

# Free School Meals: Evaluating the Impact of the Community Eligibility Provision on Academic Outcomes

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April 8, 2025

## **Abstract**

School meal programs have long been regarded as essential policy instruments for enhancing the health and nutrition of underprivileged children in both developed and developing countries. However, their effectiveness in improving academic outcomes has been scrutinized with ambivalent results. This study leverages a recent amendment to the U.S. National School Lunch Program and School Breakfast Program to assess the impact of expanding school meal programs on students' academic performance. The Community Eligibility Provision, introduced under the Healthy, Hunger-Free Kids Act of 2010, provides students with greater access to free school meals, by enabling schools with at least 40 percent income-eligible students to offer free meals to all students with additional reimbursement from the federal government. By constructing a unique dataset that combines eight years of school-level math and reading achievement data from the Department of Education with school-level program participation and characteristics data, I estimate treatment effects on math and reading scores for schools around the eligibility threshold using a regression discontinuity design. The results indicate that the expanded school meals program led to a modest but insignificant increase in average math proficiency levels and has little impact on reading proficiency levels.

# 1 Introduction

School meal programs have long been regarded as essential policy instruments for enhancing the health and nutrition of underprivileged children in both developed and developing countries. Despite evidence suggesting that school breakfast and lunch programs offer significant health benefits [12] [24], the impact on academics has been met with ambivalent results. Thus policymakers have long debated their importance given the associated costs and whether further expansions are justified. This paper provides the first nationwide evaluation of the Community Eligibility Provision, a universal school meals policy, leveraging a regression discontinuity design to estimate its causal impact on students' academic achievement. Unlike previous studies that examine the staggered rollout of the policy across states [21], this approach isolates the causal impact of program eligibility on academic performance by comparing otherwise similar schools that fall just above or below the 40 percent cutoff. This regression discontinuity approach addresses potential selection concerns inherent in difference-in-differences designs and provides transparent identification of treatment effects. This along with discussions among policymakers about further expansions make such an evaluation necessary when discussing the benefits of a universal school meals program in the United States considering one was effectively implemented during the recent COVID-19 pandemic.<sup>1</sup>.

Food provided at schools has a long history in Europe and the United States, often employed as a vital policy tool to improve the health and nutrition of impoverished children across both developed and developing countries.<sup>2</sup> <sup>3</sup> The literature on the impacts of school meal programs on health is extensive, encompassing both experimental and quasi-experimental studies. These highlight the role such programs play in improving health outcomes and the critical need for proper nutrition in supporting academic achievement in school. Benton and Parker (1998) [3] demonstrated the importance of breakfast and blood glucose concentrations on memory and recall-related tasks under

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<sup>1</sup>Free school meals 'putting pressure on small schools' budgets. Retrieved on 11/12/18 from [www.theguardian.com/education/2016/aug/31/free-school-meals-putting-pressure-small-schools-budgets-uk](http://www.theguardian.com/education/2016/aug/31/free-school-meals-putting-pressure-small-schools-budgets-uk)

<sup>2</sup>Gunderson(1971) [11] documents the history of school meal programs for the USDA. This involved private philanthropic efforts and citywide programs in the 19th century and early 20th century in several European countries and the United States. Coincidentally, the primary motivation for a national school lunch program in both the United Kingdom and the United States was in response to complaints about the recruitment of malnourished soldiers from the military.

<sup>3</sup>USDA implements flexible waivers for school lunches in response to the pandemic - <https://www.fns.usda.gov/disaster-assistance/child-nutrition-covid-19-waivers>

experimental conditions. Subjects treated with breakfast performed significantly better on spatial memory and recall tasks compared to the control group, who went without breakfast (morning fasting). Since retention and recall are critical tools for a student in the classroom, access to school meals becomes important for children with food insecurity, and for whom a free school breakfast or lunch may be the first meal of the day. Potentially indirect channels too may adversely affect the well-being and academics of non-participating students. Studies of the incidence of food insecurity among school children conclude that food insecurity has significant and adverse effects on several important skills: ‘interpersonal relations’, ‘self-control’, and ‘approaches to learning’ as extensively reported by Howard (2010) [13]. Furthermore, these effects are persistent, even after a transition from food insecure to food secure status. This is demonstrated by Alaimo, Olson, and Frongillo (2001) [1], who find that 6 to 11-year-old food-insufficient children have significantly lower arithmetic scores and are more likely to have repeated a grade, have seen a psychologist, and have had difficulty getting along with other children. Additional research has examined on nonacademic impacts of school meal programs such as obesity (Gundersen, Kreider & Pepper, 2011; Millimet, Tchernis & Husain, 2010) [10] [17]. More broadly, Wang et al. (2021) [23] highlighted the broad benefits of school feeding programs from a meta-analysis of 57 studies, highlighting significant improvements in physical health, attendance, and cognitive outcomes globally.

Recent studies leverage quasi-experimental designs, i.e. natural experiments, to estimate the real-world impacts of school breakfast and lunch programs in the United States. However, most have focused on smaller samples: groups of schools, individual school districts, or individual states. Among those that predate the launch of the Community Eligibility Provision program, Leos-Urbel et al (2013) evaluated the impact of New York City making its school breakfasts free for all students in 2003 [15]. Using difference-in-difference, the authors find that there is no significant effect on math and reading test scores, but did lead to a slight increase in attendance for Hispanics, Black, and Asian students. The study did find an increase in breakfast participation among all groups, even those who were eligible for free breakfasts before, concluding that reduction in stigma associated with school meals could be an important channel. Conversely, Imberman and Kugler (2014)[14] found positive academic effects from increased participation rates in a large Southwestern school district. They studied the effect of the district’s policy of serving free breakfasts in the

classroom instead of the cafeteria, suggesting that this helped reduce the stigma associated with free meals provided by the school and increased participation by 40 to 50 percentage points. Using a difference-in-difference approach, the authors reported gains in math scores by 0.09 standard deviation and in reading achievement by 0.06 standard deviation. This is relevant in two ways – it shows that there can be measurable effects on academic outcomes in the short run and that there is a strong increase in compliance when school meals are made functionally universal, even among those who were already eligible. Frisvold (2013)[7] utilized the fact that several states mandate certain schools to participate in the School Breakfast Program if they meet certain low-income eligibility thresholds, and found improvements in academic outcomes from the implementation of school meal programs. Gordanier et al. (2020) [9] examined the early impacts of Community Eligibility Provision in South Carolina, finding modest gains in math scores among elementary students, particularly in rural and economically disadvantaged schools. This paper builds on their work by looking at the nationwide expansion across diverse geographic and socioeconomic contexts to exclude the possibility of regional or local-specific heterogeneity.

The introduction of the Community Eligibility Provision under the Healthy, Hunger-Free Kids Act of 2010 created a natural discontinuity at the 40 percent income eligibility threshold. This study provides the first nationwide evaluation of the Community Eligibility Provision, a step towards universal school meals, using a regression discontinuity design to estimate its causal impact on the academic achievement of students. While most early studies focused on a limited number of school districts or individual schools in the United States, my study encompasses all 70,000 or so schools participating in the National School Lunch Program across the United States. By broadening the scope of analysis, this paper significantly enhances the external validity of the findings, providing a more comprehensive and robust understanding of the impact of the expansion of the school meal program on student outcomes. Through a more extensive examination of the effects of the Community Eligibility Provision, I aim to provide valuable insights for policymakers and educators alike, informing future decisions about the school meal programs and their role in promoting better academic performance for students from diverse socioeconomic backgrounds. In this study, I employ a regression discontinuity design to examine the impact of the Community Eligibility Provision on the academic outcomes of students. Specifically, I leverage the introduction of the

Community Eligibility Provision to evaluate the effects of expanding access to free school lunches on students' educational performance. To achieve this, I analyze math and reading achievement data obtained from the Department of Education's ED Facts database and estimate intent-to-treat and treatment-on-treated effects for schools that are just above the 40 percent income eligibility cutoff in comparison to those schools that fall just below the threshold. This RD approach allows me to effectively assess the causal relationship between the provision of free school meals and the academic outcomes of students attending these just-eligible schools.

The only prior national analysis of the Community Eligibility Provision was conducted by Ruffini (2020)[21], who employed a difference-in-differences (DiD) design to study early-adopting states during the CEP's pilot phase and examined the impact on academic performance. Her study leveraged variations in the timing of Community Eligibility Provision implementation and the staggered roll-out in the early adopting pilot states and found that universal free meals at participating schools increased breakfast and lunch participation by 38 percent and 12 percent, respectively. Math performance improved in districts with low baseline free meal eligibility, especially among racial/ethnic groups with low-income-based participation rates. My research complements and extends Ruffini's work in several critical ways. While she used a difference-in-differences approach to include the pilot states that adopted the Community Eligibility Provision during the pilot phase, my paper employs a regression discontinuity design to examine the national roll-out of the program and excludes those few early pilot states. This approach allows for a more comprehensive analysis, covering schools in the remaining states and improving the external validity of the findings. Although both studies study similar expansions, the primary difference lies in the methodology and scope of the analysis, with my paper providing a more extensive examination of the impact of the Community Eligibility Provision on academic performance across the United States, adding to the growing body of literature that evaluates the impacts of an expanded national school meal program. This methodological approach clarifies whether the observed effects stem from expanded meal access or confounding trends.

