Income volatility is an important element of the relationship between family income and children's developmental trajectory (Hill et al., 2013). I use longitudinal student administrative data to develop a new proxy measure of income volatility: switches in students' eligibility status for free or reduced-price lunch (FRPL) across school years. I count switches into and out of FRPL between kindergarten and 3rd grade.

### Table: FRPL Switches

<table>
<thead>
<tr>
<th>FRPL Eligibility Switches</th>
<th>Num.</th>
<th>Pct.</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>333,762</td>
<td>78.2</td>
</tr>
<tr>
<td>Grade 1</td>
<td>34,736</td>
<td>8.1</td>
</tr>
<tr>
<td>Grade 2</td>
<td>17,276</td>
<td>4.1</td>
</tr>
<tr>
<td>Grade 3</td>
<td>19,144</td>
<td>4.5</td>
</tr>
<tr>
<td>Grades 1 and 2</td>
<td>7,366</td>
<td>1.7</td>
</tr>
<tr>
<td>Grades 1 and 3</td>
<td>5,070</td>
<td>1.2</td>
</tr>
<tr>
<td>Grades 2 and 3</td>
<td>7,142</td>
<td>1.7</td>
</tr>
<tr>
<td>Grades 1, 2, and 3</td>
<td>2,234</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>426,730</td>
<td></td>
</tr>
</tbody>
</table>

### Model and Results

I analyze the relationship between switching into or out of FRPL eligibility status by estimating the following model using OLS (with heterogeneous-robust SEs):

\[ Y_{is} = \alpha + \text{switch1}_{is} + \text{switch2}_{is} + \text{switch3}_{is} + X_{is} + \lambda_s + \epsilon_{is} \]

- \( Y_{is} \): Standardized test score in 3rd or 8th grade
- \( \text{switch}_{X_{is}} \): Switch FRPL eligibility \( X \) times between kindergarten and 3rd grade
- \( X_{is} \): Student control variables—sex, race & ethnicity, migrant, state native, FRPL eligibility in grade \( Y \), switched school in grade \( Z \)
- \( \lambda_s \): School fixed effects
- \( \epsilon_{is} \): Stochastic error term

**Interpretation:** Students who switch FRPL eligibility status once between kindergarten and third grade score on average 0.06 standard deviations worse on the eighth grade standardized math test than students who never switch FRPL eligibility status.

For students who switch FRPL eligibility status twice, the achievement gap rises to 0.08 standard deviations on eighth grade math.

For students who switch FRPL eligibility status three times (i.e., every year between kindergarten and third grade), the achievement gap is 0.11 standard deviations.

### Discussion

Switches in eligibility for FRPL across school years in elementary school allows school administrators to identify a group of students at risk of persistent disadvantage early in their education.

My proxy for income volatility is not operationalizable in Community Eligibility Provision schools.

This measure complements Michelmore & Dynarski's (2017) measure that counts years eligible for FRPL, and has the potential to improve the efficiency with which resources are targeted to reduce achievement gaps over time.

### Robustness

I conduct the following robustness analyses:

1. The achievement gap almost doubles in magnitude if the proxy for income volatility is restricted to switching into FRPL eligibility (and not out of eligibility).

2. Never switchers (the comparison group) can be divided into students who are never eligible for FRPL and students who are eligible every year.

3. Compared to students who are eligible for FRPL every year, there is no significant achievement gap for switchers.

Suggests that students who switch FRPL eligibility in the early years of elementary school are about as disadvantaged as persistently disadvantaged students.

### References


Michelmore, K., & Dynarski, S. (2017). The gap within the gap: Using longitudinal data to understand income differences in educational outcomes. AERA Open, 3(1).