Targeting Early Learning Investments: Identifying Communities

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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
### Early Literacy Regression Results

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

- 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

<table>
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<tr>
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<th>Indirect</th>
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</thead>
<tbody>
<tr>
<td>Total Students</td>
<td>0.001*</td>
<td>0.000</td>
<td>0.001*</td>
</tr>
<tr>
<td>FRL %</td>
<td>-0.018***</td>
<td>-0.002**</td>
<td>-0.020***</td>
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<tr>
<td>Female %</td>
<td>-2.878**</td>
<td>-0.323</td>
<td>-3.20**</td>
</tr>
<tr>
<td>Asian %</td>
<td>1.998**</td>
<td>0.224*</td>
<td>2.222**</td>
</tr>
<tr>
<td>Hawaiian/Pacific %</td>
<td>-8.656**</td>
<td>-0.970*</td>
<td>-9.626**</td>
</tr>
<tr>
<td>Hisp/Latino %</td>
<td>-0.871***</td>
<td>-0.098*</td>
<td>-0.969***</td>
</tr>
</tbody>
</table>

- 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

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

- 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

<table>
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<tbody>
<tr>
<td>TANF Basic (&lt;10)</td>
<td>-0.082*</td>
<td>-0.013</td>
<td>-0.095*</td>
</tr>
<tr>
<td>Log(Area)</td>
<td>-0.763*</td>
<td>-0.119</td>
<td>-0.882*</td>
</tr>
<tr>
<td>FRL %</td>
<td>-0.450***</td>
<td>-0.070**</td>
<td>-0.520***</td>
</tr>
<tr>
<td>Asian %</td>
<td>37.427***</td>
<td>5.846*</td>
<td>43.273***</td>
</tr>
<tr>
<td>African American %</td>
<td>-30.329*</td>
<td>-4.737</td>
<td>-35.066*</td>
</tr>
<tr>
<td>Latino %</td>
<td>-14.989***</td>
<td>-2.341*</td>
<td>-17.330***</td>
</tr>
</tbody>
</table>

- 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?