International evidence reinforces the potential of school meals and provides further support for academic improvements. For instance, Aurino et al. (2023) [2] conducted a randomized trial in

Ghana, demonstrating significant gains in math and literacy outcomes through improved nutrition, particularly for disadvantaged students. Similarly, a study from Jiangsu, China, [25] revealed that students who ate breakfast daily achieved markedly higher academic scores, with primary and middle school students scoring over 31 points higher than their peers who skipped breakfast. Even McEwan’s (2013) work [16] in Chile, while finding limited academic impacts, identified a potential channel in how this might work. Although the policy there focused on increasing the caloric value of school meals, there was no significant impact on this approach, and concluded that emphasizing the importance of focusing on nutritional quality rather than calorie content alone for a country like Chile with high income per capita might be the correct approach. Collectively, these studies highlight the importance of school meal programs in addressing educational inequities and improving cognitive and academic outcomes, and identifying the best practices and impacts of such programs. However, the U.S. context - with its unique policy infrastructure and geographic and socioeconomic diversity - warrants an extensive analysis of the CEP’s impacts.”

## **2 Background**

### **2.1 Historical Evolution**

School meal programs are commonly used as an important policy tool in improving the health and nutrition of impoverished children in both developed and developing countries with over 125 countries administering it in some form in 2022. In the US, the National School Lunch Program (NSLP), signed into law in 1946, is the main mechanism for providing meals to children in schools. The NSLP and the School Breakfast Program (SBP) are federal programs providing free or subsidized breakfasts and lunches at both public and private schools. The Healthy, Hunger-Free Kids Act of 2010, introduced a new policy option - the Community Eligibility Provision. It allowed participating schools, both individual schools and entire school districts, to provide free meals to all students, as long as at least 40 percent of the students are income eligible. The CEP thus allowed a route for schools and school districts with high concentrations of low-income students to offer free meals to all students while eliminating the difficult task of collecting, verifying, and processing household applications.

The National School Lunch Program and School Breakfast Program programs have served as a critical component of US educational and social policy since their inception. Administered by the Department of Agriculture's Food and Nutrition Service, nearly 31 million children participated in the NSLP each day in 2016 (USDA, 2017). In its general form, students receive free or reduced-price lunches if they are determined to be categorically eligible or based on household income. Historically, this has been determined by participation in other federal programs such as the Supplemental Nutritional Assistance Program (SNAP), and the Head Start Program, or if they hold disadvantaged status as a homeless, migrant, runaway, or foster child. Additionally, children from families at or below 130 percent of the poverty line could also apply and qualify for free meals, while those between 130 percent and 185 percent of the poverty line could receive reduced-price meals. Finally, the program also allows regular students who don't qualify under any of these aforementioned programs to purchase meals at a slightly subsidized rate. Schools are then reimbursed at a fixed rate for each meal served based on whether they meet the federal guidelines regarding the meals and the category of students who received them. Harper et al. (2008) find that the NSLP has a high take-up rate among younger students aged 5-8 year olds. They also find that about 70 percent of school-going children receive their school lunches under the NSLP, among whom more than a quarter are receiving it for free or at a reduced price. The USDA (2018b) puts this number, the children who are certified or eligible to receive free meals at school, to be at 13.8 million in the school year 2014-2015.

The School Breakfast Program (SBP) was established several decades after the NSLP and has had lower rates of participation among both schools and students compared to the NSLP. This likely stems from the difficulty of scheduling school breakfasts with school start times. Initially starting as a pilot project in 1966, the program was made permanent by an act of Congress in 1975 (USDA, 2017b). In the academic school year 2016-2017, 14.6 million children were served breakfasts under the SBP.

## 2.2 Policy and Context

In December 2010, a substantial expansion of the school meal program took place when President Obama enacted the Healthy, Hunger-Free Kids Act of 2010. This comprehensive legislation transformed the school nutrition landscape and the free lunch programs by implementing more stringent nutritional guidelines, broadening access, and augmenting federal funding for both the National School Lunch Program and the School Breakfast Program. The main objective of the the Act was to address the growing concerns related to childhood obesity and malnutrition, which were adversely affecting the health and well-being of children in the United States.

A crucial component of the Healthy, Hunger-Free Kids Act was the introduction of the Community Eligibility Provision. This policy allowed participating schools to offer free meals to all their students, irrespective of individual income levels, provided that at least 40 percent of the students were "directly certified" as eligible. Direct certification refers to the process by which children are deemed eligible for free meals based on their participation in other means-tested federal assistance programs, such as the Supplemental Nutrition Assistance Program (SNAP), Temporary Assistance for Needy Families (TANF), or the Food Distribution Program on Indian Reservations (FDPIR). It can also include students who are classified as homeless, migrant, runaway, or foster children.

The Community Eligibility Provision aimed to simplify the administrative process for schools, alleviating the burden of collecting, verifying, and processing income-based applications from individual households. This, in turn, reduced the likelihood of errors and inaccuracies in determining students' eligibility for free or reduced-price meals. Additionally, by offering free meals to all students in qualifying schools, the Community Eligibility Provision helped to eliminate the stigma associated with receiving free or subsidized meals, which may have previously deterred eligible children from participating in the program. A third important advantage was once eligible and participating, a school was guaranteed to be part of the program for four years, without needing to apply annually. Lastly because it allowed the remaining students of a participating school to receive free breakfasts and lunches, this equated to a savings of approximately \$5 a day for each student (equivalent to approximately \$100 in a month).

	<b>SBP</b>	<b>NSLP</b>
<b>Free</b>	\$1.75	\$3.23
<b>Reduced Price</b>	\$1.45	\$2.83
<b>Paid</b>	\$0.30	\$0.31

Table 1: School Breakfast Program (SBP) and National School Lunch Program (NSLP) reimbursement rates for SY 2017-18, USDA (2018)

Initially implemented in Illinois, Kentucky, and Michigan for the SY 2011-12; it was slowly rolled out to nine other pilot states in several stages before a nationwide roll-out in the SY 2014-2015. Because I focus on the nationwide roll-out, I exclude the following pilot states.

- SY 2011-12: Illinois, Kentucky and Michigan (excluded)
- SY 2012-13: DC, New York, Ohio and West Virginia (excluded)
- SY 2013-14: Florida, Tennessee, Massachusetts, Georgia (excluded)
- SY 2014-15: The remaining states

### 2.3 Direct Certification

A key aspect of the Community Eligibility Provision implementation was the successful utilization of “direct certification” for determining student eligibility status. “Direct certification” is a process through which student enrollment records are cross-referenced with records from the Supplemental Nutrition Assistance Program (SNAP) agency and other federal assistance programs. Participants in these programs are automatically eligible for free breakfast and lunch at school (USDA, 2016). This streamlined approach is designed to improve the accuracy of identifying eligible students while reducing the administrative burden on schools (Gleason, 2012)[8].

Local Educational Authorities are required to carry out direct certification three times during the school year, although the specific process may vary slightly among school districts or between states. One of the primary benefits of direct certification is that it substantially reduces the number of paper applications and administrative costs for schools while enhancing the accuracy of

eligibility determinations.<sup>4</sup> In the School Year 2014-2015 (SY 2014-2015), states and LEAs used direct certification for 15.1 million children, demonstrating the broad reach of this approach. The expansion of direct certification has been shown to increase participation rates in school meal programs among eligible children, reducing the stigma associated with receiving free or reduced-price meals and ensuring that more students benefit from these vital nutritional resources. Thus direct certification serves as a critical component of the Community Eligibility Provision by simplifying the eligibility determination process, reducing administrative costs, and enhancing accuracy. As a result, more eligible children can access free or reduced-price meals, contributing to improved health and academic outcomes for students in need (Rothbart et al., 2020[20]).<sup>5</sup>

This is a significant expansion of the NSLP and SBP program especially in regards to the greater share of meals which would now be provided free of charge. As discussed below, such a change not only increased the number of students with access to free school lunches, but it is also likely to increase participation rates among those already eligible. Additionally, it would also likely decrease the overall number of students who occasionally skip meals. Lastly, there is a strong push to improve the quality and choice of the lunches provided so that the meals provided might even be an improvement over alternatives brought from home.

