# Free Lunch for All? The Impact of Universal School Lunch on Student Misbehavior

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**Abstract**

South Korean primary and secondary schools have been providing free lunches only to low-income students since the 1980s. In the early 2010s, the Free School Meal Program (FSMP) expanded the provision of free lunches to all students. We investigate the impact of this universal school lunch program on the incidence of misbehavior in schools. We find that the provision of universal school lunches reduces the number of behavioral incidents, particularly physical fights between students, by about 35%. This reduction could be observed because FSMP reduces the chances that a student's socio-economic status can be identified, and therefore the fights and bullying that are motivated by a bias towards the rich or the poor students are reduced.

Keywords: Free and Reduced-Price Lunch; Bullying; Universal Welfare; Student Behavior
*JEL Codes*: I21, I22, I24, I30

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## 1. Introduction

School meal programs, which provide students breakfast, lunch, or snacks during school hours, are common social programs throughout the world. The objective of many of these programs is to improve the nutrition intake of students, often with a focus on low-income and food-insecure populations. In the United States, the National School Lunch Program (NSLP) and the School Breakfast Program (SBP) provide access to free or reduced-price meals for students. As opposed to universal, the majority of these U.S. programs are means-tested, i.e., benefit eligibility is based on students' incomes. For example, students with family incomes below 130% and 185% of the federal poverty line receive free or reduced-price meals, respectively. As of May 2014, however, universal provision became possible in many districts. The Community Eligibility Provision enacted by the Healthy, Hunger Free Kids Act of 2010 was expanded nationwide.[1] This provision allows all schools in the United States where more than 40% of students are eligible for free lunch to implement universal meal programs.[2] Advocates of these programs often cite reduced stigma effects leading to better take-up of the programs and reduced administrative costs. On the other hand, opponents criticize universal meal programs on the grounds that they are too costly. A handful of past papers examine the impact of universal school meal programs (Leos-Urbel et al. 2013; Holford 2015; Corcoran, Elbel and Schwartz 2016). These papers generally show that universality increases take-up among previously eligible students, but do not find a significant impact on attendance or achievement.

In this paper, we investigate whether universal school meal programs, compared to the means-tested programs, influence student misbehavior and violence in schools. There are several

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[1] See Sec. 104(a) of the Healthy, Hunger Free Kids Act of 2010, which amended section 11(a)(1) of the Richard B. Russell National School Lunch Act (NSLA) (42 U.S.C. 1759a(a)(1)).
[2] Notable adoptions occurred prior to 2014 in New York City, the District of Columbia, and Boston.

channels through which universally provided free school meals may affect student discipline. For example, as universal programs increase the lunch take-up rate among students, they may also reduce hunger or food insecurity among the student body through improvements in dietary intake. If hunger induces aggressiveness and impulsiveness (Murphy 1998, Howard 2011), then universal lunch programs may improve school discipline through this channel. Another related mechanism involves the potential stigma associated with being a free-meal beneficiary. For example, those who are disadvantageously different from their peers, such as those with low socioeconomic status, are more likely to be victims of school violence (Jansen et al., 2012; Pernille et al., 2009; Tippett and Wolke, 2014). As universal programs hinder the stigmatization of free lunch beneficiaries and reduce the possibility of identifying one's income/poverty status, they may lead to a decrease in student misbehaviors.

To investigate whether universal school meal programs are empirically significant deterrents of student misbehavior, we analyze the Eco-friendly Free School Meal Program (FSMP), a universal school lunch program instituted in the South Korean schools in the early 2010s. Before the FSMP, low-income students were the *only* beneficiaries of free school meals. Students had to hand in documentation to their homeroom teachers to prove that their households belong to the lowest income group (bottom 3% as of 2016) registered in Korean National Basic Livelihood Security System or have an income lower than 50% of the median. After the implementation of FSMP, *both high- and low-income students* were eligible for free school meals.

We use a Korean school-level panel data that spans 2009-2014, and we estimate the impact of the FSMP on student misbehavior by exploiting the variation in timing of the adoption of FSMP by schools. The implementation of FSMP in a school primarily depended on the

availability of funding and support for the program by a large number of elected government officials including provincial governors and assemblies, local governments, and education superintendents. Due to lack of support by these political agents and budgetary issues, some schools adopted FSMP later than others. In our empirical analysis, we are able to control for the support of these elected officials in addition to several school and city attributes. We show that the schools that adopted FSMP are systematically different from those that did not. However, once we condition on the school and academic year fixed effects, these differences are eliminated. Further, in a series of event study analyses, we show that there are no pre-trends in misbehavior or educational outcomes in the years leading up to the time of the treatment. For example, we show that in years before the adoption of FSMP, the extent of misbehavior incidents in early-adopting schools was no different than that in late-adopting schools. That is, early- and late-adopters of FSMP followed "parallel trends" prior to implementing the program. We also did not find any pre-trends in other outcomes such as the academic success of the student body and the drop-out rate.

Our results show that expanded free school meals significantly decrease the likelihood of behavioral incidents among students. Specifically, FSMP reduces student misbehavior by about 35% in the schools that adopted the program. This impact is mainly driven by the reduced physical fights between students. We show that our results survive a number of robustness checks. We also find that, at the intensive margin, the magnitude of the reduction in misbehavior incidents is larger in schools which expanded the free meals to a greater number of students. On the other hand, we find no impact of FSMP on average scores in standardized tests or on the share of students who drop out.

Although our paper identifies the reduced form causal impact of a universal school lunch program on student misbehavior, it comes with a caveat: we cannot pinpoint the exact channels, but only speculate about the mechanism based on anecdotal evidence. Of the two important mechanisms, namely hunger/food insecurity reduction versus reduction in possibilities to identify poverty/income/social status of peers or the stigma reduction associated with being a free meal beneficiary, we believe that the first is less plausible. This is because of the characteristics of the school-based feeding environment in South Korea. Unlike most of the other countries where only a fraction of students take up school meals, effectively all Korean students, both free meal beneficiaries and others, eat lunches together in the school cafeteria. That is, as 100% of the student body eats school lunches, it is unlikely that any student will go hungry in a day due to the inability of access to school meals. We also obtained informal evidence that FSMP did not change the nutrient content of the school meals. For example, we checked with several schools in South Korea and verified that the FSMP did not alter the school meal menus.[3] Therefore, we conclude that it is unlikely FSMP is operating through reducing food insecurity among students.

We instead believe that FSMP might reduce the misbehavior incidents through lowering/eliminating the chances that the income/poverty status of students can be identified. This is because of the unique context of South Korea where, unlike in the US, school lunches are one of the few ways that the income status can be spotted. For example, a recent report by the Fair Trade Commission indicates that as of 2014, 96% of students wear school uniforms and virtually all of them use public transportation to commute to school. In other words, it is

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[3] For example, we obtained sample menus in 2008 and 2018 from a school in Gyeonggi province, i.e. pre- and post-FSMP adoption in that school. The meals always contained rice, soup, "*kimchi*," a main dish with meat and a side. The total amount of energy is always in the 650-750 Kcal range. More details on the menus and nutritional content are available upon request.

relatively difficult for students to identify peers' socioeconomic status based on their clothes, cars, and so on. FSMP also shuts down this possibility through eliminating the chance to find out who the free school meal beneficiaries are. Therefore, in schools that adopted FSMP it becomes more difficult for students to tell which of their peers are rich or poor. As a result, the physical or verbal offenses that are motivated by a bias toward the rich or the poor are less likely to occur.

Nonetheless, we note that the possibility to identify peers based on lunch status is not particular to the South Korean setting. For example, in the U.S., despite the National School Lunch Act, which explicitly prohibits the "physical segregation" and "overt identification" of eligible students (see The Code of Federal Regulations (CFR), Title 7 CFR part 245), the presence of *à la carte* options and the federal nutritional requirements that govern free and reduced school meals create segregated lines and the ability to identify income status of students. As of 2012, "Eighty-two percent of elementary schools, 95 percent of middle schools, and 90 percent of high schools had à la carte offerings available at lunch" (Fox and Hall 2012). In the United Kingdom where eligible students can either use free meals provided by the school or bring lunches from home, students will often choose the free lunches according to the opinions of their peers from the same income group or reject them in fear of being stigmatized by other income groups (Holford 2015; James 2012).

Our paper also contributes to the literature that study school violence and bullying. These problems have drawn increasing attention from researchers and policymakers because of their prevalence. For example, UNICEF's 2014 report on violence against children shows that physical assault, fighting, and bullying are common occurrences in children's lives throughout the world. In the United States, "28% [of children] under age 17 report having been physically

assaulted at some point in their lives by a non-sibling peer."[4] Further, 25% of U.S. children in

high school report participating in a physical fight during the last 12 months, with 8% reporting

the fight was on schools grounds.[5] In Korea, research on school violence and bullying has

followed concerns about high suicide rates. In a national survey, 12% of 5,540 students reported

that they were bullied, and 44.7% of the victims attempted or considered suicide (2012 National

School Violence Survey). In 2011, suicide was the number one cause of death for children 10 to

19 years of age.[6] Past research has identified reduced human capital formation as a consequence

of school violence and bullying. For example, it has been shown that school violence and

bullying reduce student test scores (Figlio 2007; Carrell and Hoekstra 2010; Eriksen, Nielsen and

Simonsen 2014), increase the propensity to drop out of school, reduce future wages (Brown and

Taylor 2008), and increase suicidal behaviors (Herz, Donato and Wright 2013; Tekin and

Markowitz 2008).

Ours and a contemporaneous working paper by Gordon and Ruffini (2018) (GR) are the

two first papers that investigate the impact of universal meal programs on student misbehavior.

Both papers find that universal school meal programs reduce student misbehavior, and their

findings complement each other's conclusions. Notwithstanding, there are essential differences

between GR and our paper. The first difference is in the outcomes. GR use the suspension rates

in schools, but not the offenses that lead to suspensions. On the other hand, we use the *actual*

*offenses/behaviors* in our analysis. Because of our access to such data, we can investigate

whether free meal programs have differential impacts on different offenses. In fact, our results

show that FSMP reduces mainly the physical fights. The other notable difference between ours

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[4] See Fund (2010), page 114.
[5]  See Fund (2010), page 189.
[6] Suicide is the second leading cause of death for children 10 to 19 years of age in the United States according to the Center for Disease Control's most recent report (Heron 2016).

versus GR is the context and the identifying variation. Specifically, GR focus on the US, and in their estimation, they use the variation in free school meals induced by the Community Eligibility Provisions Act of 2010. This program helps schools facilitate the provision of free or reduced-price meals to their students if a sufficiently high share of the student families is eligible for federal welfare programs, such as SNAP. Therefore, the findings in GR are more applicable to schools in high poverty areas, as their identifying variation comes from such schools. As explained throughout the paper, the context we study is profoundly different. Specifically, we investigate a policy which was not focused only on the high poverty regions/schools, but one that rather applied more comprehensively to all schools.

In the rest of the paper, Section 2 discusses the institutional specifics of the FSMP program, paying particular attention to the political context that informs its implementation. Section 3 reviews relevant literature on school behavioral incidents and schools lunch programs. Section 4 details the data we use in this project. Section 5 discusses the empirical analysis. Section 6 concludes.

## 2. Institutional Background

Since the provision of school meals started, in the form of UNICEF's and the Canadian government's support for war orphans in 1953, school meal programs have been essential tools for policy intervention in Korea. The School Meals Act of 1981 paved the way for the Korean government to implement school lunch policies. The government started making school meals available in the late 1980s. School meal programs were changed several times in the 1990s and

2000s.[7] By 2004, 99.9% of elementary schools, 97.8% of middle schools, and 98.7% of high schools offered school lunch (Kang 2011).

