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Capturing more than poverty: School free and reduced-price lunch data and household income

Thurston Domina

University of North Carolina at Chapel Hill

Nikolas Pharris-Ciurej

US Census Bureau

Andrew Penner

University of California, Irvine

Emily Penner

University of California, Irvine

Quentin Brummet

NORC

See next page for additional authors

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Capturing more than poverty: School free and reduced-price lunch data and household income

Abstract

Linking K-12 data on students and teachers to Internal Revenue Service (IRS) information allows us to answer questions that are difficult to answer using survey data or educational administrative data alone. We describe two research projects that demonstrate the importance of using linked administrative data to further research on education and inform policy discussions. In the first research project, using linked IRS income tax data to school administrative records for all 8th graders in one California public school district and all K-12th graders in Oregon public schools, we examine how well free and reduced price lunch (FRPL) enrollment captures student disadvantage. We find that FRPL categories capture relatively little variation in household income. However, FRPL captures elements of educational disadvantage that IRS-reported household income data do not. In the second research project, using data on teachers from a large California school district linked to IRS records and the Business Register, we examine what teachers do after they leave teaching. Preliminary findings suggest that many teachers leave the workforce after they leave teaching. Teachers that continue to work after leaving our school district often do so in a nearby school district, and often see a modest increase in their earnings in their new positions.

Comments

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Author(s)

Thurston Domina, Nikolas Pharris-Ciurej, Andrew Penner, Emily Penner, Quentin Brummet, Sonya Rastogi, and Tanya Sanabria

Capturing more than poverty: School free and reduced-price lunch data and household income

Thurston Domina¹
Nikolas Pharris-Ciurej²
Andrew Penner³
Emily Penner³
Quentin Brummet⁴
Sonya Rastogi²
Tanya Sanabria³

¹University of North Carolina, Chapel Hill, ²U.S. Census Bureau, ³University of California, Irvine, ⁴NORC

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Free and reduced price lunch enrollment (FRL) is widely used as a proxy for student poverty

- Eligibility requirements:
 - Free lunch: Household income < 1.3* poverty
 - Reduced price lunch: Household income < 1.85* poverty
- Education research (c.f. Chetty, Friedman, & Rockoff 2014; Dobie & Fryer 2010; Figlio & Hart 2014; Hill, Bloom, Black, & Lipsey 2008; Morris & Perry 2016; Reardon 2011)
- Educational finance and reporting requirements
 - Title I, and weighted per student funding formulae
 - *No Child Left Behind, Every Student Succeeds Act*, state accountability

But how accurately does FRL capture poverty and socioeconomic status?

- **Obscure variation at the top and bottom of the distribution** (Cruse & Powers 2006; Harwell & LeBeau 2010; Micheltore & Dynarski 2016)
- **FRL measures may underestimate the association between family background and education experiences, outcomes** (Micheltore & Dynarski 2016)
- **USDA Community Eligibility Provision may exacerbate measurement problems**

Research questions

- What is the relationship between IRS-reported annual household income and free or reduced-price lunch program enrollment?
 - Oregon
 - *California district*
- What does school-reported free or reduce-price lunch program enrollment tell us about the relationship between family socioeconomic background and student test scores?
 - Oregon
 - *California district*