The Community Eligibility Provision (CEP) offers schools and school districts with high concentrations of low-income students to offer free meals to all students while eliminating the difficult task of collecting, verifying, and processing household applications. Schools with an Identified Student Percentage (ISP)<sup>6</sup> of 40 percent or greater can adopt Community Eligibility Provision and offer free meals to all the students for a period of at least 4 years. Community Eligibility Provision eliminates school meal applications and the associated administrative costs of monitoring and collecting applications. Individual schools or school districts who adopt Community Eligibility Provision receive federal reimbursement calculated by the given formula:

$$\text{Federal reimbursement} = \text{ISP} \times 1.6 \times \text{no. of students}$$

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<sup>4</sup>According to the USDA's estimates, this results in a saving of approximately \$29 per student per year (USDA, 2014) [22]

<sup>5</sup>Direct certification was established in 1986, and under HHFKA Congress requires states to achieve a direct certification rate of 95%, which a majority of states achieved in SY 2014-2015. The overall certification rate in the US was estimated to be 91%.

<sup>6</sup>The ISP is calculated by finding the percentage of students who are directly certified in a school or school district

This has an important implication - schools with a high percentage of eligible students (above 62%) are fully reimbursed by the federal government and by all accounts only benefit from participating without incurring any additional costs.

A school taking up Community Eligibility Provision is likely to have different effects on the different types of students in a school. I hypothesize three potential channels through which student's health and nutrition and thus ultimately academic performances are likely to improve.

1. Reduction in stigma: Those who are already “directly certified” and eligible for free breakfasts and lunches will not see an expansion of the program, but can still see a benefit from the program. As noted in the literature and popular press (Leos-Urbel et al, 2013; Imberman and Kugler, 2014; NY Times, 2008), there is often stigma associated with getting free breakfasts and lunches from the school, and this can often discourage take-up among students who are eligible for free meals at school. Expanding the free breakfasts and lunches to everyone removes that stigma and is likely to lead to much higher rates of take-up among those who were otherwise already eligible. The USDA in its early evaluation of the Community Eligibility Provision roll-out to the earlier states finds a significant increase in take-up.
2. Reducing skipped meals: The provision of free breakfasts and lunches is also likely to positively affect those students who do not come from economically disadvantaged backgrounds, but who occasionally skip meals. Research suggests that between 12 to 35 percent of children skip breakfast in the United States (Pereira et al.,2011) [18]. The introduction of the Community Eligibility Provision is likely to lower numbers by guaranteeing access to a good breakfast to students in Community Eligibility Provision schools. Thus all students gain, by having access to a good meal are then likely to be more alert and attentive in class which increases their capacity to learn.
3. Improvement on low-quality meals brought from home or savings: Even in families who are not economically disadvantaged, preparing fresh and healthy meals to take to school might not be a priority. The Community Eligibility Provision enables students to eat a freshly prepared nutritious meal at school that meets strict federal guidelines, rather than eat low-quality meals or snacks brought from home. Alternatively, the students who are not low-income and

purchase full-price breakfasts and lunches now save approximately \$5 a day (approximately \$100 a month)

While noting that there are likely large benefits from the Community Eligibility Provision program, there are two potential disadvantages from the Community Eligibility Provision that might result in some schools not taking up the program. First, it is possible that some students who are from higher-income households may end up eating meals both at home and school, which could contribute to higher rates of obesity. The second stems from the additional costs associated with providing free breakfasts and lunches to all students. While the HHFKA provides for federal reimbursement up to a certain amount based on the formula based on the ISP, schools that are just above the cut-off are not fully reimbursed and thus will likely have to bear some additional expenditure.<sup>7</sup>

### 3 Data

In this section, I provide a detailed overview of the data sources used in this study, the key variables, descriptive statistics, and the challenges encountered during data collection and preparation. By integrating multiple datasets, this study utilizes a unique dataset of Community Eligibility Provision eligibility and participation combined with school-level achievement measures and other demographic and school-level characteristics to analyze the impact on student academic outcomes. The data on eligible schools for Community Eligibility Provision was collected from the education board's website of each participating state for the academic school years between 2014 and 2019.<sup>8</sup> The HHFKA requires state education boards to publish this list each May for the following academic year. I also use additional data collected by the Food Research and Action Center (FRAC), which compiles a continually updated list of all eligible and near-eligible schools and their Community Eligibility Provision status for the given school year.

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<sup>7</sup>According to the formula for Community Eligibility Provision reimbursement, schools with an ISP  $>62.5\%$  receive 100% reimbursement. Schools with slightly lower ISPs are likely to benefit from a reduction in administrative costs. However, it is not guaranteed that schools that are just above the 40% cutoff will see a reduction in overall costs.

<sup>8</sup>The complete list of state education boards can be found here at the Department of Agriculture website <http://www.fns.usda.gov>

Outcomes data is drawn from the U.S. Department of Education ED Facts program, which provides school-grade-level academic achievement data along with a wealth of school-level characteristics and demographics data. The main outcome variable of interest is the school-level percentage of students who are proficient in math, and reading & language for the school academic years SY2014-2015 and SY2015-2016.<sup>9</sup> The school math and reading achievement data is assessed by individual states and thus varies from state to state but are critical metrics under the “No Child Left Behind Act of 2001” and Title I of the Elementary and Secondary Education Act. Performance on state assessments is measured by assessing students against state content standards and reported as the percentage of students who take the test who meet these “proficiency” standards. Students are assessed annually from the third through the eighth grade and at least once in high school. However, as state standards can (and have) changed over the years, I follow the established practice in education literature and standardize the proficiency level of each school at the state level. The final data set is thus obtained by merging the achievement data on Math and Language proficiency levels, with the data on Community Eligibility program status and Identified Student Percentage data for schools using fuzzy matching on school name, state and school district since there are no common unique identifiers in the two data sets. As there are schools in pilot states that were eligible for the program earlier I exclude these states from my analysis focusing on the first year of eligibility.<sup>10</sup>

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<sup>9</sup>The website for ED Facts: <http://www2.ed.gov>

<sup>10</sup>The merging and matching of the data is set at a high bar, setting stringent conditions to minimize false positives. This ensure true positives focusing on correct matches only. Merge success of about 65% to 75% percent of the relevant schools is achieved using fuzzy matching that relies on bounding certain parameters and Levenshtein distance between two potential matches (using the custom Stata package `relink2`). See more in Appendix

Table 2: Summary Statistics by ISP Category

Variable	Not eligible	Near eligible	Eligible	High ISP
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
<b>Std. reading proficiency 14/15</b>	0.28 (0.93)	-0.35 (0.75)	-0.54 (0.73)	-0.98 (0.77)
<b>Std. math proficiency 14/15</b>	0.25 (0.98)	-0.31 (0.74)	-0.42 (0.73)	-0.80 (0.78)
<b>Std. reading proficiency 15/16</b>	0.36 (0.89)	-0.28 (0.72)	-0.49 (0.71)	-0.92 (0.77)
<b>Std. math proficiency 15/16</b>	0.32 (0.97)	-0.26 (0.74)	-0.38 (0.75)	-0.72 (0.80)
<b>Enrollment in NSLP for 14/15</b>	721.82 (595.21)	610.08 (406.35)	567.01 (337.84)	522.10 (271.27)
<b>No. of Math Test Takers in 14/15</b>	364.65 (272.31)	359.12 (304.85)	332.88 (290.75)	265.20 (189.60)
<b>No. of Reading Test Takers in 14/15</b>	365.17 (270.85)	329.64 (238.48)	311.13 (223.88)	261.01 (175.64)
<b>Elementary schools</b>	0.55 (0.50)	0.57 (0.49)	0.64 (0.48)	0.70 (0.46)
<b>Middle schools</b>	0.13 (0.34)	0.14 (0.35)	0.14 (0.35)	0.09 (0.29)
<b>High schools</b>	0.19 (0.39)	0.17 (0.37)	0.10 (0.31)	0.05 (0.22)
<b>Enrollment at Year-end</b>	717.70 (567.30)	611.92 (413.89)	564.54 (337.81)	513.48 (255.32)
<b>Employee FTE</b>	31.23 (24.03)	33.62 (25.91)	34.02 (21.76)	32.09 (15.59)
<b>School District Total students</b>	58806.29 (155967.80)	67337.66 (164406.93)	39670.26 (93558.66)	39751.18 (55045.01)
<b>Revenue per student</b>	11929.21 (5386.16)	12057.55 (5602.59)	11869.05 (3991.29)	12491.06 (3848.20)
<b>Expense per student</b>	11851.18 (5364.33)	12084.06 (6610.39)	11859.86 (4023.53)	12498.33 (3956.96)
<b>Salary expense per student</b>	5856.13 (1718.04)	6081.10 (1289.38)	6108.01 (1280.63)	6289.62 (1169.11)
<b>Food expense per student</b>	410.13 (175.51)	514.25 (136.57)	529.48 (141.04)	585.88 (173.04)
<b>Percent white</b>	0.39 (0.30)	0.36 (0.32)	0.32 (0.30)	0.18 (0.24)
<b>Percent female</b>	0.49 (0.04)	0.49 (0.05)	0.49 (0.05)	0.48 (0.06)
<b>Percent ESL</b>	0.15 (0.16)	0.18 (0.18)	0.19 (0.19)	0.23 (0.23)
<b>Number of Schools</b>	7596	3206	4355	1987

Table 2 provides a table of summary statistics of the data constructed by fuzzy matching school-level academic proficiency and administrative data from the Department of Education’s ED Facts with the Community Eligibility Provision participation records. Schools are classified into four groups based on their Identified Student Percentage (ISP), the proportion of students directly certified for free meals via participation in federal assistance programs (e.g., SNAP, TANF). The analysis will focus on the groups of schools around the cutoff:

- Not eligible: Schools with Identified Student Percentage below 30%
- Near Eligible: Schools with Identified Student Percentage between 30% and 40%
- Eligible: Schools with Identified Student Percentage between 40% and 60%, qualifying for CEP.
- High ISP: Schools with Identified Student Percentage above 60%, qualifying for CEP.