The Eco-friendly Free School Meal Program (FSMP) was implemented in schools beginning in 2011. The policy was a key election issue in the 2010 election cycle for mayors, governors, local councils, and superintendents.[8] "About 20% of the students eating school lunches had the benefit of free meal [prior to the 2010 local elections]; they were children from low income or rural areas." (Yoon, Kwon and Shim 2012)  The policy also received considerable attention from the press in the 2012 presidential elections. Support for the program tended to lie with the liberal parties, which were mainly in the opposition, as well as progressive civic groups. The Democratic Unite Party and other smaller, liberal parties championed the program for its ability to provide a fundamental human right to children and address growing inequality. Advocates of the program also argue that FSMP may reduce school bullying and violence between high- versus low-income students, as the universality feature of FSMP hinders the likelihood of identification of students' socio-economic status.[9] In addition, FSMP may have positive externalities for others in society. For example, FSMP may increase the disposable income for households above the poverty line, leading to more consumption and economic growth. Despite these potential benefits, the conservative Saenuri Party opposed the program because it preferred a less expensive means-tested program, and that tax revenues were not sufficient to support the universal policy. Critics typically characterize the program as an

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[7] The 1990s can best be characterized as a period of instability for school lunch programs.  Responsibility for programs was largely placed at the local level and funding support was cut by the national government.  In 1998, a compulsory school lunch system was established in elementary schools. A voluntary program, which provided start-up funds for kitchens and management by private organizations, was established in 1999 and 2002 for high schools and middle schools, respectively.

[8] Superintendents are elected, rather than appointed, officials in Korea since 2006.

[9] Elgar (2009), Farrington (1993), and Ziegler and Rosenstein-Manner (1991) show that income inequality and low family income could contribute to being victims or perpetrators of school bullying.

irresponsible, populist campaign that draws funds away from other more critical educational expenditures.

Since the Saenuri Party opposed FSMP, as the ruling party, its adoption depended on the political affiliation of several levels of government. National, provincial, and local decision-makers can influence this program's functioning and existence in a particular district. Superintendents are vested with the legal ability to design and develop the school meal policy. The execution, however, can be circumscribed by provincial governors, city mayors, provincial councils, and local councils, all of whom share control over its financing, as well as public opinion. The funding for the program can come from any or all of these sources, so no one entity is expected to have the ability to prevent its use exclusively. There are examples, however, that some of these agents may be able to prevent the implementation of FSMP successfully. For instance, in 2011, the opposition-controlled Seoul Metropolitan Council and Office of Education enforced FSMP against the desires of Mayor Oh Se-hoon from the ruling Saenuri Party (Cho 2010). In 2015, however, the governor Hong Joon-Pyo of South Gyeongsang Province, a member of the ruling party, stopped funding FSMP and forced the province to abandon it (We 2015). There is also a case of the superintendent, Kim Shinho at Daejeon Metropolitan Office of Education, who strategically insisted on disproportionate cost-sharing with the mayor's office to support FSMP. The mayor, Yeom Hong-Chul, could not accept this cost-sharing proposal due to his budget (Jung 2010). The result was that FSMP started on a smaller scale and its full application was delayed. Also, anecdotal evidence suggests that Koreans are aware of FSMP, and they are motivated to vote accordingly. For example, in 2011, voters in Seoul were presented with a referendum to remove an FSMP already in place. Voters responded with meager voter

turnout, only 25.7% voted, and invalidated the election by keeping turnout below the required 33.3% (Choe 2011).

Figure 1 depicts the take-up of FSMP by province in 2014 and the political affiliation of the superintendent in the same year. The pattern in the figure suggests that political support is closely tied to the implementation of FSMP. Because of this finding and the anecdotal evidence presented in this section, we include political affiliations of local governors and superintendents in our regressions.

## 3. Literature Review

To our knowledge, our paper is the first to identify the behavioral impacts of universal school meals.  We draw on two major strands of literature to support both the importance and intent of our work. First, we review the literature on free school meals. We, then, discuss the research on peer victimization and bullying, both in South Korea and around the world.

Free school meal programs are generally instituted because of their potential to improve food security and nutrition for at-risk children.  Over time the discussion about the goals of school meal programs has evolved to include how they contribute to children's overall health, obesity, and academic outcomes.  Due to the focus of these programs, most of them have been implemented as means-tested policies.[10]

There is an extensive literature on the impact of school meal programs (see, for example, Bhattacharya 2006, Figlio 2005, Gundersen 2012, Millimet 2010, and Schazenbach 2009). Most of the papers in the literature focus on the impact of these programs on students' health and achievement. Unlike our empirical setting where there is little variation in the quality of meals

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[10] Discussion of these programs also fits within the broader context of whether welfare programs should be universal or means-tested. See e.g. Feldstein (1987) and Cohen and Dupas (2010).

that students access on the school grounds, these studies exploit the increase in the exposure of food insecure students to school meals better than the other food options they have outside the school meal program. For example, some researchers have explored the impact of the School Breakfast Program (SBP) on nutritional outcomes, such as caloric intake, intake of nutrients, and serum levels of important vitamins and minerals. The literature has been mixed in its findings (Bhattacharya, Currie and Haider 2006; Devaney and Fraker 1989; Devaney and Stuart 1998; Gleason 1995; Gleason and Suitor 2001). Bhattacharya, Currie and Haider (2006) largely answer the indeterminacy with a credible difference-in-differences method. They show that the SBP positively impacts the quality of children's diets. Measuring the quality both as an index from self-reported food intake and through serum levels, they find a positive impact on outcomes.[11]

Another set of papers focuses on the effect of meal programs on obesity (Schazenbach 2009; Gundersen, Kreider and Pepper 2012; Millimet, Tchernis and Husain 2010). Schazenbach (2009) uses two approaches to examine the impact of NSLP on obesity for young students: a school fixed-effects approach and a regression discontinuity design that exploits the income eligibility requirement for reduced lunch status and the variation in reduced lunch prices. The results of the school fixed effects approach show that eating school lunches increased obesity for those students that are not eligible for the free and reduced-price lunch. The regression discontinuity results, when filtered through a Wald estimator to account for reporting errors, suggest that the program may increase the obesity rates at the end of first grade by 20%. As Schazenbach (2009) states that the regression discontinuity results are estimated imprecisely.

Gundersen, Kreider and Pepper (2012) examine the impact of the National School Lunch Program (NSLP) in the United States on food insecurity, general health, and obesity. They are

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[11] The authors spend considerable effort checking the robustness of their results. They also find some suggestive (i.e. not statistically significant) evidence of a positive impact on other family members.

the only study we are aware of that directly measures its impact on food insecurity. They find that the average treatment effect of NSLP decreases food insecurity, improves overall health, and decreases obesity given assumptions about the latent health outcomes of children who do not participate in the program and the likely impact of the program.[12]

Access to school meals and improvements in school food quality have been shown to result in better cognitive functioning and educational outcomes, particularly in developing countries. Recent research has provided evidence that the food quality (Frisvold 2015; Belot and James 2011) and increased caloric intake on the day of the test (Figlio and Winicki 2005) improve academic performance.

A small body of literature examines the role of universal school breakfast. These papers focus on how universal provision may cause greater take-up of such a program among previously eligible students due to a reduced stigma effect. Leos-Urbel et al. (2013) use a difference-in-differences strategy that estimates the impact of universal free school breakfast in New York City on program participation, attendance, and academic outcomes. They find that the program has a modest positive effect on program participation. Corcoran, Elbel and Schwartz (2016) evaluate the role of serving breakfast in the classroom on improving participation beyond universal provision alone.

Holford (2015) finds that universal school lunch programs for young, primary school students raise take-up by eligible students through two mechanisms: 1) reduced stigma due to greater peer group participation and 2) increased information about the quality of the school

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[12] The combination of their monotone instrumental variables (MIV) assumptions and monotone treatment response (MTR) assumption yields these results. Their MIV assumptions amount to assuming that children in households with incomes above the eligibility threshold and children enrolled in schools that do not participate in NSLP on average have no worse latent health outcomes than eligibile children and that children who have dropped out of school have on average no better outcomes. The MTR assumption is that program will not lead to a reduction in health status.

lunch. He finds that the latter is likely to cause a more substantial change in take-up because school meal choices do not differ across schools where payment is anonymized versus those where it is not. The increased information about quality is driven by students of slightly higher socioeconomic status consuming the lunch.[13]

Taken as a whole, in a student feeding environment where food insecure students do not fully participate in school meal programs, the literature suggests that the impacts of meal program will function through improved nutrition and that social dynamics within a school play an essential role in the outcomes. It is important to highlight that such setting is different from ours, in that food insecurity is unlikely to be the main channel in Korea.

There is a small body of work within the economics literature that focuses on the economic impacts of bullying. Brown and Taylor (2008), for instance, find that increased intensity of bullying results in a decrease in wages of approximately 3%. Further, they find that the impact of bullying persists into late adulthood. Eriksen, Nielsen and Simonsen (2014) show that children bullied in elementary school suffer reductions in ninth grade GPA and that the magnitude of these consequences increases with the severity of bullying. Their findings suggest that bullying on average reduces a student's GPA by one standard deviation.[14] Figlio (2007) and Carrell and Hoekstra (2010) also provide compelling evidence that a student's misbehavior fuels peer misbehavior and decreases peers' test scores. Ahn and Trogdon (2017) also find that a 10 percent increase in behavioral issues would decrease student math scores by about 6.2 percent of a standard deviation. Another notable study by Persson and Svensson (2013) investigate the Swedish populace's willingness to reduce bullying. They estimate that a Swedish taxpayer would

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[13] He also shows that provision of universal free lunch is a less expensive means of raising take-up among low income students than reducing the price for those who are ineligible.

[14] Eriksen, Nielsen and Simonsen (2014) use a credible instrumental variables specification, following Carrell and Hoekstra (2010), which exploits the impact of parents criminal behavior on their child's classroom behavior.

be willing to contribute between \$0.89 and \$1.28 per victim.[15] Taxpayers' willingness to pay may be rooted in cultural understandings about an individual's responsibility for their neighbors or appropriate conflict resolution. If South Korean citizens viewed bullying with the same importance, the value of a statistical incident of bullying would be between \$45.2 million and \$61.5 million.

**4. Data**

To examine the effects of the Free School Meal Program (FSMP) in Korea, we use data obtained from the *Edudata Service System* (EDSS) created by the Ministry of Education along with city and provincial offices of education. EDSS provides longitudinal school-level information since 2009 for all elementary, middle, and high schools in Korea. However, the Ministry of Education discloses only 70% of the data based on stratified sampling. EDSS contains school-level information such as school characteristics, the number of teachers, and extracurricular programs provided to students. Also, EDSS includes information about school meals and student misbehavior, which are the variables of interest in our analysis.

In our data set, there are about 8,000 schools. We observe these schools over academic years 2009-2010 to 2014-2015, except for the 2010-2011 academic year which is excluded because information on misbehavior incidents was not collected by the EDSS.[16] An academic year in South Korea starts in March of a calendar year, and it ends in February of the next

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[15] We have converted the original values from the paper to 2017 dollars.
[16] In addition, although we observe schools in 2009-2010, we exclude that academic year from our estimation sample because we lack some of the important control variables, including those that measure the political climate in the provinces where the schools are located. We estimated all of our regressions omitting those control variables that have missing values for 2009-2010, and thus including observations from that year. The results, which are available upon request, were qualitatively same as those we report in the paper.

calendar year. There are long breaks during the Monsoon season (summer) and during Christmas time.

Our treatment is identified by the indicator variable *FSMP* which takes the value of one if a school adopted the Free School Meal Program (FSMP). We do not observe whether a school has taken up the program. Instead, we see the number of students who are the beneficiaries of free meals on one day in the academic year, April 1st. We impute *FSMP* using the ratio of the number of free meal beneficiaries to the total number of students. Specifically, we assign *FSMP* equal to one if the share of free meal beneficiaries among the school population is at least 0.90.[17] In our sample, 47% of the schools have adopted the program. As depicted in Figure 2, the share of the students covered with FSMP increased over time.