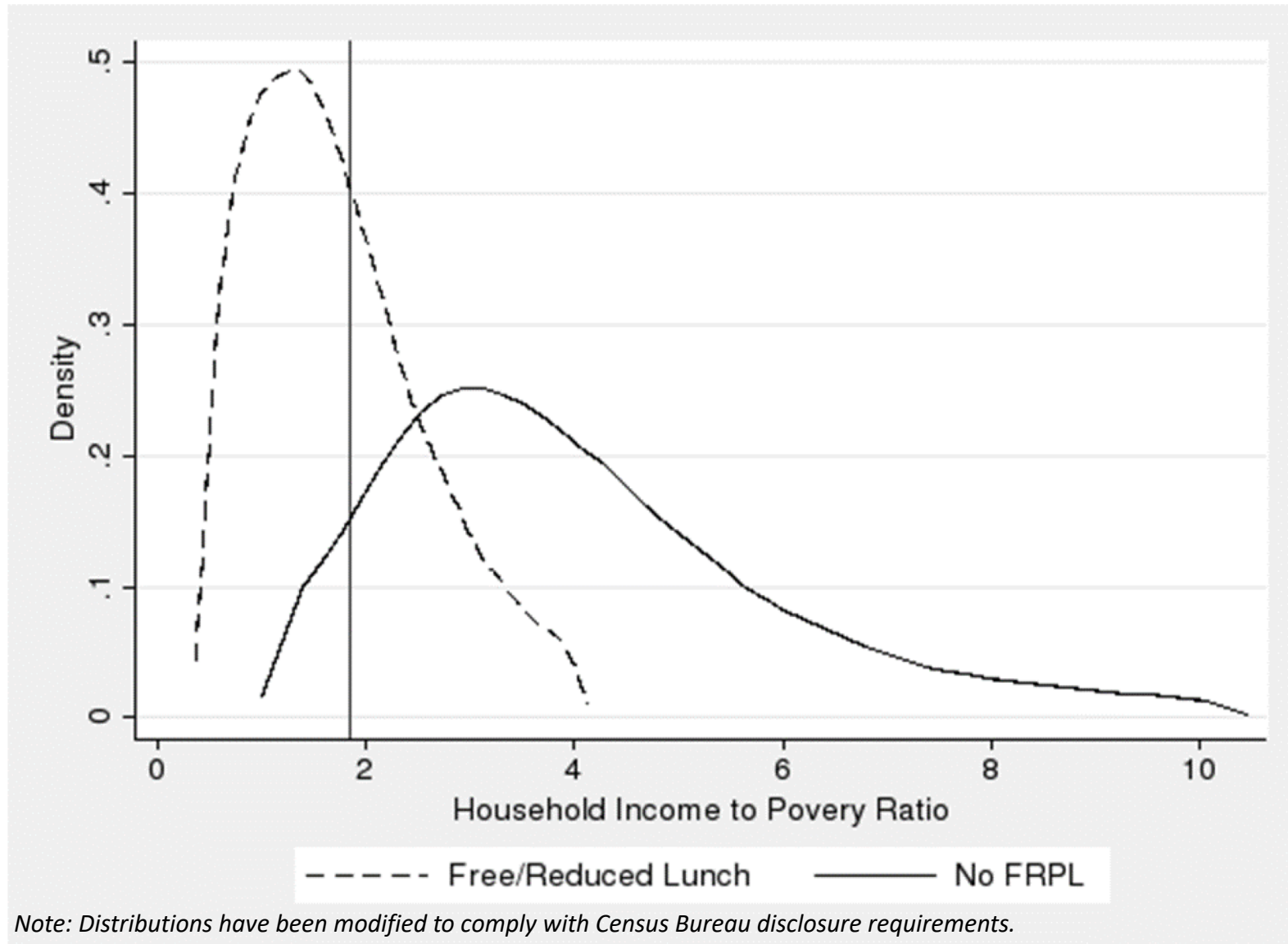
Data: 8th graders in Oregon public schools, 2004-05 - 2013-14

- Data Sources:
 - Student-level administrative data from 2003-04 through 2013-14 school years
 - Internal Revenue Service (IRS) 1040 Tax data from 2000 through 2014
- Data Linkage at US Census Bureau
 - A unique person identification key (PIK) was placed on each record, using personally identifying information, such as SSN, name, DOB, and address.
 - 93% of student records received a PIK
 - ~99% of individuals listed on IRS 1040 forms received a PIK
 - PIK allows records linkage

Data: 8th graders in Oregon public schools, 2004-05 - 2013-14

- Student-level administrative data (N=350,507)
 - Indicators for enrollment in either free or reduced price lunch
 - Basic demographics (race/ethnicity, gender, language status, special education)
 - Annual end-of-grade achievement test scores
- Internal Revenue Service 1040 Tax data (2000-2014)
 - IRS-reported household income: Sum of all total money income reported on all filed 1040s in the household for the calendar year in which student began focal grade
 - Indicators based upon IRS-Reported Household Income:
 - Household income $\leq 1.85^*$ poverty (8th grade calendar year)
 - Household Income to Poverty Ratio (8th grade calendar year)
 - From 3rd to 8th grade percentage of years household income is below poverty threshold.
 - From 3rd to 8th grade percentage of years household income is below reduced price lunch threshold.
 - 88% of 8th graders were located on a 1040 tax form from the calendar year they started 8th grade