The primary dependent variables are four standardized proficiency measures: math and reading proficiency rates for the 2014–2015 and 2015–2016 school years. These outcomes are standardized at the state level in a given academic year to account for differences in assessment rigor across states, and across years, with proficiency rates expressed as z-scores relative to each state’s annual mean. For example, a reading proficiency score of -0.54 indicates that a school’s performance is 0.54 standard deviations below its state’s average. I standardize each school’s proficiency rate within its state-year distribution. Specifically, for each school  $i$  in state  $s$  in year  $t$ , the standardized proficiency score is calculated as:

$$Z_{ist} = \frac{P_{ist} - \mu_{st}}{\sigma_{st}}, \tag{1}$$

where  $P_{ist}$  is the school’s raw proficiency rate,  $\mu_{st}$  is the state-year mean proficiency rate, and  $\sigma_{st}$  is the state-year standard deviation. This approach follows standard practice in the economics of education literature [19] and allows for meaningful comparisons of school performance across states with different assessment systems while preserving the discontinuity structure needed for the regression discontinuity setup.

School-level covariates include binary indicators for school type (elementary, middle, or high school), demographic composition (percent white, female, and English as a Second Language (ESL) students), number of students enrolled and number who participated in math and reading assessments, and financial metrics. These financial variables include revenue, total expenses, salary expenses, and food expenses at a per student rate and are reported in nominal dollars for 2014/15.

### **3.1 Differences between Near Eligible and Eligible Schools**

A comparison of the near eligible and eligible school show a few differences. Schools in the near eligible group tend to perform slightly better academically than those in the eligible group. For instance, the standardized reading proficiency for the 2014–2015 school year averages -0.35 in near eligible schools, whereas it is -0.54 in eligible schools. This is consistent with their higher poverty concentrations.

Eligible schools are more likely to be elementary schools (64% vs. 57%) and less likely to be high schools (10% vs. 17%), aligning with evidence that poverty rates are higher in elementary settings, reflecting family circumstances (early career, younger parents vs. older parents, mid/late career). Financially, eligible schools report slightly lower per-student revenue and expenses but higher food expenses. Notably, covariates such as enrollment, district student population size, and staffing (measured by Full-Time Equivalent employees) change gradually across the ISP spectrum rather than discontinuously at the 40% threshold. This continuity supports the validity of the regression discontinuity (RD) design, as schools just above and below the cutoff are comparable on observables, satisfying the key identifying assumption, and further evidence will be shown with balance graphs in the following section.

## 4 Empirical Strategy

### 4.1 Regression Discontinuity Design

The Community Eligibility Provision (CEP) provides a natural fit for a Regression Discontinuity Design (RDD) analysis due to its clear eligibility threshold at a 40% Identified Student Percentage. Individual schools with an Identified Student Percentage at or above 40% qualify for CEP participation, allowing them to offer free meals to all students. This eligibility threshold provides an exogenous source of variation in program participation that can be used to identify the causal impact of expanded school meals on academic outcomes. By comparing schools immediately above and below the 40 percent cutoff, we can assume that these institutions are similar in all relevant respects except for their exposure to the universal school meals policy, permitting a local comparison that mimics a randomized control trial.

RDD is particularly well-suited for this analysis because it relies on relatively mild assumptions compared to other quasi-experimental methods. As detailed in Cattaneo, Idrobo, and Titiunik (2024)[6], the core identifying assumption is that the potential outcomes are smooth and continuous across the cutoff. This implies that, absent the treatment, the outcome variables (e.g., academic proficiency) would not exhibit discontinuities at the ISP threshold. This continuity assumption is likely in the context of the Community Eligibility Provision program, as schools just above and below the cutoff are likely to share similar socioeconomic and demographic characteristics. The running variable in our analysis is defined as the difference between a school's Identified Student Percentage for the 2014–2015 school year and the 40 percent eligibility threshold. Thus near the cutoff, the assignment to treatment can be considered as good as random. Schools just above and below the threshold are assumed to be similar in observable and unobservable characteristics, ensuring that any differences in outcomes are due to CEP participation, i.e. schools with ISPs of 39.8% and 40.2% should not differ systematically in their characteristics or pre-treatment outcomes, except for their eligibility for CEP. Thus any jump or discontinuity in the observed outcomes at the threshold can be attributed to the treatment (CEP eligibility) rather than other factors.

Additionally, another important assumption for the validity of the RDD framework is that schools must not be able to precisely manipulate the running variable Identified Student Percentage (ISP) to fall on one side of the threshold. For example, schools should not artificially inflate their ISP percentages to qualify for CEP. I argue that the 40 percent ISP cutoff was largely arbitrary, a political decision, and thus not correlated with the schools that are chosen to be in the treatment group versus the control group. Since the school ISP is measured using Direct Certification which itself uses administrative data from SNAP, TANF, and other federal programs, there is unlikely any manipulation involved around the eligibility threshold. If manipulation occurs, the distribution of ISP values would exhibit a jump at the cutoff, violating the assumption that schools near the threshold are comparable. This can be tested using the McCrary density test, which examines the smoothness of the running variable's distribution at the threshold (in progress) and this is shown in Figure 1.

Since the CEP program is voluntary, Community Eligibility Provision take-up is imperfect: some eligible schools ( $ISP > 40\%$ ) choose not to participate. Factors such as administrative hurdles, district-level policy decisions, or funding limitations may deter eligible schools from opting into the program. As a result, the probability of treatment on the right side of the cutoff ( $ISP > 40\%$ ) is less than 1. while a few ineligible schools ( $ISP < 40\%$ ) gain access due to district-wide participation, i.e. schools in a district group together and qualify under an school district Identified Student Percentage. This violates the sharp RDD assumption that the probability of treatment jumps from 0 to 1 at the cutoff. Instead, the fuzzy RDD framework is useful where the probability of treatment jumps discontinuously once we cross the threshold, but does not reach 1 for the eligible group, nor is it 0 on the other side of the cutoff. To confirm that there is in fact a discontinuity at the cut-off, I run a rdrobust regression on CEP participation status of schools around the 40% ISP cutoff. The table 3 shows there is a discontinuity around the ISP cutoff and that schools just above the cutoff have a higher rate of CEP takeup of around 8 percentage points in non-pilot states in the first year of roll-out in SY 2014-15. With a fuzzy RDD framework, I can estimate intent-to-treat (ITT) effects, which measure the impact of eligibility (somewhat analogous to a sharp RDD), and treatment-on-the-treated (TOT) effects, which capture the effect of actual CEP participation of schools and not just their eligibility.

