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***Evaluation of the National School Lunch
Program Application/Verification Pilot Projects***

Volume III: Impacts on Participation



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Volume III: Impacts on Participation

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EXECUTIVE SUMMARY

To address concerns about the integrity of the process used by school districts for establishing eligibility for free and reduced-price meals in the National School Lunch Program (NSLP) and School Breakfast Program (SBP), the U.S. Department of Agriculture (USDA) sponsored the NSLP Application/Verification Pilot Projects. In particular, USDA asked districts around the country to voluntarily participate by testing ways of improving the process for certifying students as approved to receive free or reduced-price meals. They also commissioned an evaluation of two of these approaches—Up-Front Documentation and Graduated Verification—in 12 public school districts nationally. The evaluation examined the implementation of the pilots, assessed their costs, and estimated their impacts on a set of outcomes designed to measure the success of the school meal programs in providing free or reduced-price meals to their target population without providing benefits to ineligible students. This report focuses on impacts of the pilots on students' participation in the NSLP. In particular, the report examines the impacts of Up-Front Documentation and Graduated Verification on the extent to which students get any school lunch, as well as the extent to which they buy free meals, reduced-price meals, or full-price (or paid) meals, both among all students and among those whose incomes make them eligible for free and/or reduced-price meals.

What Did the Pilot Projects Attempt to Achieve?

The overall objective of the pilot projects was to deter ineligible students from being approved for and getting free or reduced-price meals while at the same time avoiding raising barriers to certification and participation among students eligible for these benefits. Under federal guidelines, children living in families with incomes of 130 percent or less of the federal poverty level qualify for free meals, while those in families with income of between 130 and 185 percent of poverty qualify for reduced-price meals. In addition, children receiving food stamp, Temporary Assistance for Needy Families (TANF), or Food Distribution Program on Indian Reservations (FDPIR) benefits are categorically eligible for free meals.

Most children become certified for free meals by submitting an application on which they report their income and household size or food stamp/TANF/FDPIR case number. Under standard federal rules, no documentation of applicants' income or benefit receipt is required at the time of application. In the verification process, however, districts must select a small sample of applications that have already been approved and collect income or benefit documentation from approved families in order to verify their eligibility for free or reduced-price meals.

Some districts also establish eligibility for the NSLP using a process called direct certification, whereby students on food stamps/TANF/FDPIR can bypass the application process. Information from the food stamp or welfare offices in the states in which these districts are located is used to identify students on assistance, and these students can become certified for free meals without having to complete an application.

The pilots were designed to address a perceived problem that the number of children approved for free or reduced-price meals from families with incomes too high to qualify for the benefits they are receiving is large and perhaps growing. In particular, each of the pilot approaches intensifies the effort of districts to require students to document their income or benefit receipt in order to become certified or maintain their certification status.

Nine districts included in the evaluation implemented *Up-Front Documentation (UFD)*. Under this pilot, districts required all applicants for free or reduced-price meals to provide documentation, either of their income or receipt of public assistance, with the application. Benefits were not granted if the application did not include the required documentation. After the applications and documentation were reviewed and approved, the districts were not required to conduct any subsequent verifications.

Three districts included in the evaluation implemented *Graduated Verification (GV)*, under which the standard verification process was enhanced. Districts using GV first conducted the standard verification process by verifying a small sample of approved applications. Unlike the standard process, however, these districts conducted up to two additional rounds of verification. If at least 25 percent of the initially verified applications had their benefits reduced or terminated as a result of the verification process, districts were required to verify an additional 50 percent of remaining applications. Similarly, if 25 percent of these second-round applications resulted in benefit reduction/termination, districts were required to verify all remaining applications. Finally, students whose benefits were reduced/terminated as a result of verification were required to submit documentation with their application if they applied for benefits in the following year.

Evaluation Design

To estimate the impact of UFD and GV on participation, the evaluation used a comparison group design. For each pilot district, we selected a comparison district with similar characteristics during the pre-pilot period, and that was judged to be similar to the pilot district by program staff familiar with both districts. These comparison districts were used to establish benchmarks for measuring the impacts of UFD and GV. We estimated impacts by comparing average outcomes among students in the pilot districts with those in the comparison districts, controlling for preexisting differences in the observed characteristics of the two groups.

Within the pilot and comparison districts, samples of students were selected that were representative of all the district's students except those who were directly certified. Directly certified students were excluded from the sample because they were not subject to the pilot project rules and therefore not expected to be affected by the pilot procedures. Our analysis sample includes 1,950 students' families in UFD pilot and comparison districts, and 1,070 families in GV districts.

Key information on sampled families was obtained by administering two surveys to the student's parent or guardian, and by examining administrative data provided by the districts included in the evaluation. Initially, we conducted a telephone interview with the parent or guardian of each student in the sample, in which respondents were asked about experiences with and perceptions of the program—including the extent to which their child ate school lunches—

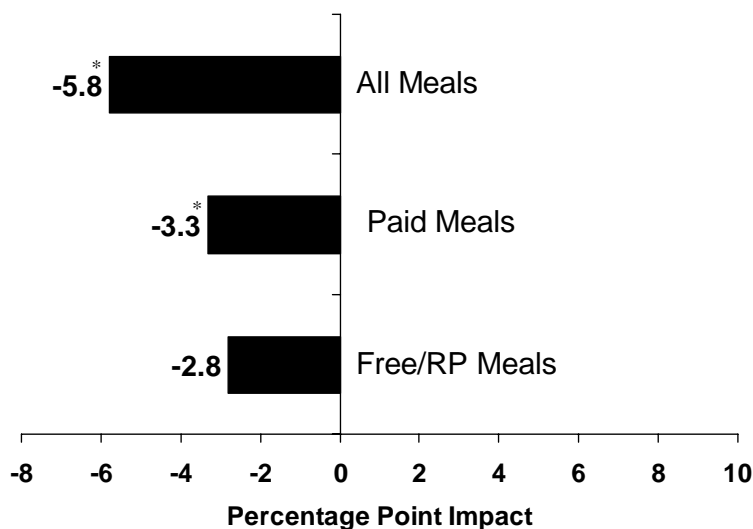
and about characteristics of their family. They were also asked a simple set of questions about their household size and income. Unless the respondent reported a very high income level, we then conducted an in-person interview with the family. The purpose of the in-person interview was to collect more detailed information about the household's size and income. In particular, respondents were asked detailed questions about each source of income for each household member, and were also asked to retrieve documentation of income amounts. To obtain highly accurate information on the certification status of all sample members, we relied on administrative records provided by the pilot and comparison districts.

The Impacts of Up-Front Documentation

Overall, UFD led to a decrease in the proportion of all students getting a school lunch on a given day. The estimated impact of the pilot on the overall participation rate (as reported by parents) was -5.8 percentage points, and was statistically significant. This impact represented a reduction in participation of about 8 percent from the parent-reported rate of 72.6 in comparison districts.

The overall decrease in participation brought about by UFD arose from a combination of a statistically significant decline in the free/reduced-price meal participation rate of 2.8 percentage points (or 15 percent) and a decline in the paid participation rate of 3.3 percentage points (6 percent) that was not statistically significant.

Estimated Impact of Up-Front Documentation on Rates of NSLP Participation Among Non-Directly Certified Students



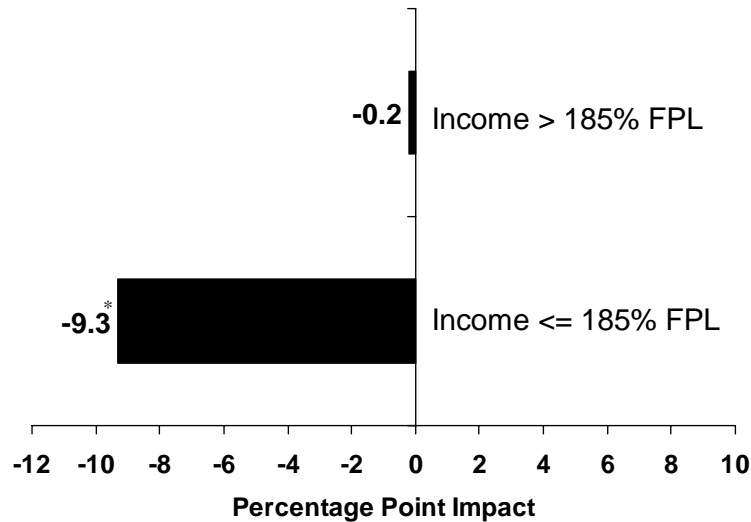
* Estimated impact is statistically significant at the 0.05 level.

The negative impact of UFD on the overall participation rate could have different interpretations depending on which students were participating at lower levels as a result of the pilot intervention. The intervention was designed to reduce certification for free or reduced-price meals among students who were income-ineligible for benefits without reducing certification among income-eligible students. Correspondingly, it was designed to reduce free and reduced-price participation among income-ineligible students without altering free or reduced-price participation among students whose incomes made them eligible for these benefits.

Based on impact estimates from the evaluation, UFD had the opposite effect. Among income-ineligible students, the estimated impact of UFD on the free/reduced-price NSLP participation rate was very small (-0.2 percentage points) and not statistically significant. Among income-eligible students, by contrast, UFD was estimated to lead to a statistically significant 9.3 percentage point decline in the free/reduced-price participation rate. Among both groups, the estimated impact on the paid participation rate was not statistically significant.

These estimates of the impact of UFD on NSLP participation rates are consistent with the

Estimated Impact of Up-Front Documentation on Rates of Free/Reduced-Price NSLP Participation, by Income Level



FPL = Federal Poverty Level

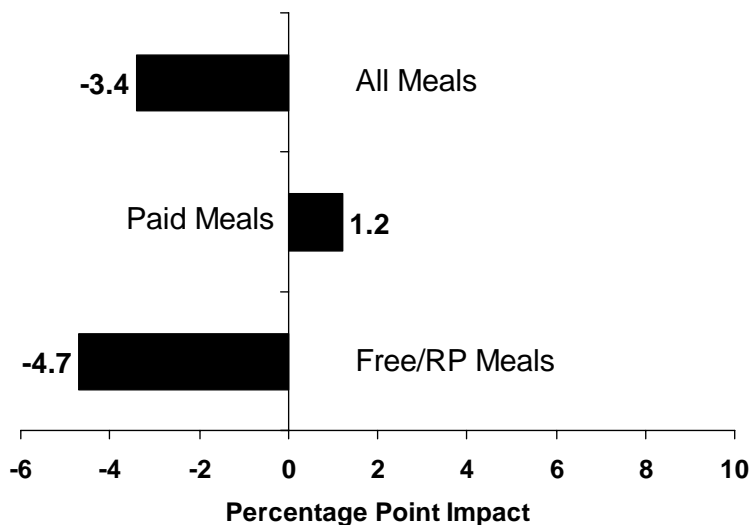
* Estimated impact is statistically significant at the 0.05 level.

observed changes in the participation rate during the first year in which the UFD pilot was in place. While the evaluation suggested that UFD led to a decline in the overall free/reduced-price participation rate of about 15 percent, the observed free/reduced-price participation rate in the UFD pilot districts declined by 16 percent between the year before UFD and the first year it was in place.

The Impacts of Graduated Verification

Overall, GV was estimated to lead to a small reduction in the participation rate of -3.4 percentage points, which represented a 4 percent decline from the rate of 81.5 percent in comparison districts. This estimated impact was not statistically significant at the 0.05 level. The estimated impact on the free/reduced-price participation rate was larger in magnitude, at -4.7 percentage points, which represented a 14 percent decline from the rate of 33.5 percent in comparison districts, but this estimate was not statistically significant either.

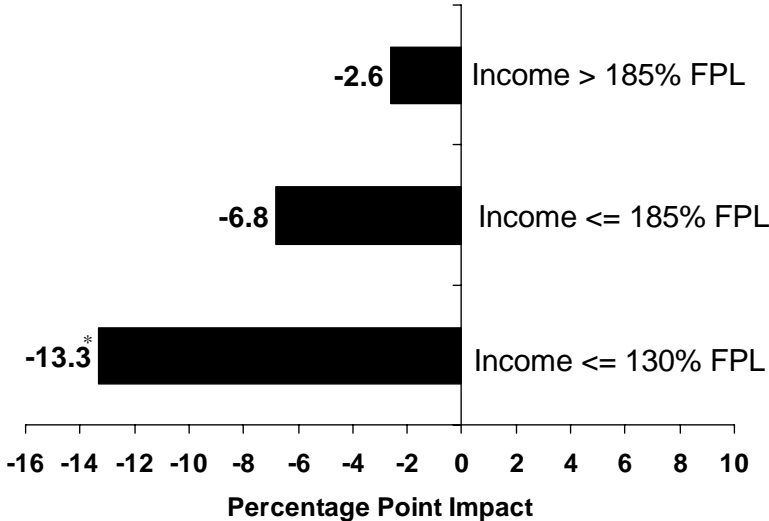
Estimated Impact of Graduated Verification on Rates of NSLP Participation Among Non-Directly Certified Students



None of the estimated impacts is statistically significant at the 0.05 level.

The estimated impact of GV on the free/reduced-price participation rate was negative among both students from households with incomes of no more than 185 percent of the federal poverty level and among students from households with higher incomes. In each case, however, the estimated impact was not statistically significant. Among those from households with incomes of no more than 185 percent of poverty (and thus income eligible for free or reduced-price meals), GV was estimated to lead to a 6.8 percent decline in the free/reduced-price participation rate. Among higher-income households, the estimated impact was -2.6 percentage points. However, among the lowest-income households—those of no more than 130 percent of poverty and thus income-eligible for free meals—GV was estimated to lead to a 13.3 percent decline in the participation rate. This estimated impact was statistically significant at the 0.05 level.

Estimated Impact of Graduated Verification on Rates of Free/Reduced-Price NSLP Participation, by Income Level



FPL = Federal Poverty Level

* Estimated impact is statistically significant at the 0.05 level.

I. INTRODUCTION

The National School Lunch Program (NSLP) and School Breakfast Program (SBP) serve nearly 4 billion free and reduced-price meals annually to children certified as being from low-income households (U.S. Department of Agriculture 2003). In recent years, however, policymakers have raised concerns about the integrity of the programs' process for establishing eligibility for these benefits. In response, the U.S. Department of Agriculture (USDA) asked school districts around the country to voluntarily participate in the National School Lunch Program Application/Verification Pilot Projects to test ways of improving the process for certifying students for free and reduced-price meals. USDA also contracted with Mathematica Policy Research, Inc. (MPR) to conduct an evaluation of two of the approaches that were tested: (1) Up-Front Documentation (UFD), and (2) Graduated Verification (GV).

This report presents the impacts of UFD and GV on the extent to which students *participate* in the NSLP by getting a meal for which the School Food Authority (SFA) seeks federal reimbursement. A companion study to this report (Burghardt et al. 2004) described the findings of the evaluation on the effects of UFD and GV on the *certification* of income-eligible and income-ineligible students for free or reduced-price benefits. The analysis presented in this report extends the analysis of certification to examine how the demonstration affected the participation of eligible and ineligible students, as well as the participation of certified and noncertified students.

The rest of this chapter presents important background information for the study, lists the key research questions being addressed, and briefly summarizes the relevant prior research.

A. STUDY BACKGROUND

Several studies examining income levels of students certified for free or reduced-price meals have found that a nontrivial number of these students have income levels that make them ineligible for the level of benefits they are receiving (U.S. Department of Agriculture 1990, and Office of Inspector General, USDA 1997). To address this issue, USDA sought school districts to test alternative ways of determining the income eligibility of students' families. USDA published a report on first-year experience of these districts (U.S. Department of Agriculture 2002) to describe changes in the districts that implemented UFD and GV, and it contracted for the evaluation to estimate the impacts of these pilot projects on selected outcomes. In particular, the evaluation included nine districts that tested UFD during the 2000-2001 through 2002-2003 school years and three districts that tested GV during these same years.

Under UFD, districts required that all applicants for free or reduced-price meals provide documentation of their income or food stamp/Temporary Assistance for Needy Families (TANF) receipt with their application.¹ If the application did not include documentation, the district was required to inform the household that the application was incomplete and request that the household resubmit the application with documentation. Without documentation, the district could not certify a student for free or reduced-price meal benefits. After the district reviewed and approved applications, it was not required to perform the verification of income for any free or reduced-price approved children, whereas, under federal regulations, a small sample of approved households typically is verified. Students certified for free meals through direct certification in the UFD pilot districts were not subject to these requirements, which applied only to students who submitted an application.

¹ For additional details on the pilot projects and how their rules differed from standard district eligibility determination procedures, see Burghardt et al. (2004).

Under GV, application procedures were strengthened and, in certain circumstances, the verification process was enhanced. First, households that applied for free or reduced-price meals and whose benefits had been terminated or reduced in the prior year because of the district's verification procedures had to provide documentation of their incomes or of their categorical eligibility at the point of application. Second, the district was required to conduct the standard verification of three percent of participating households and the following additional verifications:

- If 25 percent or more of the originally verified applications led to a termination or reduction of free or reduced-price meal benefits, the district was required to verify an additional 50 percent of remaining applications.
- If 25 percent or more of these second-round verifications resulted in terminations or reductions in benefits, the district was required to verify all remaining applications.

B. RESEARCH QUESTIONS

The evaluation examines the overall effects of UFD and GV on the NSLP. Burghardt et al. (2004) presented estimates of the impacts on certification for free or reduced-price meals among students who were income eligible and students who were not income eligible for the benefits. In this report, we present estimates of the impacts of UFD and GV on NSLP participation that address four sets of research questions:

1. How do UFD and GV affect the percentages of students who get free meals, reduced-price meals, and paid meals on a typical school day? How do the pilots affect the overall NSLP participation rate?
2. How do UFD and GV affect participation rates among students income eligible for benefits? How do the pilots affect participation rates among students not income eligible for free or reduced-price meals?
3. How do UFD and GV affect the rate of participation accuracy—that is, the percentage of students getting free or reduced-price meals who are income eligible for these benefits?

