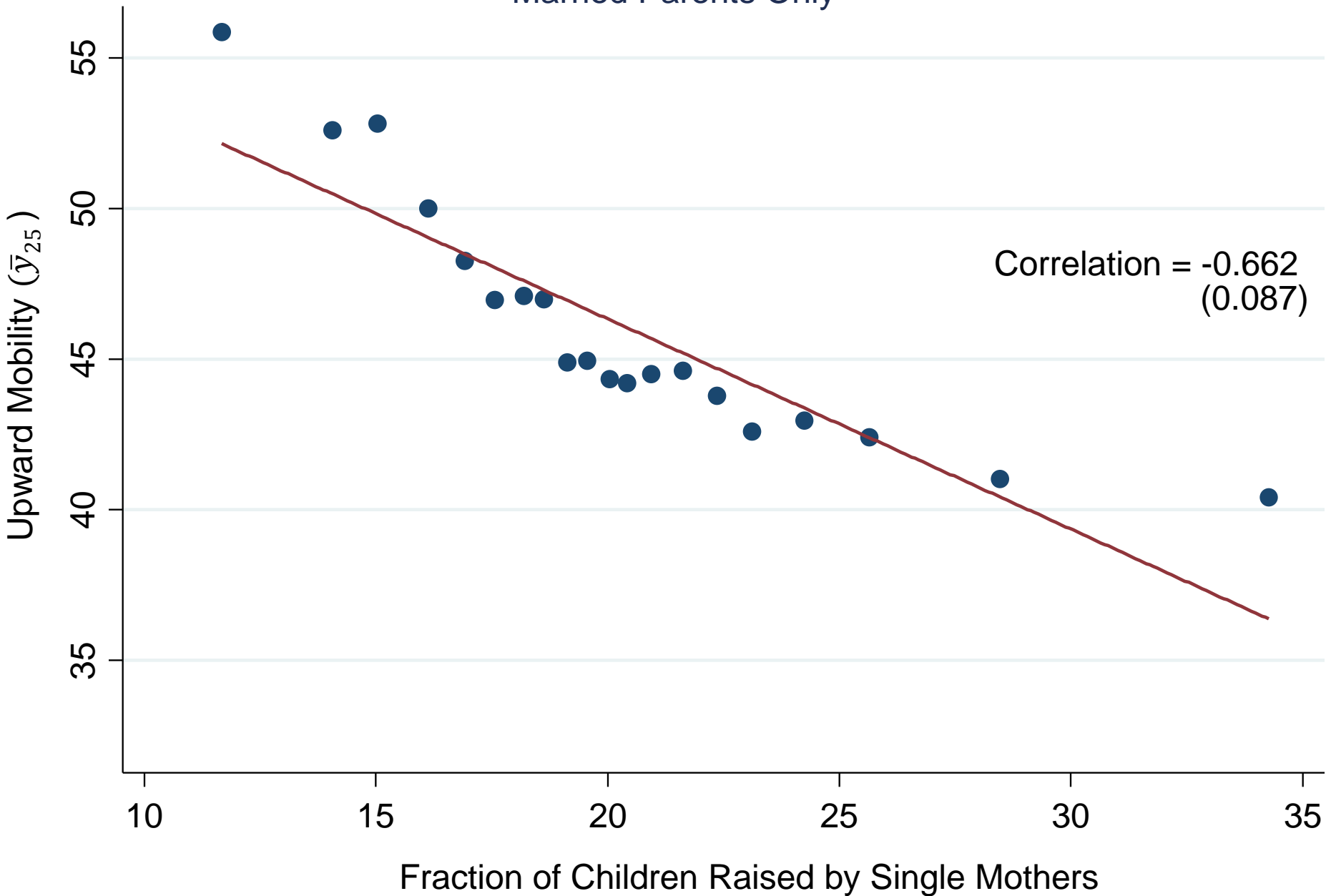


# Upward Mobility and Fraction of Single Mothers in CZ



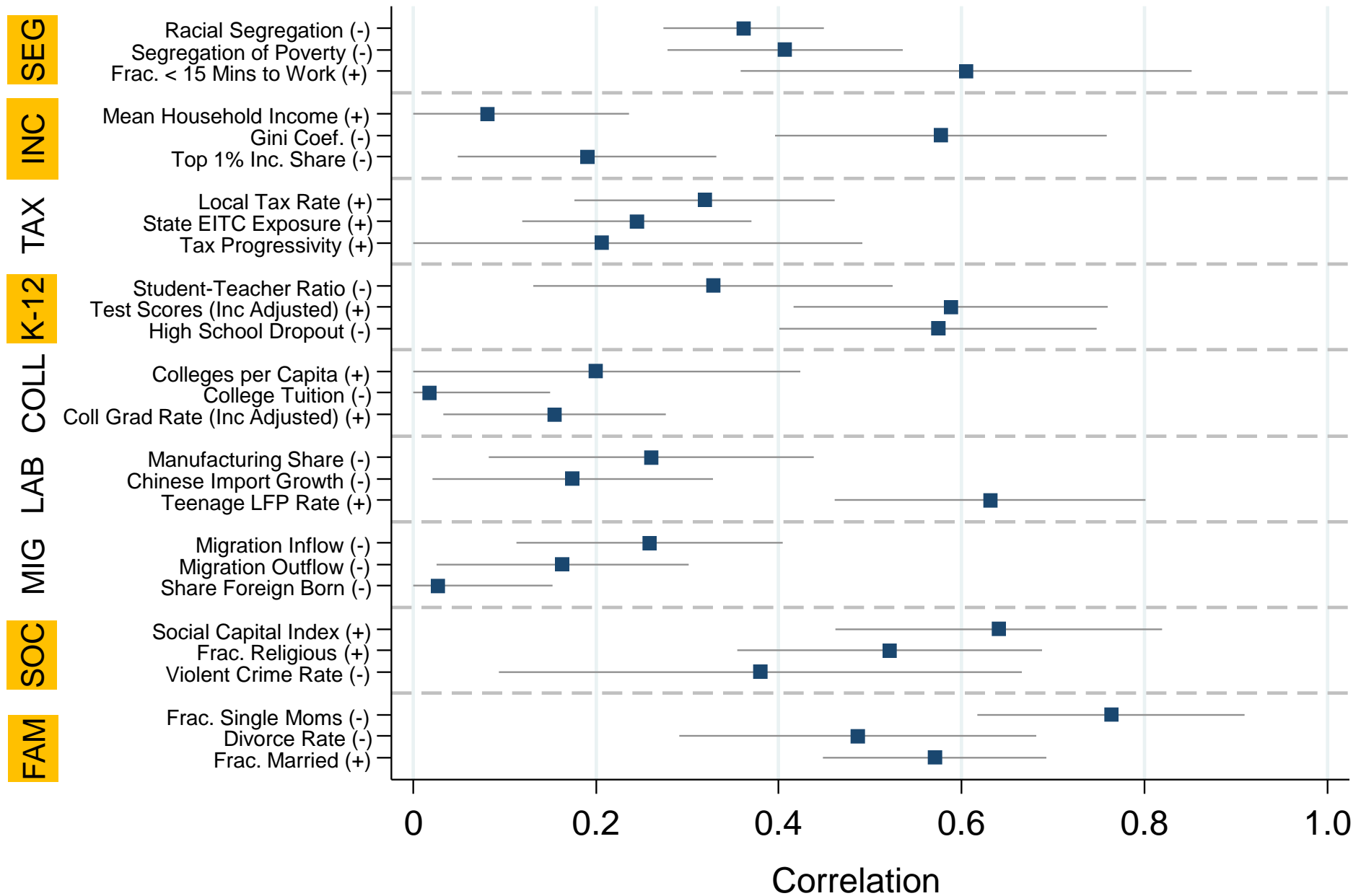
# Upward Mobility and Fraction of Single Mothers in CZ

Married Parents Only





# Spatial Correlates of Upward Mobility



## Comparison of Alternative Hypotheses

Dep. Var.:	Upward Mobility ( $Y_{25}$ )			
	(1)	(2)	(3)	(4)
Racial Segregation	-0.085 (0.029)	-0.112 (0.020)	-0.165 (0.034)	
Gini Bottom 99%	-0.050 (0.063)	-0.019 (0.039)	-0.313 (0.064)	
High School Dropout Rate	-0.157 (0.061)	-0.142 (0.030)	-0.286 (0.067)	
Social Capital Index	0.284 (0.056)	0.109 (0.053)	0.296 (0.065)	
Fraction Single Mothers	-0.484 (0.070)	-0.438 (0.072)		-0.808 (0.085)
Fraction Black				0.056 (0.073)
<b>State FEs</b>		<b>X</b>		
R-squared	0.705	0.848	0.605	0.584
Observations	709	709	709	709

# Conclusion

- Substantial variation in upward and relative mobility across the U.S.
  - Implies CZ-level neighborhood effects are 60% as large as parent-child income correlation
  - Intergenerational mobility is shaped by environment and may therefore be manipulable (not pure genetics)

# Future Research

- Key questions for future work:
  1. Is the variation due to differences in people (sorting) or places?
    - Currently studying this question by analyzing individuals who move across areas [Chetty and Hendren 2014]
  2. If place effects, what policies cause improvements in mobility?
    - To facilitate this work, we have posted statistics on mobility online at [www.equality-of-opportunity.org](http://www.equality-of-opportunity.org)

# Download CZ-Level Data on Social Mobility

[www.equality-of-opportunity.org/data](http://www.equality-of-opportunity.org/data)

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## Downloadable Data on Intergenerational Mobility