EDSS provides multiple measures of student misbehavior, such as the total number of reported misbehavior incidents, and the number of victims and offenders in these incidents. In addition, in our dataset, there is a breakdown of misbehavior types. These misbehavior categories are fights, blackmail, confinement, insults, threat, luring, obscenity, and ostracism.[18] All of these misbehavior types involve physical or verbal bullying. The definitions of these misbehavior types are presented in Appendix Table 1. In our estimations, we use the misbehavior *rates*, i.e., the number of offenses per 100 students in the school. Table 1 presents the means of these misbehavior outcomes. For example, the average number of reported misbehavior incidents is 0.32 per 100 students. In other words, about two incidents are reported on average in a school

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[17] The free meal take-up rate can be lower than 100% even for schools under the FSMP because the program can be partially given to certain grade levels only, depending on local government, educational authorities, and school budgets. We established a 90% threshold, which should be possible only with expanded FSMP. Later in the paper and in the appendix, we show that the main finding of the paper is not sensitive to the choice of 90% threshold.
[18] Peer rejection is usually called "wangtta" in Korea and "ijime" in Japan, which means singling out one student to bully or ostracize.

with 600 students (the average school size in the sample).[19] The majority of these incidents are fights where one or more students assault other students. The mean of the fight rate is 0.20. The mean of the offenders rate (the number of offenders per 100 students) and victims rate (the number of victims per 100 students) are both approximately 0.5. These summary statistics point to some group level fighting on average, as the averages of both offenders and victims rate are higher than the misbehavior rate.

We augmented our data with attributes of the district in which the schools are located. Specifically, we obtained average income data from the Korean Labor Income Panel Study (KLIPS). Also, we collected information about the political affiliation of superintendents, metropolitan city mayors, provincial governors, and council members for 17 districts. We also hand-collected information about the party membership of mayors for 17 districts and council members for 226 counties and cities. Using these data, we constructed variables that measure whether the superintendent, governor, and mayor of a particular municipality in which a school is located are members of progressive parties, i.e., the ones that support FSMP. Another control variable that we include is the share of the municipal council seats that are occupied by members of the progressive parties.

## 5. Empirical Analysis

### 5.1. Empirical Specification

We begin our analysis by estimating the equation depicted below:

(1) $$Misbehavior_{sct} = \beta FSMP_{sct} + \gamma X_{sct} + \mu_s + \tau_t + \epsilon_{sct}$$

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[19] Student misbehaviors are entered into relevant data fields in EDSS only when the nature of violence is serious enough for the student violence committee to be called. Hence, the EDSS variables we employ are conservative measures of school violence. Including minor incidents, the gross number can be larger.

where $Misbehavior_{sct}$ is the number of misbehavior incidents per 100 students reported in academic year $t$ in school $s$ which is located in city $c$. We analyze a number of outcome variables. For example, in some specifications, we use the number of total misbehavior cases, in others we use the number of offenders or the number of victims. In addition, we analyze each misbehavior type separately. These types include fights, blackmail, confinement, insult, luring, obscenity, threat and ostracism. Fights are physical altercations between students. The descriptions of other misbehavior types are listed in Appendix Table 1.

Our variable of interest, $FSMP$, is an indicator that takes the value of one if the school $s$ has taken up the universal free lunch program in the academic year $t$. That is, $FSMP$ is equal to one if the school provides free lunch to all students, and it is equal to zero if the school provides free lunches to only the low-income students. Unfortunately, we do not observe whether the school has actually taken up the FSMP. Instead, we observe the share of the students who are having free lunches on April 1. We postulate that schools in which at least 90% of the student body is having free lunch have taken up the FSMP. Our results are not sensitive to the choice of this threshold.[20]

The estimate of $\beta$ in equation (1) measures the difference in misbehavior incidents in schools that adopted the FSMP versus those that did not. For this parameter to have a causal interpretation in our setting, the treatment, FSMP, must be randomly assigned to schools. This may be unlikely, since schools/cities may opt into or out of FSMP depending on their attributes. We tested this hypothesis by comparing several school/city characteristics that may simultaneously influence both the adoption of FSMP and student misbehavior. These characteristics include measures for student composition (average class size in the school, share

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[20] Appendix Table 2 shows that our results do not change if we use thresholds of 80% and 95%, instead of 90%.

of males in the student body, average age of the student body) and various other school attributes

that proxy for its quality (the number of teachers, the number of books in the library, the share of

students in extra-curricular clubs and the allocation of school rooms to administration, English

education and student wellness, and whether the school has a dormitory). In addition to these

school characteristics, we checked whether the attributes of the city in which the schools are

located are similar. These attributes are the average income in the city where the school is

located and the share of multiracial families in the district.[21] As explained in section 2, funding

and the support for the program could be a bone of contention among political parties. Therefore,

we additionally include in our analysis several variables that capture the political climate in the

school district where the school is located. These variables are indicators for whether the mayor

and superintendent of the school district have affiliations with political parties that favor the

FSMP, and the share of the city council seats that are occupied by members of parties that favor

FSMP.

Figure 3A, which presents the standardized differences of the schools with versus without

FSMP, suggests that there are substantial differences between the treated and untreated schools.[22]

The treated schools are on average of higher quality compared to the untreated schools. For

example, the treated schools have smaller class sizes, more of their students are involved in

clubs, and they have more rooms allocated to specialty education such as English. In addition, as

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[21] The percentage of multiracial families is the percentage of families in a district that have one Korean and one
foreign-born spouse. Students from these families may have physical features that differ from their peers, and
therefore make them an easy target for bullying. Further, these families may be of lower income and located in rural
areas because Korean men in these areas, who are increasingly left out of the domestic marriage market, have
searched for spouses in less developed countries in Asia (Moon 2015). We use this to control for the possibility that
the taste for universal school lunch may be correlated with unobserved parenting beliefs or methods that impact
student behavior.

[22] To obtain the point estimates in Figure 3A, we regressed the school characteristics on the FSMP indicator. We
then divide the coefficient of FSMP by the standard deviation of the school characteristic. Therefore, the estimates
in the figure can be interpreted as the difference in terms of standard deviations between schools with versus without
FSMP.

shown in the lower portion of Figure 3A, these schools are located in more developed regions of the country and in areas where there is stronger political support for FSMP. However, the differences between schools with and without FSMP disappear when we condition on school and academic year fixed effects. The result of this exercise is visualized in Figure 3B, which depicts the standardized difference between the treated and the untreated schools conditional on school and time dummies. The estimates in Figure 3B indicate that the time-invariant school characteristics and time effects common to all schools account for almost all of the differences in attributes of the treated versus untreated schools. The analysis in Figures 3A and 3B suggests that adoption of FSMP may be *as-good-as-random conditional on school and time fixed effects*. For this reason, in equation (1), we include $\mu_s$ and $\tau_t$, representing the school fixed effects and academic year dummies, respectively. That is, we identify the causal impact of FSMP using the within-school variation.

Although the analysis in Figures 3A and 3B indicate that controlling for time and school dummies will eliminate the bias due to the time-varying school and city characteristics, we nevertheless include these characteristics, vector *X*, in equation (1), in order to increase the precision of our estimates. Later we show that our estimates are not sensitive to the inclusion of these characteristics.

### 5.2. Baseline Results

The results obtained from estimating equation 1 are presented in Table 2. In columns 1-3, we include only the school fixed effects and time dummies for academic years. In column 1, where the outcome is the total misbehavior incidents, the coefficient of *FSMP* is -0.128 and, it is statistically significant at 1% level. This coefficient implies that in schools with the free meal

program there are 0.13 fewer reported cases of misbehavior per 100 students compared to other schools which did not adopt the program. For the average school with 600 students in our sample, this impact is equivalent to a 0.8 fewer misbehavior incidents every year. This is a sizeable impact. For example, the estimated impact of FSMP is about 40% of the mean of the outcome (0.320). Results in columns (2) and (3) of Table 2 pertain to the number of offenders and victims, respectively. They show that in the schools with the FSMP program there are 0.152 fewer offenders and 0.147 fewer victims per 100 students compared to other schools without the FSMP program. These impacts correspond to about 30% of the mean of the outcomes (0.48 and 0.46 for offenders and victims per 100 student, respectively.

We re-estimated equation 1 including the whole set of school and city attributes in the regressions. Results are reported in columns 4-6 of Table 2. Coefficients of FSMP for all three outcomes are still negative and statistically significant. Also, the magnitudes are similar to those obtained in columns 1-3, indicating that inclusion of school characteristics does not change our results. Majority of the control variables are not estimated with precision. This is possibly due to the lack of sufficient within-school variation in these variables. An alternative explanation could involve an error in their measurement. Therefore, we do not over-emphasize the results related to control variables.

In Table 3, we present the results that pertain to each misbehavior type, separately. That is, we estimate equation (1) with outcomes fights, blackmails, confinement, insults, luring, obscenity, ostracism, and threats, separately. In Panel A, we control for only academic year dummies and school fixed effects, and in Panel B, we additionally control for the time-varying school characteristics. In all of these regressions, *FSMP* has a negative coefficient. For two out of these eight misbehavior types, namely fights and blackmails, the impact is statistically

significant. These results indicate that the FMSP program is most effective in reducing the physical fights between the students. The mean of fights is 0.17 per 100 students in our sample. The coefficients in columns 1 of Table 3 implies that the FSMP reduces physical fights by about 50-60%.

**5.3. Robustness Checks and Extensions**

**5.3.1. Schools that Adopt FSMP versus Schools that Never Adopt FSMP**

One potential concern about our baseline estimates is the possibility of bias due to selection into treatment. Specifically, the schools that adopted FSMP could be systematically different in their attributes from other schools that never took this program, and at the same time, these unobservable attributes could also be determinants of student misbehavior. To understand whether such a difference drives our baseline results, we re-estimate equation (1) over a subsample of the schools, the ones that adopted FSMP at some point in our estimation period. That is, we exclude the schools that never adopted FSMP from our estimation sample. These schools make up about one-fourth of all schools in our sample.

The estimates obtained from these regressions are presented in Table 4. The number of observations is smaller in Table 4 compared to Table 2 (21,000 versus 27,000). Despite the smaller sample size, our variable of interest, FSMP, is negative and statistically significant. For example, the coefficients of FSMP in columns 4-6 indicate that adoption of the program reduces misbehavior cases, victims and offenders by about 40-60% from their means. These findings are very similar to those in Table 2 indicating that our baseline results are unlikely to be driven by the difference between the schools that never adopted FSMP and their counterparts which adopted the program at some point in our sample period.

**5.3.2. Test for Parallel Trends in Misbehavior Outcomes**

Our results in the previous sections can have a causal interpretation only if the schools that did not adopt the FSMP program (the control group) is the counterfactual to the schools with FSMP (the treatment group). The fact that the inclusion of time-varying school characteristics in the regressions does not change the coefficient of FSMP is encouraging in that regard. In this section, we additionally test for the "parallel trends" condition. This condition requires that the treatment and the control groups follow a similar time trend in the absence of the treatment, and the treatment group diverges away from that trend only after they receive the treatment.

In our application, there are no clear treatment vs. control groups and no clear pre- and post-treatment periods, because the schools adopt the FSMP in different academic years. That is, a school is in the control group until it takes up the FSMP, and at that year the post-treatment period starts for that school. Therefore, we cannot conduct a typical event study analysis.[23] Instead, to investigate whether the parallel trends condition is satisfied, we estimated an augmented version of equation 1:

(2) $\quad Misbehavior_{sct} = \beta Time\ Relative\ to\ FSMP_{sct} + \gamma X_{sct} + \delta R_{ct} + \mu_s + \tau_t + \epsilon_{sct}$

In equation 2, all variables are identical to those in equation 1, except for the *FSMP* indicator, which is replaced by the vector *Time Relative to FSMP*. This vector includes a set of dummy variables for the academic years relative to the time of adopting FSMP. Specifically, in the regressions, we include dummies for the first, second, third and fourth year of the adoption of

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[23] This type of test is standard in papers which implement a difference-in-differences strategy (for example, see Cesur, Tekin and Ulker 2017 and Hoynes, Miller and Simon 2015). Typically, these studies conduct an event study analysis where the treatment indicator is interacted with the full set of time dummies. If the interaction between the treatment indicator and the time dummies for the pre-treatment period are statistically insignificant, this is taken as an evidence that support the "parallel trends" condition.