4. What is the proportion of school lunch reimbursements paid in excess of the amount that should be paid based on students' true income eligibility levels in UFD and GV pilot and comparison districts?

C. PRIOR RESEARCH

The findings of the evaluation with respect to the impacts of UFD and GV on application rates (Hulsey et al. 2004) and certification rates (Burghardt et al. 2004) for free and/or reduced-price meals provide some guidance as to what we may expect the impacts of the pilots on participation to be. Those reports found that the estimated impacts of UFD and GV on certification among students income ineligible for free or reduced price meal benefits were not statistically significant. In other words, the evaluation found no statistically significant evidence that the pilots deterred income-ineligible students from applying for, and being approved for, free or reduced-price meals. On the other hand, the pilots reduced application rates and certification rates among income eligible students. Thus, the pilots created barriers to certification among some students who qualified for free or reduced-price meal benefits. Finally, the estimated effects of UFD and GV on rates of certification accuracy—the percentage of students certified for free or reduced-price meals who were income eligible for the benefits they were receiving—were not statistically significant.

Previous research has shown that certification and participation rates are positively related—students certified for free or reduced-price meals are more likely than otherwise similar noncertified students to get a school lunch (see, for example, Gleason 1995). If this relationship holds for the students in UFD and GV districts in the evaluation, in light of the findings in Burghardt et al. (2004) cited above, we expected the following impacts of the pilots on participation:

- A decline in NSLP participation of income eligible students

- No significant change in the NSLP participation of income ineligible students
- A decline in overall NSLP participation

A U.S. Department of Agriculture report titled: NSLP Application/Verification Pilot Projects: Report on First Year Experience (2002) used aggregate administrative data to compare participation in the pilot districts during the first year of pilot implementation with participation during the period just before pilot implementation. Both UFD and GV districts had reductions in free and reduced-price meals and increases in paid meals served to students in the first year of implementation compared to the previous year. The net effects of these offsetting changes were modest reductions in total meals served after pilot implementation. One limitation of this analysis, however, was that it could not distinguish between free or reduced-price meal participation among students income eligible for these benefits versus free or reduced-price meal participation among income-ineligible students.

Since Burghardt et al. (2004) found that the estimated effect of the pilots on the rate of certification accuracy was not statistically significant, we had no strong a priori expectations about whether the impact on participation accuracy would be positive or negative. Nor do we have a strong expectation about the direction or magnitude of the impact of the pilots on the rate of reimbursements paid in excess of the amount that should be paid based on students' true eligibility levels.

II. DATA AND METHODS

The methods we used to estimate the impacts of Up-Front Documentation (UFD) and Graduated Verification (GV) on participation levels and participation accuracy in this report build directly on the methods used to estimate impacts on certification levels and certification accuracy as described in Burghardt et al. (2004).¹ The study used a comparison group design, in which a single comparison district was selected to match each UFD and GV pilot district in the evaluation.² We interviewed parents of samples of students selected from each pilot district and a matched comparison district and used survey and administrative data to measure their outcomes (certification status, certification eligibility, and participation). The difference between mean outcomes in pilot versus comparison districts, after controlling for other observable characteristics in a regression framework, was the estimate of the impact of UFD and GV on these outcomes.

The student samples were selected at random from among all students in the pilot and comparison districts, except for those who had been *directly certified* to receive free meals on the basis of receipt of food stamps, TANF, or assistance from the Food Distribution Program on Indian Reservations (FDPIR). Thus, the results presented in this report generalize to all

¹ For a detailed description of the methodology used to estimate the impacts of the pilots on certification and certification accuracy, see Volume II of Burghardt et al. (2004).

² A drawback of a nonexperimental comparison group design such as this is that it is difficult to identify and successfully recruit comparison districts that are similar to pilot districts in all ways except for the pilot intervention. We developed a careful process for selecting comparison districts that we felt would meet this objective, and, for the most part, the resulting characteristics of students in comparison versus pilot districts were similar. Nonetheless, we could not identify or control for *unobservable* differences between the two groups of districts. See Burghardt et al. (2004) for a description of the comparison district selection process, as well as the observable characteristics of students in pilot versus comparison districts.

non-directly certified students in the evaluation districts. The reason for the exclusion of directly certified students was that the UFD and GV pilot interventions directly affected only those students who were not directly certified.³ For selected tables, however, the report also includes estimates of the rates of participation and participation accuracy for the full group of students, including those directly certified. These estimates are based on a set of assumptions made about the levels of participation and rates of participation accuracy using a methodology described in greater detail later in this chapter.

The rest of this chapter describes details of the methods we used to address the research questions listed in Chapter I. Section A describes the data and methods we used to estimate NSLP participation. Section B lists the outcome measures we examined, summarizing how we used the NSLP participation data to create these outcome measures. Section C presents the methodology we used to estimate impacts of UFD and GV on these outcomes. Finally, Section D reports on some limitations of the study design.

A. MEASURING NSLP PARTICIPATION

The primary data source for measuring NSLP participation levels in the pilot and comparison districts in this report was the survey of the parents or guardians of sampled students in these districts. We contacted parents, by telephone and thru in-home interviews, between October 2002 and January 2003. We asked them, among other questions, how many days per week their children usually ate a school lunch. We then divided the reported number of meals in a usual week by five to estimate each student's likelihood of getting a school lunch on any given

³ We tried to minimize the influence of the exclusion of directly certified students on the impact estimates from the evaluation by selecting comparison districts that matched the pilot districts in their use of direct certification. For further discussion of this issue, see Burghardt et al. (2004).

day. By averaging this likelihood of participating on a given day across all sampled students in a district, we obtained an estimate of the overall daily participation rate of students in that district, excluding those who had been directly certified.

To estimate participation rates among all students, including those directly certified, we relied on the assumption that patterns of participation among directly certified students would be similar to those among non-directly certified students with incomes of no more than 130 percent of poverty in the appropriate comparison district. In other words, for directly certified students in a given pilot district, the participation rate is assumed to be equal to the participation rate among non-directly certified students who are income eligible for free meals in the comparison district to which that pilot district is matched. For directly certified students from that comparison district, the participation rate assumption is the same.⁴ This assumption, along with information on the percentage of all students who were directly certified, allowed us to estimate the overall participation rate.

These estimates were based on reports by each student's parent/guardian about whether the student usually got a school lunch. Because of the burden involved, the study did not gather individual-level *administrative* data on whether each sampled student received a reimbursable school meal over a specific period.

The other key piece of information used in measuring NSLP participation was information obtained from school records on the certification status of each student in the sample.⁵ This information enabled us to classify each student selected for the study as certified for free meals,

⁴ The reason that the same participation rate assumption is made for matched pairs of pilot and comparison districts is that we wanted to ensure that we did not create an impact on participation among this group by assumption.

⁵ See Burghardt et al. (2004) for a description of the collection of school records data on students' certification status.

certified for reduced-price meals, or not certified. Correspondingly, we used certification status to classify the meals the student obtained as either free, reduced-price, or paid.

An important limitation of the study's participation data is that parents reported the data. This is a limitation because parents may not know whether their children actually got school lunches. For example, parents may not know the extent to which their children obtain NSLP reimbursable lunches when they are at school. Previous research indicates that parents typically overestimate their children's true levels of participation as measured by administrative counts of reimbursable meals claimed by SFAs. Burghardt et al. (1993) and Gleason and Sutor (2001), for example, found substantially higher rates of participation when estimates were based on parental reports of usual participation than when based on foods consumed from the school cafeteria on a given day.

Due to this potential misreporting of students' NSLP participation by their parents, we sought an alternative way of both measuring NSLP participation in the pilot and comparison districts and estimating the impact of the pilot on participation. An alternative method of measuring NSLP participation rates in pilot and comparison districts is to use SFA administrative records to provide aggregate counts of reimbursable meals claimed by students. FNS regularly collected NSLP administrative data from UFD and GV pilot and comparison districts during the years of pilot operation and in two prepilot years. Data FNS collected included the number of free, reduced-price, and paid meals served in the district by month, along with the number of serving days and the number of students enrolled in the district. This information allowed us to calculate participation rates, defined as the percentage of all students in the district who got a school lunch (overall, or by meal price status—free, reduced-price, or paid) on a given day. This methodology provides an accurate estimate of overall participation at the district level, but it cannot be used to determine the participation status of individual students

in the district (or in our sample). Without individual-level participation data, we would not be able to estimate participation rates separately for students who were income eligible versus those who were income ineligible. Nor could we use the other individual-level information collected in the evaluation surveys to control for factors unrelated to the pilot intervention that may have influenced participation.

Because the parent-reported data on participation from the survey were available at the student level, we use that source of information throughout this report. Because of the possibility that a parent-reported measure of NSLP participation is not accurate, however, we also used the administrative data on participation to conduct a sensitivity analysis to assess whether our results would likely have been different if we had more accurate individual-level participation data. In general, the sensitivity analysis corroborated the findings reported in Chapter III. Appendix A describes this sensitivity analysis and its results.

B. OUTCOME MEASURES

We used the data on NSLP participation rates to define three main types of outcome variables for our analysis: (1) participation rates, (2) rates of participation accuracy, and (3) rates of reimbursement accuracy. We were interested in measuring these outcomes for all students and for selected subgroups of students as defined by their income eligibility and certification statuses. Table II.1 shows one way of conceptualizing the relevant categories of all students and of NSLP participants.

The top panel of Table II.1 is a modified version of Table II.1 in Burghardt et al. (2004). This panel shows how the total population of students in a district is distributed across different categories of certification status and income eligibility status. For example, the group N_E represents the number of students certified for free meals by application in the district (regardless of income eligibility status). The bottom panel has a similar structure, but instead of showing

TABLE II.1

POSSIBLE COMBINATIONS OF INCOME AND CERTIFICATION STATUS,
ALL STUDENTS AND NSLP PARTICIPANTS

Certification Status	Income Eligibility Status			Total
	<= 130 Percent FPL ^a	131 to 185 Percent FPL	> 185 Percent FPL	
<i>All Students</i>				
Directly Certified ^b	N _A	---	---	N _A
Certified Free by Application	N _B	N _C	N _D	N _E
Certified Reduced-Price	N _F	N _G	N _H	N _I
Not Certified (Paid)	N _J	N _K	N _L	N _M
Total	N_N	N_O	N_P	N_Q
<i>NSLP Participants^c</i>				
Directly Certified ^b	P _A	---	---	P _A
Certified Free by Application	P _B	P _C	P _D	P _E
Certified Reduced-Price	P _F	P _G	P _H	P _I
Not Certified (Paid)	P _J	P _K	P _L	P _M
Total	P_N	P_O	P_P	P_Q

^aThis column potentially includes both students receiving food stamp or Temporary Assistance for Needy Families (FS/TANF) benefits and students not receiving these benefits. For simplicity, we assume that no FS/TANF recipients have incomes above 130 percent of the FPL.

^bWe assume that all directly certified students have incomes below 130 percent of the FPL.

^cIf a student obtained an NSLP lunch, the student is assumed to be a participant in the meal price status category for which he or she is certified, or if the student is not certified, he or she is assumed to be a paid participant. Our analysis assumes meal counting and claiming for reimbursement purposes were performed correctly.

FPL = federal poverty level.

how all students are distributed across these groups, it shows how school lunch participants are distributed across the groups. For example, P_E represents the number of students who are certified for free meals by application who got a school lunch on a given day.

Together, the two panels of Table II.1 can be used to define the various outcome measures examined in this report. Table II.2 lists these outcomes and defines them in terms of the groups shown in Table II.1. We describe the outcomes in greater detail below.

1. Participation Rates

As described earlier, the NSLP participation rate is defined as the likelihood that the student ate a school lunch on any given day and is based on a parental report on the household survey. We calculated the participation rate by dividing the reported number of meals the student usually ate per week by five. By calculating the mean of this variable across all students in our sample in a given district, we estimated the NSLP participation rate among non-directly certified students in that district. For calculating the percentage of all students who ate free, reduced-price, or paid meals, we used information on the certification status of each student that we obtained from the district to assign the meals that students received to the free, reduced-price, or paid category.

We derived the other participation rate outcomes by limiting the group for which the participation rate was calculated. In particular, we measured the rate of participation among students income eligible for free (or free/reduced-price) meals by restricting the sample to students with estimated incomes of no more than 130 percent (185 percent) of the federal poverty level (FPL). Similarly, we measured the rate of participation among income ineligible students by restricting the sample to students with incomes above 185 percent of the FPL.

TABLE II.2

OUTCOME MEASURES USED IN ESTIMATING IMPACTS ON PARTICIPATION

Outcome Measure	Population/Sample ^a
Participation Rates	
P1: Probability that student obtained a school lunch on typical day	P_Q / N_Q
P2: Probability that student obtained a free school lunch on typical day	P_E / N_Q
P3: Probability that student obtained a reduced-price school lunch on typical day	P_I / N_Q
P4: Probability that student obtained a paid school lunch on typical day	P_M / N_Q
P5: Probability that student income eligible for free meals obtained a school lunch on a typical day	P_N / N_N
P6: Probability that student income eligible for free meals obtained a free school lunch on a typical day	P_B / N_N
P7: Probability that student income eligible for free meals obtained a reduced-price school lunch on a typical day	P_F / N_N
P8: Probability that student income eligible for free meals obtained a paid school lunch on a typical day	P_J / N_N
P9: Probability that student income eligible for free or reduced-price meals obtained a school lunch on a typical day	$(P_N + P_O) / (N_N + N_O)$
P10: Probability that student income eligible for free or reduced-price meals obtained a free school lunch on a typical day	$(P_B + P_C) / (N_N + N_O)$
P11: Probability that student income eligible for free or reduced-price meals obtained a reduced-price school lunch on a typical day	$(P_F + P_G) / (N_N + N_O)$
P12: Probability that student income eligible for free or reduced-price meals obtained a paid school lunch on a typical day	$(P_J + P_K) / (N_N + N_O)$
P13: Probability that student not income eligible for free or reduced-price meals obtained a school lunch on a typical day	P_P / N_P
P14: Probability that student not income eligible for free or reduced-price meals obtained a free school lunch on a typical day	P_D / N_P
P15: Probability that student not income eligible for free or reduced-price meals obtained a reduced-price school lunch on a typical day	P_H / N_P
P16: Probability that student not income eligible for free or reduced-price meals obtained a paid school lunch on a typical day	P_L / N_P

TABLE II.2 (continued)

Outcome Measure	Population/Sample ^a
Rates of Participation by Certification Status	
P_CF: Probability that student certified for free meals obtained a school lunch on a typical day	P_E / N_E
P_CRP: Probability that student certified for reduced-price meals obtained a school lunch on a typical day	P_I / N_I
P_NC: Probability that student not certified for free or reduced-price meals obtained a school lunch on a typical day	P_M / N_M
Rates of Participation Accuracy	
Free Meal Accuracy	
PA_F: Percentage of free meals served to students income eligible for free meals	P_B / P_E
Free/Reduced-Price Meal Accuracy	
PA_FRP1: Percentage of free or reduced-price meals served to students income eligible for the level of benefits they received	$(P_B + P_G) / (P_E + P_I)$
PA_FRP2: Percentage of free or reduced-price meals served to students not overcertified for the level of benefits they received	$(P_B + P_G + P_F) / (P_E + P_I)$
PA_FRP3: Percentage of free or reduced-price meals served to students with incomes below 185 percent of the FPL	$(P_B + P_G + P_F + P_C) / (P_E + P_I)$
Rates of Reimbursement Accuracy	
RA_OP: Percentage of all federal reimbursements for meals served to students not eligible for the level of benefits they received	$[0.40P_C + 1.94P_D + 1.54P_H] / (2.29P_E + 1.89P_I + 0.35P_M)$
RA_UP: Percentage shortfall in federal reimbursements because some certified students received a lower benefit than they were eligible for	$0.40P_F / [2.29P_E + 1.89P_I + 0.35P_M]$

^aThe formulas shown here are all designed to show rates of participation, participation accuracy, and certification accuracy among non-directly certified students, since that is the group that forms the basis for most of the analysis in the report. Thus, where relevant, the formulas should be assumed to exclude the groups N_A and P_A .

FPL = federal poverty level.

In defining these subgroups, we used income information collected in both telephone and in-person surveys as part of the evaluation. We developed a process to try to minimize the extent of reporting error in the income data and classify students into income categories as accurately as possible. We also conducted a sensitivity analysis to determine whether the estimated impacts of the pilot on the rate of certification changed under different ways of defining income. We found that the results were robust to changes in the specifics of the process for defining income eligibility categories. See Burghardt et al. (2004) for more information about the process used to define income eligibility categories and the sensitivity of the results to the income eligibility definition used.

As mentioned previously, we estimated the participation rate among all students in the district (including those directly certified), by using information on the percentage of students in the district who were directly certified and relying on the assumption that directly certified students participate at the same rate as non-directly certified students in the same income category (that is, with incomes of no more than 130 percent of poverty). To calculate the participation rate among all students, for example, we used the following formula:

$$(1) \quad Pr(M) = Pr(M | NDC) * \{1 - Pr(DC)\} + Pr(M | DC) * Pr(DC) \\ = Pr(M | NDC) * \{1 - Pr(DC)\} + Pr(M | NDC, Income \leq 130, Comp. Dist.) * Pr(DC)$$

In this equation, the participation rate among all students is represented by the probability of getting a school meal (M). This is equal to the weighted sum of two terms. The first term is the participation rate among non-directly certified students, or the probability of getting a meal conditional on no direct certification (NDC), and the weight on this term is the probability of not being directly certified ($1 - Pr\{DC\}$). The second term is the participation rate among directly certified students, which—given the above assumption—can be written as the probability of

getting a meal conditional on not being directly certified, having a household income of no more than 130 percent of poverty, and being in the appropriate comparison district. The weight on this second term is the probability of being directly certified ($Pr\{DC\}$).