Distribution of IRS-reported household income-to-poverty ratio by 8th grade NSLP enrollment, Oregon (N= 315,457)



OLS predictors of 8th grade English Language Arts scores (standardized) for students in Oregon using linked administrative and IRS records

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|-------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Coef. | Coef. | Coef. | Coef. | Coef. | Coef. |
| NSLP Free Lunch | -.518 *** | | -.451 *** | -.394 *** | -.277 *** | -.277 *** |
| IRS Free Lunch | | -.355 *** | -.144 *** | .011 * | .011 * | .222 |
| HH Income to Poverty Ratio | | | | .079 *** | .062 *** | .062 *** |
| HH Inc: Poverty Ratio Squared | | | | -.002 *** | -.002 *** | -.002 *** |
| Demographic Controls | | | | | + | + |
| % Years in Poverty | | | | | | -.008 |
| % Years NSLP Eligible | | | | | | -.209 |
| School Fixed Effect | + | + | + | + | + | + |
| Academic Year Fixed Effect | + | + | + | + | + | + |
| Constant | .260 *** | .181 *** | .280 *** | -.010 *** | .320 *** | .321 *** |
| N | 350,507 | 350,507 | 350,507 | 350,507 | 350,507 | 350,507 |
| R-Squared | .161 | .130 | .164 | .172 | .290 | .290 |

*** p < .001 ** p < .01 * p < .05

Demographic Controls include race/ethnicity, gender, special education flag, and migrant education flag.

Source: Linked Oregon Department of Education records, for academic years 2004-05 – 2013-14, and Internal Revenue Service 1040 Tax data, from 2000 – 2013.

California District Analysis and Results

- ~14,000 8th graders in a mid-sized CA school district, 2008-09 – 2013-14
- Measures and analytic strategy are largely similar
 - Key difference is the ability to distinguish *between*:
 - free lunch enrollment
 - reduced price lunch enrollment
- Findings are similar to those displayed for Oregon
 - Free lunch recipients displayed an educational disadvantage relative to reduced price lunch recipients

Data Limitations

- Calendar year covered by IRS data captures only a portion of the August to May school year
- IRS income measure is not sensitive to month-to-month income volatility
- NSLP households may not match IRS households

Conclusions

- NSLP category data are at best imperfect proxies for the household income of students in a given year
- NSLP information appears to capture additional aspects of disadvantage not captured by IRS income measures



