
Targeting Early Learning Investments: Identifying Communities

Andrew S. Waugh, PhD
Department of Human Services
Oregon Enterprise Data Analytics



Main Study Questions

- How do Kindergarten Assessment scores vary across communities?
- How do 3rd Grade Reading/Math scores vary across communities?
- How do communities across the state vary in terms of need for increased investment? In which service sectors?
- **Community** defined as “elementary school catchment area”
 - All variables measured at the school or catchment area level

Dependent Variables

Kindergarten Assessment

- Early Math: Numerical Operations (school mean)
- Early Literacy: English Letter Names (school mean)

Third Grade Assessment

- English Language Arts (school % scoring 3-4)
- Mathematics (school % scoring 3-4)

Independent Variables

Child Care Resources

- Total Child Care Capacity (slots)
- Regulated Centers (#)
- Exempt Centers (#)
- Head Start/Early Head Start (#)
- Regulated Family CC Homes (#)
- Exempt Family CC Homes (#)
- Early Learning Hub (dummy)

Controls

- Total Students (#)
- Catchment Size (log(area))
- Free/Reduced Lunch (% of students)
- Classes with High Quality Teachers (%)
- Median Class Size

DHS Service Utilization

- Paid Foster Care (# <7, # <11)
- Child Care Services
- SNAP
- TANF Basic
- TANF Unemployment

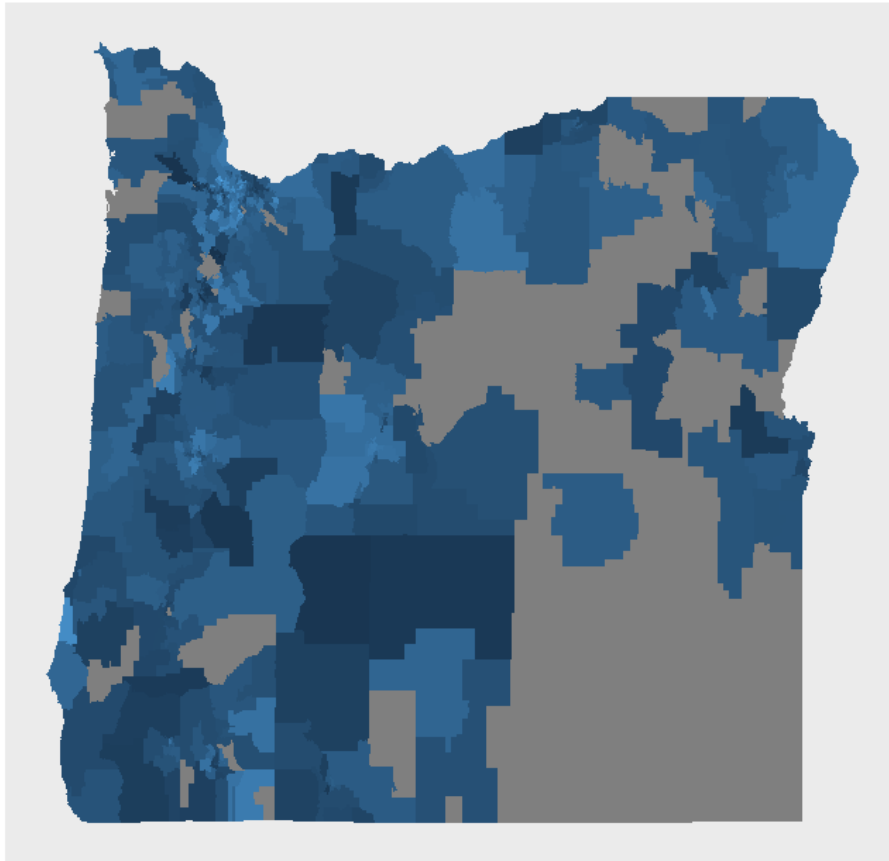
Demographics

- Female (%)
- American Indian (%)
- Asian (%)
- African American (%)
- Hawaiian/Pacific Islander (%)
- Hispanic/Latino (%)
- Multiple Races/Ethnicities (%)

Methodology

- Spatial Lag Regression
 - Traditional OLS assumes independence of cases
 - This assumption is frequently violated in the case of geographic boundaries (spatial autocorrelation)
 - Example: A family in one catchment area may use a child care facility in another.
 - Using elementary school catchment boundary geography allows us to account for the effects of neighboring communities on one another.
 - With **spatial lag regression** we can estimate:
 - The direct effect of a variable within a community
 - The indirect effect of that variable from neighboring communities