2. Rates of Participation Accuracy

Participation accuracy rates measure the percentage of free or reduced-price meals served to students eligible for the level of benefits for which they are certified. For example, free meal participation accuracy is defined as the percentage of all free meals consumed by students whose household incomes are less than 130 percent of the FPL or who receive food stamps or TANF. Conversely, 100 minus the participation accuracy rate is the measure of the percentage of meals served to students who were ineligible to receive them.

These measures of participation accuracy correspond to the measures of certification accuracy presented in Burghardt et al. (2004). That report presented four certification accuracy measures—one measure of free meal certification accuracy and three measures of free/reduced-price certification accuracy. Each of these four measures was calculated separately for a population that excluded directly certified students and for a population that included directly certified students. Analogously, we present two sets of four participation accuracy measures in this report—for both non-directly certified students and all students, in other words, we present the measure of free meal participation accuracy described in the preceding paragraph and three measures of free/reduced-price participation accuracy. In each case, as Table II.2 shows, the participation accuracy measure focuses on a group of *participants* (thus excluding students who do not get school meals) to determine whether the level of benefits they are receiving (free, reduced-price, or paid) is consistent with their household circumstances.

The four definitions of free/reduced-price participation accuracy differ in how they define free/reduced-price participants as being eligible, or accurate. The first measure treats

free/reduced-price participants as being accurate if their household circumstances make them income eligible for exactly the level of benefits they are receiving—that is, if their income is less than 130 percent of the FPL and they are free meal participants or if their income is between 130 and 185 percent of the FPL and they are reduced-price meal participants. The second measure of free/reduced-price meal accuracy loosens the definition of accuracy somewhat, treating participants as accurate as long as they are not “overcertified”—that is, certified for a higher level of benefits than that for which they were eligible. Thus, free meal participants with incomes of less than 130 percent of poverty and reduced-price participants with incomes of less than 185 percent of poverty would be considered accurate, while all other free/reduced-price meal participants would be considered inaccurate. Therefore, meals received by students certified for reduced-price meals but eligible for free meals would be counted as inaccurate in the first measure but accurate in the second one. The third measure is the most inclusive measure of free/reduced-price meal participation accuracy—any free or reduced-price meal participant with an income less than 185 percent of poverty is considered accurate. In this measure, meals received by students certified for free meals but eligible for reduced-price meals are counted as accurate, whereas in the first and second measure such meals are counted as inaccurate.

3. Reimbursement Accuracy

The final outcome measure is similar to the participation accuracy measure but takes into account that different types of inaccuracy have different financial consequences. These differential consequences arise from the fact that USDA reimburses NSLP lunches at three levels for free, reduced-price, and paid lunches. In particular, lunch reimbursements are specified in the National School Lunch Act. For the 2002-2003 school year, Section 4 of the Act specified a reimbursement rate for all lunches served, and Section 11 specified additional payments for free and reduced-price meals. In addition, SFAs receive donated commodities for each meal served.

The overall per-lunch reimbursement rates in 2002-2003 were \$2.29 for free lunches, \$1.89 for reduced-price lunches, and \$0.35 for paid lunches. These totals represent the sum of the Section 4 and Section 11 funds, along with the value of donated commodities, as shown in Table II.3.

Thus, a district that served a free school lunch in 2002-2003 to a student who was income eligible for only a reduced-price lunch was reimbursed \$0.40 more than it should have been reimbursed according to the student's income eligibility level. If, on the other hand, that student had been income eligible for neither free nor reduced-price meals, the district would have been reimbursed \$1.94 more than it should have been.

To measure reimbursement accuracy, we developed two measures of the prevalence of erroneous payments. The first is the overpayment rate, defined as the percentage of actual payments made to districts in excess of what the district would have received if no school lunch participants had been overcertified. The second is the rate of underpayments among certified students. This is defined as the amount of additional payments that should have been—but were not—made to districts due to participants being income eligible for free meals but certified for reduced-price meals only, measured as a percentage of actual payments made to the district.⁶

We took the following steps to measure these two rates of erroneous payments. We first calculated average reimbursement amounts under three alternative scenarios within each of the districts in the evaluation:

- ***Scenario 1: Actual Reimbursements.*** Reimbursements under Scenario 1 were defined as the reimbursements actually paid per student in the district. For a given student, this was calculated as his or her probability of getting a school lunch on a

⁶ This rate of underpayments among certified students does not take into account “underpayments” brought about by paid meal participants who were eligible for free or reduced-price meals.

TABLE II.3

REIMBURSEMENT RATES PER MEAL FOR NSLP LUNCHES SERVED^a

Type of Lunch	Section 4	Section 11	Value of Donated Commodities	Total
Free	0.20	1.94	0.15	\$2.29
Reduced-Price	0.20	1.54	0.15	\$1.89
Paid	0.20	0.00	0.15	\$0.35

^aThese are the reimbursement rates for the majority of SFAs. A few SFAs receive higher reimbursement rates, either because they have a large proportion of students eligible for free or reduced-price meals or because they are located outside of the continental United States.

typical day times the amount the school would have been reimbursed if that student did get a school lunch, which was determined by the student’s actual certification status (\$2.29 for those certified for free meals, \$1.89 for those certified for reduced-price meals, and \$0.35 for noncertified students). For a given student, the equation below shows how the actual reimbursements were calculated:

$$(2) \quad R_{actual} = Pr(M) * [2.29*CF + 1.89*CRP + 0.35*(1-CF - CRP)]$$

where M = gets a school meal

CF = binary indicator of whether student is certified free

CRP = binary indicator of whether student is certified reduced-price

- **Scenario 2: Reimbursements with No Overcertification.** Under Scenario 2, we calculated the reimbursements per student the district would have received if no student were reimbursed for a benefit in excess of the one for which they were actually income eligible. This amount was calculated as the student’s probability of getting a school lunch times the maximum reimbursement for which the student was both income eligible and had been certified. If, for example, the student was certified for free meals but income eligible only for reduced-price meals, the level of reimbursement used in this calculation would have been \$1.89 (the reduced-price reimbursement) based on their actual income eligibility.⁷ The equation below shows the calculation of reimbursements with no overcertification for a given student:

$$(3) \quad R_{no_overcert} = Pr(M) * [2.29*CF*FE + 1.89*(CF*RPE + CRP*FRPE) + 0.35*(1-CFRP*FRPE)]$$

where M , CF , and CRP are defined as before, and

$CFRP$ = binary indicator of whether student is certified free or reduced-price

FE = binary indicator of whether student is income eligible for free meals

RPE = binary indicator of whether student is income eligible for reduced-price meals

⁷ The reimbursements calculated under this scenario did not take into account “under certification,” however. In other words, among students who were eligible for greater reimbursements than their current certification level, Scenario 2 reimbursements would include only the level of benefits they were receiving, not the higher level of benefits for which they were eligible.

$FRPE$ = binary indicator of whether student is income eligible for free or reduced-price meals

- **Scenario 3: Reimbursements with Accurate Certification.** Under Scenario 3, we calculated the reimbursements per student the district would have received if all certified students had been certified accurately according to their income eligibility level. This amount was calculated as the student’s probability of getting a school lunch times the reimbursement the district would have received if all certified students income eligible for free meals had been certified for free meals and if all certified students income eligible for reduced-price meals had been certified for reduced-price meals. Among noncertified students, the reimbursement level under this scenario was \$0.35, regardless of the income eligibility status of the student. The following equation shows the calculation of reimbursements with accurate certification among participants for a given student:

$$(4) R_{accurate} = Pr(M) * [2.29 * FE * CFRP + 1.89 * RPE * CFRP + 0.35 * (1 - CFRP * FRPE)]$$

where M , FE , RPE , $CFRP$, and $FRPE$ are defined as before.

Next, we calculated the amount of overpayments to districts as the difference between reimbursements under Scenario 2 (that is, reimbursements with no overcertification) and reimbursements under Scenario 1 (that is, actual reimbursements). This difference can be interpreted as the amount per student (on a typical day) that a given district received in excess of what it would have received if no students had been overcertified. By dividing this difference by the actual reimbursements paid to districts, we generated an “overpayment rate,” or the amount of overpayments in a district as a percentage of the total amount of reimbursements.

Similarly, we calculated the amount of underpayments *to certified students* as the difference between the amount of reimbursements with accurate certification (Scenario 3) and the amount of reimbursements with no overcertification (Scenario 2). This difference captures underpayments only among students who were certified for reduced-price meals when they were actually eligible for free meals. Note that it does not include underpayments among noncertified students who were income eligible for either free or reduced-price meals. By dividing the difference by the actual reimbursements paid to districts, we generated an “underpayment rate,”

or the amount of underpayments in a district as a percentage of the total amount of reimbursements.⁸

C. APPROACHES TO MEASURING IMPACTS

Throughout the impact analysis presented in Chapter III, we use survey data on participation in calculating the impact of the pilots on the outcome measures described above. We then examine the sensitivity of the results to the use of this survey data (versus the more accurate, yet less detailed, administrative data) in Appendix A. This section describes the methodology used to estimate impacts on participation rates and on participation accuracy.

1. Impacts on Participation Rates

At its most basic level, the estimated impact of the pilots on participation is the difference between the mean value of the participation outcome measure in the pilot districts and the mean value of the participation outcome measure in the comparison districts, controlling for other differences between the two types of districts. In Chapter III, we first show the simple mean

⁸ In analyzing reimbursement accuracy, we calculated mean overpayment and underpayment rates in pilot and comparison districts. We did not, however, estimate the impacts of the pilots on these rates, due to the complexity of developing and estimating these impact models (and limited project resources for doing so). In particular, the reimbursement accuracy outcome measures actually depend on three factors: (1) the frequency with which a given student participates, (2) the student's certification status, and (3) the student's income eligibility level. Although the pilot interventions could conceivably have influenced participation and certification, they could not have affected students' income eligibility level. Thus, estimating the impact of the pilots on these outcomes would have required us to use indirect methods, much like the indirect methods used to estimate impacts on participation accuracy. The methods needed to estimate impacts on these reimbursement accuracy outcomes are even more complex than the participation accuracy models, however, since the models had to take into account an additional number of possible combinations of certification status and eligibility status. For example, while students not certified for free or reduced-price meals could be excluded from the participation accuracy models, they would need to be accounted for in reimbursement accuracy models, since districts are reimbursed to some extent for paid meals served to noncertified students.

values of outcomes measures in pilot and comparison districts. These descriptive results show the overall difference in the outcome measure in pilot and comparison districts, which results from some combination of the impact of UFD or GV and the effect of other differences in the characteristics of pilot and comparison districts. We used regression analysis to control for these other differences in pilot and comparison district characteristics to generate an estimate of the impact of the pilots.

In particular, we estimated a reduced-form model, based on the following two-equation model of the relationships between the pilot demonstrations, certification for free/reduced-price meals, and NSLP participation:

$$(5) \quad C_i = c_1 + X_{1i}b_1 + X_{2i}b_2 + \sum_{j=2}^K d_{1j}DP_{ij} + \sum_{k=1}^K a_{1k}[DP_{ik} * P_i] + e_i$$

$$(6) \quad M_i = c_2 + X_{1i}b_3 + X_{3i}b_4 + b_5C_i + \sum_{j=2}^K d_{2j}DP_{ij} + \sum_{k=1}^K a_{2k}[DP_{ik} * P_i] + u_i$$

where C_i represents the student's certification status (free or free/reduced-price); M_i is a variable indicating whether a student participates in the NSLP; X_{1i} , X_{2i} , and X_{3i} , represent student/household characteristics; DP_{ij} is a binary indicator of whether student i attended the j th pilot-comparison district pair (where there are a total of K pilot comparison pairs); P_i is a binary indicator of whether student i attended a pilot district; and e_{ij} and u_i are random error terms.

This two-equation model suggests that the pilot may affect NSLP participation in one of two ways. It may have an indirect effect, by first influencing whether or not a student becomes certified, which in turn influences the student's NSLP participation. In the model, the effect of the pilot on certification is represented by the vector of coefficients, a_{1k} , and the effect of certification on participation is represented by b_5 . The model also allows the pilot to influence

participation directly, independent of its effect on certification, represented by the vector of coefficients a_{2k} .

By substituting the right-hand side of equation (5) for certification status in equation (6), we obtained a reduced-form version of this model:

$$\begin{aligned}
 M_i &= c_2 + X_{1i}b_3 + X_{3i}b_4 + b_5 \left[c_1 + X_{1i}b_1 + X_{2i}b_2 + \sum_{j=2}^K d_{1j}DP_{ij} + \sum_{k=1}^K a_{1k}[DP_{ik} * P_i] + e_i \right] \\
 &\quad + \sum_{j=2}^K d_{2j}DP_{ij} + \sum_{k=1}^K a_{2k}[DP_{ik} * P_i] + u_i
 \end{aligned}
 \tag{7}$$

$$\begin{aligned}
 &= [c_2 + b_5c_1] + X_{1i} [b_3 + b_5b_1] + X_{2i}b_2 + X_{3i}b_4 + \sum_{j=2}^K [d_{2j} + b_5d_{1j}] DP_{ij} \\
 &\quad + \sum_{k=1}^K [a_{2k} + b_5a_{1k}] [DP_{ik} * P_i] + [u_i + b_5e_i].
 \end{aligned}$$

We estimated this reduced-form model to determine the impacts of UFD and GV on NSLP participation. In particular, we regressed our measure of NSLP participation on a constant term, the household characteristics included in X_{1i} and X_{3i} , the binary district pair variables, and the interactions between district pair and pilot status. In estimating this reduced-form model, we could not identify all of the separate parameters of the two-equation model. For example, we estimated the overall effects of the district-pair-pilot status interaction terms ($a_{2k} + b_5a_{1k}$), which reflect both the direct and indirect effects of the pilot on NSLP participation. We could not separately identify the direct and indirect effects.⁹ To determine the overall impact of the pilot

⁹ To identify all the parameters of the two-equation model, we would have had to estimate a model such as a two-stage least squares model, which would have required one or more variables that strongly affect certification status but do not directly affect participation (that is, the variables included in X_{2i}). Because of the difficulty in finding such “identifying variables” and because the most important objective of the participation analysis reported here was to identify the overall effect of the pilot on NSLP participation, we did not attempt to estimate a two-stage least squares model.

on NSLP participation, we estimated each of the district-pair-pilot status interaction coefficients, which represent the estimated impact of the pilot in each site, and then calculated a simple average of these impacts across all UFD sites or all GV sites.

The main form of the dependent variable was a variable indicating the likelihood that a student ate a school lunch on a typical day, as reported by parents. As described earlier, this dependent variable was calculated by dividing a variable indicating the number of times the student usually ate a school lunch per week by five. In addition to the model based on this dependent variable, we also estimated separate models with the following different versions of the dependent variable: (1) a variable indicating the likelihood that the student ate a free school lunch on a typical day, (2) a variable indicating the likelihood that the student ate a free or reduced-price school lunch on a typical day, and (3) a variable indicating the likelihood that the student ate a paid school lunch on a typical day. These four versions of the model were estimated using samples representative of all district students (except those directly certified). We also estimated separate versions of the models using subgroups of students, including (1) students with incomes of no more than 130 percent of the FPL, (2) students with incomes of no more than 185 percent of the FPL, and (3) students with incomes above 185 percent of the FPL.

2. Impacts on Participation Accuracy

Participation accuracy is measured as the percentage of free or reduced-price meals served to students who are eligible for those benefits. As with certification accuracy, the impact of the pilots on participation accuracy cannot be estimated using a straightforward regression model because of technical issues concerning the effects of the explanatory variables—including pilot status—on the composition of the estimation sample. In particular, when we estimated the impact of the pilots on participation, we simply regressed the explanatory variables on an outcome variable indicating the student’s likelihood of participating on a given day. If we were

to use an analogous strategy here, we would first have to restrict the sample to certified students and then regress the student’s income eligibility status (that is, a binary variable indicating whether the student’s income is no more than 130 or 185 percent of the FPL) on pilot status and the other explanatory variables. The problem with a regression model such as this, however, is that the sample in the model is endogenous in that pilot status (and other student characteristics) would affect the sample upon which the regression was based rather than affecting the dependent variable in the model.

To estimate impacts on participation accuracy, therefore, we used a procedure analogous to the procedure to estimate impacts on certification accuracy, described in Burghardt et al. (2004). For the impact of the pilot on participation accuracy among students who eat free school lunches, for example, we used the results from the regression models of participation among those eligible for free meals and not eligible for free meals. This estimated impact can be written:

$$(8) \text{ Imp}\{\text{Accuracy} \mid \text{FM}_i=1\} = \Pr\{FE_i = 1 \mid X_i, \text{FM}_i = 1, P_i = 1\} - \Pr\{FE_i = 1 \mid X_i, \text{FM}_i = 1, P_i = 0\},$$

where: FM_i = indicator of whether student i eats a free school lunch on given day
 X_i = vector of relevant characteristics of student i
 FE_i = binary indicator of whether student i is eligible for free meals

Although we cannot directly estimate the impact of the pilot on the probability of being eligible for free meals, we can estimate the reverse—the impact on the probability of eating a free school lunch conditional on the student being income-eligible. Hence, we can estimate the conditional probability of eating a free lunch given being eligible for free meals and being in a pilot district (or comparison district). We can use Bayes’ Theorem, along with information on the proportion of the sample who are eligible and not eligible for free meals, to generate the

conditional probabilities we need to generate the estimated impact on accuracy. We did this as follows:

$$\Pr\{FE_i = 1 | X_i, FM_i = 1, P_i = 1\} = \frac{\Pr\{FE_i = 1 \& FM_i = 1 | X_i, P_i = 1\}}{\Pr\{FM_i = 1 | X_i = 1, P_i = 1\}}$$

(9)

$$= \frac{\Pr\{FM_i = 1 | X_i, FE_i = 1, P_i = 1\} \Pr\{FE_i = 1 | P_i = 1\}}{\Pr\{FM_i = 1 | X_i, P_i = 1\}}.$$

Each of the probabilities on the right-hand side of this equation is known. The conditional probabilities of eating a free school lunch were estimated previously, and the probability of being eligible for free meals is being treated as exogenous and was calculated from the sample.