Thank you

Nikolas.D.Pharris-Ciurej@census.gov

California District Results

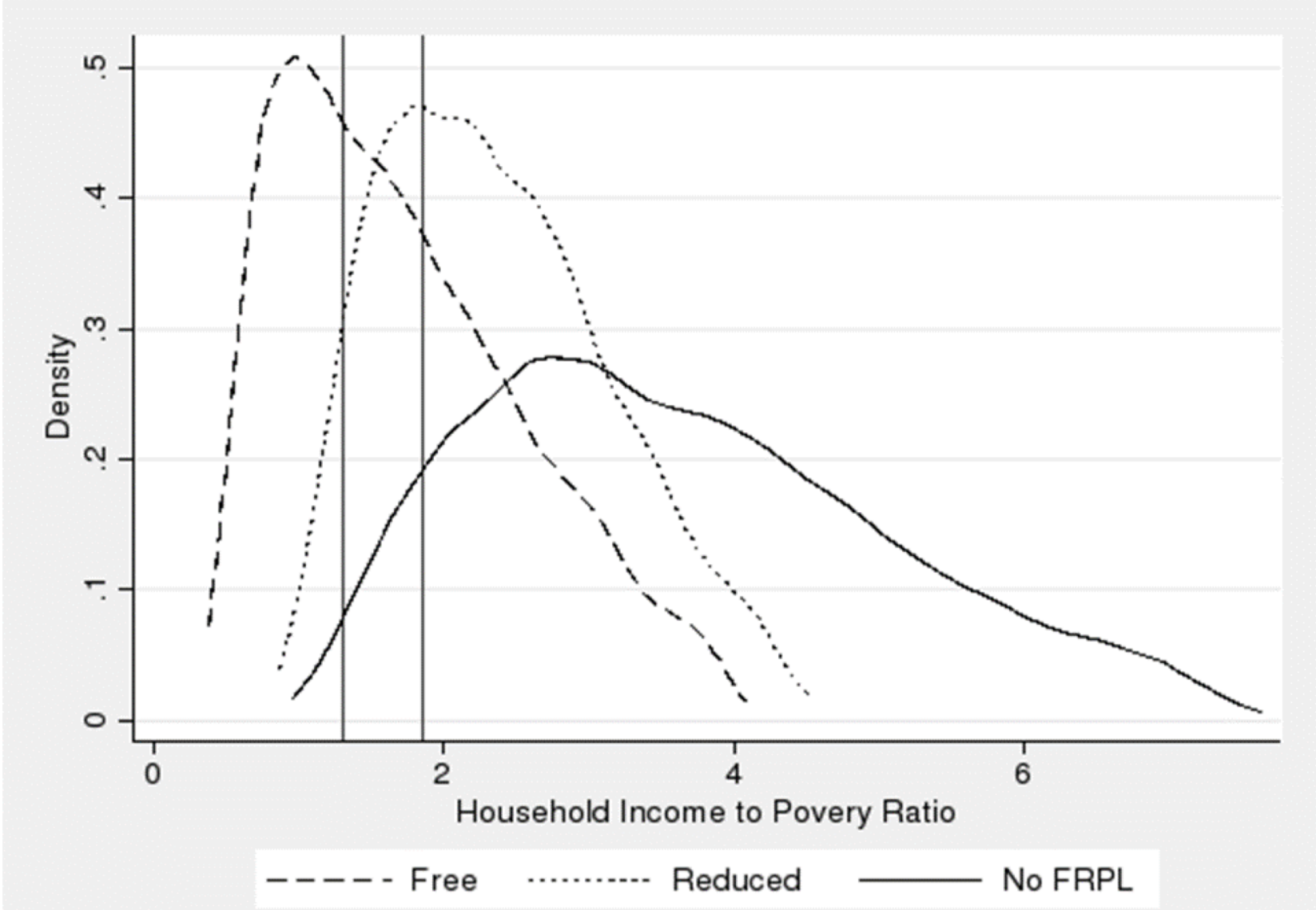
Data: 8th graders in a mid-sized California school district, 2008-09 – 2013-14

- Data Sources:
 - Student-level administrative data from 2008-09 through 2013-14 school years
 - Internal Revenue Service (IRS) 1040 Tax data from 2000 through 2014
- Data Linkage at US Census Bureau
 - A unique person identification key (PIK) was placed on each record, using personally identifying information, such as SSN, name, DOB, and address.
 - 94% of student records received a PIK
 - ~99% of individuals listed on IRS 1040 forms received a PIK
 - PIK allows records linkage

Data: 8th graders in a mid-sized California school district, 2008-09 – 2013-14

- Student-level administrative data (N=14,066)
 - Indicators for enrollment in free, reduced price lunch
 - Basic demographics (race/ethnicity, gender, language status)
 - Annual end-of-grade achievement test scores (standardized)
- Internal Revenue Service 1040 Tax data (2000-2014)
 - IRS-reported household income: Sum of all total money income reported on all filed 1040s in the household for the calendar year in which student began focal grade
 - Indicators based upon IRS-Reported Household Income:
 - Household income ≤ 1.3 * poverty (8th grade calendar year)
 - 1.3 *poverty < Household income ≤ 1.85 *poverty (8th grade calendar year)
 - Household Income to Poverty Ratio (8th grade calendar year)
 - From K to 8th grade percentage of years household income is below poverty threshold.
 - From K to 8th grade percentage of years household income is below reduced price lunch threshold.
 - 87% of 8th graders were located on a 1040 tax form from the calendar year they started 8th grade

Distribution of IRS-reported household income-to-poverty ratio by 8th grade NSLP enrollment, California district (N=12,659)



Note: Distributions have been modified to comply with Census Bureau disclosure requirements.

Source: Linked California school district records, for academic years 2008-09 – 2013-14, and Internal Revenue Service 1040 Tax data, from 2008 – 2013.