Kindergarten Assessment: Early Literacy



Summary Stats

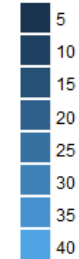
Mean: 18.0

Median: 17.2

Standard Deviation: 6.37

Missing: 65

OKA Early Lit

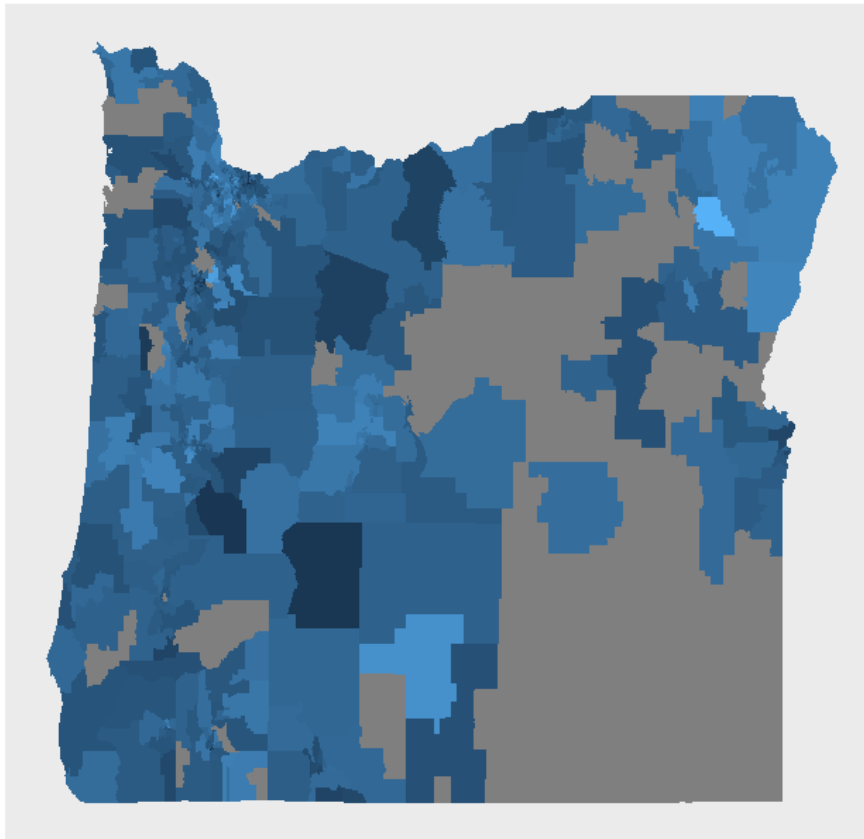


Early Literacy Regression Results

	Direct	Indirect	Total
HS/Early HS	0.389*	0.097	0.487*
Exempt Home	0.281**	0.070*	0.351**
CC Service (<7)	0.047*	0.012	0.059*
SNAP (<7)	-0.008*	-0.002	-0.011*
Total Students	0.003*	0.001	0.004*
Log(Area)	-0.227*	-0.057*	-0.284*
FRL%	-0.131***	-0.033***	-0.164***
Asian %	15.052***	3.753***	18.804***
African American %	10.873**	2.711**	13.584***
Hisp/Latino %	-7.095***	-1.769***	-8.864***

- Best fit of the four models.
- Head Start Facilities, Exempt Family CC Homes, and DHS CC Service Counts all significant, positive.

Kindergarten Assessment: Early Math



Summary Stats

Mean: 8.401

Median: 8.3

Standard Deviation: 1.072

Missing: 65

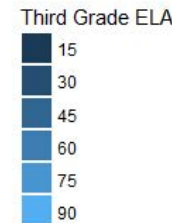
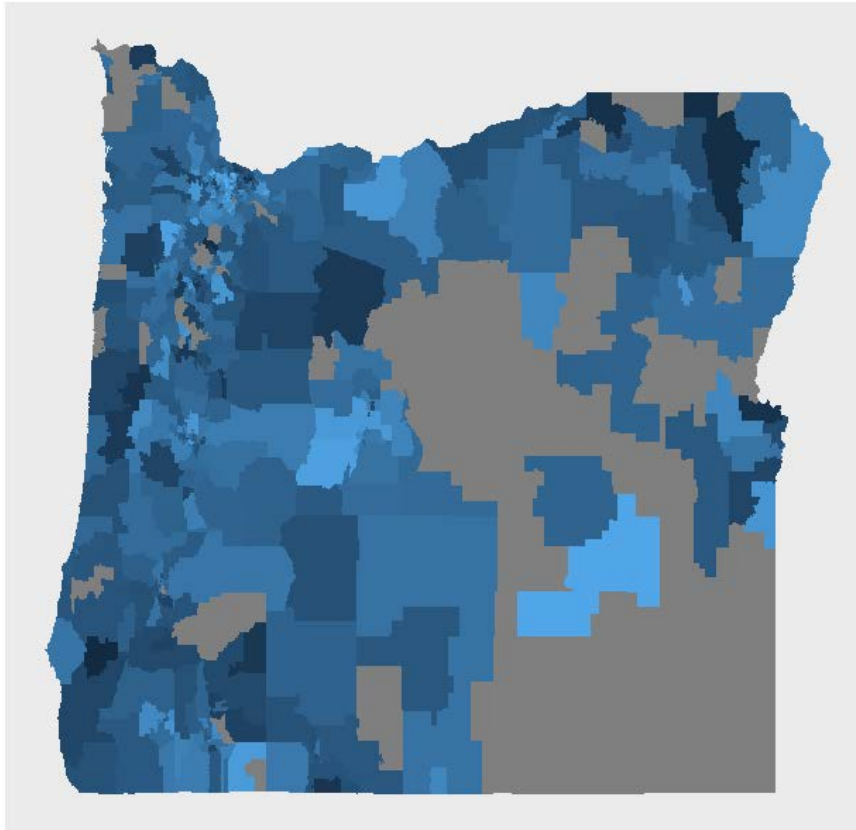
Early Math Regression Results