To estimate impacts on participation-based free meal accuracy, we calculated the value of the left-hand side probability in equation (9) separately for each of the pilot districts and then averaged these estimates. Next, we estimated an analogous set of conditional probabilities of free meal income eligibility given free meal participation for the comparison districts and averaged those estimates. The difference between the estimated probability of being income eligible for free meals conditional on having eaten a free meal in pilot districts and the corresponding conditional probability in comparison districts is the estimated impact on free meal participation accuracy. The impacts of UFD and GV on free or reduced-price meal accuracy can be estimated analogously. As with the certification-based accuracy measure in Burghardt et al. (2004), we estimated the standard errors of these impact estimates using a bootstrapping method.

D. LIMITATIONS OF STUDY DESIGN

Like all studies, this one is subject to several limitations that should be clearly understood so that the findings are used appropriately. We note these here.

1. Comparison Group Design

The impacts of the pilot projects on deterrence, barriers, and accuracy are measured by comparing the outcomes of families in the pilot districts with the outcomes of families in comparison districts. The identification of suitably matched comparison districts was done with great care, and we controlled statistically for a range of personal and family characteristics that could influence the outcomes. As shown in Burghardt et al. (2004), the comparison district matching process produced a set of comparison districts and a sample of families with characteristics similar to those of the pilot districts. However, while—in our judgment—these comparison districts provide a reasonable basis for measuring net impacts of the pilot interventions, there remains an element of uncertainty about the quality of the benchmark that we cannot quantify.

2. Sample Size Limitation

As in most studies, resource constraints limited the size of the samples that it was possible to interview. For most outcomes, the study samples are of sufficient size to give us confidence that if the pilot projects caused an impact of a policy-relevant magnitude—such as an impact of 20 to 30 percent of the mean outcome in comparison districts—our sample would provide a high likelihood of detecting the impact. For some measures, however, limits on sample sizes constrain our ability to detect significant demonstration effects. For example, in examining impacts on free/reduced-price participation among students not eligible for free/reduced-price certification, the sample cannot reliably detect impacts of a small *absolute* magnitude, even though these impacts are fairly large in *relative* terms. This is because we found the level of the outcome measure in comparison districts is a small absolute number. Suppose, for example, that the mean free/reduced-price participation rate among students not eligible for free/reduced-price certification in comparison districts were four percent. If that were the case, given our sample

sizes, we would be unlikely to be able to detect an impact of 1 percentage point, even though this impact would represent a 25 percent decline in the participation rate among this group.

3. Issues of Generalizability

The small number of demonstration sites and the voluntary nature of the decision to participate in the pilot projects necessarily limit our ability to draw conclusions about what would happen if the policies tested were to be implemented in a larger set of districts or nationwide. Just nine districts included in the study implemented UFD, and just three successfully implemented GV. Furthermore, these districts were part of a very small group nationwide that volunteered to test new procedures designed to improve the accuracy of the process for administering NSLP certification. Burghardt et al. (2004) document how these districts as a group compare with the nation as a whole in some readily observable characteristics of the districts. However, one can only speculate about how these districts differed from others nationwide in unobservable characteristics that may to affect the outcomes of interest in the evaluation.

III. IMPACTS OF THE PILOT PROJECTS ON PARTICIPATION

This chapter presents estimates of the impacts of Up-Front Documentation (UFD) and Graduated Verification (GV) on participation in the NSLP in two parallel sections. Each section examines how the pilot procedures changed the likelihood that a student got a reimbursable school lunch and the likelihood that he or she got a free, reduced-price, or paid school lunch. We present separate impact estimates for all students and for groups of students defined by their eligibility status. To provide context for the impact estimates, we present mean values of each of the outcome measures for both pilot and comparison districts. Finally, each section examines participation accuracy and reimbursement accuracy.

Burghardt et al. (2004) presented estimates of the impacts of the pilots on levels of certification among students in UFD and GV districts, and these estimates help us form expectations about what we might find in examining the pilots' effects on participation. As described in Chapter I, that study found that UFD and GV reduced certification, primarily among income-eligible (low-income) students. Since lower levels of certification imply that fewer students can potentially get free or reduced-price meals, we would expect the pilots to reduce free and reduced-price participation. Furthermore, since certified students are more likely to participate than noncertified students of the same income level (Gleason 1995), the pilots may also have reduced overall participation. However, whether and to what extent overall participation is reduced also depends on whether those students who were discouraged by the pilots from becoming certified decided to get a school lunch at the full price. Indeed, evidence from FNS analysis of the first-year pilot experience indicates that free and reduced-price participation declined after pilot implementation, while paid participation increased. (U.S.

Department of Agriculture 2002)¹ Finally, it is possible that UFD or GV pilots had a spillover effect, whereby students whose certification status was not affected by the pilot procedures—primarily those from families with incomes exceeding 185 percent of the FPL—changed their participation behavior because of the pilot procedures. For example, the spillover effect could take the form of a peer effect whereby students who were not directly affected by the pilot could have reduced their participation because other students had done so.

A. IMPACTS OF UP-FRONT DOCUMENTATION

Nine of the districts included in the evaluation implemented UFD, whereby students applying for free or reduced-price meals had to provide documentation of their household circumstances (income/household size and/or receipt of food stamps or TANF benefits). The following subsections describe our findings on NSLP participation and participation/reimbursement accuracy in UFD pilot and comparison districts. First, we give descriptive data on levels of participation in UFD pilot and comparison districts to provide a context for understanding the impact estimates, which we present next. We then give both descriptive and impact data on participation accuracy. Section A ends with a presentation of descriptive data on the two measures of reimbursement accuracy described in Chapter II.

1. Descriptive Data on Levels of NSLP Participation

Table III.1a shows the estimated participation rates of various groups of students attending the UFD pilot and comparison districts. As described previously, these figures are estimates of the likelihood that a given student got a school lunch on a typical day, based on

¹ Changes following implementation of the pilots do not necessarily mean that implementation *caused* the changes. Factors unrelated to the pilot may have caused these changes.

TABLE III.1a

NSLP PARTICIPATION RATES OF STUDENTS AS REPORTED BY PARENTS IN UP-FRONT
DOCUMENTATION PILOT AND COMPARISON DISTRICTS, FALL 2002

Student's Certification/Eligibility Status	Probability That Student Obtained a School Lunch on a Given Day ^a	
	Pilot Districts	Comparison Districts
Estimates Excluding Directly Certified Students		
All Students		
No school lunch (100-P1)	33.9 (1.48)	27.4 (1.28)
Any school lunch (P1)	66.1 (1.48)	72.6 (1.28)
Free lunch (P2)	11.4 (0.65)	13.6 (0.61)
Reduced-price lunch (P3)	3.9 (0.44)	4.9 (0.39)
Paid lunch (P4)	50.5 (1.51)	54.0 (1.35)
Students Certified for Free Meals (P_CF)	91.3 (1.56)	91.8 (1.95)
Students Certified for Reduced-Price Meals (P_CRP)	85.8 (3.43)	87.6 (2.64)
Students Not Certified for Free or Reduced-Price Meals (P_NC)	61.6 (1.69)	68.1 (1.57)
Students Eligible for Free Meals (Income ≤130% FPL)		
No school lunch (100-P5)	23.0 (2.71)	16.5 (2.22)
Any school lunch (P5)	77.0 (2.71)	83.5 (2.22)
Free lunch (P6)	43.5 (2.96)	50.0 (1.92)
Reduced-price lunch (P7)	5.3 (1.23)	7.4 (0.73)
Paid lunch (P8)	28.1 (3.28)	26.1 (2.42)

TABLE III.1a (continued)

Student's Certification/Eligibility Status	Probability That Student Obtained a School Lunch on a Given Day ^a	
	Pilot Districts	Comparison Districts
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
No school lunch (100-P9)	26.7 (2.65)	17.5 (1.79)
Any school lunch (P9)	73.3 (2.65)	82.5 (1.79)
Free lunch (P10)	29.7 (1.78)	35.4 (1.35)
Reduced-price lunch (P11)	8.4 (1.13)	10.7 (0.89)
Paid lunch (P12)	35.2 (2.75)	36.3 (2.01)
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)		
No school lunch (100-P13)	37.7 (1.87)	32.4 (1.72)
Any school lunch (P13)	62.4 (1.87)	67.6 (1.72)
Free lunch (P14)	1.5 (0.38)	1.7 (0.35)
Reduced-price lunch (P15)	1.9 (0.30)	1.8 (0.27)
Paid lunch (P16)	59.0 (1.88)	64.1 (1.74)
Estimates for All Students, Including Those Directly Certified		
All Students		
No school lunch (100-P1)	33.6	27.1
Any school lunch (P1)	66.4	72.9
Free lunch (P2)	13.3	15.1
Reduced-price lunch (P3)	3.8	4.8
Paid lunch (P4)	49.1	53.0
Students Certified for Free Meals (P_CF)	89.2	90.2
Students Certified for Reduced-Price Meals (P_CRP)	85.8	87.6
Students Not Certified for Free or Reduced-Price Meals (P_NC)	61.6	68.1
Students Eligible for Free Meals (Income ≤130% FPL)		
No school lunch (100-P5)	22.3	16.5
Any school lunch (P5)	77.7	83.5
Free lunch (P6)	49.2	53.4
Reduced-price lunch (P7)	4.5	6.6
Paid lunch (P8)	23.5	23.4

TABLE III.1a (continued)

Student's Certification/Eligibility Status	Probability That Student Obtained a School Lunch on a Given Day ^a	
	Pilot Districts	Comparison Districts
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
No school lunch (100-P9)	25.8	17.5
Any school lunch (P9)	74.2	82.5
Free lunch (P10)	34.1	38.3
Reduced-price lunch (P11)	7.5	10.1
Paid lunch (P12)	31.7	34.1
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)		
No school lunch (100-P13)	37.7	32.4
Any school lunch (P13)	62.4	67.6
Free lunch (P14)	1.5	1.7
Reduced-price lunch (P15)	1.9	1.8
Paid lunch (P16)	59.0	64.1

Note: This table is intended to provide descriptive information on participation rates in UFD pilot and comparison districts only. Differences between participation rates in pilot and comparison districts should not be interpreted as estimates of the impact of UFD on NSLP participation rates. See Table III.2 for impact estimates.

^aStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

FPL = federal poverty level.

a parent's report of the frequency of the student's participation. The top panel shows participation rate estimates for students in the pilot and comparison districts who were not directly certified; the bottom panel shows estimates for all students, including those directly certified.

The discussion below focuses initially on participation rates in UFD comparison districts. This provides a sense of the counterfactual—what the situation would have been like in the pilot districts without the UFD intervention. We then discuss how participation rates differ in pilot and comparison districts. While the difference between pilot and comparison districts' participation rates suggests the likely effect of the pilot on participation, the estimates in Table III.1a do not attempt to control for student characteristics. Thus, the pilot-comparison difference may be due to differences in the characteristics of the two groups of students rather than to the effect of the pilot intervention.²

According to parents' reports in UFD comparison districts, 72.6 percent of students—excluding those directly certified—got a school lunch on a typical day in fall 2002 (Table III.1a).³ This overall participation rate includes 13.6 percent of students who got a free lunch, 4.9 percent who got a reduced-price lunch, and 54.0 percent who got a paid lunch. Based on parents' reports, just over one-quarter of students did not get a school lunch on a typical day.

Among non-directly certified students who were certified for free or reduced-price meals, about 9 of 10 were reported to have obtained a school lunch on a typical day (91.8 percent

² See Subsection A.2 for estimates of the impacts of UFD in which we do attempt to control for differences in the characteristics of the two groups of students.

³ Although most of the discussion here focuses on the sample of students for which we collected survey data, which excludes directly certified students, Table III.1a (as well as Table III.1b, Table III.3, and each of the corresponding GV tables) also includes estimates for all students, including those directly certified.

among those certified for free meals and 87.6 percent among those certified for reduced-price meals). Approximately two-thirds of noncertified students got a school lunch on a typical school day.

We also examined participation rates separately among non-directly certified students with family incomes that make them eligible for free/reduced-price meals (or free meals alone) and those not income-eligible for benefits. Participation rates were higher among the lower-income groups than among the higher-income one. Among non-directly certified students income eligible for free meals, for example, 83.5 percent got a school lunch on a typical day, including 50.0 percent who got a free lunch, 7.4 percent who got a reduced-price lunch, and 26.1 percent who got a paid lunch (Table III.1a). A similar pattern is evident among students with incomes less than 185 percent of the FPL—and thus eligible for free or reduced-price meals—with participation rates of 82.5 percent overall, 35.4 percent for free lunches, 10.7 percent for reduced-price lunches, and 36.3 percent for paid lunches.

Table III.1b renormalizes the participation rates in Table III.1a to show the implicit percentages of all meals served that are in each reimbursement category, thus providing additional perspective on the participation patterns of students within each income subgroup. Among all lunches served to non-directly certified students with incomes below 130 percent of poverty in UFD comparison districts, for example, 59.9 percent were free, while 8.8 percent were reduced-price, and the remaining 31.3 percent were paid (Table III.1b). These percentages show that substantial numbers of meals to low-income children are being served as *paid* meals. In particular, nearly one-third of the reimbursable lunches served to non-directly certified

TABLE III.1b

REIMBURSEMENT CATEGORY OF MEALS RECEIVED BY NSLP PARTICIPANTS IN UP-FRONT DOCUMENTATION PILOT AND COMPARISON DISTRICTS, FALL 2002

Student's Estimated Eligibility Status ^a	Percentage Distribution of Participants by Reimbursement Category ^b	
	Pilot Districts	Comparison Districts
Estimates Excluding Directly Certified Students		
Students Eligible for Free Meals (Income ≤130% FPL)		
Free lunch (P6 / P5)	56.5 (3.72)	59.9 (2.38)
Reduced-price lunch (P7 / P5)	6.9 (1.59)	8.8 (0.88)
Paid lunch (P8 / P5)	36.6 (3.91)	31.3 (2.44)
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
Free lunch (P10 / P9)	40.6 (2.50)	43.0 (1.70)
Reduced-price lunch (P11 / P9)	11.5 (1.56)	13.0 (1.10)
Paid lunch (P12 / P9)	47.9 (2.80)	44.0 (1.89)
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)		
Free lunch (P14 / P13)	2.5 (0.61)	2.5 (0.53)
Reduced-price lunch (P15 / P13)	3.0 (0.49)	2.7 (0.40)
Paid lunch (P16 / P13)	94.5 (0.77)	94.8 (0.66)
Estimates for All Students, Including Those Directly Certified		
Students Eligible for Free Meals (Income ≤130% FPL)		
Free lunch (P6 / P5)	63.3	64.4
Reduced-price lunch (P7 / P5)	6.1	7.9
Paid lunch (P8 / P5)	30.7	27.6
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
Free lunch (P10 / P9)	45.9	46.7
Reduced-price lunch (P11 / P9)	10.2	12.2
Paid lunch (P12 / P9)	43.9	41.0

FPL = federal poverty level.

^aNSLP participation is reported by parents in the study survey.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

students who were income eligible for free meals were *full-price* (or paid) lunches.⁴ Among lunches served to students with incomes of no more than 185 percent of poverty, on the other hand, 44.0 percent were full price. Among lunches served to higher-income students, most (94.8 percent) were paid, with 2.5 percent free and 2.7 percent reduced-price.

Tables III.1a and III.1b also show participation rates in UFD pilot districts. For nearly all of the measures shown in Table III.1a, the participation rate in the pilot district is lower than the corresponding rate in the comparison district. For example, the overall participation rate among non-directly certified students reported by parents in UFD pilot districts was 66.1 percent, compared with 72.6 percent in comparison districts. The free, reduced-price, and paid participation rates among all non-directly certified students were also lower in pilot districts than in comparison ones.

2. Impacts on Participation Rates

Comparisons of the differences in the participation rates reported in Tables III.1a and III.1b in UFD pilot and comparison districts do not take into account differences in the characteristics of students who attend the pilot and comparison districts. Thus, although the participation rates in pilot districts are lower than those in comparison districts, this could be due either to differences in the student or district characteristics or to the effects of the UFD intervention. As described in Chapter II, we estimated regression models to control for the observable characteristics of students and their families before estimating the impacts of UFD (including characteristics such as race/ethnicity and educational attainment of the household head). The regression models do not directly control for the effects of district-level differences that could

⁴ When directly certified students are included in this calculation, the paid participation rate among students eligible for free meals is 27.6 percent (Table III.1b).

influence individual participation decisions. Our analytical approach has attempted to control for these types of differences by selecting a comparison district for each pilot district that matches the pilot on a range of factors that could affect certification and participation (such as the districts' baseline certification rates and poverty rates).⁵

Table III.2 shows the results of the impact analysis. The first two columns of the table show the regression-adjusted participation rates in pilot and comparison districts. These participation rates have been adjusted to take into account the fact that students in pilot and comparison districts may differ in some characteristic that influences their participation. To the extent that the regression model has controlled for all relevant characteristics, the remaining difference between pilot and comparison districts in the regression-adjusted participation rate can be attributed to the impact of UFD pilot procedures. Thus, the final column of the table shows the estimate of the impact, which is the difference between the regression-adjusted mean in pilot versus comparison districts.

UFD is estimated to lead to a reduction in the reported overall NSLP participation rate (among non-directly certified students) of 5.8 percentage points, from a regression-adjusted rate of 72.3 percent in comparison districts to 66.5 percent in pilot districts (Table III.2). This difference is statistically significant at the 0.01 level.

Conceptually, the change in the overall NSLP participation rate can be decomposed into the change in the free or reduced-price lunch participation rate and the paid participation rate. About half of the overall change is due to reductions in free or reduced-price meal participation, as the impact on this participation rate is -2.8 percentage points and is statistically significant. The rest

⁵ See Burghardt et al. (2004) for a description of the comparison district matching process.