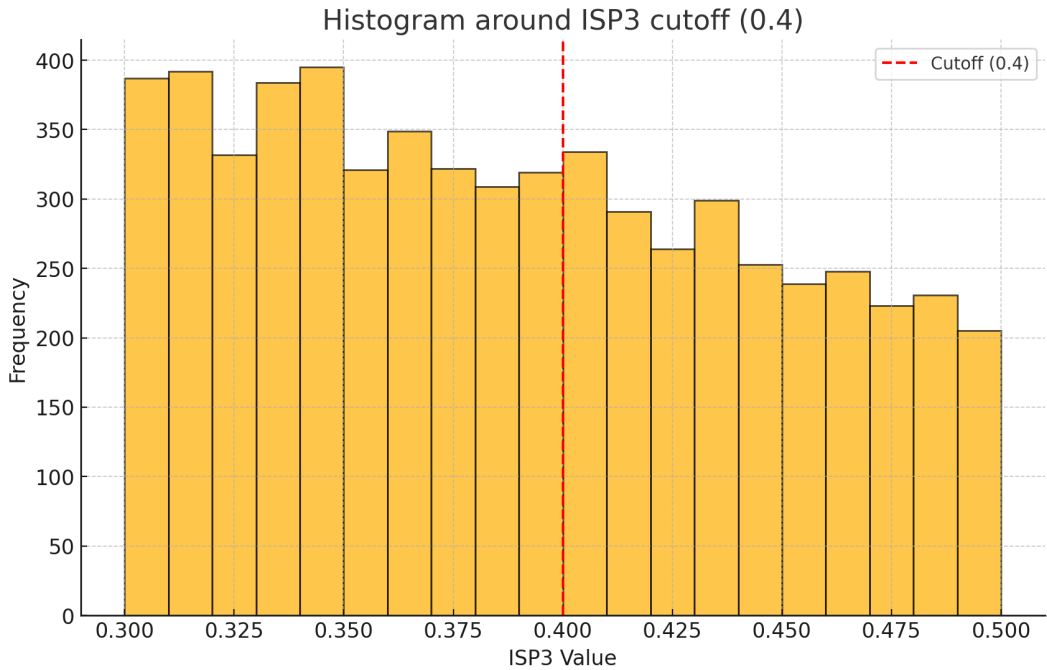
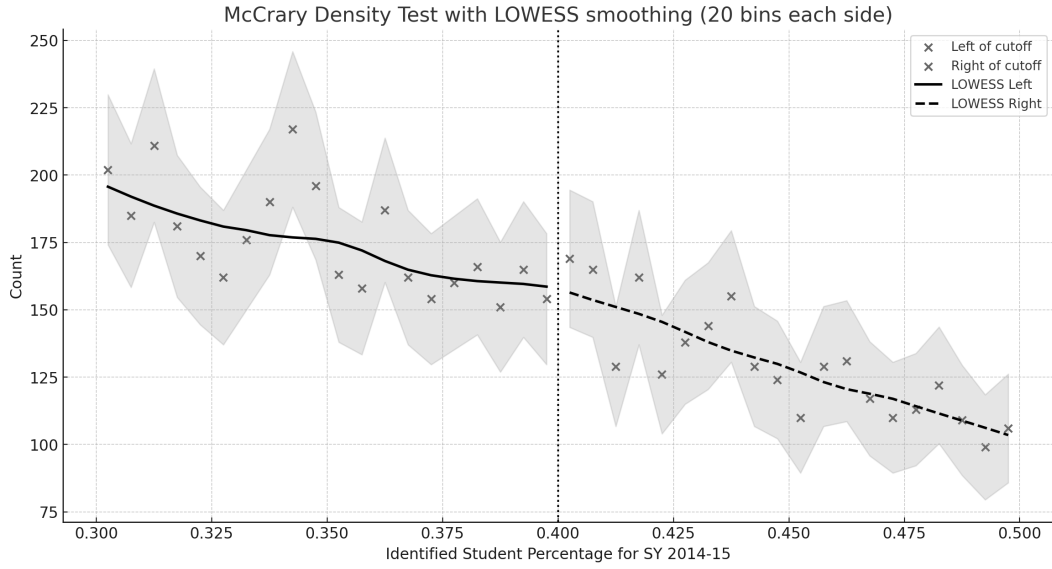


Figure 1: RD Manipulation Density Test

To estimate the treatment effects, I apply a local linear regression approach on either side of the cutoff. This method not only captures the immediate impact of universal school meals but also mitigates potential biases that could arise from non-linear relationships in the data. The analysis includes both intent-to-treat estimates, which measure the effect of being assigned to the treatment group, and treatment-on-the-treated estimates, which capture the effect on schools that actually

	CEP takeup in SY14-15 (Treatment)	CEP takeup in SY14-15 (Treatment)	CEP takeup in SY14-15 (Treatment)
Participation	0.088*** (0.017 ) Linear	0.086*** (0.017) Linear	0.085*** (0.021) Quadratic
Covariates	No	Yes	Yes
Bandwidth	0.100	0.089	0.128
Bandwidth selection	heuristic	rdrobust	rdrobust
N	6331	5329	7019

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Both linear and quadratic functional forms and include covariates

Table 3: First Stage: CEP take up around the cut-off

experience the treatment. In addition, I perform a series of robustness tests, including alternative bandwidth choices and polynomial specifications, to ensure that our results are not driven by particular modeling decisions.

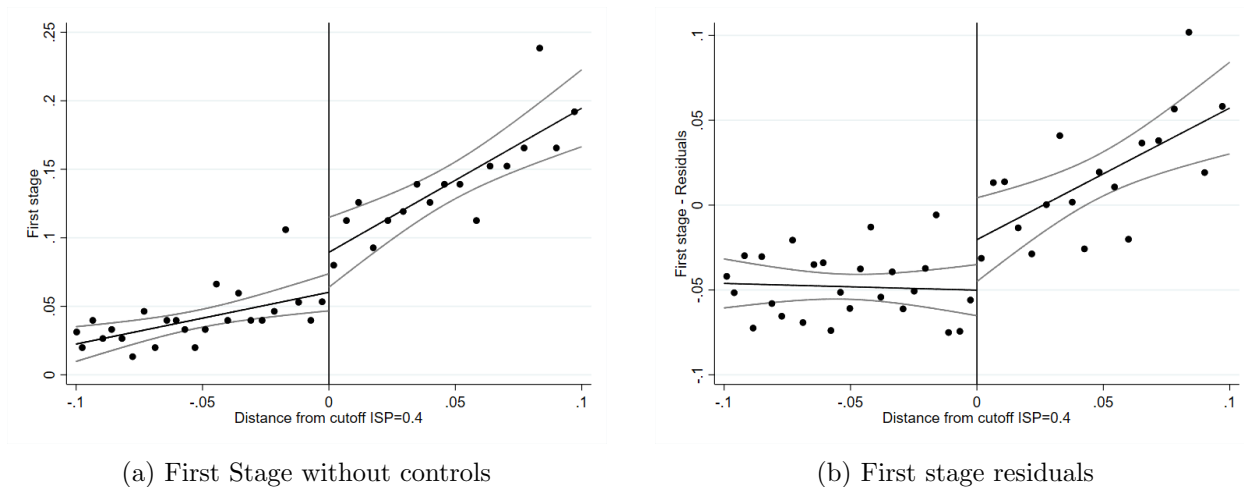


Figure 2: First stage across cutoff

## 4.2 Are there differences among schools across the cutoff?

Since the take-up discontinuity around the cutoff is so small, an important question that is important to answer is whether there are significant differences between schools that are eligible in the first year of eligibility and schools that are near eligible. One way to test the validity of the RDD framework is to check if there are any jumps among the covariates at the cutoff. If factors unrelated

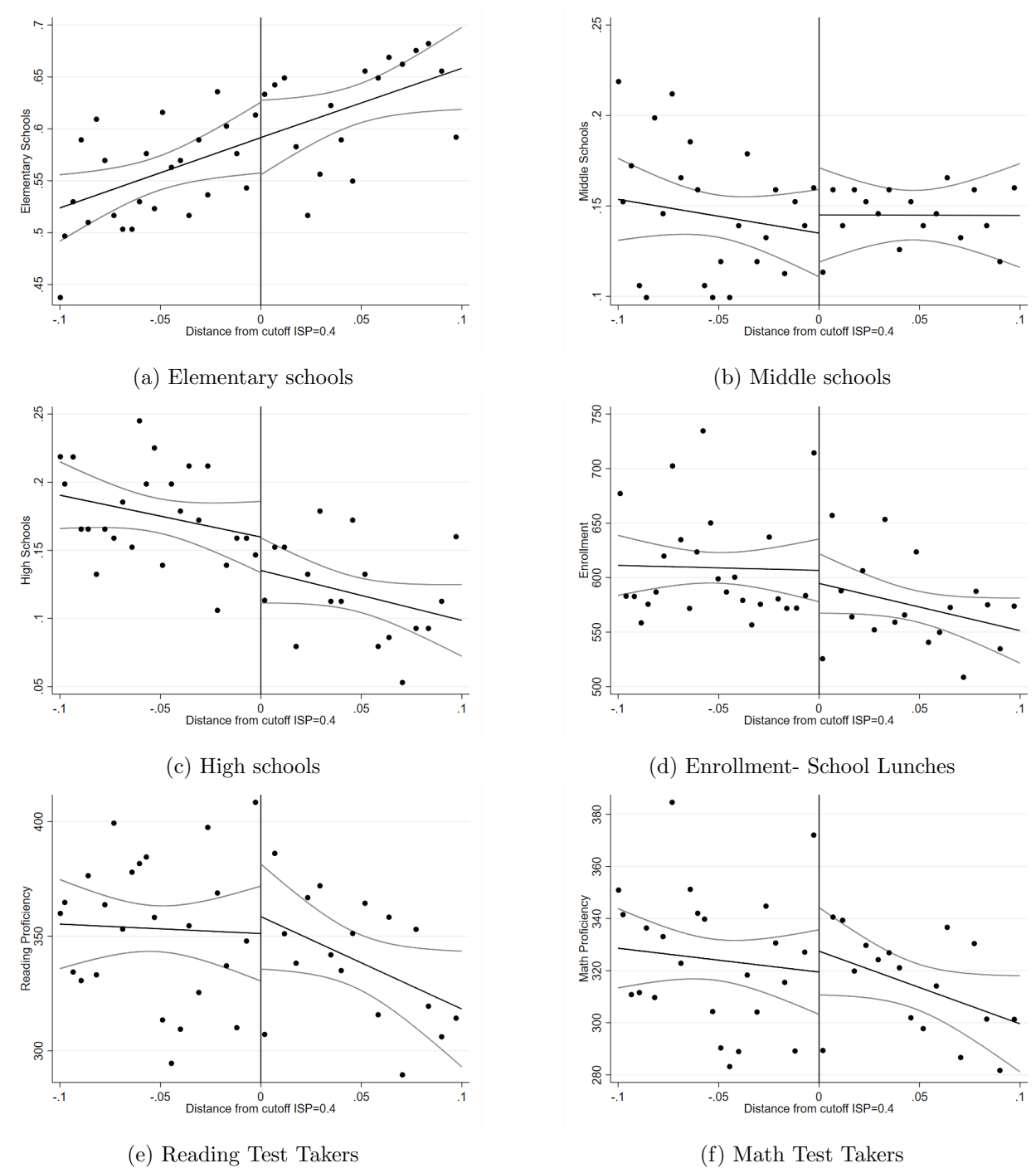
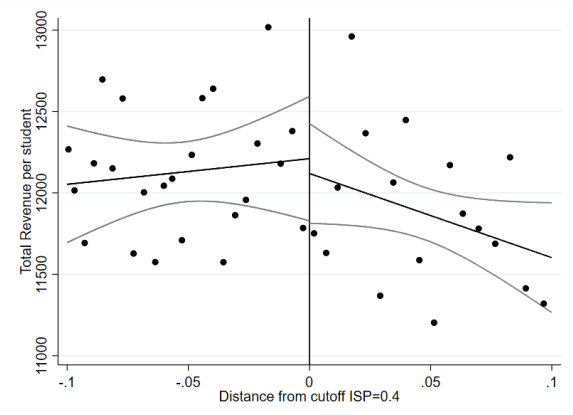