FSMP, as well as the dummies for years prior to the adoption of FSMP. For example, for a school which adopted the FSMP in 2012, the *First Year of FSMP* dummy in 2012 is equal to one, the *Second Year of FSMP* dummy in 2013 is equal to one, and so on. For the same school, the dummy for *Two Years Prior to FSMP* is equal to one in 2010.

We estimated equation 2 over the sample of schools that have adopted the program at some point in our sample period. The excluded category is One Year Prior to FSMP. Therefore, the coefficient estimates of the indicators in *Time Relative to FSMP* are interpreted relative to that year. The results obtained from the event study analysis are presented in Figure 4, where bars and capped lines represent the point estimates and the 95% confidence intervals, respectively. Two important conclusions can be drawn from Figure 4. First, the coefficients of all of the time dummies for the years before the adoption of FSMP are statistically insignificant. This finding provides evidence against anticipation or selection into treatment concerns. For example, we can rule out the possibility that schools which experienced a large number of student misbehaviors in the past few years adopted the FSMP. Second, the coefficients of the variables that represent years since the school adopted the FSMP are all negative and significant in 9 out of 12 cases. That is, the schools that adopted FSMP experienced a decrease in misbehavior cases after they adopted FSMP, and this effect continued over time.

Column (1) of Table 5 shows the regression estimates that are depicted in Figure 4. Columns (2) and (3) of the same table display the event study estimates for other outcomes, Offenders and Victims, respectively. These results, similar to those in column (1), indicate no pre-trends for the alternative measures of student misbehavior. Schools that adopted FSMP experience a decrease in the number of offenders and victims after the adoption. In addition, the bottom of Table 5 presents the p-values for the joint significance of pre- and post-FSMP

adoption indicators. The p-values for the joint significance for pre-intervention dummies (2 through 4 Years Prior to FSMP) are large for all outcomes. On the other hand, the post-intervention dummies for Misbehaviors and Offenders are jointly significant. Although three of the four post-FSMP adoption dummies are individually significant for victims, these indicators are not jointly significant.

Taken together, the results in Figure 4 and Table 5 support the notion that our estimate is the causal effect of FSMP on student misbehavior. Specifically, the parallel trends condition holds, in that the schools which adopted the FSMP program were following a similar trend in student misbehavior before taking up FSMP, and those that adopted FSMP earlier started experiencing its impact earlier than other schools which implemented it later.

### 5.3.3. Test for Parallel Trends in Academic Outcomes

Another threat to our identification strategy is that selection into the treatment could be based on the academic success of the students. For example, our results could be convoluted, if, say, more or fewer funds for FSMP are allocated to the schools depending on how well their students do on the standardized tests, and at the same time academic success is correlated with student misbehavior.

We test for this type of selection by conducting a series of event study analyzes for academic outcomes. Specifically, we estimate equation (2) with standardized test scores in Korean, English, and Math as the outcome variables. Estimates obtained from Math test scores are depicted in Figure 5. The results for other test scores are virtually identical. The graph indicates that there are no pre-trends for test scores before a school's adoption of FSMP. Also, we find no change in test scores after a school implements FSMP. We repeated the same exercise

with an alternative measure of school performance: share of students who drop out. The event study estimates for this outcome are given in Figure 6, which displays a similar pattern. This analysis suggests that schools' treatment status is unlikely to depend on their student body's academic performance.

### 5.3.4. Alternative Measurements of Misbehavior

In this section, we checked whether our results are artificially driven by our regression specification and the measurement of the misbehavior variables. For example, instead of using the misbehavior rates as the outcome variables, we experimented with using the natural logarithms of these rates.[24] The results that are obtained from estimating equation (1) with the natural logarithm of the outcomes are presented in Panel A of Table 6. For all three regressions, the coefficient of FSMP is negative and statistically significant. In Panel B of Table 6, we used indicator variables as outcomes in our regressions instead of continuous variables. That is, in columns (1), (2) and (3) the outcomes are dummy variables that take the value of one if there was at least one misbehavior incident, one offender and one victim in a school in an academic year, respectively. Results in all three columns show that FSMP reduces the probability that a school suffers a misbehavior incidence.

In the same vein as the analyses in Panels A and B of Table 6, in Panel C, we incorporate in our estimation the count nature of our outcome variables. Specifically, the misbehavior cases in a school, as well as the victims and offenders in those incidents, are all non-negative integers. We used these count outcomes to estimate negative binomial regressions where the school level dispersion is constant, i.e., fixed-effects negative binomial regressions (Hausman, Hall and

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[24] In order not to lose observations with zero outcomes, we use log of rate plus 0.01 as the outcome.

Griliches 1984). The estimates in Panel C of Table 6 are still negative and statistically different from zero.

As a yet another robustness check, we estimated the impact of FSMP on student misbehavior using a propensity score matching (PSM) estimator following the strategy described in Imbens (2015) and Imbens and Rubin (2015). The details of our approach are explained in the Appendix. The PSM estimates, presented in Appendix Table 4, are similar to our baseline results. For example, our estimates of FSMP are negative and significant for the misbehavior cases, offenders and victims. In addition, we find that the reduction in misbehavior is due to the decrease in fights between the students in schools. All of these findings indicate that our baseline results are not artifacts of a particular measurement of student misbehaviors.

### 5.3.5. Alternative Measurements of the Treatment

An additional concern related to our results could be the potential measurement error in our treatment variable. Specifically, we do not observe whether a school has adopted the FSMP program, but rather the share of students who had free lunches on one specific day (April 1$^{st}$) in the academic year. We postulated that schools in which at least 90% of the student body had free lunch had taken up the FSMP program. If for any reason, the extent of misbehaviors in a school is correlated with the share of students having lunch on that day, then our estimates could be biased. To address this issue, we re-estimate equation 1 with treatment indicators that are constructed using 80% and 95% thresholds, separately. The results presented in Appendix Table 2 suggest that our results are not sensitive to the choice of the 90% threshold.

We further investigate whether the results in the previous sections are sensitive to our measurement of the treatment variable, by estimating the following regression:

$$(3) \qquad Misbehavior_{sct} = \beta\%Free\ Meals_{sct} + \gamma X_{sct} + \delta R_{ct} + \mu_s + \tau_t + \epsilon_{sct}$$

This regression is identical to equation (1), except for the treatment indicator, $FSMP$, which is replaced by $\%Free\ Meals$. This variable measures the share of students who receive free school lunches. Estimating equation (3) helps us identify the impact of free lunch provision at the intensive margin.

The results obtained from estimating equation (3) are reported in Panel A of Table 7. The estimate of $\beta$ for total misbehavior incidents, offenders and victims are all negative and statistically significant, indicating that an increase in the share of students who receive free school meals reduces the misbehavior cases. The coefficient on misbehavior cases (column 1) implies that each additional one percentage point increase in the students who receive free school meals reduces violence incidences by 0.0015 per 100 students. This effect corresponds to 0.5% of the outcome's mean. The results are similar for the number of offenders and victims. A one percentage point increase in the share of students who have free school meals reduces the number of offenders and victims per 100 students by about 0.0020 and 0.0017, respectively, or by about 0.4%.[25]

In a separate set of regressions, we additionally include the lagged value of the $\%Free\ Meals$ among the controls. All the remaining variables are the same as those in equation (3). Therefore, the estimate of $\%Free\ Meals$ in panel B can be interpreted as the change in misbehavior incidences when a school increases the provision of free meals by one percent, conditional on the share of free meals in the same school in the past academic year. The results, presented in Panel B of Table 7, are virtually the same as those in Panel A.

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[25] Results obtained from using different misbehavior categories as outcome variable in equation (3) produce estimates that are qualitatively same as those reported in Table 3. That is, the share of the students who receive free meals is negative for all misbehavior categories and, and it is statistically significant for fights and blackmail

As the final analysis in this section, we re-estimate equation (3) with first differences instead of fixed effects. That is, we regressed the change in the misbehavior in a school from one academic year to the next one on the change in the share of students who gets free meals in the school over the same period. In these regressions, we also controlled for the change in the control variables and but not the fixed effects. As shown in Panel C of Table 7, our estimates did not change appreciably as a result of this specification change either.

### 5.3.6. Controls for the Political Landscape

One may suspect that including three variables (Pro-FSMP Mayor, Education Superintendent and the Share of City Council Seats that are Pro-FSMP) that measure the political landscape of the region may cause a multicollinearity problem, as these variables are highly correlated in our sample. To address this concern, we re-estimate equation (1) with subsets of these political variables (not reported). Including the political variables jointly or separately, or excluding all of them did not meaningfully change the coefficients or the standard errors of FSMP. We also tried controlling for the first principal component of the three political variables, and this experiment also did not alter our estimates.

Another concern around including these political variables in the regressions is the possibility that these variables are not adequately capturing what they are supposed to do. Specifically, by controlling for the leadership's party affiliation, we intend to isolate the influence of voter appetite for public expenditures on free school meals. However, if party affiliation is a lagging (rather than a leading) indicator of public opinion/adoption of FSMP, then these political covariates may magnify bias rather than reducing it. This is because, the

remaining (within party) variation might be more strongly correlated with other confounders once party effects are held constant.

To address this potential problem, we include in the regressions, the lagged values of our political controls. Our baseline results survived this robustness check as well. Specifically, when we included the lagged share of council seats that are pro-FSMP, the coefficient of FSMP in the Misbehavior regression was -0.111 (se: 0.027). Similarly, when the lagged value of Pro-FSMP Mayor is included, the coefficient of FSMP became -0.129 (se: 0.026). Recall that in our baseline regressions, we estimated the coefficient of FSMP -0.121 (se: 0.026).

The anecdotal evidence in section 2 and the regression analysis in Appendix Table 3 suggest that the adoption of FSMP depends very much on the decisions of the political actors. For this reason, and those presented in this section, we opted for including these political variables, and all three of them contemporaneously, among our controls in the regressions throughout the paper.

**6. Summary and Conclusion**

The question of whether school meal programs should be designed as means-tested (benefit eligibility depends on student's income) versus universal (benefits are provided to all students) is a major discussion among academics, policymakers as well as the public. Advocates of universal programs argue that these programs reduce administrative costs and they achieve better take-up, citing the stigma effects of means-tested programs. On the other hand, critics oppose universal programs on the grounds that they are highly costly. Past research mainly focused on the impact of universal programs on student take-up, attendance, and test scores.

They find that take-up is improved, but that there is no significant impact on attendance or test scores.

In this paper, we investigate the impact of the universal provision of school meals on misbehavior incidents in schools. Particularly, we exploit a major shift in school meal policy in South Korea where a significant share of schools shifted from means-tested school meal programs to universal school meal programs in the early 2010s, due to a plan which is known as the Free School Meal Program (FSMP). It is notable that the take-up rate is always close to 100% in South Korea. That is, FSMP only altered who can obtain free school meals. Particularly, before adopting FSMP, schools provided free meals only to low-income students. When FSMP is implemented, schools offered free meals to all students regardless of their income levels. Thus, FSMP reduced/eliminated the possibility of identifying a student's socio-economic status. That is, post-FSMP, students could not as easily tell who among their peers are rich versus poor. It is important to highlight that observing whether one is a school meal beneficiary is one of the few ways that students can identify their peers' socio-economic status in South Korean schools. This is because, unlike their counterparts in the US, the overwhelming majority of Korean school children wear school uniform, and they almost exclusively use public transportation to commute. Therefore, it is difficult for them to identify the poverty status of their peers by their clothes, cars and so on.

Using a Korean school-level panel data set that spans years 2009-2014, we estimate the impact of FSMP on misbehavior cases, exploiting the variation in the timing of the school's take-up of the program. This variation is observed primarily due to the availability of funding sources from local governments and regional education offices. Because major political actors including governors, mayors, superintendents, and council members have varying degrees of support for

the program (due to the positions of the political parties with which they are affiliated), there is significant variation in the timing of FSMP take-up among schools. In our estimations, we are able to control for these important determinants of adoption of FSMP.