TABLE III.2

ESTIMATED IMPACT OF UP-FRONT DOCUMENTATION PILOT PROJECTS ON NSLP PARTICIPATION
(AS REPORTED BY PARENTS) AMONG STUDENTS NOT DIRECTLY CERTIFIED, FALL 2002

Measure of Participation	Regression-Adjusted Rate ^a		Impact ^b
	Pilot	Comparison	
All Students			
Any school lunch (P1)	66.5	72.3	-5.8** (2.07)
Free lunch (P2)	11.5	13.6	-2.1* (1.05)
Free or reduced-price lunch (P2+P3)	15.6	18.4	-2.8* (1.20)
Paid lunch (P4)	50.6	53.8	-3.3 (2.22)
Students Eligible for Free Meals (Income ≤130% FPL)			
Any school lunch (P5)	77.6	82.9	-5.4 (3.77)
Free lunch (P6)	43.6	49.6	-6.0 (4.24)
Free or reduced-price lunch (P6+P7)	49.1	56.9	-7.8 (4.30)
Paid lunch (P8)	27.8	26.0	1.8 (4.69)
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)			
Any school lunch (P9)	73.1	82.8	-9.8** (3.30)
Free lunch (P10)	29.3	35.6	-6.2* (3.10)
Free or reduced-price lunch (P10+P11)	37.4	46.7	-9.3** (3.37)
Paid lunch (P12)	34.8	36.1	-1.4 (4.16)
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)			
Any school lunch (P13)	62.8	67.2	-4.4 (2.50)
Free lunch (P14)	1.6	1.7	-0.1 (0.62)
Free or reduced-price lunch (P14+P15)	3.6	3.4	0.2 (0.75)
Paid lunch (P16)	59.2	63.8	-4.6 (2.55)

TABLE III.2 (continued)

FPL = federal poverty level.

^aThe regression-adjusted rate shows the estimated participation rate that would result under the assumption that students in both UFD pilot and comparison districts had the same distribution of observable characteristics. Thus, any remaining difference between the regression-adjusted participation rate in pilot versus comparison district can be attributed to the impact of the pilot intervention.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

of the overall impact comes from a reduction in the paid participation rate, which is estimated to decrease by 3.3 percentage points, although this impact is not statistically significant at the 0.05 level.⁶

Among students income eligible for free meals, the regression-adjusted overall participation rate was 5.4 percentage points lower in pilot districts than in comparison ones (77.6 versus 82.9 percent). This difference is not statistically significant at the 0.05 level (Table III.2). This pilot-comparison difference arises essentially from a difference in the free/reduced-price participation rate, which was 7.8 percentage points lower in pilot districts than in comparison ones (49.1 versus 56.9 percent; again, not significant at the 0.05 level). The paid lunch participation rate among students who were income eligible for free meals was similar in pilot and comparison districts.

The patterns of estimated impacts were similar among students income eligible for free or reduced-price meals (that is, with incomes below 185 percent of poverty), except that the impacts were statistically significant. UFD was estimated to have led to a statistically significant 9.8 percentage point decline in the overall NSLP participation rate of non-directly certified students in this income category, from 82.8 to 73.1 percent (Table III.2). This impact was driven

⁶Because of concerns about the quality of the participation data reported by parents, we conducted several sensitivity tests to determine whether the estimated impacts of UFD on the participation rate changed when we changed our data, our methods, or our sample. Appendix A describes the estimated impacts of UFD on participation rates based on administrative data. In addition, we conducted two additional sensitivity tests. First, we re-estimated the impact models after excluding one site in which the quality of the parent-report participation data appeared particularly suspect. The exclusion of this site did not influence the estimated impacts of UFD on NSLP participation rates. Second, we re-estimated the model after excluding all high school students, under the reasoning that the parents of high school students would be less likely to know their children's NSLP participation status than the parents of younger students. The exclusion of this group did not substantially influence the key estimates from the model—the estimated impact of UFD on free and reduced-price NSLP participation.

almost entirely by a decrease in the percentage of students getting free or reduced-price meals, as the impact on the free/reduced-price participation rate was -9.3 percentage points, and statistically significant. In contrast, the estimated impact on the paid participation rate among this group of students income eligible for free or reduced-price meals was -1.4 percentage points, and not statistically significant.

This pattern of impacts among students income eligible for free or reduced-price meals is consistent with the estimated impact of UFD on rates of certification among this same group, presented in Burghardt et al. (2004). That study found that UFD led to a statistically significant decline in the free/reduced-price certification rate among students with incomes of no more than 185 percent of poverty. Thus, it is consistent that the pilot would also lead to a decline in the percentage of this low-income group who got free or reduced-price meals. The UFD pilot had little or no impact on paid meal participation within this low-income group.

Among students not income eligible for free or reduced-price meals (that is, with incomes of more than 185 percent of poverty), the estimated impact of UFD on the overall participation rate was -4.4 percentage points (P13), from a regression-adjusted rate of 67.2 percent in comparison districts to 62.8 percent in pilot districts (Table III.2). Since nearly all higher-income participants got paid lunches rather than free or reduced-price lunches, this impact was due to an impact of a similar size (-4.6 percentage points) on the paid participation rate (P16). However, neither of these estimated impacts was statistically significant at the 0.05 level.

According to Burghardt et al. (2004), the estimated impact of the UFD pilots on the *certification* of students from households with incomes exceeding 185 percent of poverty was zero: 3.9 percent of this income group was certified in comparison sites, and 3.9 percent was certified in pilot sites. Consistent with this, we found that, among this higher-income group, the percentage getting free or reduced-price meals was nearly identical in UFD pilot and comparison

districts. However, we also found that the estimated regression-adjusted paid participation rate (P16) among students from households with incomes exceeding 185 percent of poverty was almost five percentage points lower in UFD pilot districts than in comparison ones. What could account for the fact that higher-income students were estimated to be less likely to get *paid* lunches in pilot districts, given that the pilot intervention focused on the certification process?

Sampling variability is one possible explanation. In fact, the estimated impact on the paid participation rate was not statistically significant at the 0.05 level. Despite this lack of significance, however, we believe that the estimated impact of UFD on paid participation among higher-income students is worth examining, for two reasons. First, this impact estimate would have been statistically significant if we had used a 0.10 threshold for statistical significance. In other words, while the null hypothesis of no impact cannot be rejected with 95 percent confidence, it can be rejected with more than 90 percent confidence.⁷

A second piece of evidence that lends credence to a negative impact of UFD on paid participation among higher-income students is that an examination of administrative data provides similar evidence. In particular, we conducted an analysis of aggregate administrative data on participation in which we examined changes in participation rates between the prepilot baseline period and the 2002-2003 follow-up period (see Appendix A). In this analysis, the pilot districts themselves (in the baseline period) essentially served as their own control group. The analysis resulted in findings on the impacts of the pilot on overall participation and participation

⁷ An alternative way of presenting the estimated impact of UFD on the paid participation rate among higher-income students is through a 95 percent confidence interval. This confidence interval indicates that we are 95 percent confident that the true impact falls within the range -9.60 to 0.04 percentage points.

by meal price category that were similar to the findings based on the regression model and presented above.

If the negative impact of UFD on the paid participation rate of higher-income students (P16) is real and not the result of sampling variability, then what factors could explain it? As noted above, UFD was estimated to lead to no change in the proportion of students who were certified for free or reduced-price meals (and thus no change in the proportion not certified) among those from households with incomes exceeding 185 percent of poverty. Thus, the negative impact on the paid participation rate (P16) among these higher-income students had to come about through a change in the behavior of (noncertified) students whose certification status was not affected by UFD. We do not have direct evidence on what might have led to this negative impact. However, one possible explanation is a peer effect. Given our finding that UFD led to a decrease in participation among lower-income students (P9), the peer effect explanation would imply that, because of reduced participation among their peers, noncertified higher-income students may have chosen to obtain a school lunch less frequently than they would have otherwise.

3. Descriptive Data on Levels of Participation Accuracy

To examine the impacts of UFD on the accuracy with which students receive free or reduced-price meals, we estimated four alternative measures of free or free/reduced-price participation accuracy that correspond to the measures of certification accuracy presented in Burghardt et al. (2004). We describe these measures in Chapter II. Each is a measure of the proportion of meals served free or free/reduced-price that went to students whose incomes made them eligible for these benefits. We estimated a single measure of free meal accuracy—the percentage of free meals served to students with incomes of no more than 130 percent of poverty.

Due to our sampling strategy of excluding directly certified students, each of these measures of participation accuracy in the top panel of Table III.3 is based only on those students certified for free or free/reduced-price meals *by application*. The bottom panel includes estimates of the participation accuracy among all students getting free meals or getting free or reduced-price meals, including directly certified students. The latter set of estimates relies on the assumption that directly certified students who get school lunches are eligible for free meals. This assumption is based on previous research showing that more than 9 out of every 10 directly certified students are income eligible for the free meal benefits they are receiving (see, for example, Food and Nutrition Service 2002; and Gleason et al. 2003). Thus, the estimated levels of participation accuracy among non-directly certified students reported in this chapter are lower than levels of participation accuracy among all students shown in the bottom panel of the table.

The free meal accuracy rate among non-directly certified students in UFD comparison districts was 78.4 percent in fall 2002 (Table III.3).⁸ This implies that, among free meals served to non-directly certified students in these districts, just under four out of five were served to students eligible for this benefit—that is, those with incomes of no more than 130 percent of poverty. Conversely, 21.6 percent of free meals obtained by students went to those with incomes above 130 percent of poverty. Accuracy rates for *all* free meals, including those served to directly certified students, are about four percentage points higher, as shown in the bottom panel of the table.

⁸ However, we also estimated that, among students getting free school lunches in UFD comparison districts, 91.1 percent are income eligible for either free or reduced-price meals. Only 8.9 percent of free meal participants, in other words, are ineligible for both free and reduced-price meals.

TABLE III.3

PARTICIPATION ACCURACY AMONG STUDENTS IN UP-FRONT DOCUMENTATION
PILOT AND COMPARISON DISTRICTS, FALL 2002

Participation Accuracy Measures ^a	Estimated Rate ^b	
	Pilot Districts	Comparison Districts
Estimates Excluding Directly Certified Students		
Free Meal Accuracy		
PA_F: Percentage of Free Meals Served to Students Income Eligible for Free Meals ^c	80.0 (2.86)	78.4 (3.09)
Free/Reduced-Price Meal Accuracy		
PA_FRP1: Percentage of Free or Reduced-Price Meals Served to Students Eligible for the Level of Benefits They Are Receiving	71.3 (2.66)	69.2 (2.58)
PA_FRP2: Percentage of Free or Reduced-Price Meals Served to Students Not Overcertified for Benefits They Are Receiving	78.5 (2.40)	77.9 (2.49)
PA_FRP3: Percentage of Free or Reduced-Price Meals Served to Students with Incomes Below 185% of the FPL	85.6 (1.98)	87.0 (1.95)
Estimates for All Students, Including Those Directly Certified		
Free Meal Accuracy		
PA_F: Percentage of Free Meals Served to Students Income Eligible for Free Meals	85.1	82.0
Free/Reduced-Price Meal Accuracy		
PA_FRP1: Percentage of Free or Reduced-Price Meals Served to Students Eligible for the Level of Benefits They Are Receiving	76.8	72.7
PA_FRP2: Percentage of Free or Reduced-Price Meals Served to Students Not Overcertified Benefits They Are Receiving	82.8	80.4
PA_FRP3: Percentage of Free or Reduced-Price Meals Served to Students with Incomes Below 185% of the FPL	88.6	88.4

FPL = federal poverty level.

Note: This table is intended to provide descriptive information on participation accuracy rates in Up-Front Documentation (UFD) pilot and comparison districts only. Differences between accuracy rates in pilot and comparison districts should not be interpreted as estimates of the impact of UFD on NSLP participation accuracy. See Table III.4 for impact estimates.

^aNSLP participation is reported by parents in the study survey.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

^cAmong students who are served free meals, 89.9 percent of those in pilot districts and 91.1 percent of those in comparison districts are income eligible for either free or reduced-price meals.

The estimated free/reduced-price meal accuracy rate was in the same general range, although its value depended on the definition of accuracy used. According to the most stringent definition of accuracy, among non-directly certified children 69.2 percent of free or reduced-price meals served went to those who were income eligible for exactly the benefit level they received. In contrast, 77.9 percent of these meals were served to students who were not overcertified, and 87.0 percent were served to those who were income eligible for either free or reduced-price meals.

Before controlling for any student characteristics, participation accuracy rates were similar in UFD pilot districts to those in comparison districts (as described above). For each of the four accuracy measures, the participation accuracy rate among non-directly certified students in pilot districts was about two percentage points (or less) different from the comparable accuracy rate in comparison districts.

4. Impacts on Participation Accuracy

Using the methodology described in Chapter II, we estimated the impacts of UFD on each of the four measures of participation accuracy that exclude directly certified students. These impacts reflect the difference in the predicted accuracy rate after controlling for student characteristics. Table III.4 shows these regression-adjusted participation accuracy rates in pilot and comparison districts, along with the estimated impact of the pilot on participation accuracy.

For each of the four measures of participation accuracy, the estimated impact of UFD was not statistically significant. For example, the regression-adjusted free meal accuracy rate in pilot districts was 76.6 percent, 1.7 percentage points lower than the rate of 78.3 percent in

TABLE III.4

ESTIMATED IMPACT OF UP-FRONT DOCUMENTATION ON PARTICIPATION ACCURACY
AMONG STUDENTS NOT DIRECTLY CERTIFIED, FALL 2002

Participation Accuracy Measures ^a	Regression-Adjusted Rate ^b		Impact ^c
	Pilot	Comparison	
Free Meal Accuracy			
PA_F: Percentage of Free Meals Served to Students Income Eligible for Free Meals	76.6	78.3	-1.7 (10.86)
Free/Reduced-Price Meal Accuracy			
PA_FRP1: Percentage of Free or Reduced-Price Meals Served to Students Eligible for the Level of Benefits They Are Receiving	67.5	69.8	-2.3 (8.30)
PA_FRP2: Percentage of Free or Reduced-Price Meals Served to Students Not Overcertified for the Level of Benefits They Are Receiving	72.6	79.4	-6.76 (8.82)
PA_FRP3: Percentage of Free or Reduced-Price Meals Served to Students with Incomes Below 185% of the FPL	78.6	88.8	-10.2 (8.04)

FPL = federal poverty level.

^aNSLP participation is reported by parents in the study survey.

^bThe regression-adjusted rate shows the estimated participation accuracy rate that would result under the assumption that students in both UFD pilot and comparison districts had the same distribution of observable characteristics. Thus, any remaining difference between the regression-adjusted accuracy rate in pilot versus comparison district can be attributed to the impact of the pilot intervention.

^cStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

comparison districts (Table III.4). As the standard error of this estimated impact was much greater than 1.7 percentage points, the estimated impact was not statistically significant.

The estimated impacts of UFD on each of the three measures of free/reduced-price participation accuracy were also not statistically significant. In each case, the standard error of the impact estimate was quite large, so we could not be confident the observed difference between pilot and comparison districts was not due to chance. In addition, the magnitude of the estimated impact was somewhat sensitive to the measure of free/reduced-price participation accuracy used. In particular, the estimated impacts of UFD ranged from -2.3 to -10.2 percentage points.

Given that each of the estimated impacts of UFD on participation accuracy was not statistically significant, we cannot conclude that the pilot had any influence on the accuracy with which free or free/reduced-price lunches go to students. However, the fact that the standard error of each impact estimate was large and the magnitude of the impact estimate was sensitive to the definition of accuracy used suggests that the methodology we used led to unstable results. Further evidence of the instability of the estimated impacts on participation accuracy came from another sensitivity test we conducted. Because the quality of information on students' NSLP participation as reported by parents appears especially suspect for students in one particular district, we reestimated each of our impact models after excluding this district.⁹ Although the

⁹ See Appendix A for evidence on parents' reporting of their children's participation status in each UFD and GV district, including the district for which estimated participation rates based on parents' reports is greatly different from the estimates based on administrative data.

exclusion of this site did not materially influence the estimated impact of UFD on rates of participation, it affected the estimated impact on rates of participation accuracy.¹⁰

5. Reimbursement Accuracy

Chapter II defined two measures of the extent to which federal reimbursements for free, reduced-price, or paid meals are either higher than or lower than they should be according to the survey-based free/reduced-price eligibility status of the certified students who consumed meals. The first captures payments in excess of what districts should receive based on students' eligibility status. The second captures the shortfall in reimbursement payments due to students who are actually certified for one level of benefits (reduced-price meals) when they should be certified for a higher level of benefits (free meals) based on their eligibility status. The calculations presented here assume that the certification status change would not affect the participation behavior of students whose certification status was changed in this way.

Among reimbursements for all meals served to non-directly certified students in UFD comparison districts, we estimated that 7.7 percent are “overpayments” in the sense of being paid for meals served to students who are certified for a higher level of benefits than that for which they are eligible (Table III.5). In other words, if the certification status of all students who were certified for a higher level of benefits than they were eligible for was suddenly adjusted and they became certified for the appropriate level of benefits given their income, and if their participation behavior did not change as a result of the certification status change, the federal reimbursements

¹⁰ In particular, the magnitude of the estimated impacts on participation accuracy changed substantially when this site was excluded. However, the results did not lead to any changes in the levels of statistical significance of the estimated impacts on participation accuracy. In both the full sample and in the sample that excluded the suspect site, each of these impact estimates was not statistically significant.