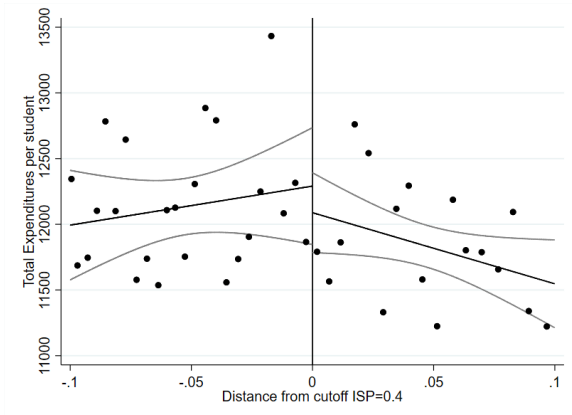
Figure 3: Balance checks across the 0.4 ISP cutoff

to CEP participation (e.g., demographic shifts or changes in funding) cause a discontinuity at the cutoff, the RDD estimate would be biased.

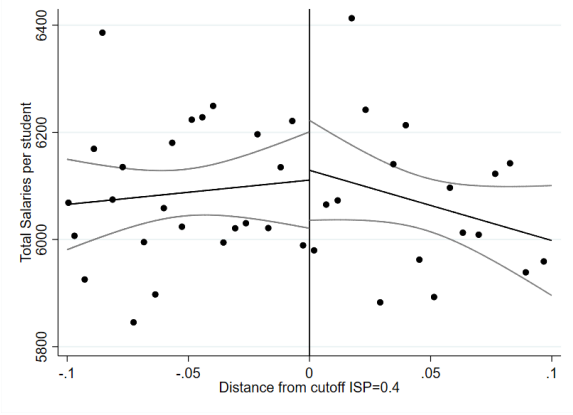
Figures 2 and 3 show local balance graphs where enrollment, number of test takers, school types and financial metrics plotted across Identified Student Percentage between 0.3 and 0.5. All



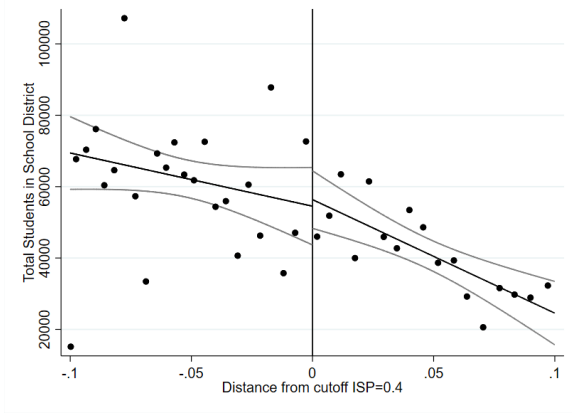
(a) Total revenue



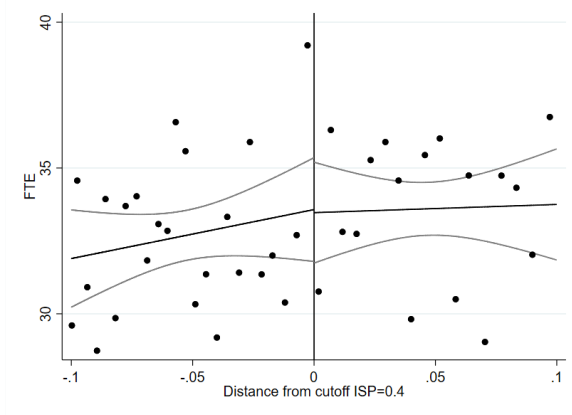
(b) Total expenditures



(c) Salaries



(d) Membership



(e) School FTE

Figure 4: Financial balance checks across the 0.4 ISP cutoff

the graphs consistently show that all key covariates used in our regression specifications — including enrollment figures, numbers of test takers, school type indicators, and financial and demographic measures — vary smoothly as a function of the running variable. This confirms that there are no pre-existing observable differences between schools just above and just below the 40 percent eligibility cutoff. This supports the validity of the RDD design.

### 4.3 Identification and Model Specification

While CEP eligibility occurs at the 40% ISP cutoff, participation is not. Some eligible schools (ISP > 40%) never choose to opt in due to administrative, financial, or miscellaneous reasons, while a small number of ineligible schools (ISP < 40%) participate through school district-wide agreements. This imperfect compliance thus requires a fuzzy RDD framework, where eligibility serves as an instrument for actual program participation. I thus implement a fuzzy Regression Discontinuity Design (RDD) to estimate the causal impact of the Community Eligibility Provision (CEP) on academic outcomes. The  $f(\text{ISP}_i)$  function is modeled flexibly using local polynomials (and not global polynomials) around the cutoff to ensure accurate and efficient estimates of local trends across ISP near the threshold. Local polynomial regression with robust bias-corrected bandwidth selection is used with the help of the `rdrobust` user-created Stata package by Calonico et al.(2017)[4] for data-driven bandwidth selection with several polynomial functional forms (linear, quadratic).

#### 4.3.1 Probability of Treatment (First-stage)

The fuzzy regression discontinuity design addresses the issue of imperfect compliance with eligibility at the 40% Identified Student Percentage threshold by implementing a two-stage approach. In the first-stage regression, I model the probability of treatment (CEP participation) as a function of the eligibility threshold:

$$D_i = \gamma_0 + \gamma_1 Z_i + f(\text{ISP}_i) + X_i' \gamma + \eta_i, \quad (2)$$

- $D_i$ : Binary indicator for CEP participation (1 if school is participating, 0 otherwise),
- $Z_i$ : Eligibility indicator (1 if  $\text{ISP}_i \geq .40$ , 0 otherwise),
- $f(\text{ISP}_i)$ : Smooth function of the running variable ISP to account for local trends, both linear

and quadratic specifications

- $X_i$ : Vector of pre-treatment covariates (school type, student demographics, enrollment, financial metrics),
- $\eta_i$ : Error term.

The coefficient  $\gamma_1$  captures the discontinuity in the probability of treatment at the cutoff.

### 4.3.2 Reduced Form

In the reduced form, I estimate the effect of eligibility on academic outcomes:

$$Y_i = \delta_0 + \delta_1 Z_i + f(\text{ISP}_i) + X_i' \delta + \nu_i, \quad (3)$$

- $Y_i$ : Standardized Math and Reading proficiency scores,
- $\delta_1$ : Reduced-form effect of eligibility,
- $f(\text{ISP}_i)$ : Smooth function of the running variable ISP to account for local trends, both linear and quadratic specifications
- $X_i$ : Vector of pre-treatment covariates (school type, demographics, enrollment, financial metrics),
- $\nu_i$ : Error term.

**Treatment effect:** The local average treatment effect (LATE) of CEP participation is calculated by instrumenting  $D_i$  with  $Z_i$ :

$$Y_i = \beta_0 + \beta_1 \hat{D}_i + f(\text{ISP}_i) + X_i' \beta + \epsilon_i, \quad (4)$$

where  $\hat{D}_i$  is the predicted treatment status from Equation 2. The coefficient  $\beta_1 = \delta_1/\gamma_1$  represents the causal effect of CEP participation for schools induced to join the program by crossing the 40% threshold. Covariates  $X_i$  include school types, demographics, enrollment, and financial metrics.