Our identification strategy exploits the timing of school's adoption of FSMP, and it estimates the causal effect under the condition that schools that adopted FSMP late (late-adopters) are indeed counterfactuals to those schools that took up the program earlier (early-adopters). We provide multiple pieces of evidence that support this condition. First, we show that conditional on school and academic year fixed effects, there are no statistically significant differences in characteristics of schools with versus without FSMP. In addition, we show that the patterns of misbehavior cases in early- versus late-adopting schools was similar *prior* to their take-up of FSMP. In other words, control and treatment schools followed a "parallel trend" in the absence of the treatment. We also show that there were no pre-trends in schools' academic outcomes and drop-out rates in the years leading up to the take up of the program.

Our main findings, which remain unchanged in several robustness checks, indicate that adopting the FSMP reduces student misbehaviors. The magnitude of this impact is about 35%. This effect is primarily driven by the decrease in physical fights between the students. We also find that the schools that expanded free meals to a larger share of their student body experienced a greater reduction in misbehavior. We also investigated whether FSMP has an impact on other outcomes. However, we find null effect of FSMP on average test scores and the drop-out rates.

Although we are confident that we identify the causal impact of FSMP on misbehaviors, we are unable to single out the mechanisms through which FSMP works. Nevertheless, we speculatively argue that adoption of FSMP reduces fights in schools because of its universality. Specifically, informal and anecdotal evidence indicates that FSMP did not affect the

nutrition/energy student body gets from school meals, suggesting FSMP did not have an impact on food insecurity or hunger in Korean schools. Instead, we believe FSMP eliminated/reduced the possibility of identifying a student's income level, and as a result, the fights that are motivated by a bias against the rich or the poor are decreased.

It is important to note that the recorded fights and misbehaviors are most likely of serious nature. Further, fights in schools are indicative of other behavioral problems which are less likely to be measured or reported, such as intimidating behavior or online bullying. Therefore, our results may understate the impact of FSMP on misbehavior in schools and other behavioral problems.

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**Figure 1: Political Affiliation of Education Superintendent and take-up of Free Meals**
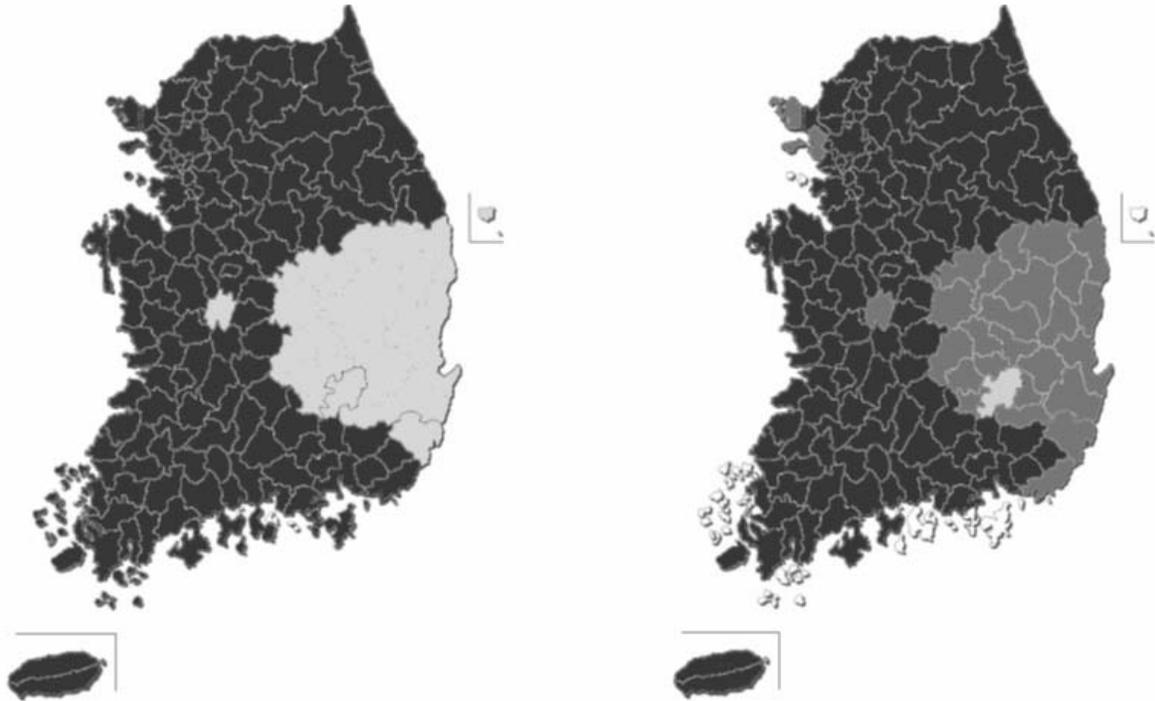


The Korean map on the left depicts the political affiliation of the superintendents of the departments of education. Dark and light grey represent provinces with pro-FSMP and superintendents and anti-FSMP superintendents, respectively. The map on the right depicts take-up rates of free school meals by region. Dark grey regions have more than 70% of students taking a free lunch. Very light grey regions have between 30% and 70% of students eating free lunch. In medium dark regions, less than 30% of students receive free lunch.

**Figure 2: Share of Free School Meal Beneficiaries over Time**
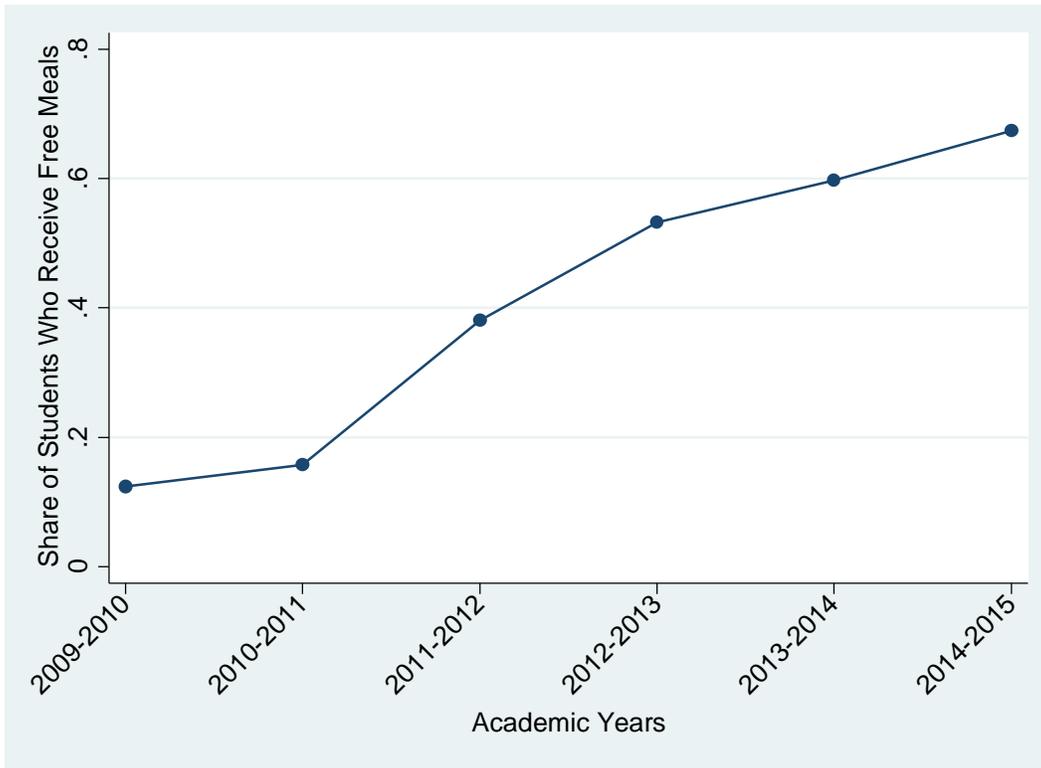


The share of the students who get free meals in their schools.

**Figure 3A: Unconditional Differences Between Schools With vs. Without FSMP**
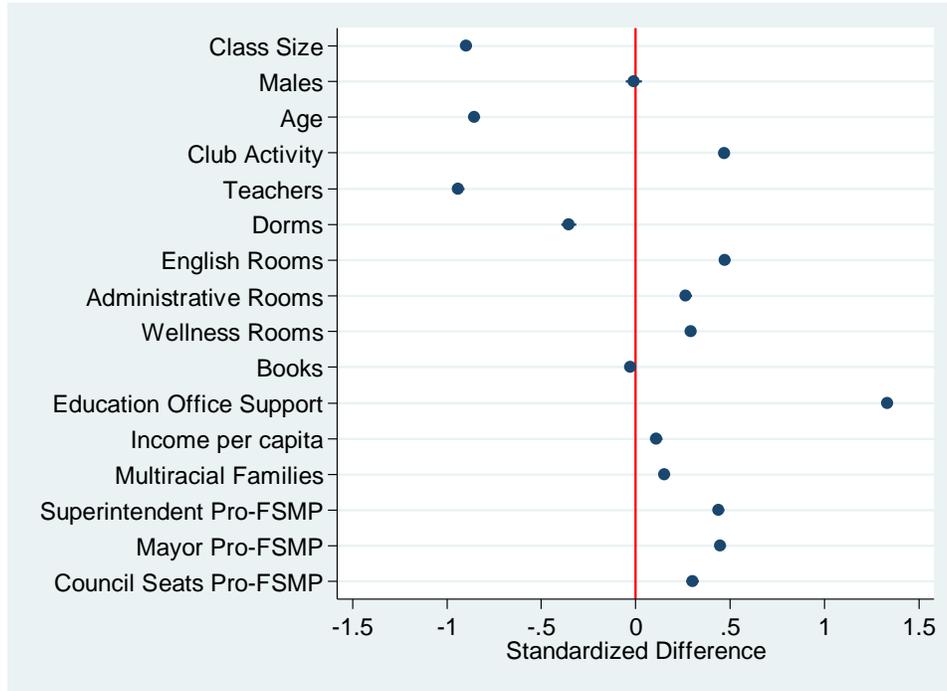


**Figure 3B: Differences between Schools With vs. Without FSMP Conditional on School and Time Fixed Effects**
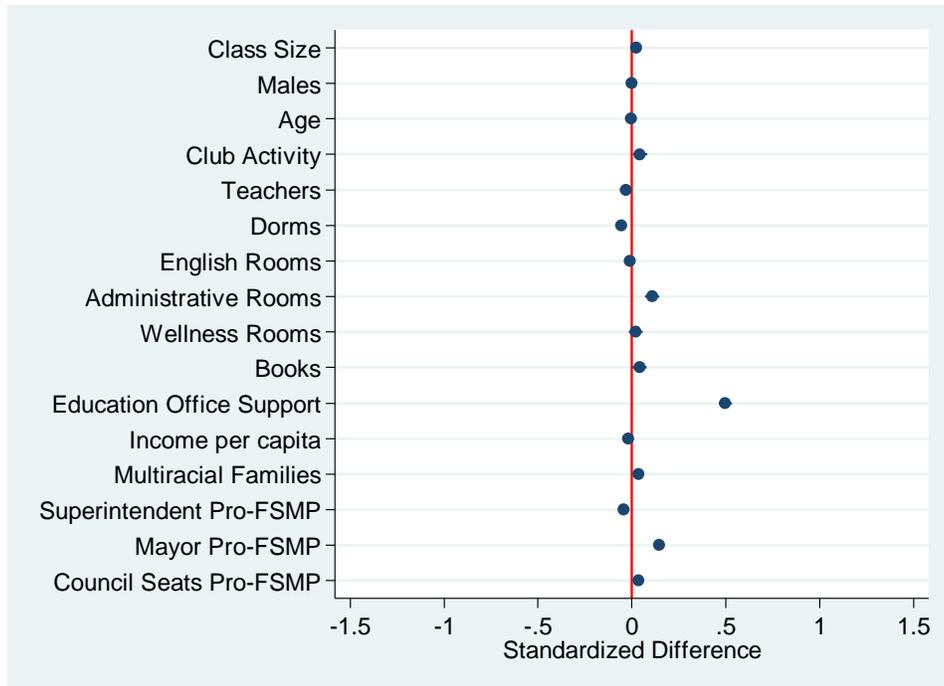


Notes: To obtain the standardized differences, we first estimate this regression: $x_{st} = \beta_0 + \beta_1 FSMP_{st} + \epsilon_{st}$, where $x_{st}$ is a school/city attribute and $FSMP$ is an indicator for schools that adopted FSMP. We then divide the estimate of $\beta_1$ by the standard deviation of the attribute.