TABLE III.5

FEDERAL REIMBURSEMENTS FOR LUNCHES RECEIVED BY STUDENTS WHO ARE NOT DIRECTLY CERTIFIED IN UP-FRONT DOCUMENTATION PILOT AND COMPARISON DISTRICTS, FALL 2002

Reimbursement Measures ^a	Estimated Rate ^b	
	Pilot Districts	Comparison Districts
RA_OP: Percentage of All Federal Reimbursements for Meals Served to Students Not Eligible for the Level of Benefit They Are Receiving	7.3 (0.9)	7.7 (1.1)
RA_UP: Percentage Short-Fall in Federal Reimbursements Because Some Certified Students Received a Lower Benefit Than They Were Eligible for	0.8 (0.2)	1.1 (0.1)

Note: This table is intended to provide descriptive information on reimbursement accuracy in Up-Front Documentation (UFD) pilot and comparison districts only. Differences between rates in pilot and comparison districts should not be interpreted as estimates of the impact of UFD on reimbursement accuracy.

^aReimbursements are calculated by using student participation as reported by parents in the study survey and applying the reimbursement appropriate for the student's meal price status.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

to the comparison districts would decline by 7.7 percent. The analogous rate of reimbursements in excess of students' eligibility status in UFD pilot districts was similar, at 7.3 percent.

A different measure of the extent to which federal reimbursements are not accurate involves examining the extent to which certified students are undercertified—that is, are receiving reduced-price meals when they should be receiving free meals. This turns out to have a relatively small effect on the overall level of reimbursements. If the eligibility status of all of these undercertified students was suddenly changed so that their benefits were increased to the appropriate level given their income, federal reimbursements in UFD comparison districts would have increased by only 1.1 percent (Table III.5).¹¹ Again, the comparable rate in UFD pilot districts was similar: 0.8 percent.

B. IMPACTS OF GRADUATED VERIFICATION

Three of the districts in the evaluation implemented GV. Districts using GV increased the scale of their verification efforts if their initial verification of approved applications resulted in large proportions of verified households whose benefits were reduced or terminated. Thus, these additional verification efforts took place—if they took place at all—only after the initial verification efforts were completed and the results determined. Since data collection for the study was conducted primarily during October through January, it is important to note that the outcomes measured in this study reflect conditions in GV districts prior to the completion of any

¹¹ This ignores another type of undercertification—students not certified for either free or reduced-price meals when they are eligible for these benefits. That situation could have resulted from one of three scenarios: (1) the household could have applied for benefits and been denied, (2) the household could have decided not to apply for benefits (or not to complete the application process) because of the requirements the pilot imposed, or (3) the student could have decided not to apply for benefits because he or she did not wish to consume school meals at all or meals that were free or reduced-price. Because we could not fully distinguish between these scenarios and did not wish to combine them in our analysis, we did not analyze this type of undercertification.

additional verification activities that took place in the district. Correspondingly, the measured impacts of GV described in this section primarily reflect the cumulative effects of the GV activities that took place in prior years, and not the effects of GV activities during the year in which the data were collected (year 3 of the pilot intervention).

1. Descriptive Data on Levels of NSLP Participation

According to parents' reports in GV comparison districts, 81.5 percent of non-directly certified students got a school lunch on a typical day in fall 2002 (Table III.6a).¹² Among all these non-directly certified students, 24.2 percent got a free lunch, 9.3 percent got a reduced-price lunch, and 47.9 percent got a paid lunch. Based on parents' reports, fewer than one in five students did not eat a school lunch on a typical day.

As in UFD comparison districts, about 9 of 10 students in GV comparison districts who were certified for free (by application) or for reduced-price meals got a school lunch on a typical school day. In particular, the participation rate was 93.0 percent among those certified for free meals and 89.1 percent among those certified for reduced-price meals. Three-fourths of noncertified students got a school lunch on a typical day.

Participation rates were also higher among the lower-income students than among the higher-income ones in GV comparison districts. Among non-directly certified students eligible for free meals (that is, with incomes of no more than 130 percent of poverty), for example, 92.2 percent got a school lunch on a typical day, including 64.5 percent who got a free lunch (Table III.6a). The overall participation rates among students eligible for free or reduced-price meals

¹² The GV participation rate estimates that include all students are shown in the bottom panel of Table III.6b. Among all students in GV comparison districts, an estimated 82.8 percent get a school lunch on a typical day (according to parents' reports). Administrative data suggests that the participation rate in GV comparison districts is 62.3 percent (see Appendix A).

TABLE III.6a

NSLP PARTICIPATION RATES OF STUDENTS AS REPORTED BY PARENTS IN GRADUATED
VERIFICATION PILOT AND COMPARISON DISTRICTS, FALL 2002

Student's Certification/Eligibility Status	Probability That Student Obtained a School Lunch on a Given Day ^a	
	Pilot Districts	Comparison Districts
Estimates Excluding Directly Certified Students		
All Students		
No school lunch (100 – P1)	22.1 (1.84)	18.5 (1.78)
Any school lunch (P1)	77.9 (1.84)	81.5 (1.78)
Free lunch (P2)	20.8 (1.22)	24.2 (1.40)
Reduced-price lunch (P3)	7.2 (0.83)	9.3 (1.11)
Paid lunch (P4)	49.4 (2.09)	47.9 (2.00)
Students Certified for Free Meals (P_CF)	91.7 (3.71)	93.0 (1.26)
Students Certified for Reduced-Price Meals (P_CRP)	91.9 (3.71)	89.1 (4.08)
Students Not Certified for Free or Reduced-Price Meals (P_NC)	71.7 (2.49)	75.0 (2.63)
Students Eligible for Free Meals (Income ≤130% FPL)		
No school lunch (100 – P5)	15.8 (3.33)	7.8 (1.76)
Any school lunch (P5)	84.2 (3.33)	92.2 (1.76)
Free lunch (P6)	51.4 (3.98)	64.5 (3.95)
Reduced-price lunch (P7)	6.3 (2.17)	10.7 (1.47)
Paid lunch (P8)	26.4 (4.28)	16.9 (3.88)

Table III.6a (continued)

Student's Certification/Eligibility Status	Probability That Student Obtained a School Lunch on a Given Day ^a	
	Pilot Districts	Comparison Districts
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
No school lunch (100 – P9)	14.0 (2.41)	10.2 (1.85)
Any school lunch (P9)	86.0 (2.41)	89.8 (1.85)
Free lunch (P10)	42.2 (2.76)	50.6 (2.66)
Reduced-price lunch (P11)	13.3 (2.18)	15.9 (1.32)
Paid lunch (P12)	30.0 (3.38)	23.3 (2.84)
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)		
No school lunch (100 – P13)	29.2 (2.78)	26.5 (2.83)
Any school lunch (P13)	70.8 (2.78)	73.6 (2.83)
Free lunch (P14)	1.6 (0.64)	2.6 (0.64)
Reduced-price lunch (P15)	2.7 (0.35)	6.4 (2.09)
Paid lunch (P16)	66.5 (2.81)	64.6 (3.00)
Estimates for All Students, Including Those Directly Certified		
All Students		
No school lunch (100 – P1)	20.4	17.2
Any school lunch (P1)	79.6	82.8
Free lunch (P2)	29.5	31.7
Reduced-price lunch (P3)	6.4	8.2
Paid lunch (P4)	43.4	42.8
Students Certified for Free Meals (P_CF)	92.2	92.7
Students Certified for Reduced-Price Meals (P_CRP)	91.9	89.1
Students Not Certified for Free or Reduced-Price Meals (P_NC)	71.7	75.0
Students Eligible for Free Meals (Income ≤130% FPL)		
No school lunch (100 – P5)	12.3	7.8
Any school lunch (P5)	87.7	92.2
Free lunch (P6)	66.5	73.5
Reduced-price lunch (P7)	4.2	7.0
Paid lunch (P8)	16.9	11.6

Table III.6a (continued)

Student's Certification/Eligibility Status	Probability That Student Obtained a School Lunch on a Given Day ^a	
	Pilot Districts	Comparison Districts
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
No school lunch (100 – P9)	12.3	9.7
Any school lunch (P9)	87.7	90.3
Free lunch (P10)	54.7	59.8
Reduced-price lunch (P11)	10.1	12.4
Paid lunch (P12)	22.5	18.0
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)		
No school lunch (100 – P13)	29.2	26.5
Any school lunch (P13)	70.8	73.6
Free lunch (P14)	1.6	2.6
Reduced-price lunch (P15)	2.7	6.4
Paid lunch (P16)	66.5	64.6

FPL = federal poverty level.

Note: This table is intended to provide descriptive information on participation rates in Graduated Verification (GV) pilot and comparison districts only. Differences between participation rates in pilot and comparison districts should not be interpreted as estimates of the impact of GV on NSLP participation rates. See Table III.7 for impact estimates.

^aStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

(that is, with incomes of no more than 185 percent of poverty), excluding those directly certified, is similar (89.8 percent). However, among the higher-income students not eligible for free or reduced-price meals, the reported overall participation rate among non-directly certified students was 73.6 percent, with most higher-income participants getting paid lunches.

As we did in UFD districts, we examined the proportion of meals served to students in different income groups in GV districts by reimbursement status (Table III.6b). Students who did not get a school lunch were excluded from these calculations. Among non-directly certified students income-eligible for free meals who got a school meal, 70.0 percent got free meals, 11.7 percent got reduced-price meals, and 18.4 percent got paid meals (Table III.6b). Among all students from households below 130 percent FPL, including those directly certified, 79.8 percent got free meals, 7.6 percent got reduced-price meals, and 12.6 percent got paid meals. Thus, only about one of eight meals served to students eligible for free meals were full-price meals. Among meals served to students with incomes of no more than 185 percent of poverty (including those directly certified), 66.1 percent were free, 13.7 percent were reduced-price, and 20.2 percent were paid. A large majority of lunches served to students not income-eligible for free or reduced-price meals in GV comparison districts were paid (87.8 percent), with 8.7 percent reduced-price and 3.5 percent free.

Rates of NSLP participation in GV pilot districts may have been different from those in GV comparison districts, due either to the effects of the pilot intervention or to differences between the two types of districts in student/household characteristics or both. In general, the proportion of non-directly certified students in GV pilot districts reported to be receiving free (or reduced-price) meals was lower than in comparison districts. For example, the free meal participation rate among non-directly certified students was 20.8 percent in pilot districts, compared with 24.2 percent in comparison districts (Table III.6a).

TABLE III.6b

REIMBURSEMENT CATEGORY OF MEALS RECEIVED BY NSLP PARTICIPANTS IN GRADUATED
VERIFICATION PILOT AND COMPARISON DISTRICTS, FALL 2002

Student's Estimated Eligibility Status ^a	Percentage Distribution of Participants by Reimbursement Category ^b	
	Pilot Districts	Comparison Districts
Estimates Excluding Directly Certified Students		
Students Eligible for Free Meals (Income ≤130% FPL)		
Free lunch (P6 / P5)	61.0 (4.67)	70.0 (4.10)
Reduced-price lunch (P7 / P5)	7.5 (2.55)	11.7 (1.60)
Paid lunch (P8 / P5)	31.6 (4.77)	18.4 (4.20)
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
Free lunch (P10 / P9)	48.9 (3.26)	56.3 (2.83)
Reduced-price lunch (P11 / P9)	15.7 (2.52)	17.7 (1.48)
Paid lunch (P12 / P9)	35.3 (3.62)	25.9 (3.04)
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)		
Free lunch (P14 / P13)	2.2 (0.91)	3.5 (0.88)
Reduced-price lunch (P15 / P13)	3.7 (0.51)	8.7 (2.77)
Paid lunch (P16 / P13)	94.1 (1.02)	87.8 (2.81)
Estimates for All Students, Including Those Directly Certified		
Students Eligible for Free Meals (Income ≤130% FPL)		
Free lunch (P6 / P5)	75.9	79.8
Reduced-price lunch (P7 / P5)	4.8	7.6
Paid lunch (P8 / P5)	19.3	12.6
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)		
Free lunch (P10 / P9)	62.5	66.1
Reduced-price lunch (P11 / P9)	11.6	13.7
Paid lunch (P12 / P9)	25.9	20.2

FPL = federal poverty level.

^aNSLP participation is reported by parents in the study survey.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

On the other hand, the paid participation rate among non-directly certified students in pilot districts (49.4 percent) was a bit higher than in comparison districts (47.9 percent). On balance, the free/reduced-price meal difference outweighed the paid meal difference, so the overall participation rate in pilot districts was a bit lower than in comparison districts (for example, 77.9 versus 81.5 percent among all non-directly certified students). These patterns held both overall and for each of the three income subgroups we examined. The patterns are also consistent with the reduction in free and reduced-price meals and increase in paid meals with small net change in total meals that the Food and Nutrition Service (2002) reported during the first year of pilot operation compared to the two prepilot years.

2. Impacts on Participation Rates

The estimated impact of GV on the overall participation rate of non-directly certified students is not statistically significant. After controlling for student/household characteristics, the impact estimates indicated that participation in pilot districts was lower than in comparison districts both overall and for free or reduced-price meal participation—by 3 to 5 percentage points—but these estimates were not significant at the 95 percent level (Table III.7).

Among students income eligible for free meals, after controlling for student characteristics, the overall regression-adjusted participation rate was 5.4 percentage points lower in pilot districts than in comparison districts; this impact was not statistically significant at the 0.05 level. The reduction in the overall participation rate reflected a combination of a negative and statistically significant impact (of 13.3 percentage points) of the pilot on free/reduced-price participation among non-directly certified low-income students, combined with a positive 8.0 percentage point effect on paid participation that was not statistically significant at the 0.05 level. When free/reduced-price income-eligible students were examined, all the estimated effects were smaller, and none was statistically significant.

TABLE III.7

ESTIMATED IMPACT OF GRADUATED VERIFICATION PILOT PROJECTS ON NSLP PARTICIPATION
(AS REPORTED BY PARENTS) AMONG STUDENTS NOT DIRECTLY CERTIFIED

Measure of Participation	Regression-Adjusted Rate ^a		Impact ^b
	Pilot	Comparison	
All Students			
Any school lunch (P1)	78.0	81.4	-3.4 (2.82)
Free lunch (P2)	21.1	24.1	-3.0 (2.36)
Free or reduced-price lunch (P2+P3)	28.6	33.3	-4.7 (2.65)
Paid lunch (P4)	49.2	48.0	1.2 (3.65)
Students Eligible for Free Meals (Income ≤130% FPL)			
Any school lunch (P5)	85.6	91.1	-5.4 (3.38)
Free lunch (P6)	52.7	63.8	-11.1 (5.90)
Free or reduced-price lunch (P6+P7)	60.2	73.5	-13.3* (6.00)
Paid lunch (P8)	25.4	17.4	8.0 (5.90)
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)			
Any school lunch (P9)	87.3	88.7	-1.3 (3.04)
Free lunch (P10)	44.6	48.5	-3.9 (4.93)
Free or reduced-price lunch (P10+P11)	57.9	64.7	-6.8 (5.11)
Paid lunch (P12)	29.1	23.9	5.1 (4.94)
Students Not Eligible for Free/Reduced-Price Meals (Income >185% FPL)			
Any school lunch (P13)	69.3	74.9	-5.6 (4.03)
Free lunch (P14)	1.8	2.4	-0.6 (0.96)
Free or reduced-price lunch (P14+P15)	5.4	7.9	-2.6 (1.68)
Paid lunch (P16)	63.8	67.0	-3.1 (4.31)

FPL = federal poverty level.

TABLE III.7 (continued)

^aThe regression-adjusted rate shows the estimated participation rate that would result under the assumption that students in both GV pilot and comparison districts had the same distribution of observable characteristics. Thus, any remaining difference between the regression-adjusted participation rate in pilot versus comparison district can be attributed to the impact of the pilot intervention.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

Among students not income eligible for free or reduced-price meals, GV was estimated to have a negative effect on the overall participation rate of 5.6 percentage points, but this estimate was not statistically significant (Table III.7). Nor were the estimated effects of GV on the free, free/reduced-price, or paid meal participation rates statistically significant.

Overall, the impact estimates suggest that GV reduced free or reduced-price participation among students income eligible for free meals—that is, the intervention may have discouraged low-income students from getting free or reduced-price meals. This discouraging effect probably occurred because of the impact of GV on the rate of free/reduced-price certification among this group. Burghardt et al. (2004) found that GV raised barriers to certification among students income eligible for free meals. With fewer students certified, fewer were getting free or reduced-price meals. However, many of the students discouraged from being certified (and thus no longer getting free or reduced-price meals) may have gotten school lunches at full price. In particular, we observed an increase in the paid participation rate among students income eligible for free meals. Although this estimated positive impact was not statistically significant, it was relatively large (8 percentage points, or 46 percent of the paid participation rate among free meal income-eligible students in GV comparison districts). Among groups other than those income eligible for free meals, however, GV did not have a statistically significant effect on participation; thus, the estimated effects of GV on overall participation rates among all students were not statistically significant either.

3. Descriptive Data on Levels of Participation Accuracy

As in UFD districts, we examined participation accuracy in GV districts using four different measures—one measure of free meal participation accuracy and three measures of free/reduced-price meal accuracy—for both non-directly certified students and for all students. The free meal accuracy rate excluding directly certified students in GV comparison districts was 73.3 percent in

fall 2002 (Table III.8). In other words, just under three-fourths of free meals served to non-directly certified students in GV comparison districts were served to students income eligible for these benefits—that is, those with incomes of no more than 130 percent of poverty.¹³ Among all students served free meals (including those directly certified), the free meal accuracy rate was 82.2 percent. The estimated free/reduced-price meal accuracy rate depended on the definition of accuracy used. According to the most stringent definition of accuracy, 65.0 percent of free or reduced-price meals served to non-directly certified students went to those income eligible for exactly the benefit level they received. The other estimates indicated that 72.4 percent of free/reduced-price meals were served to students who were not overcertified, and 85.0 percent were served to students income eligible for either free or reduced-price meals.