Data Description		
Preferred Mobility Measures by Commuting Zone	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 1: National 100 by 100 Transition Matrix	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 2: Marginal Income Distributions by Centile	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 3: Intergenerational Mobility Statistics and Selected Covariates by County	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 4: Intergenerational Mobility Statistics by Metropolitan Statistical Area	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 5: Intergenerational Mobility Statistics by Commuting Zone	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 6: Quintile-Quintile Transition Matrices by Commuting Zone	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 7: Income Distributions by Commuting Zone	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 8: Commuting Zone Characteristics	<a href="#">Stata file</a>	<a href="#">Excel file</a>
Online Data Table 9: Commuting Zone Characteristics Definitions and Data Sources		<a href="#">Excel file</a>
Geographic Crosswalks (Tolbert and Sizer 1996, Autor and Dorn 2009 & 2013)	<a href="#">Zip file</a>	
Replication Stata Code and Datasets	<a href="#">Zip file</a>	
<a href="#">Downloadable Map of Absolute Upward Mobility</a>		

Version 2.0, released January 17, 2014. For Version 1.0 (released on July 22, 2013), click [here](#). Version 2.0 reports statistics using the 1980-82 birth cohorts (rather than 1980-81) and includes new data such as mobility statistics by county and MSA, new CZ-level covariates, and marginal income distributions for parents and children.

For more information on the data, please email [info@equality-of-opportunity.org](mailto:info@equality-of-opportunity.org)