School Meal Quality and Academic Performance

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A presentation of our peer-reviewed research on the impact of healthier school-provided meals on student learning.

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The Economist Magazine

School food

Biting commentary

A new company is trying to make school meals healthier



Quote from article: "*Visits to the school nurse plummeted, and complaints of stomach-ache and headaches have almost vanished. Teachers say everyone works better in the afternoons.*" (The Economist, May 4th 2013, p30)

Do better school meals improve academic performance?

Motivation

- We published our study in 2018 in the *Journal of Public Economics*, a top peer-reviewed Economics research journal
- Improving nutritional content of school meals (breakfast and lunch) was and continues to be a topic of policy interest
- The focus has been on the potential health benefit for children. For example, 1 in 5 school-aged child is obese (Centers for Disease Control, 2017).
- At the same time, medical and nutrition research hypothesize a strong link between improved nutrition and cognitive development and function
- Largely missing from the policy discussion is whether better school meals could (also) improve student learning. There was (and still is) little direct evidence establishing the relationship between improved nutrition and learning.
- Our goal was to help fill this gap

We combine several large-scale data sets to answer our research question

1. **Test Score Data**
   - Standardized test scores for all students in CA public schools grades 2-11 for 5 years: school year 2008-2009 to 2012-2013 (CA Dept Education)
   - For privacy reasons, test scores are averages at the grade level for each school and year

2. **Vendor Data**
   (1) 12% CA public schools contract with an outside meal vendor (CA Dept Education)

   (2) Nutritionists at the *Nutrition Policy Institute* analyzed vendor menus and assigned each vendor a Healthy Eating Index (HEI) score
      - HEI is a well-established food-component analysis with scores 0 to 100
      - HEI is USDA's preferred measure of diet quality

   (3) We classify vendors as:
      → "Healthy" if above the median HEI score
      → "Standard" if below the median HEI score

3. **School and Student Characteristics**: student-to-teacher ratios, English learner, reduced/free school lunch, school budget

4. **Cost of Vendor Contracts**

We compare changes in test scores at schools adopting healthy meal vendors to those at other schools

Statistical Model

- Regression model with test scores as the outcome and healthy vendor adoption as the independent variable of interest
- The model accounts for:
  (1) Common yearly factors (e.g. CA economy, federal policy)
  (2) Persistent grade-by-school factors (e.g. whether 6th grade is with elementary school or middle school)
  (3) Time varying school and student characteristics
- We report averages across all schools and grades, and some sub-sample averages
- Model intuition
  → We identify the effect of healthy vendors using *within-school variation* that occurs when schools switch between outside (healthy or standard) vendors and in-house meal preparation
  → In essence, we use each school as a comparison for itself and compare test scores in years with and without outside vendors

We find that test scores increase with healthy meal vendor adoption

Main Findings

(1) A switch from in-house school meals to a *healthy* meal vendor is correlated with a **.03** to **.04** standard deviation (SD) increase in test scores (relative to in-house)

(2) A switch to a *standard* meal vendor has **no effect** on student performance (relative to in-house)

(3) A concern with offering healthier school lunches is that fewer students will eat the lunches: We do not find that contracting with a *healthy* (or *standard*) meal vendor changes the number of meals sold

(4) We are not able to track if a particular student eats the school lunch, but as expected, the *healthy* school meal test score estimates are largest for the group of students most likely to eat the school lunches: Test score estimates are **40-50%** larger for students eligible for reduced/free school lunch

A variety of robustness checks make us confident in our results

Robustness Checks

(1) The test score results are very similar regardless of:

i. **The Exact Sample:** All CA Schools, Contract Schools, Standard Contract Schools