Rates of participation accuracy were very similar in GV pilot districts and comparison districts—in both cases, about 73 percent of free meals obtained by non-directly certified students were estimated to be served to income-eligible students. Free/reduced-price participation accuracy rates tended to be somewhat higher in pilot districts than in comparison ones. The three free/reduced-price participation accuracy rates among non-directly certified students ranged from 70.2 to 91.4 percent in GV pilot districts, compared with 65.0 to 85.0 percent in comparison districts (Table III.8). The accuracy rates were higher in GV pilot districts

¹³ An additional 19.0 percent of free meals served to non-directly certified students in GV comparison districts were served to students who were income eligible for reduced-price meals—that is, those with incomes of between 130 and 185 percent of poverty. In other words, an estimated 92.3 percent of free meals served to non-directly certified students in GV comparison districts were served to students who were income eligible for either free or reduced-price meals.

TABLE III.8

PARTICIPATION ACCURACY AMONG STUDENTS IN GRADUATED VERIFICATION
PILOT AND COMPARISON DISTRICTS, FALL 2002

Participation Accuracy Measures ^a	Estimated Rate ^b	
	Pilot Districts	Comparison Districts
Estimates Excluding Directly Certified Students		
Free Meal Accuracy		
PA_F: Percentage of Free Meals Served to Students Income Eligible for Free Meals ^c	73.0 (4.56)	73.3 (3.38)
Free/Reduced-Price Meal Accuracy		
PA_FRP1: Percentage of Free or Reduced-Price Meals Served to Students Eligible for the Level of Benefits They Are Receiving	70.2 (3.82)	65.0 (3.51)
PA_FRP2: Percentage of Free or Reduced-Price Meals Served to Students Not Overcertified for Benefits They Are Receiving	76.7 (3.40)	72.4 (3.42)
PA_FRP3: Percentage of Free or Reduced-Price Meals Served to Students with Incomes Below 185% of the FPL	91.4 (1.98)	85.0 (3.08)
Estimates for All Students, Including Those Directly Certified		
Free Meal Accuracy		
PA_F: Percentage of Free Meals Served to Students Income Eligible for Free Meals	85.6	82.2
Free/Reduced-Price Meal Accuracy		
PA_FRP1: Percentage of Free or Reduced-Price Meals Served to Students Eligible for the Level of Benefits They Are Receiving	80.8	73.9
PA_FRP2: Percentage of Free or Reduced-Price Meals Served to Students Not Overcertified Benefits They Are Receiving	85.2	79.4
PA_FRP3: Percentage of Free or Reduced-Price Meals Served to Students with Incomes Below 185% of the FPL	94.8	88.8

FPL = federal poverty level.

Note: This table is intended to provide descriptive information on participation accuracy rates in Graduated Verification (GV) pilot and comparison districts only. Differences between accuracy rates in pilot and comparison districts should not be interpreted as estimates of the impact of GV on NSLP participation accuracy. See Table III.9 for impact estimates.

^aNSLP participation is reported by parents in the study survey.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

^cAmong students who are served free meals, 94.8 percent of those in pilot districts and 92.3 percent of those in comparison districts are income eligible for either free or reduced-price meals.

than in GV comparison districts because participation rates of income-ineligible students were lower in pilot districts than in comparison ones.¹⁴ It is important to keep in mind that these accuracy rates were calculated without controlling for any student/household characteristics and therefore pilot-comparison differences in the accuracy rate do not imply that the pilot necessarily caused the difference. The following section presents estimated impacts of GV on participation accuracy.

4. Impacts on Participation Accuracy

Table III.9 shows the regression-adjusted participation accuracy rates among non-directly certified students in GV pilot and comparison districts, along with the estimated impact of the pilot on participation accuracy. For each measure of participation accuracy, the estimated impact of GV was not statistically significant. In each case, the regression-adjusted participation accuracy rate in pilot districts was greater than the regression-adjusted participation accuracy rate in comparison districts. However, the estimated standard errors of these impact estimates were so large that the observed pilot-comparison difference could be due to sampling variability. Furthermore, as with UFD, the estimated impact of GV on free/reduced-price participation accuracy was sensitive to the definition we used to measure free/reduced-price accuracy.

5. Reimbursement Accuracy

In GV comparison districts, about 1 of 10 dollars (or 10.7 percent) of federal reimbursements for free, reduced-price, or paid meals (excluding directly certified meals) was

¹⁴ In contrast, participation rates among eligible students were also lower in pilot districts than in comparison ones. In isolation, this difference would have led to lower participation accuracy in the pilot districts. However, this difference among eligible students was more than offset by the fact that students ineligible for free (or free/reduced-price) were less likely to participate in pilot districts, leading to greater accuracy in those districts.

TABLE III.9

ESTIMATED IMPACT OF GRADUATED VERIFICATION ON PARTICIPATION ACCURACY
AMONG STUDENTS NOT DIRECTLY CERTIFIED, FALL 2002

Participation Accuracy Measures ^a	Regression-Adjusted Rate ^b		Impact ^c
	Pilot	Comparison	
Free Meal Accuracy			
PA_F: Percentage of Free Meals Served to Students Income Eligible for Free Meals	74.9	73.1	1.71 (10.77)
Free/Reduced-Price Meal Accuracy			
PA_FRP1: Percentage of Free or Reduced-Price Meals Served to Students Eligible for the Level of Benefits They Are Receiving	69.6	65.5	4.11 (8.71)
PA_FRP2: Percentage of Free or Reduced-Price Meals Served to Students Not Overcertified for the Level of Benefits They Are Receiving	76.3	73.0	3.28 (9.07)
PA_FRP3: Percentage of Free or Reduced-Price Meals Served to Students with Incomes Below 185% of the FPL	95.3	83.1	12.2 (8.82)

FPL = federal poverty level.

^aNSLP participation is reported by parents in the study survey.

^bThe regression-adjusted rate shows the estimated participation accuracy rate that would result under the assumption that students in both GV pilot and comparison districts had the same distribution of observable characteristics. Thus, any remaining difference between the regression-adjusted accuracy rate in pilot versus comparison district can be attributed to the impact of the pilot intervention.

^cStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

paid to districts over and above what they would have been paid if no students were overcertified (Table III.10). The rate of reimbursements in excess of students' income eligibility status in GV pilot districts was lower, at 6.9 percent. As in UFD districts, the amount by which reimbursements fall below what should have been paid to districts if all *certified* students had received their maximum level of benefits—that is, if all certified students with incomes below 130 percent of poverty had received free meals—was much smaller. If the eligibility status of all of these undercertified students was changed so that their benefits were increased to the appropriate level given their income, federal reimbursements in GV comparison districts would have increased by only 1.1 percent.¹⁵ The comparable rate in GV pilot districts was similar: 0.9 percent.

¹⁵ Again, this ignores another type of undercertification—students not certified for either free or reduced-price meals when they are income-eligible for these benefits.

TABLE III.10

FEDERAL REIMBURSEMENTS FOR LUNCHES RECEIVED BY STUDENTS WHO ARE NOT DIRECTLY CERTIFIED IN GRADUATED VERIFICATION PILOT AND COMPARISON DISTRICTS, FALL 2002

Reimbursement Measures ^a	Estimated Rate ^b	
	Pilot Districts	Comparison Districts
Percentage of all Federal Reimbursements for Meals Served to Students Not Eligible for the Level of Benefits They Are Receiving	6.9 (1.2)	10.7 (1.8)
Percentage Short-Fall in Federal Reimbursements Because Some Certified Students Received a Lower Benefit Than They Were Eligible for	0.9 (0.3)	1.1 (0.2)

Note: This table is intended to provide descriptive information on reimbursement accuracy in Graduated Verification (GV) pilot and comparison districts only. Differences between rates in pilot and comparison districts should not be interpreted as estimates of the impact of GV on reimbursement accuracy.

^aReimbursements are calculated by using student participation as reported by parents in the study survey and applying the reimbursement appropriate for the student's meal price status.

^bStandard errors are in parentheses. These standard errors have been adjusted to account for the complex sampling design of the data set.

IV. SUMMARY OF IMPACTS

This report has examined the effects of Up-Front Documentation (UFD) and Graduated Verification (GV) on participation in the NSLP and is part of a larger study examining the overall effects of these interventions on the NSLP. The study has focused largely on outcomes related to (1) *deterrence* of students who are income ineligible for free or reduced-price meals from becoming certified for those benefits, and (2) *barriers* to free/reduced-price meals certification among students who are income eligible for those benefits. The pilot interventions were designed to deter income-ineligible students from becoming certified, and it was hoped that this could be accomplished without raising barriers to certification among income-eligible students. Burghardt et al. (2004) addressed the question of what impacts UFD and GV had on rates of certification among eligible and ineligible students.

Simply examining how the pilot interventions affected certification is incomplete, however. The main reason students become certified is to get school meals free or at a reduced price. Thus, whether students become certified presumably affects whether they get school lunches. By extension, if the pilot interventions influence certification rates, then they may also influence rates of participation. Furthermore, knowing whether any impacts on certification translate into impacts on participation helps us interpret the impacts on certification. If UFD and GV lead to lower certification rates but rates of free/reduced-price, paid, and overall participation are unchanged, then the impacts on certification rates become less important. If, on the other hand, the lower certification rates in pilot districts translate into lower participation rates, then this could have implications for children's dietary intake, families' spending on their children's meals, the extent to which the NSLP provides income support to low-income families in the manner the National School Lunch Act intended, and SFAs' budgets.

This chapter summarizes the overall impacts of UFD and GV on rates of school lunch participation. The chapter also places these participation impact results into context by comparing them to estimated impacts on certification as reported in Burghardt et al. (2004). Section A summarizes the impacts of UFD, while Section B provides analogous information on the impacts of GV.

A. UP-FRONT DOCUMENTATION

Overall, UFD reduced the proportion of all students getting a school lunch on a given day. The estimated impact of the pilot on the overall participation rate (as reported by parents) was -5.8 percentage points and was statistically significant (Table IV.1). This impact represents a reduction in participation of 8.0 percent from the rate observed in comparison districts. The overall reduction in participation came from a combination of decreases in the proportion of students getting free/reduce-price meals and the proportion getting paid meals. In particular, the UFD was estimated to reduce the free/reduced-price participation rate by 15.1 percent (which was statistically significant) and to reduce the paid participation rate by 6.1 percent (which was not statistically significant).

These estimated impacts of UFD on rates of participation among all students are reasonably consistent with observed changes in participation rates during the first year after the implementation of the pilot, as presented in the USDA descriptive study of the NSLP Application/Verification Pilot Projects (U.S. Department of Agriculture 2002). Based on the USDA study, the observed decline in the number of free/reduced-price meals served per day in eight UFD districts in the first year after the pilot was 16 percent, close to the negative 15 percent impact described above. Both studies also show a negative relationship between UFD and the overall level of NSLP participation. On the other hand, while this study found a negative

TABLE IV.1
SUMMARY OF ESTIMATED IMPACTS OF UP-FRONT DOCUMENTATION
AMONG NON-DIRECTLY CERTIFIED STUDENTS

Measure of Participation/Certification	Mean Rate in Comparison District	Estimated Impact	
		Percentage Points	As Percent of Comparison District Mean
All Students			
Free/reduced-price participation rate	18.5	-2.8*	-15.1
Paid participation rate	54.0	-3.3	-6.1
Overall participation rate	72.6	-5.8**	-8.0
Students Eligible for Free Meals (Income ≤130% FPL)			
Free/reduced-price certification rate ^a	53.7	-6.2	-11.5
Free/reduced-price participation rate	57.4	-7.8	-13.6
Paid participation rate	26.1	1.8	6.9
Overall participation rate	83.5	-5.4	-6.5
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)			
Free/reduced-price certification rate ^a	51.1	-9.1*	-17.8
Free/reduced-price participation rate	46.1	-9.3**	-20.2
Paid participation rate	36.3	-1.4	-3.9
Overall participation rate	82.5	-9.8**	-11.9
Students Ineligible for Free or Reduced-Price Meals (Income >185% FPL)			
Free/reduced-price certification rate ^a	3.9	0.0	0.0
Free/reduced-price participation rate	3.5	-0.2	-5.7
Paid participation rate	64.1	-4.6	-7.2
Overall participation rate	67.6	-4.4	-6.5

^aThe certification rate estimates are taken from Burghardt et al. (2003).

FPL = federal poverty level.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

impact of UFD on paid participation, the U.S. Department of Agriculture (2002) found that the observed level of paid participation increased in the first year after the implementation of the pilot.¹

To fully understand how UFD affected the participation behavior of students in pilot districts, however, we need to know how the pilot influenced participation rates of two different groups of students: (1) those income eligible for free/reduced-price meals, and (2) those not income eligible for these benefits. This distinction is important because UFD was designed with the hope that it would have differential effects on these two groups of students. By requiring students applying for benefits to submit documentation of the information provided on their application, the hope was that income-ineligible students would be deterred from becoming certified without discouraging those who were income eligible for benefits from becoming certified. Presumably, these differential effects on certification between the two groups would also lead to differential effects on participation. So while it is interesting to know that our estimates suggest that UFD led to a decline in both free/reduced-price and paid participation, we are particularly interested in knowing whether these effects primarily occurred among those low-

¹ There are several reasons why the estimated impacts presented in this report could differ from the observed changes presented in the year one descriptive report (U.S. Department of Agriculture 2002). Most important, the study findings presented here are based on a design intended to estimate the impacts of UFD and GV. Thus, we have attempted to control for factors potentially affecting participation but not related to the pilot intervention itself. The descriptive report, on the other hand, did not attempt to control for such factors; its objective was to describe observed changes in outcomes after the implementation of the pilot. Three other differences are worth mentioning. First, this report examines outcomes from the 2002-2003 school year, two years after the year one descriptive report. Second, this report includes information from nine UFD pilot districts, including two that first implemented UFD in the 2001-2002 school year and not including one included in the USDA first-year analysis. Third, this report excluded directly certified students from the sample, while the figures presented in the descriptive report included all students.

income students eligible for benefits, those higher-income students not eligible for benefits, or some combination of both groups.

Among students income eligible for free/reduced-price meals, UFD was estimated to lead to an 11.9 percent reduction in NSLP participation (Table IV.1). This reduction in the overall participation rate arose essentially from a reduction of 20.2 percent in the rate of free/reduced-price participation. Both of these estimated impacts were statistically significant. The estimated impact of UFD on free/reduced-price participation closely matched the estimated impact on the free/reduced-price certification rate among students from households income eligible for free or reduced-price meals, presented in Burghardt et al. (2004), which was -17.8 percent (excluding those directly certified). Among income-eligible students, the estimated impact on paid participation was small and not statistically significant.

Thus, among students from households income eligible for free or reduced-price meals, UFD led to a decline in both free/reduced-price certification and participation, with no effect on paid participation. One explanation consistent with this pattern of impacts is that the pilot intervention discouraged some students from becoming certified for benefits, and these students stopped getting school lunches as a result. The fact that the free/reduced-price participation rate declined as a result of the intervention—and that this decline matched the decline in free/reduced-price certification—suggests that the students discouraged from becoming certified would have gotten free or reduced-price school lunches if UFD had not been implemented. In addition, the fact that there was essentially no change in paid participation as a result of UFD suggests that this group of students discouraged from becoming certified did not continue to get school lunches at the full price. If they had, we would likely have observed an increase in the paid participation rate.

Among students who were income ineligible for free/reduced-price meals, the estimated effects of UFD on certification and participation were smaller and not statistically significant. Just as Burghardt et al. (2004) found no impact on the free/reduced-price certification rate among this group, our estimate of the impact on the free/reduced-price participation rate is small and not statistically significant. However, UFD may have led to a modest decrease in the paid participation rate and a corresponding modest decrease in the overall participation rate among students not income eligible for free/reduced-price meals. Both of these estimated impacts had relative magnitudes of about -7 percent, although they were not significant at the 0.05 level of statistical significance. Despite not being significant at the 0.05 level, we believe that these negative impacts on paid and overall participation represented actual impacts of UFD and did not arise solely from chance, for two reasons. First, the estimates would have achieved statistical significance if we had used the 0.10 level as the standard of significance. Second, the estimated negative impacts were supported by evidence from an analysis of administrative data on NSLP participation that UFD reduced the percentage of students receiving paid meals (Appendix Table A.4).

If UFD actually caused reductions in paid participation among students not income eligible for free/reduced-price meals, this finding is unexpected because the UFD pilot was designed to directly affect only those who applied (or considered applying) for free/reduced-price meal benefits. If anything, we would have expected to see an increase in paid participation among income-ineligible students, as some of those who were deterred from becoming certified continued to get NSLP lunches at the paid rate.

One possible explanation for this unexpected negative impact is the “peer” effect. If the participation behavior of other students influences a given student’s decision to get a school lunch, it is possible that the negative impact of UFD on free/reduced-price participation among

students who were income eligible for those benefits spills over into a negative impact on paid participation among students not income eligible for free/reduced-price meals. In other words, students not directly affected by UFD may stop getting paid meals because their friends, who were directly affected by UFD, have stopped getting free/reduced-price meals.

UFD did not affect participation accuracy to an extent that we could detect with the study sample and measures. Point estimates of the effects varied widely depending on the specific measure used, and they were sensitive to the inclusion or exclusion of one pilot district that exhibited unusual characteristics (an unusually small fraction of students certified for free and reduced-price meals, and small numbers of students reported by parents to get free or reduced-price meals). However, the point estimates suggest that the percentage of benefits going to income-eligible students was not increased and may even have been reduced slightly. Furthermore, a small reduction in participation accuracy is consistent with the finding that free and reduced-price participation among income-eligible students was reduced, while free and reduced-price participation among income-ineligible students was unchanged.