**Figure 4: Event Study Analysis - Misbehavior Incidents**
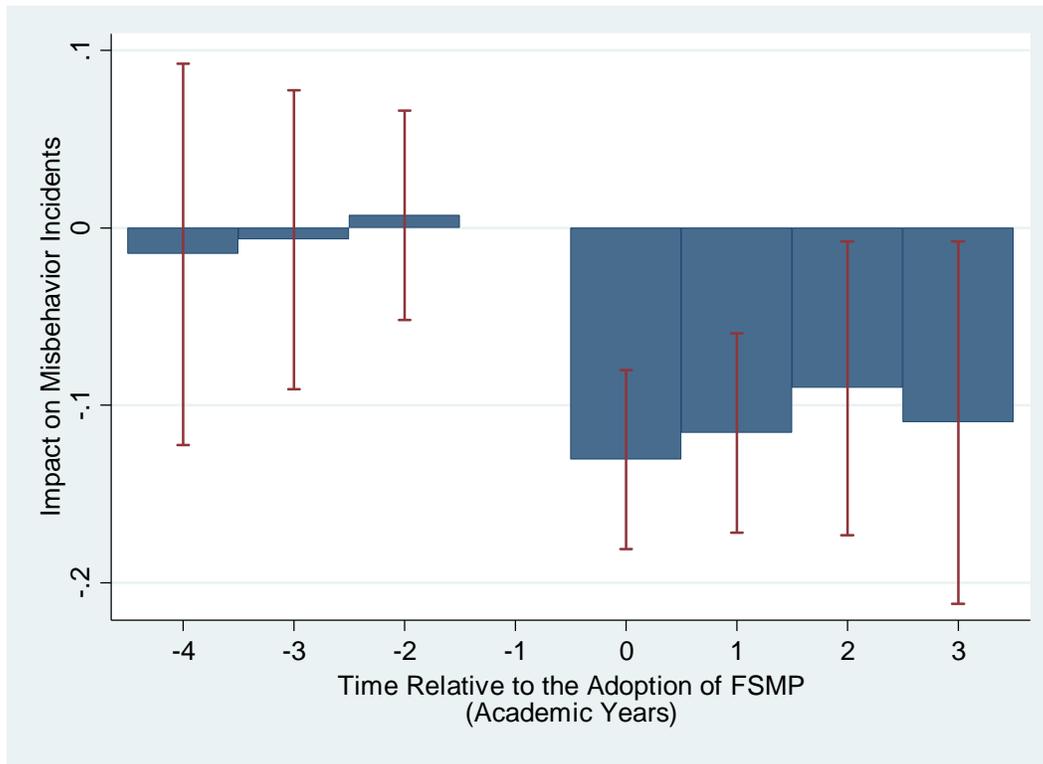


Notes: Bars (capped lines) represent the point estimates (95% confidence intervals) obtained from a regression of Misbehavior incidents on dummies for the academic years relative to the year of adoption of FSMP (equation 2). The omitted category is one year before the adoption.

**Figure 5: Event Study Analysis – Math Test Scores**
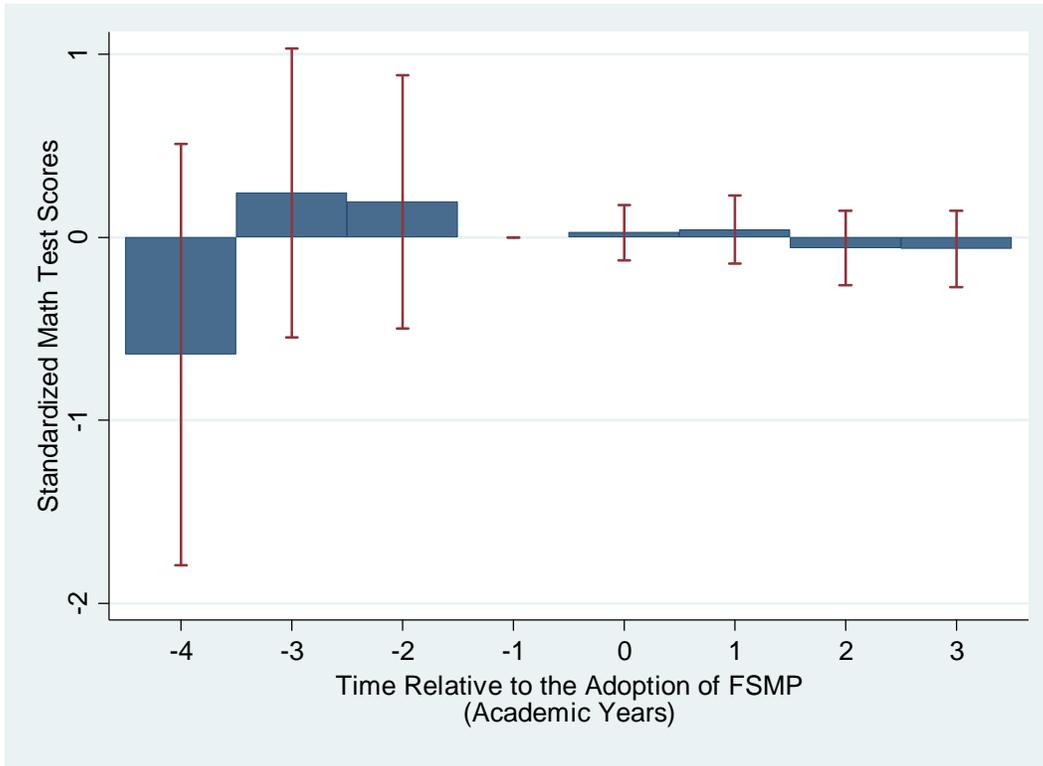


Notes: Bars (capped lines) represent the point estimates (95% confidence intervals) obtained from a regression of standardized math test scores on dummies for the academic years relative to the year of adoption of FSMP (equation 2). The omitted category is one year before the adoption.

**Figure 6: Event Study Analysis – Drop-outs**



Notes: Bars (capped lines) represent the point estimates (95% confidence intervals) obtained from a regression of share of students who dropped out on dummies for the academic years relative to the year of adoption of FSMP (equation 2). The omitted category is one year before the adoption.

**Table 1**
**Summary Statistics**

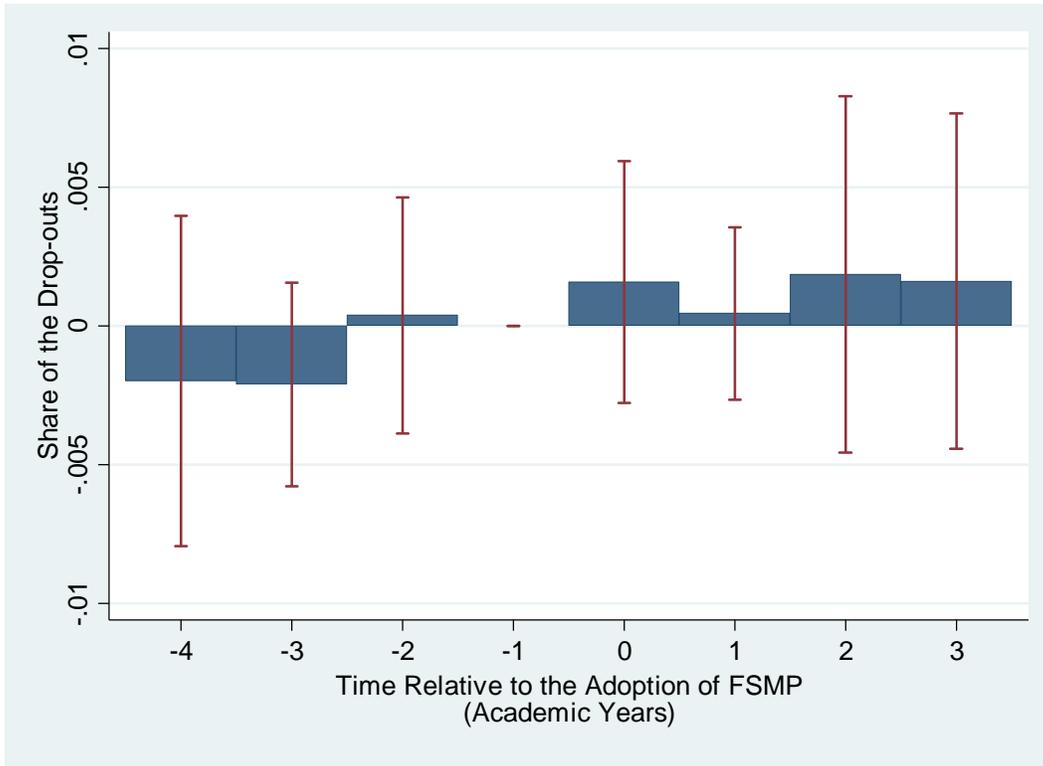| Variable | Description | Mean | Std. Dev. |
|---|---|---|---|
| FSMP | =1 if the school adopted the Eco-Friendly Free School Meal Program. | 0.56 | 0.50 |
| Misbehavior | The total number of misbehavior cases reported per 100 students in an academic year. These cases can be physical fights, or they can involve blackmailing, confinement, insults, luring, threats, obscenity or ostracism. | 0.32 | 1.05 |
| Offenders | The number of reported offenders per 100 students in misbehavior cases. | 0.48 | 1.45 |
| Victims | The number of victims per 100 students in misbehavior cases. | 0.46 | 2.08 |
| Class Size | The number of students per classroom | 24.63 | 9.75 |
| Males | The share of male students in the school | 0.53 | 0.21 |
| Age | The average age in the school | 11.27 | 2.93 |
| Club Activity | The share of students in a school that belong to an extracurricular club. | 0.62 | 0.60 |
| Teachers | Number of teachers | 31.43 | 20.73 |
| Dorms | =1 if school has a dorm | 0.10 | 0.30 |
| English Rooms | The share of school rooms in which English education is provided | 0.00 | 0.01 |
| Administration Rooms | The share of school rooms that are allocated to the administration | 0.09 | 0.05 |
| Wellness Rooms | The share of school rooms that are allocated to student wellness | 0.02 | 0.02 |
| Books | Number of books in the school library | 12754.16 | 7492.94 |
| Education Office Support | The share of the financial support for meals provided by the education office | 0.46 | 0.27 |
| Income per capita | Per capita income in the city where the school is located | 14984.14 | 1667.69 |
| Multiracial Families | The share of multiracial families in the city where the school is located | 9.72 | 3.92 |
| Superintendent Pro-FSMP Party | =1 if education superintendent's party affiliation is progressive | 0.63 | 0.48 |
| Mayor Pro-FSMP Party | =1 if city governor's party affiliation is progressive | 0.42 | 0.49 |
| Council Seats Pro-FSMP Party | The share of members of the city council that are members of a progressive party. | 0.51 | 0.32 |

The unit of observation is a school-academic year. There are 27,470 observations.