OLS predictors of 8th grade English Language Arts scores (standardized) for students in one California district using linked administrative and IRS records

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| | Coef. | Coef. | Coef. | Coef. | Coef. | Coef. |
| NSLP Free Lunch | -.392 *** | | -.384 *** | -.348 *** | -.145 *** | -.146 *** |
| NSLP Reduced Price Lunch | -.200 *** | | -.192 *** | -.155 *** | -.066 ** | -.069 ** |
| IRS Free Lunch | | -.153 *** | -.002 | .085 * | .046 | .049 |
| IRS Reduced Price Lunch | | -.160 *** | -.056 * | .007 | .032 | .022 |
| HH Income to Poverty Ratio | | | | .032 | .024 | .025 |
| HH Inc: Poverty Ratio Squared | | | | .001 | .001 | .001 |
| Demographic Controls | | | | | + | + |
| % Years in Poverty (K-8 th) | | | | | | -.067 |
| % Years NSLP Eligible (K-8 th) | | | | | | .040 |
| School Fixed Effect | + | + | + | + | + | + |
| Academic Year Fixed Effect | + | + | + | + | + | + |
| Constant | .282 *** | .122 *** | .286 *** | .133 ** | -.673 *** | -.678 *** |
| N | 14,066 | 14,066 | 14,066 | 14,066 | 14,066 | 14,066 |
| R-Squared | .099 | .078 | .100 | .103 | .411 | .411 |