I utilize the data-driven bandwidth selection procedure by Calonico et al. (2017), optimizing the bias-variance trade-off for local linear regression. The primary results use a bandwidth of 10 percentage points (ISP 30%–50%). Along with that, I do robustness checks with alternative bandwidths (5–15 percentage points) in section 5.3 and specifications with different polynomial orders (linear, quadratic). I also run several falsification tests using false cutoffs at  $ISP=0.35$  and  $ISP=0.45$  to show that the discontinuity in takeup only occurs at the eligibility threshold where  $ISP=0.40$ .

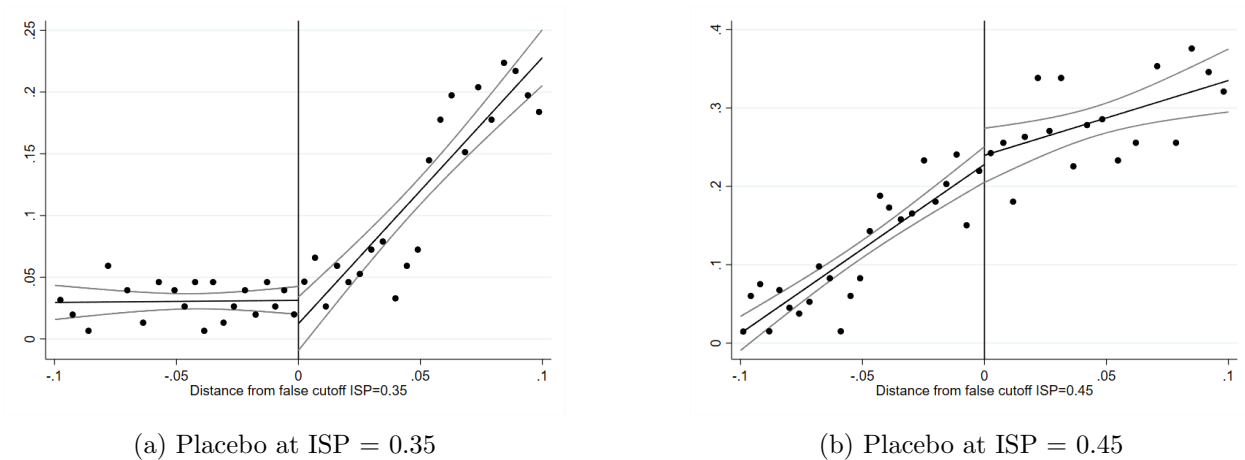


Figure 5: Falsification Test: False Cutoffs

## 5 Results

### 5.1 Causal Impact on Academic Outcomes

I estimate the effect of the Community Eligibility Provision on student outcomes using the `rdrobust` package (Calonico et al., 2017)[4] [5]. This approach offers several methodological advantages: it allows the selection of an optimal bandwidth based on the data or manually, and provides bias-corrected estimates and robust confidence intervals. Tables 4 and 5 show that for the two specifications (linear and quadratic functional forms), there is no statistically significant impact of the Community Eligibility Provision on math or reading outcomes across the cutoff in both the linear and quadratic specifications. The magnitude of these point estimates, while positive and suggesting that there might be a beneficial effect, should be interpreted cautiously given their statistical insignificance and large standard errors.

The results suggest that, for schools near the eligibility threshold, universal free meals in these schools do not generate clear improvements in annual state assessments in the short term. These findings diverge somewhat from Ruffini (2020), who found modest improvements in math performance, particularly in districts with low baseline free meal eligibility. While Ruffini examined within-district changes over time as districts adopted the Community Eligibility Provision, this study focuses specifically on the causal effect of eligibility at the threshold, which captures a different local average treatment effect. While there may be heterogeneous impacts on specific sub-populations, it is not evident that the policy leads to measurable short-run improvements in overall academic performance.

Table 4: Second Stage Estimates for Reading Proficiency

	Linear	Quadratic
	Reading proficiency (z-score)	Reading proficiency (z-score)
ITT Estimate for 14/15	0.155 (0.458)	0.192 (0.570)
Observations	17174	17174
ITT Estimate for 15/16	-0.0377 (0.466)	0.0344 (0.605)
Observations	17148	17148

Standard errors in parentheses  
\* p<sub>i</sub>0.10, \*\* p<sub>i</sub>0.05

Table 5: Second Stage Estimates (14/15 Math)

	Linear	Quadratic
	Math proficiency (z-score)	Math proficiency (z-score)
ITT Estimate for 14/15	0.138 (0.457)	0.0506 (0.584)
Observations	17172	17172
ITT Estimate for 15/16	-0.0484 (0.513)	-0.0533 (0.658)
Observations	17148	17148

Standard errors in parentheses  
\* p<sub>i</sub>0.10, \*\* p<sub>i</sub>0.05

In addition to the primary standardized math and reading proficiency outcomes from 2014-15, I also examine potential delayed effects by testing outcomes in the 2015-2016 school year using the ISP from the 2014-2015 school year as the running variable. The rationale behind this ap-

proach is to capture any lagged effects of the universal school meals policy that might take longer to take effect and show in academic outcomes. Even with this additional year of treatment, my estimates in Tables 6 and 7 show statistically insignificant effects on both standardized math and reading proficiency scores. This finding suggests that any benefits stemming from improved nutrition or increased school meal participation may either be too small in the short run for the schools around the cutoff or require a longer adjustment period. The one-year exposure window may be insufficient for impacts to materialize. For instance, improved nutrition could affect non-cognitive skills (e.g., attendance, behavior) before academic outcomes, a pathway not captured by test scores.

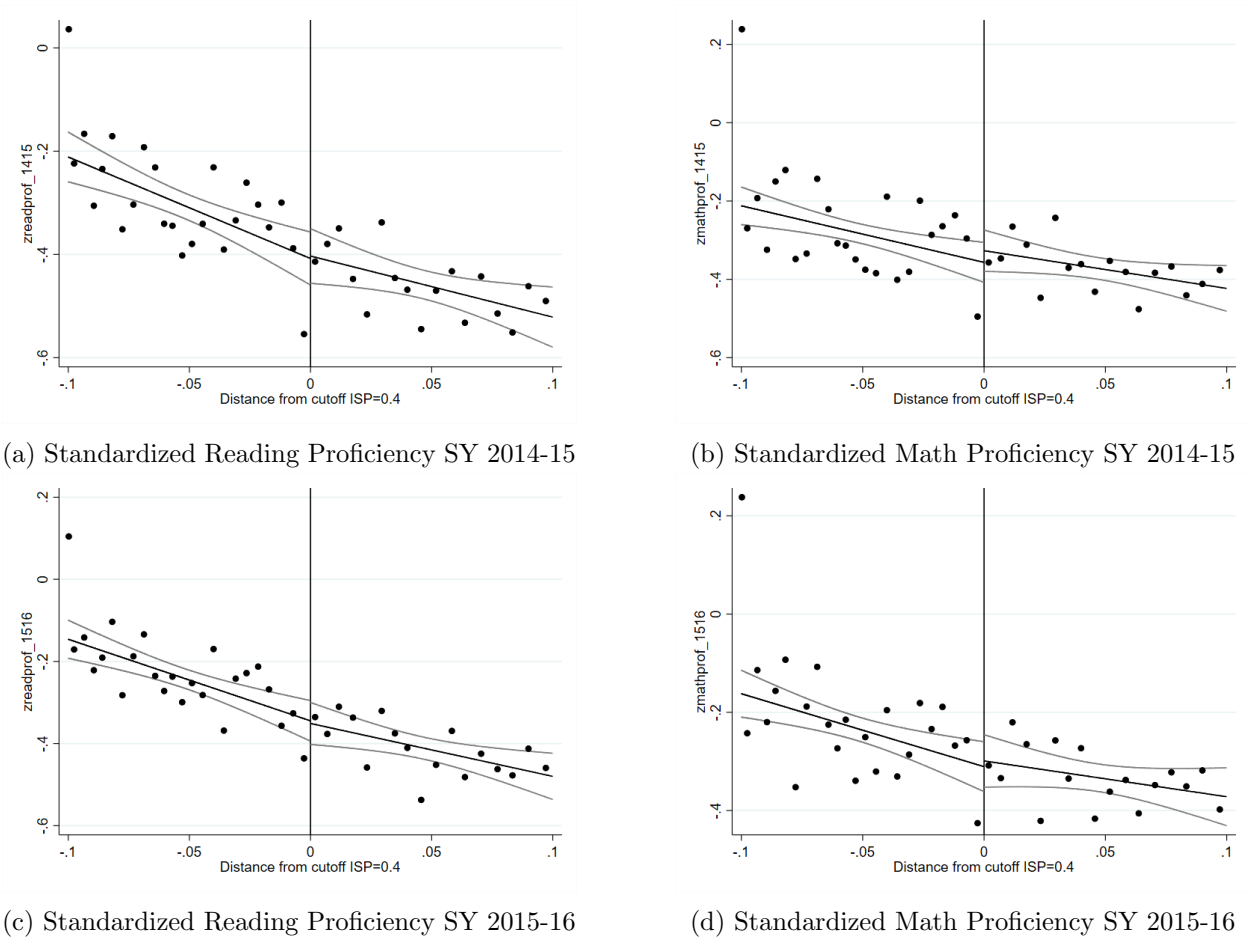


Figure 6: Outcomes across cutoff no controls

Despite finding insignificant effects on academic outcomes, it is important to consider the possibility of heterogeneous effects across various subpopulations or school types. I investigate whether such effects exist for the different school types and English learners.