**Table 2**
**Impact of FSMP on Student Misbehavior**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Misbehavior | Offenders | Victims | Misbehavior | Offenders | Victims |
| FSMP | -0.128*** | -0.152*** | -0.147*** | -0.121*** | -0.163*** | -0.142*** |
| | (0.026) | (0.041) | (0.053) | (0.026) | (0.042) | (0.051) |
| Class Size | | | | 0.002 | 0.009 | 0.009 |
| | | | | (0.004) | (0.006) | (0.006) |
| Males | | | | 0.510 | 0.144 | -0.799 |
| | | | | (0.412) | (0.469) | (1.602) |
| Age | | | | -0.102 | -0.099 | -0.146* |
| | | | | (0.151) | (0.072) | (0.082) |
| Club Activity | | | | 0.001 | -0.076*** | -0.044 |
| | | | | (0.026) | (0.026) | (0.043) |
| Teachers | | | | 0.001 | -0.002 | -0.004 |
| | | | | (0.001) | (0.002) | (0.004) |
| Dorms | | | | -0.137** | -0.160 | 0.083 |
| | | | | (0.060) | (0.114) | (0.313) |
| English Rooms | | | | 4.370 | -0.805 | 7.188 |
| | | | | (3.643) | (4.419) | (4.588) |
| Administration Rooms | | | | 0.010 | 0.238 | 0.202 |
| | | | | (0.260) | (0.354) | (0.378) |
| Wellness Rooms | | | | 0.126 | -0.356 | -2.421 |
| | | | | (0.513) | (0.698) | (2.338) |
| Books | | | | -0.000** | 0.000 | -0.000 |
| | | | | (0.000) | (0.000) | (0.000) |
| Education Office Support | | | | -0.072 | 0.009 | -0.028 |
| | | | | (0.057) | (0.079) | (0.120) |
| Income per capita | | | | -0.000*** | -0.000*** | -0.000 |
| | | | | (0.000) | (0.000) | (0.000) |
| Multiracial Families | | | | -0.010 | -0.006 | -0.004 |
| | | | | (0.007) | (0.009) | (0.010) |
| Superintendent Pro-FSMP Party | | | | 0.002 | 0.024 | 0.016 |
| | | | | (0.050) | (0.053) | (0.087) |
| Mayor Pro-FSMP Party | | | | -0.075** | -0.104** | -0.176* |
| | | | | (0.033) | (0.046) | (0.106) |
| Council Seats Pro-FSMP Party | | | | 0.321*** | 0.358** | 0.401 |
| | | | | (0.110) | (0.159) | (0.290) |
| Academic Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| School FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 27,470 | 27,470 | 27,470 | 27,470 | 27,470 | 27,470 |

Unit of observation is a school-academic year. Outcomes are the numbers of misbehavior incidents, offenders and victims per 100 students. FSMP takes the value of one if a school provides free lunch to all students (adopted the Free School Meal Program), and it is zero if free lunches are provided only to low-income students. All regressions include school fixed effects and academic year dummies. Standard errors, clustered at the school level, are presented in parentheses. *, **, and *** indicate p-value less than 0.1, 0.05, and 0.01, respectively

## Table 3
## Impact of FSMP on Types of Student Misbehavior

### Panel A

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Fights | Blackmail | Confinement | Insult | Luring | Obscenity | Threat | Ostracism |
| FSMP | -0.089*** | -0.011*** | -0.002 | -0.003 | -0.004 | -0.010 | -0.004 | -0.007 |
| | (0.017) | (0.003) | (0.002) | (0.003) | (0.002) | (0.007) | (0.004) | (0.007) |
| Acad. Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| School FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | No | No | No | No | No | No | No |
| N | 27470 | 27470 | 27470 | 27470 | 27470 | 27470 | 27470 | 27470 |

### Panel B

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Fights | Blackmail | Confinement | Insult | Luring | Obscenity | Threat | Ostracism |
| FSMP | -0.097*** | -0.011*** | -0.002 | -0.004 | -0.005 | -0.010* | -0.003 | -0.008 |
| | (0.017) | (0.003) | (0.002) | (0.003) | (0.003) | (0.006) | (0.004) | (0.007) |
| Acad. Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| School FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 27470 | 27470 | 27470 | 27470 | 27470 | 27470 | 27470 | 27470 |

Unit of observation is a school-academic year. Outcomes are the numbers of misbehavior types per 100 students. Fights are physical altercations between students. Definitions of other misbehaviors are listed in Appendix Table 1. FSMP takes the value of one if a school provides free lunch to all students (adopted the Free School Meal Program), and it is zero if free lunches are provided only to low-income students. In Panel A, regressions include only the school fixed effects and academic year dummies. Panel B regressions additionally include the time-varying control variables as in Table 2. Standard errors, clustered at the school level, are presented in parentheses. *, **, and *** indicate p-value less than 0.1, 0.05, and 0.01, respectively.

**Table 4**
**Robustness Analysis: Excluding Schools That Never Adopted FSMP**

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
|  | Misbehavior | Offenders | Victims | Misbehavior | Offenders | Victims |
| FSMP | -0.213*** | -0.228*** | -0.230*** | -0.187*** | -0.223*** | -0.206*** |
|  | (0.039) | (0.056) | (0.072) | (0.035) | (0.056) | (0.071) |
| Acad. Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| School FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | No | No | Yes | Yes | Yes |
| N | 21,001 | 21,001 | 21,001 | 21,001 | 21,001 | 21,001 |

The estimation sample in these regressions exclude the schools that never adopted the FSMP in our sample period. Unit of observation is a school-academic year. Outcomes are the numbers of misbehavior incidents, offenders and victims per 100 students. FSMP takes the value of one if a school provides free lunch to all students (adopted the Free School Meal Program), and it is zero if free lunches are provided only to low-income students. All regressions include school fixed effects and academic year dummies. Regressions in columns 4-6 control additionally for time-varying school attributes. Standard errors, which are clustered at the school level, are presented in parentheses. *, **, and *** indicate p-value less than 0.1, 0.05, and 0.01, respectively.

**Table 5**
**The Impact of FSMP on Misbehavior over Time**

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | Misbehavior | Offenders | Victims |
| 1$^{st}$ Year of FSMP | -0.131*** | -0.146*** | -0.123** |
|  | (0.026) | (0.042) | (0.057) |
| 2$^{nd}$ Year of FSMP | -0.116*** | -0.097*** | -0.116** |
|  | (0.029) | (0.033) | (0.059) |
| 3$^{rd}$ Year of FSMP | -0.090** | -0.078 | -0.139 |
|  | (0.042) | (0.052) | (0.101) |
| 4$^{th}$+ Year of FSMP | -0.110** | -0.077 | -0.190* |
|  | (0.052) | (0.055) | (0.112) |
| 2 Years Prior to FSMP | 0.007 | -0.071 | -0.026 |
|  | (0.030) | (0.050) | (0.080) |
| 3 Years Prior to FSMP | -0.007 | -0.002 | 0.014 |
|  | (0.043) | (0.078) | (0.118) |
| 4+ Years Prior to FSMP | -0.015 | -0.147* | -0.041 |
|  | (0.055) | (0.083) | (0.096) |
| Academic Year FE | Yes | Yes | Yes |
| School FE | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes |
| N | 21001 | 21001 | 21001 |
| p-value for Joint significance of |  |  |  |
| Pre-adoption dummies | 0.940 | 0.236 | 0.934 |
| Post-adoption dummies | 0.000 | 0.005 | 0.229 |

The estimation sample in these regressions exclude the schools that never adopted the FSMP in our sample period. Unit of observation is a school-academic year. Outcomes are the numbers of misbehavior incidents, offenders and victims per 100 students. The dummies indicate the time relative to the academic year when a school adopted the FSMP and start providing free lunches to all students. All regressions include school fixed effects, academic year dummies, as well as the time-varying school attributes as in Table 2. Standard errors, which are clustered at the school level, are presented in parentheses. *, **, and *** indicate p-value less than 0.1, 0.05, and 0.01, respectively.

**Table 6**
**Alternative Measurements of Misbehaviors**

**Panel A: Natural Logarithms**

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | Log(Misbehavior) | Log(Offenders) | Log(Victims) |
| FSMP | -0.161*** | -0.182*** | -0.160*** |
|  | (0.036) | (0.039) | (0.038) |
| N | 27470 | 27470 | 27470 |

**Panel B: Indicator Outcomes**

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | =1 if Misbehaviors > 0 | =1 if Offenders > 0 | =1 if Victims > 0 |
| FSMP | -0.019** | -0.025*** | -0.017* |
|  | (0.009) | (0.009) | (0.009) |
| N | 27470 | 27470 | 27470 |

**Panel C: Count Outcomes**

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | Number of Misbehaviors | Number of Offenders | Number of Victims |
| FSMP | -0.108*** | -0.148*** | -0.129*** |
|  | (0.037) | (0.042) | (0.044) |
| N | 11,968 | 10,761 | 11,016 |

Unit of observation is a school-academic year. The outcomes in Panel A are natural logarithms of misbehavior rates. In Panel B, the outcomes take the value of one if there is at least one misbehavior incident, offender and victim in a school in an academic year. These estimates are obtained from OLS. In Panel C, outcomes are the counts of misbehavior incidents, offenders and victims. Estimates in this panel are obtained from a fixed effects negative binomial regression as described in Hausman, Hall, and Griliches (1984). FSMP takes the value of one if a school provides free lunch to all students, and it is zero if free lunches are provided only to low-income students. All regressions include school fixed effects and academic year dummies, as well as the full set of control variables as in Table 2. *, **, and ***, indicate p-value less than 0.1, 0.05, and 0.01, respectively.

## Table 7
## Impact of the FSMP on Student Misbehavior – Intensive Margin

### Panel A – Fixed Effects

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | Misbehavior | Offenders | Victims |
| %Free Meals | -0.0015*** | -0.0020*** | -0.0017*** |
|  | (0.0003) | (0.0005) | (0.0006) |
| N | 27470 | 27470 | 27470 |

### Panel B – Fixed Effects plus Lagged %Free Meals

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | Misbehavior | Offenders | Victims |
| %Free Meals | -0.0014*** | -0.0020*** | -0.0017** |
|  | (0.0003) | (0.0005) | (0.0006) |
| N | 27470 | 27470 | 27470 |

### Panel C – First Differences

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | Misbehavior | Offenders | Victims |
| Δ%Free Meals | -0.0011*** | -0.0017** | -0.0016** |
|  | (0.0003) | (0.0007) | (0.0006) |
| N | 13811 | 13811 | 13811 |

Unit of observation is a school-academic year. Outcomes are the numbers of misbehavior incidents, offenders and victims per 100 students. %Free Meals stands for the percentage of students who obtain free lunches. All regressions include the time-varying school attributes as in Table 2. In addition, Panels A and B include school fixed effects and academic year dummies. Panel B regressions also include the one period lagged value of %Free Meals as a control variable. Regressions in Panel C are obtained from regressing the first-differenced outcomes on first-differenced %Free Meals and first-differenced time-varying controls. Standard errors, which are clustered at the school level, are presented in parentheses. *, **, and *** indicate p-value less than 0.1, 0.05, and 0.01, respectively

**Appendix Table 1**
**Description of Misbehavior Types**

| Misbehavior Type | Description |
| --- | --- |
| Fight | Physical altercations between students |
| Blackmail | Cases in which a student is blackmailed for money or property |
| Confinement | Physical detainment against a student's will |
| Insult | Defamation of a student |
| Threat | Threats or intimidation towards a student |
| Luring | Deception of a student |
| Obscenity | Obscene interactions, including cyberbullying |
| Ostracism | Exclusion of a student from the peer group |

**Appendix Table 2**
**Impact of FSMP on Student Misbehavior**

| | (1) Misbehavior | (2) Misbehavior | (3) Offenders | (4) Offenders | (5) Victims | (6) Victims |
|---|---|---|---|---|---|---|
| FSMP (80% Threshold) | -0.121*** (0.026) | | -0.163*** (0.042) | | -0.142*** (0.051) | |
| FSMP (95% Threshold) | | -0.126*** (0.027) | | -0.159*** (0.044) | | -0.128** (0.052) |
| Academic Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| School FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 27,470 | 27,470 | 27,470 | 27,470 | 27,470 | 27,470 |

In the main text, we assigned FSMP=1 if at least 90% of the students obtained free lunches. In this table, we replicate our baseline results in Table 2 with FSMP which are defined by other thresholds, 95% and 80%.

**Appendix: Propensity Score Matching**

As an additional robustness check of our main results, we repeated our estimation exercise with a propensity score matching (PSM) method. Below we explain the decisions we have made during the implementation in detail.