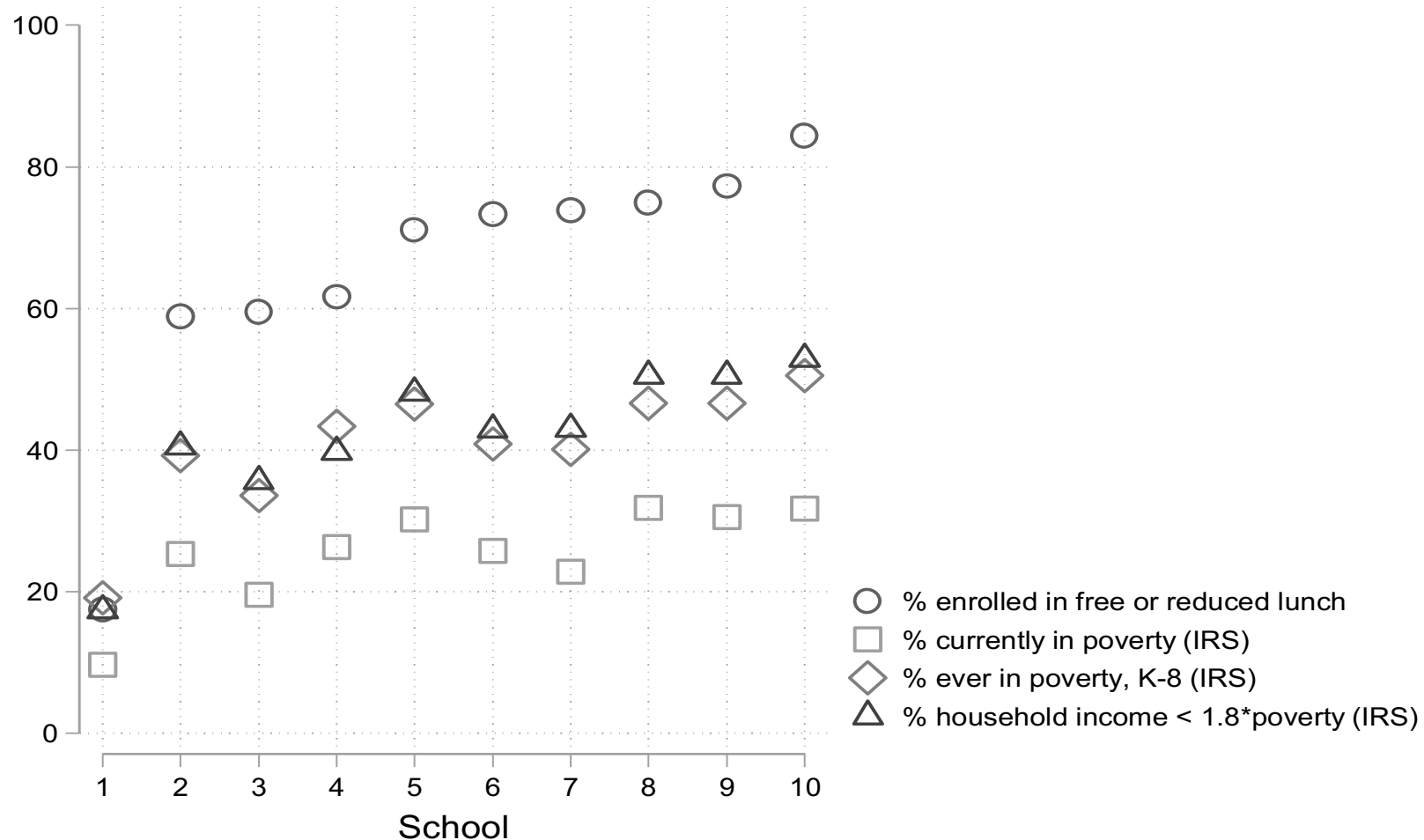
*** p < .001 ** p < .01 * p < .05

Demographic Controls include race/ethnicity and nativity, gender, and English language status.

Source: Linked California school district records, for academic years 2008-09 – 2013-14, and Internal Revenue Service 1040 Tax data, from 2000 – 2013.

8th grade NSLP enrollment, IRS-validated household income, and poverty rates for California district schools (N=14,066)

(averaged at the school level for all 8th graders for which data are available, 2008-09 through 2013-14)



Descriptive Statistics for 8th Graders in a California Public School using Administrative Records from 2008-2013 and IRS 1040 Tax Data from 2003-2013 (N=14,066)

| | Mean/ Proportion | Std. Dev. |
|---|------------------|-----------|
| End of Year ELA Exam | 371.674 | 59.302 |
| NSLP Free Lunch | 0.539 | 0.498 |
| NSL Reduced Price Lunch | 0.132 | 0.339 |
| IRS Free Lunch | 0.242 | 0.429 |
| IRS Reduced Price Lunch | 0.166 | 0.372 |
| HH Income: Poverty Ratio | 2.554 | 1.752 |
| Female | 0.497 | 0.5 |
| <i>Race/Ethnicity and Nativity</i> | | |
| White | 0.125 | 0.331 |
| Black | 0.008 | 0.088 |
| US Born Hispanic | 0.382 | 0.486 |
| Foreign Born Hispanic | 0.014 | 0.116 |
| US Born Asian | 0.24 | 0.427 |
| Foreign Born Asian | 0.066 | 0.249 |
| Hispanic Place of Birth Unknown | 0.091 | 0.288 |
| Asian Place of Birth Unknown | 0.073 | 0.26 |
| Language Status: English Language Learner | 0.253 | 0.435 |
| Language Status: English Only | 0.277 | 0.447 |
| Language Status: Initially Fluent in English | 0.009 | 0.094 |
| Language Status: Reclassified Fluent in English | 0.422 | 0.494 |
| Language Status: Multiple Language Statuses | 0.039 | 0.193 |
| % of Years Poor (grades K-8) | 0.131 | 0.225 |
| % of Years FRL Eligible (grades K-8) | 0.357 | 0.344 |

Oregon Descriptive Results

Descriptive Statistics for 8th Graders in Oregon Public Schools from 2004-2015 using Oregon Department of Education Administrative Records and IRS 1040 Tax Data from 2000 through 2013 (N=350,507)

| | Mean/ Proportion | Std. Dev. |
|--------------------------------------|------------------|-----------|
| End of Year Reading Exam | 232.218 | 9.915 |
| OR FRL | 0.431 | 0.495 |
| IRS FRL | 0.328 | 0.469 |
| HH Income: Poverty Ratio | 3.319 | 2.841 |
| Female | 0.488 | 0.5 |
| Race/Ethnicity: White | 0.724 | 0.447 |
| Race/Ethnicity: Asian | 0.042 | 0.2 |
| Race/Ethnicity: Black | 0.027 | 0.161 |
| Race/Ethnicity: Hispanic | 0.145 | 0.352 |
| Race/Ethnicity: Other groups | 0.063 | 0.243 |
| Special Edu Flag | 0.121 | 0.326 |
| Migrant Edu Flag | 0.016 | 0.124 |
| % of Years Poor (grades 3-8) | 0.118 | 0.258 |
| % of Years FRL Eligible (grades 3-8) | 0.338 | 0.416 |