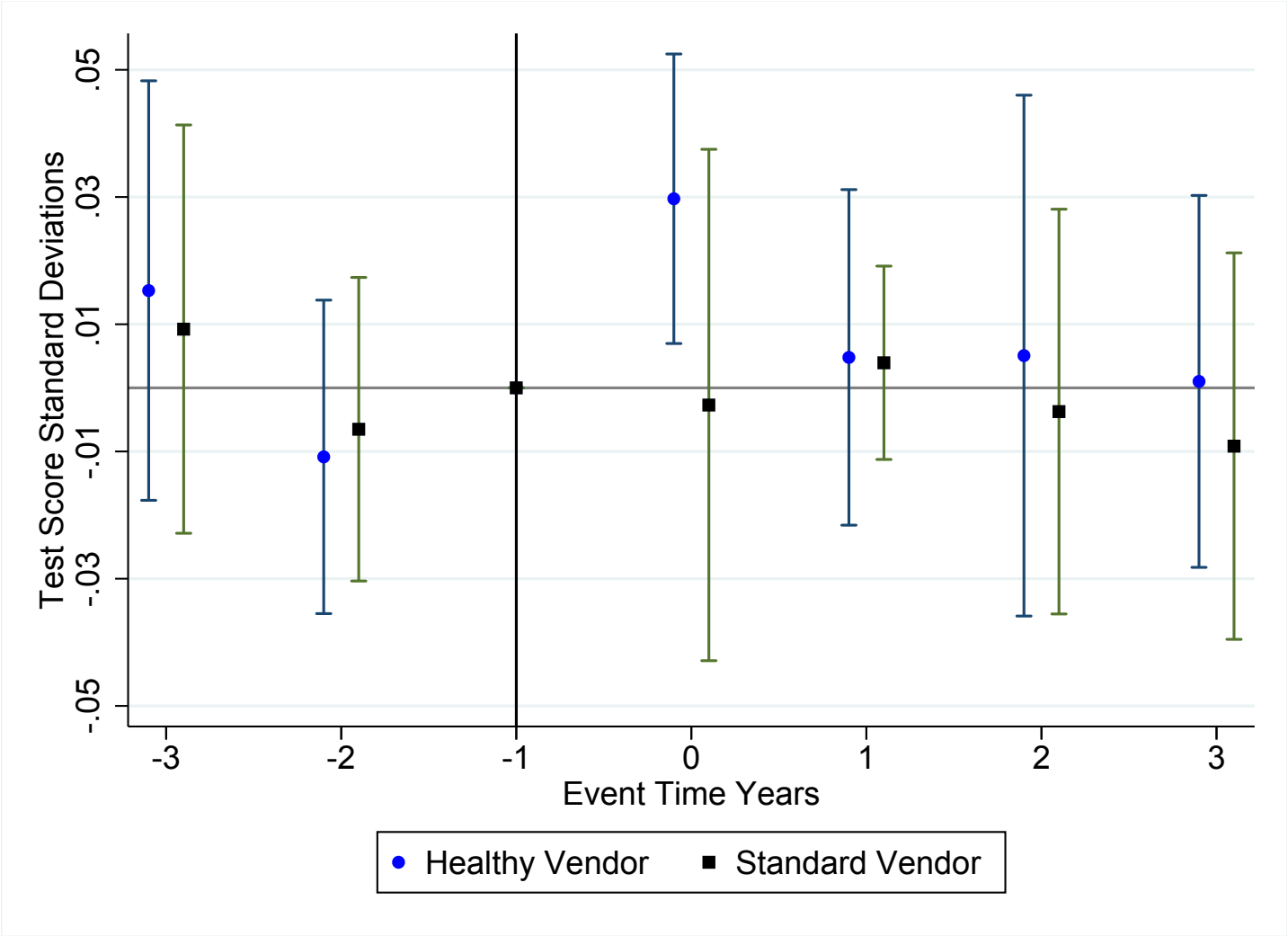
ii. **Control Variables:** Whether we control for grade level, or time-varying characteristics

iii. **HEI Scoring:** Continuous scoring variable

(2) No evidence that changes in other school or student characteristics predict whether a school will contract with a healthy or standard vendor (Currie et al., 2010)

(3) No evidence that test scores were increasing in schools that adopt healthy vendors prior to vendor adoption

Placebo test for the effect of contracting with a vendor on test scores



Healthier school lunches are a cost effective way to improve student learning

- Education researchers typically measure changes in learning in terms of test score standard deviations (SD) on standardized tests
  - → We find an overall impact of to **0.03** to **0.04 SD**
  - → We find an impact of **0.05** to **0.06 SD** for those students most likely to eat the lunches
- How large are these impacts?
  - Vary rare for a single educational intervention to have a large impact on learning
  - One common benchmark is the Tennessee Star experiment (Krueger, 1999)
    - → A one-third reduction in class size correlated with **0.22 SD** increase in test scores at an annual cost of $4,157 (2025$) per student placed in a smaller class
    - → $1,890 per year to raise student test score 0.1 SD
  - We use information on vendor contracts to estimate the additional cost of offering healthy school lunches relative to in-house
    - → We estimate that it costs approx. $375 (2025$) to increase student test scores 0.1 SD

Thanks!

- Happy to answer any questions!

- References

(1) *School Meal Quality and Academic Performance* by Michael L. Anderson, Justin Gallagher, and Elizabeth Ramirez Ritchie in **Journal of Public Economics** (2018), 168, 81-93.

(2) *School Vending Menu Analysis – Methods, Assumptions, and Results* by Grace Chan and Pat Crawford, **Nutrition Policy Institute Report**, July 2016.