In a nutshell, this method compares the outcomes (misbehavior rates) in schools that are treated (i.e., adopted FSMP) versus those that are not treated despite having about an equal probability of being treated conditional on their observable characteristics. This strategy estimates the causal effect under the condition of unconfoundedness, i.e., in our application whether a school adopts FSMP is a function of only the observed characteristics of the schools. Since unconfoundedness is not truly testable and it is very a strong assumption, it is usually not applicable to cases that uses non-experimental methods. However, we believe that in our application it is justified. This is because, as explained in section 2 (Institutional Background), the adoption of FSMP by a school depends heavily on the funding support from the local government and other elected officials (such as mayor, education superintendent and city council members). Since only certain political parties support FSMP, the probability of the program take-up by a school is highly correlated with the political support for certain parties. This correlation is depicted in Figure 1 in the main text, which shows that FSMP take-up intensity almost perfectly lines up with whether local elected officials are members of political parties that support FSMP.

Our application of the PSM follows the procedure in Imbens (2015). The first step for this approach is estimating propensity scores. We used the stepwise method described in Imbens and Rubin (2015) and estimated propensity scores through a series of logit regressions. Precisely, after a baseline model (including a basic set of covariates) is estimated, other covariates are

added one by one into the regression. This additional covariate is then included in the final model if a likelihood ratio (LR) test suggests that the coefficient of the added covariate is significantly different from zero. The process continues updating the model until no additional covariate generates an LR statistic greater than a critical value.[26] In this fashion, we tested for covariates themselves, their squares, and their interactions with other covariates. To be on the agnostic side in picking the variables that should be included in the basic model, we started with the base model that contains only an intercept.  We selected variables for the set of additional covariates using our knowledge of the political landscape of South Korea during our study period and the insights about the history of FSMP, as well as student and population demographics. All of the control variables in our baseline model (as in Table 2) are included in the model search.

The procedure resulted in a model with 77 covariates, which include the main control variables and a subset of their interactions. Average marginal effects obtained from the final specification for schools assigned to treatment are presented in Appendix Table 4. In accord with our expectations, the results indicate that schools that are located in areas where the political actors (mayors, governors, and superintendent) are members of the parties that support FSMP, and the schools that obtain greater funding from the local education office are more likely to have adopted the FSMP. In addition, several school attributes are associated with the treatment assignment. Appendix Figure 1 presents the distribution of the estimated propensity scores.

To create a subsample of our data that has a better covariate balance, we drop observations with extreme values of propensity score, as suggested by Crump et al. (2009). As a result of this trimming, only the observations with values of propensity score between 0.1 and 0.9 remain in the sample. The propensity scores are then used to match treated schools to

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[26] Imbens (2015) suggests 1 as the critical value for linear terms, and 2.17 for higher ordered terms.

untreated schools with replacement. We match treated schools with their first nearest neighbor in propensity scores using a caliper of 0.01. We also match observations from the same academic year. The resulting matches exhibit strong balance in observables. For example, Appendix Figure 2 displays the standardized differences between the treated versus untreated schools in matched and unmatched samples for each variable. In the matched sample, the differences are mostly eliminated.

In the final step of the estimation, we compute the average of the difference in outcomes of the treated versus the untreated schools in the matched sample. These average treatment effects are presented in Appendix Table 5. The results are qualitatively identical to our baseline estimates, but the point estimates are smaller. For example, the first column in Panel A shows that FSMP reduces the number of misbehavior cases (per 100 students) by 0.05, or about 16% of the mean. The estimate of FSMP is also negative and significant for victims and offenders. In Panel B, the outcomes are the individual misbehavior types. Similar to our baseline results in the main text, with PSM, we also find that FSMP's impact on student misbehavior is mainly due to the reduction in fights. Among the other misbehavior types, only blackmail is negative and statistically significant. However, the point estimate's magnitude is small.

**Appendix Figure 1**
**Common Support for Propensity Score**
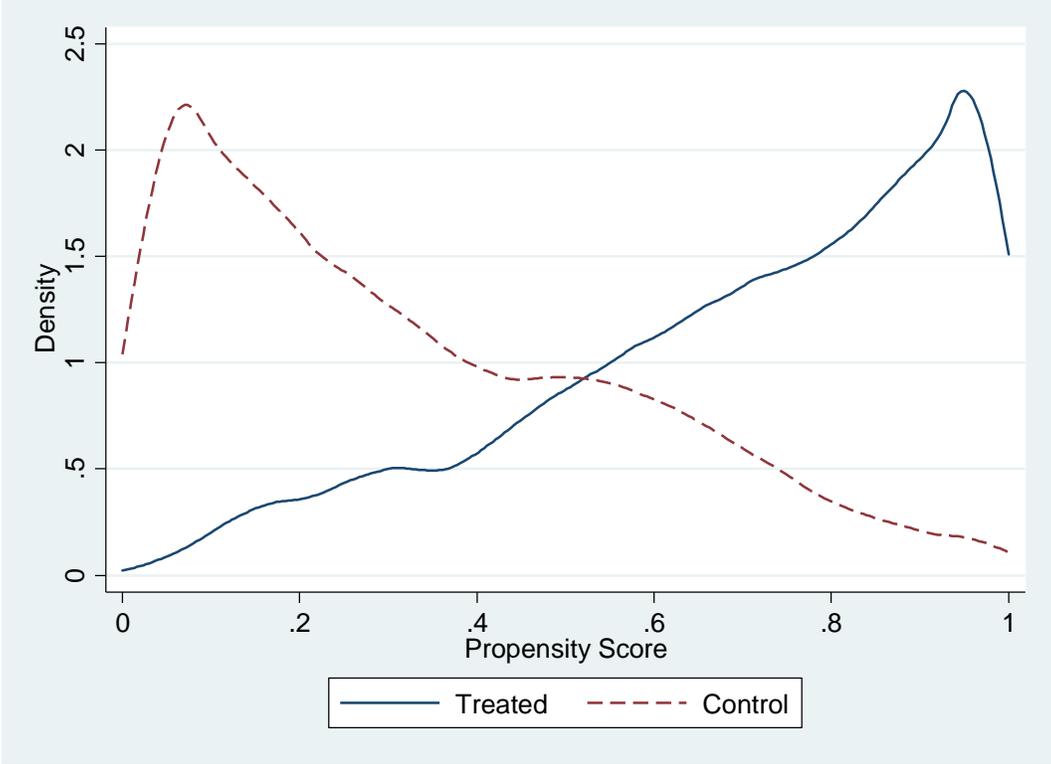


Distribution of the estimated propensity scores of the treated (adopted FSMP) and untreated schools.

**Appendix Figure 2**
**Covariate Balance for Matched and Unmatched Samples**
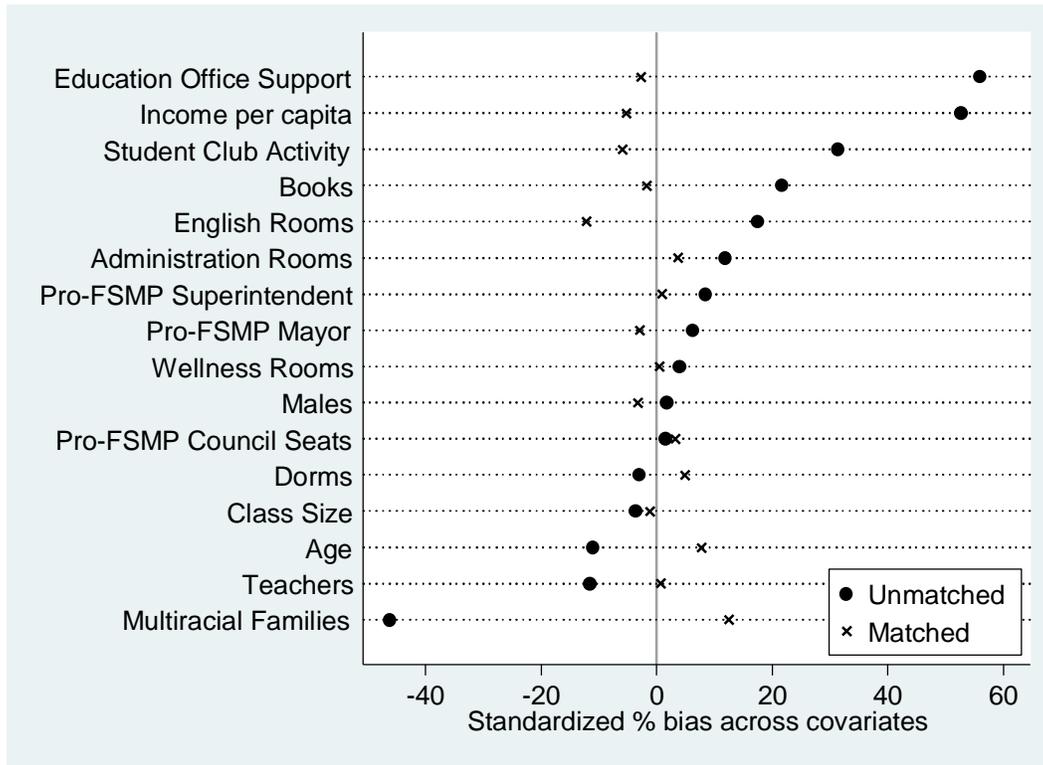


Standardized differences in the covariates in the matched and the unmatched sample.

**Appendix Table 3**
**Determinants of <u>Probability of Adopting FSMP</u> (Propensity Score Specification)**

|                                | FSMP        |
| ------------------------------ | ----------- |
| Class Size                     | 0.004***    |
|                                | (0.001)     |
| Age                            | -0.142***   |
|                                | (0.018)     |
| Club Activity                  | 0.005       |
|                                | (0.007)     |
| Teachers                       | -0.002***   |
|                                | (0.001)     |
| Dorms                          | -0.089***   |
|                                | (0.028)     |
| English Rooms                  | 7.639***    |
|                                | (0.791)     |
| Administration Rooms           | 0.326***    |
|                                | (0.098)     |
| Wellness Rooms                 | 0.557**     |
|                                | (0.230)     |
| Books                          | 0.000***    |
|                                | (0.000)     |
| Education Office Support        | 0.672***    |
|                                | (0.019)     |
| Income per capita              | 0.000***    |
|                                | (0.000)     |
| Multiracial Families           | -0.019***   |
|                                | (0.002)     |
| Superintendent Pro-FSMP Party  | 0.224***    |
|                                | (0.015)     |
| Mayor Pro-FSMP Party           | 0.285***    |
|                                | (0.014)     |
| Council Seats Pro-FSMP Party   | -0.085**    |
|                                | (0.037)     |
| N                              | 27,470      |

Unit of observation is a school-academic year. The outcome is an indicator that takes the value of one if a school provides free lunch to all students, and it is zero if free lunches are provided only to low-income students. The table presents the average marginal effects obtained from a logit regression which we used to estimate the propensity scores. *, **, and *** indicate p-value less than 0.1, 0.05, and 0.01, respectively.

**Appendix Table 4**
**Impact of FSMP on Types of Student Misbehavior (Propensity Score Matching)**

**Panel A**

|  | (1) | (2) | (3) |
|---|---|---|---|
|  | Misbehavior | Offenders | Victims |
| FSMP | -0.050*** | -0.043* | -0.051* |
|  | (0.017) | (0.023) | (0.028) |
| N | 19,781 | 19,781 | 19,781 |

**Panel B**

|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
|  | Fights | Blackmail | Confinement | Insult | Luring | Obscenity | Threat | Ostracism |
| FSMP | -0.038*** | -0.008*** | -0.0002 | 0.0004 | -0.002 | -0.002 | -0.003 | -0.002 |
|  | (0.010) | (0.003) | (0.0016) | (0.0020) | (0.002) | (0.002) | (0.003) | (0.003) |
| N | 19,781 | 19,781 | 19,781 | 19,781 | 19,781 | 19,781 | 19,781 | 19,781 |

Estimates are obtained from propensity score matching method.