## 5.2 Heterogeneity

Table 8 presents the treatment-on-the-treated (TOT) effects of universal school meals on academic outcomes, estimated separately for elementary, middle, and high schools using a fuzzy regression discontinuity design. In our approach, I restrict the sample of schools to those of each type. The eligibility indicator - based on whether a school meets the 40 percent income-eligibility threshold - is used as an instrument for actual participation in the universal school meals program. Since compliance is imperfect (not every school above the threshold fully implements the program, and some below may participate partially), our estimates reflect the effect on schools that effectively receive the treatment rather than a simple intent-to-treat (ITT) effect.

In the subsample of elementary schools, I estimate a treatment-on-treated effect on standardized reading proficiency for the 2014–2015 school year of -1.73, and the corresponding effect on standardized math proficiency is -1.08. Both estimates are statistically insignificant, suggesting that for elementary schools the policy does not yield any measurable changes in academic performance either. The negative estimates are a little counterintuitive and go against the theoretical mechanisms linking nutrition to cognitive performance but are statistically insignificant. For high schools ( $n = 821$ ), the estimated effects are small and positive, 0.74 for reading and 0.95 for math, but not statistically significant.

These heterogeneity results indicate that, when disaggregated by school type, the introduction of an expanded school meals policy does not have a robust impact on standardized academic outcomes. The null findings at the aggregate level persist across different school types. It is conceivable that unobserved factors or local contextual conditions influence how the policy translates into academic outcomes, particularly in middle schools (which is the smallest group) and where noise and variability appear to be high.

Table 6: Treatment Effects by School Type

	(1)	(2)	(3)	(4)	(5)	(6)
	Elem Read	Middle Read	High Read	Elem Math	Middle Math	High Math
Treatment effect	-1.72 (2.18)	26.01 (1140.83)	0.74 (1.31)	-1.07 (1.98)	53.21 (2337.44)	0.95 (1.44)
Observations	3391	804	821	3391	804	821

Standard errors in parentheses \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 5.3 Robustness checks

Table 7: Robustness of First Stage to Alternative Bandwidths

Bandwidth	0.05	0.075	0.125	0.150
Covariates	Yes	Yes	Yes	Yes
Participation (Linear)	0.10*** (0.02)	0.09*** (0.02)	0.09*** (0.02)	0.10*** (0.01)
Participation (Quadratic)	0.10*** (.03)	0.10*** (0.03)	0.08 (0.02)	0.08*** (0.02)
Observations	3126	4755	7303	8316

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Both linear and quadratic functional forms.

All specifications include covariates.

Table 7 presents robustness checks for the first stage using alternative equal bandwidths ranging from 0.05 to 0.15 of Identified Student Percentage around the  $ISP=0.4$  threshold. I test both linear and quadratic functional forms, and include covariates in all specifications. Across these different bandwidths, the estimated coefficient on participation remains consistent, showing an 8% to 10% jump in school participation across the  $ISP=0.40$  threshold, across both the linear and quadratic coefficients at 1% level. This consistency in magnitude and significance strongly indicates that there is a clear discontinuity in participation in the CEP program at the threshold and is not driven by the choice of bandwidth. This supports the key requirement that treatment assignment is driven solely by the cutoff. Moreover, the similarity of results across both the linear and quadratic models suggests that the observed jump is not an artifact of the specific functional form chosen but is robust to alternative specifications. Additionally, while smaller bandwidths might reduce bias by focusing more closely on observations near the threshold and larger bandwidths ensure larger sample sizes and greater power, the consistent estimates across these different bandwidth choices show that there needn't be a concern about the potential trade-offs between bias and variance in reducing the strength of the first stage results. Overall, these results show compelling evidence that the discontinuity in participation is a real consequence of the eligibility threshold rather than an artifact of model specification or sample selection.

## 6 Conclusions

This study provides the first nationwide evaluation of the Community Eligibility Provision using a regression discontinuity design that exploits the program’s administratively set 40% eligibility threshold. Leveraging this quasi-experimental variation, I evaluate the academic impacts of the expansion of school meals policy, using a regression discontinuity design (RDD) that exploits the program’s 40% eligibility threshold. I find results that suggest an expanded school meals program (the provision of both lunches and breakfasts was included as part of the law) seems to have a very modest but no statistically significant effect on math and reading proficiency levels around the cutoff in the short term. The academic benefits of the Community Eligibility Provision may be heterogeneously distributed, but further exploration of its effects on elementary schools and high schools. It is possible that schools above a certain threshold in ISP definitively benefit from the program though they are not the sample I study in this paper. In particular, the reimbursement formula suggests that all schools above an ISP of 62% should find it financially beneficial to participate in the CEP program for the double benefit of a reduction in administrative costs, and the health and food security of their students which may in turn lead to potential academic improvements as well.

The absence of significant LATE estimates could stem from several factors. First, the analysis captures the math and reading proficiency outcomes within one to two years of program exposure, which may be insufficient for nutritional or stigma-reduction benefits to manifest in standardized state assessments. Cognitive and non-cognitive skills, such as attendance or classroom behavior, might improve before academic performance, a pathway that is not directly measured here. Finally, imperfect program compliance (e.g., there is only 7–9% jump in eligible schools near the threshold who adopt CEP) may detract from a more accurate measure of treatment effects. Future research could potentially explore these subgroup differences to uncover whether expanded school meals access can yield significant benefits in specific contexts or over a longer horizon since it is plausible that the benefits of universal school meals may manifest gradually over time. The relatively short-term academic outcomes analyzed in this study may not fully capture the cumulative advantages of improved nutrition and reduced food insecurity.

The lack of any academic effects of the Community Eligibility Provision do not negate its broader societal value. By eliminating meal applications, the policy reduces administrative burdens for schools and stigma for students, while also providing a modest transfer, fostering greater equity. Additionally, the focus on standardized state assessment test scores as the sole outcome measure may overlook other important benefits of universal school meals, including reduced food insecurity, improved attendance, decreased disciplinary incidents, and enhanced overall student health (Rothbart et al., 2023, Gordanier et al., 2020, Rothbart & Schwartz, 2019)[20]. For high-poverty schools above the eligibility threshold, these procedural benefits may justify CEP adoption even absent test score improvements and this is seen with the increasing takeup of the option in the years since.

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## 7 Appendix

### 7.1 Fuzzy matching

I use `relink2` (Wasi & Flaaen, 2015), a custom Stata script that undertakes probabilistic linking using Levenshtein distance under certain bounded parameters and weights to match schools across the two datasets with a significantly higher rate of success than Stata’s own built-in merge function. The user-script is a refined version of the original `relink` user script and is often used in similar endeavors when matching business and company names and addresses across different datasets without any unique identifiers.

I adopt this along with additional data prep across the two datasets to improve the accuracy of linking the two datasets. Below is an example of three randomly selected schools which `relink2` accurately links across the two datasets where Stata’s built-in merge function fails to link.

CEPSchoolname Achievements data	Mathschoolname CEP data	schoolname2 Corrected name	relink2 Degree of matching
F.K. Sweet Elementary school	FRANCES K. SWEET ELEMENTARY SCHOOL	frances k. sweet elementary school	0.8524
barbara jordan h s	JORDAN High S	jordan high school	0.8724
ROBERT MCDERMOTT EL	MCDERMOTT EL.	mcdermott elementary	0.8704

Using `relink2`’s custom functions to apply additional weights to school districts ensures a high degree of similarity using the Levenshtein distance matching. To further reduce errors among names that are very similar and might be close anagrams of others, I bound by state and whether the school is an elementary, middle, or high school. This significantly improves the degree of matching since it prevents any match where two hypothetical schools from the same school district named “Arbitrary ES” and “Arbitrary HS” would otherwise be linked with a high degree of probability.

Finally I restrict my matches to a high minimum match score bound of 0.85, i.e. any schools that are matched at a level below this are discarded. This seems to be an acceptable level to set, as a quick audit of a random sample of 1000 matched schools show an error rate of 2/1000 (false matches) which were manually discarded. A more lax minimum bound causes higher rates of false matches (false positives).