	Direct	Indirect	Total
Total Students	0.001*	0.000	0.001*
FRL %	-0.018***	-0.002**	-0.020***
Female %	-2.878**	-0.323	-3.20**
Asian %	1.998**	0.224*	2.222**
Hawaiian/Pacific %	-8.656**	-0.970*	-9.626**
Hisp/Latino %	-0.871***	-0.098*	-0.969***

- Communities in schools with more girls doing worse?
- Communities with larger schools doing better for both Early Lit and Early Math.

- $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
- Insignificant variables not reported

English Language Arts Assessment, 3rd Grade



Summary Stats

Mean: 47.18

Median: 46.30

Standard Deviation: 18.173

Missing: 58

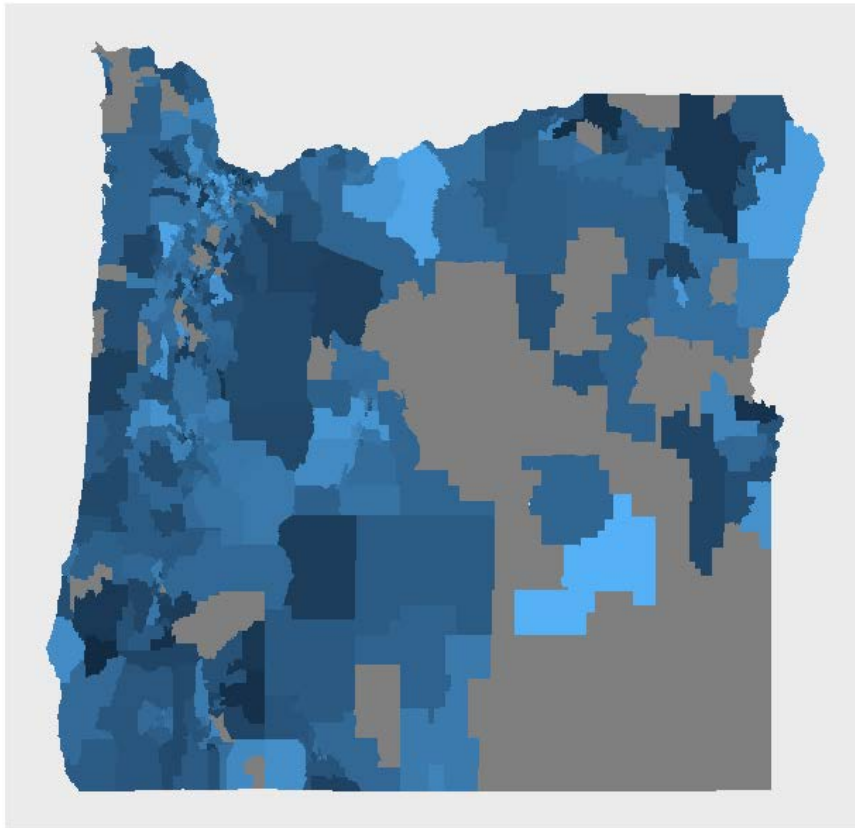
Third Grade ELA Regression Results

	Direct	Indirect	Total
Log(Area)	-0.823*	-0.146	-0.969*
FRL %	-0.411***	-0.073**	-0.484***
Asian %	22.394*	3.962	26.357*
Hawaiian/Pacific %	-101.017*	-17.873	-118.890*
Hisp/Latino %	-16.223***	-2.870*	-19.093***

- Schools with larger catchment areas perform worse.

- $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
- Insignificant variables not reported

Mathematics Assessment, 3rd Grade



Summary Stats

Mean: 46.97

Median: 46.20

Standard Deviation: 19.008

Missing: 58

Third Grade Math Regression Results

	Direct	Indirect	Total
TANF Basic (<10)	-0.082*	-0.013	-0.095*
Log(Area)	-0.763*	-0.119	-0.882*
FRL %	-0.450***	-0.070**	-0.520***
Asian %	37.427***	5.846*	43.273***
African American %	-30.329*	-4.737	-35.066*
Latino %	-14.989***	-2.341*	-17.330***

- Larger catchment areas performing worse.
- African American % negative and significant (was positive and significant for Early Lit)
- Asian % positive, Latino % negative, FRL % negative in all four models.

- $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
- Insignificant variables not reported

Discussion

- Looking for suggestions!
- Other school-level variables?
- Ideas for using:
 - Elementary School Catchment Shapefiles
 - DHS Client Data
- Desired visualizations? Maps?
- What would be most useful to the Early Learning research community?