B. GRADUATED VERIFICATION

The estimated impacts of GV on participation rates among all students tended to be small and were not statistically significant. Overall, based on parental reports, GV was estimated to lead to a small reduction in the proportion of all students getting a school lunch on a given day in fall 2002: -3.4 percentage points (Table IV.2), which represents a reduction in participation of about 4.2 percent from the rate observed in comparison districts. The overall reduction in participation came from a combination of a 14 percent decrease in the proportion of students getting free/reduced-price meals and a 2.5 percent increase in the proportion getting paid meals. Again, none of these estimates was statistically significant at the 0.05 level, although the estimated impact on free/reduced-price participation was marginally significant (that is,

TABLE IV.2

SUMMARY OF ESTIMATED IMPACTS OF GRADUATED VERIFICATION

Measure of Participation/Certification	Mean Rate in Comparison District	Estimated Impact	
		Percentage Points	As Percent of Comparison District Mean
All Students			
Free/reduced-price participation rate	33.5	-4.7	-14.0
Paid participation rate	47.9	1.2	2.5
Overall participation rate	81.5	-3.4	-4.2
Students Eligible for Free Meals (Income ≤130% FPL)			
Free/reduced-price certification rate ^a	81.1	-15.6*	-19.2
Free/reduced-price participation rate	75.2	-13.3*	-17.7
Paid participation rate	16.9	8.0	47.3
Overall participation rate	92.2	-5.4	-5.9
Students Eligible for Free or Reduced-Price Meals (Income ≤185% FPL)			
Free/reduced-price certification rate ^a	71.1	-9.1	-12.8
Free/reduced-price participation rate	66.4	-6.8	-10.2
Paid participation rate	23.3	5.1	21.9
Overall participation rate	89.8	-1.3	-1.4
Students Ineligible for Free or Reduced-Price Meals (Income >185% FPL)			
Free/reduced-price certification rate ^a	8.6	-2.5	-29.1
Free/reduced-price participation rate	9.0	-2.6	-28.9
Paid participation rate	64.6	-3.1	-4.8
Overall participation rate	70.8	-5.6	-7.9

^aThe certification rate estimates are taken from Burghardt et al. (2003).

FPL = federal poverty level.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

significant at the 0.10 level). Since these estimates were based on data collected in the fall of 2002, they do not reflect any effects of additional verification activities conducted in the pilot districts during the 2002-2003 school year as a result of the GV intervention. Instead, the estimated impacts capture any cumulative effects of the intervention as it was implemented in previous years.

As with UFD, the estimated impacts of GV on the rate of free/reduced-price participation among all students were reasonably consistent with observed changes in this participation rates during the first year after the implementation of the pilot, as presented in the USDA descriptive study of the NSLP Application/Verification Pilot Projects (U.S. Department of Agriculture 2002). That study reported a decline of 14 percent in the number of free/reduced-price meals served per day in the three GV districts included in the evaluation in the first year after the pilot was implemented, which matches the 14.0 percent impact described above. Both studies also showed a positive relationship between GV and the paid participation rate, although the observed year one changes presented in the U.S. Department of Agriculture (2002) study were larger than the estimated impact of GV on this outcome presented in Table IV.2. Consequently, the observed year-one change in the overall participation rate, although negative, was smaller in magnitude than the impact presented in Table IV.2.

Table IV.2 presents estimates of the impact of GV on participation rates separately for students who were income eligible for free or reduced-price meal benefits and for those not income eligible for these benefits. In addition, the table also presents impacts separately for the group that was income eligible for free meal benefits alone.

Among students who were income eligible for free meals, GV led to a 17.7 percent reduction in the rate of free/reduced-price participation (Table IV.2). This reduction in the free/reduced-price participation rate was about the same as the estimated impact of -19.2 percent

on the free/reduced-price certification rate among students who were income eligible for free meals presented in Burghardt et al. (2004). Both of these estimates were statistically significant. In contrast, GV led to an increase in the paid participation rate among income-eligible students, with the estimated rate in pilot districts being 8.0 percentage points, or 47.3 percent, higher in GV pilot districts than in comparison districts. However, this estimate was not statistically significant at the 0.05 level. This combination of a negative impact on free/reduced-price participation and a positive impact on paid participation resulted in a small (5.9 percent)—and not statistically significant—negative impact of GV on the overall NSLP participation rate among students who were income eligible for free meals.²

As described in Burghardt et al. (2004), the estimated negative impact of GV on certification among this group suggests that some students who were income eligible for free meal benefits were discouraged from becoming certified for benefits as a result of GV. The fact that the estimated impacts on free/reduced-price participation were of a similar magnitude as the impacts on certification suggests that those income-eligible students discouraged from certification would have gotten free/reduced-price meals if GV had not been implemented. Thus, by reducing the number of income-eligible students certified for benefits, GV also reduced the number getting free/reduced-price meals. However, the pattern of impacts described above suggests that some (although not all) of those who were no longer getting free/reduced-price meals due to GV continued to get school lunches, although at the full-price, or paid, rate. This would explain a

² The estimated impact of GV on participation among students eligible for free or reduced-price meals followed a pattern similar to that of the estimated impacts among those eligible for free meals. The magnitudes of these impacts were smaller—although still reasonably large in percentage terms—and were not statistically significant.

positive effect of GV on the paid participation rate and the fact that the estimated negative impact on the overall participation rate was relatively small.

Among students who were income ineligible for free/reduced-price meals, the percentage getting free or reduced-price meals in comparison districts was not trivial. On a typical day, for example, 9.0 percent of these income-ineligible students in comparison district got free/reduced-price meals. GV was estimated to have a negative impact on this participation rate among income-ineligible students—the free/reduced-price participation rate was 2.6 percentage points (29 percent) lower in GV pilot districts than in comparison ones. The magnitude of this estimated impact was consistent with the magnitude of the estimated impact of GV on the free/reduced-price certification rate among income-ineligible students (Burghardt et al. 2004). In each case, however, this estimate was not statistically significant at the 0.05 level. These data suggest that GV lowered the rate of both free/reduced-price certification and participation among some students who were income-ineligible for these benefits, but we cannot rule out the possibility that these patterns are due to chance variation in our study sample.

The estimated impact of GV on paid participation among students who were income ineligible for free/reduced-price benefits was also not statistically significant and was small in percentage terms, with the paid participation rate 3.1 percentage points (4.8 percent) lower in pilot districts than in comparison ones. Similarly, the estimated impact of GV on the overall NSLP participation rate among students who were income ineligible for free/reduced-price meals was small and negative, but not statistically significant.

Overall, therefore, the strongest impacts of GV appear to be in reducing free/reduced-price participation among low-income students eligible for free meals. The pilot resulted in a substantial number of these students not becoming certified for free/reduced-price meals and, therefore, not getting these meals. However, some of the students affected in this way appear to

have continued to get school meals at the higher paid rate. Among students who were income ineligible for free/reduced price benefits, the pilot may have deterred some from become certified and getting free/reduced-price meals. However, this estimated impact was not statistically significant and did not greatly affect the overall participation rate among this group, since a large majority of the income-ineligible students who participate get paid meals. There was no hint that GV had a negative peer effect on the paid participation rate in fall 2002.

Finally, GV did not affect participation accuracy to an extent that we could detect with the study sample and measures. The point estimates of the effects varied widely depending on the specific measure used, although each point estimate was consistent with a small increase in participation accuracy. In contrast to the situation for UFD districts, we cannot infer the direction of change in participation accuracy from the separate estimates of participation impacts for income-eligible students and income-ineligible students because the effects for the two groups were offsetting. For GV districts, we found a reduction in free and reduced-price participation of 6.8 percentage points among income-eligible students and a reduction of 2.6 percentage points among income-ineligible students. The former will tend to decrease participation accuracy, while the latter will tend to increase it, and we cannot infer whether the net effect will be an increase or decrease.

REFERENCES

- Burghardt, John, Philip Gleason, Michael Sinclair, Rhoda Cohen, Lara Hulsey, and Julita Milliner-Waddell. "Evaluation of the National School Lunch Program Application/Verification Pilot Projects: Volume I: Impact on Deterrence, Barriers, and Accuracy." *Special Nutrition Program Report Series*, No. CN-04-AV1. Project Officer: Paul Strasberg. U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. Alexandria, VA: February 2004.
- Burghardt, John, Anne Gordon, Nancy Chapman, Philip Gleason, and Thomas Fraker. "The School Nutrition Dietary Assessment Study: School Food Service, Meals Offered, and Dietary Intakes." Final report submitted to the U.S. Department of Agriculture, Food and Nutrition Service. Princeton, NJ: Mathematica Policy Research, Inc., October 1993.
- Gleason, Philip. "Participation in the National School Lunch Program and the School Breakfast Program." *American Journal of Clinical Nutrition*, vol. 61, no. 1(s), January 1995, pp. 213S-220S.
- Gleason, Philip, Tania Tasse, Kenneth Jackson, and Patricia Nemeth. "Direct Certification in the National School Lunch Program: Impacts on Program Access and Integrity." Final report submitted to the U.S. Department of Agriculture, Economic Research Service. Princeton, NJ: Mathematica Policy Research, Inc., October 2003.
- Gleason, Philip, and Carol Suitor. "Children's Diets in the Mid-1990s: Dietary Intake and Its Relationship with School Meal Participation." Final report submitted to the U.S. Department of Agriculture, Food and Nutrition Service. Princeton, NJ: Mathematica Policy Research, January 2001.
- Hulsey, Lara, Philip Gleason, and James Ohls. "Evaluation of the National School Lunch Program Application/Verification Pilot Projects: Volume V: Analysis of Applications." *Special Nutrition Program Report Series*, No. CN-04-AV4. Project Officer: Paul Strasberg. U. S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. Alexandria, VA: April 2004.
- U.S. Department of Agriculture, Food and Nutrition Service, Web site [www.fns.usda.gov]. Accessed August 2003.
- U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. "National School Lunch Program Application/Verification Pilot Project: Report on First Year Experience." CN-02-AV. Alexandria, VA: 2002.
- U.S. Department of Agriculture, Food and Nutrition Service. "Study of Income Verification in the National School Lunch Program: Final Report: Volume 1." Washington, DC: Office of Analysis and Evaluation, 1990.

U.S. Department of Agriculture, Office of Inspector General. "Food and Consumer Service National School Lunch Program Verification of Applications in Illinois." Audit Report No. 27010-001-Ch. August 1997.

APPENDIX A
ANALYSIS OF ADMINISTRATIVE DATA

As noted in Chapter II, the main data source for the analysis was survey data, on which parents reported the number of days per week their child usually eats a school lunch. A limitation of using this source of data to measure students' NSLP participation is reporting error. Parents may not know whether their children are getting school lunches for which the local SFA receives federal reimbursement. In this Appendix, we use administrative data on aggregate levels of participation in pilot and comparison districts to address concerns about the accuracy of the parent-reported data. In participation, we address two questions:

1. Are participation levels reported by parents accurate (that is, consistent with the administrative data)?
2. Are estimated impacts of the pilot demonstrations on participation (based on parent-reported data) accurate?

A. DATA AND METHODS

1. Administrative Data on NSLP Participation

The Food and Nutrition Service (FNS) of USDA obtained administrative data on participation in the NSLP from each of the districts included in the evaluation. The data collected included:

- The number of free, reduced-price, and paid meals served in the district in September through November 1999 and September through November 2002
- The number of children enrolled and the number certified for free and reduced-price meals as of October 31, 1999 and October 31, 2002
- The number of servings days per month in September-November 1999 and September-November 2002

A copy of the form used to collect these data at Up-Front Documentation (alternative 1) pilot districts is shown as Exhibit A.1. Based on these data, FNS calculated average daily participation rates in September through November 1999 and 2002 for all students and for

subgroups of students certified for free meals, certified for free or reduced-price meals, and not certified.¹

These participation rates are based on all students, including those directly certified for free meals. The participation rates presented in Chapter III of this report are based on all students except those who have been directly certified. Therefore, the next step in generating participation estimates based on administrative data comparable to those based on parent-reported survey data involved adjusting the participation rates based on administrative data to exclude directly certified students. A critical piece of information needed to do this is the number of directly certified students in each district. We collected data on the number of directly certified students in each district as part of the overall evaluation (see Burghardt et al. 2004). We then assumed that participation rates among directly certified students are identical to those among other students within the same district who are certified for free meals (by application). This allowed us to adjust the overall participation rate in order to translate it into a participation rate among only non-directly certified students.

2. Methods for Comparing Participation Rates from the Two Data Sources

The first comparison we made between the two data sources involved whether the levels of NSLP participation were different when based on parents' reports in the survey data versus when based on administrative data. Do parents accurately estimate, overestimate or underestimate the frequency with which their children eat school lunches?

¹ The data collected by FNS and the methods used to measure participation rates based on the data are summarized in: Strasberg, Paul, "NSLP Application / Verification Pilot Projects: Analysis of the Effect on Participation," internal memorandum, September 23, 2003.

EXHIBIT A.1

**National School Lunch Program Application & Verification Pilot Projects
School Food Authority Reporting Form for School Year 2001-02
Alternative 1**

Name of School Food Authority _____

**As of last operating
day in October**

1. SFA Enrollment (as of last operating day in October)

Number of children with access to school lunch in schools operating the pilot this year

--

2. Free and Reduced Price Applications (thru last operating day in October)

A. Type of free and reduced price application (household or individual child)

--

B. Total number of applications received (complete or incomplete)

--

C. Number of applications received that lacked documentation of income

--

D. Among applications in 2C., number that were re-submitted

--

E. Among applications in 2C., number that were NOT re-submitted

--

3. Free and Reduced Price Applications & Direct Certification

A. Total of free approved children

--

B. Free approved children included in A. approved by direct certification

--

C. Free approved children included in A. approved by CATEGORICAL eligibility

--

Note: CATEGORICAL eligibility is defined as a child whose parent/guardian completed an application which was approved by the school district for free meal benefits indicating current eligibility for Food Stamps, TANF or FDPIR benefits

D. Free approved children included in A. approved on the basis of household size and income information provided on an application

--

E. Reduced price approved children

--

F. Completed applications for free/reduced price meal benefits that were DENIED based on income and family size

--

G. Children represented in 3F on applications that were DENIED based on income and family size

--

Please complete second page.

**National School Lunch Program Application & Verification Pilot Projects
School Food Authority Reporting Form for School Year 2001-02**

Reimbursable meals served and serving days, by month

Name of School Food Authority _____

School Year 2001-02

	Lunches reimbursed			
	Serving Days	Free	Reduced Price	Paid
August				
September				
October				
November				
December				
January				
February				
March				
April				
May				

Instructions: Complete and mail, fax or email this form to

Dr. Paul J. Strasberg
USDA Food and Nutrition Service
3101 Park Center Drive
Alexandria, VA 22302
paul.strasberg@fns.usda.gov
phone (703) 305 2141; fax (703) 305-2576

As described above, the administrative data measure free/reduced-price, paid, and total participation rates at the district level (adjusted to exclude directly certified students). To compare these rates to survey-based participation rates, we first had to aggregate the individual-level participation data by district to obtain survey-based estimates of district level participation rates.

Next, we averaged both survey-based and administrative data-based participation rates across the nine Up-Front Documentation pilot districts and nine comparison districts, as well as across the three Graduated Verification pilot districts and four comparison districts.² This allowed us to compare the overall participation rate estimates based on administrative versus survey data. A statistically significant difference in the estimated participation rates between the two data sources would suggest that the survey based information on students' rates of participation is biased, assuming that the administrative data provides accurate information on NSLP participation.

3. Methods for Comparing Estimated Impacts of the Pilots on Participation Rates

Even if the estimated participation rates based on the two data sources differed, however, it will not necessarily imply that the estimated impacts of the pilots on participation rates will be biased. In other words, if parents overestimate their children's frequency of participation, but do so to a similar extent in the pilot and comparison districts, our estimate of the effect of the pilot on participation would be unbiased.

² Because two of the Graduated Verification comparison districts were for the same pilot district, we first computed the mean participation rate in these two districts and then computed the average of this mean across the two comparison districts to create a single comparison district participation rate for this pilot-comparison district pair.

In Chapter II of this report, we presented our methodology for estimating the impacts of the pilots on participation using survey data. This involved using regression analysis with individual-level survey data to compare probabilities of participation in pilot versus comparison districts, after controlling for relevant individual characteristics. Since we do not have individual-level administrative data on participation, we must use a different methodology to estimate impacts with this source of data. In particular, we estimated a fixed effects model using district-level administrative data on participation rates in pilot and comparison districts in both the fall of 2002 and in a similar period during a baseline year prior to the implementation of Up-Front Documentation and Graduated Verification.

The fixed effects, or “difference-in-differences,” model can be written:

$$\text{Impact} = (P_{pilot}^{02} - P_{comparison}^{02}) - (P_{pilot}^{99} - P_{comparison}^{99})$$

The idea behind this estimate is that the first term examines how participation rates differ in pilot and comparison districts after the pilot has been in place. This difference would indicate how the pilot affected participation if all else were equal. But all else may not be equal. To control both for any pre-existing differences in pilot and comparison districts and for changes over time in conditions in pilot and comparison districts that could affect participation, we simply subtract the difference in baseline participation rates between pilot and comparison districts. This “difference-in-differences” is our estimate of the overall impact based on administrative data.

We estimated difference-in-difference impact estimates separately for each pilot-comparison district pair. Then, we averaged the nine Up-Front Documentation estimates to come up with an overall estimate of the impact of Up-Front Documentation on participation, and averaged the four Graduated Verification estimates to obtain the estimate of the impact of Graduated Verification.

B. RESULTS

1. Level of NSLP Participation

Table A.1 presents the mean estimated participation rates in 2002 for all districts within each of four groups—(1) Up-Front Documentation pilot districts, (2) Up-Front Documentation comparison districts, (3) Graduated Verification pilot districts, and (4) Graduated Verification comparison districts—based on both parents’ reports of their children’s participation and on the administrative data provided by FNS. This measure is the percentage of students getting a NSLP lunch on a typical school day (excluding directly certified students). In addition, the final column shows the average difference between the participation rate in pilot versus comparison districts. In addition to the overall participation rate, the table shows the free/reduced-price and paid participation rates according to the two data sources.³

The table indicates that parents reported higher levels of NSLP participation on the survey than are consistent with the administrative data on participation. According to the parent-reported data, 72.6 percent of students got a lunch in the average Up-Front Documentation comparison district in fall 2002. However, according to administrative data, the average

³ Tables A.2 and A.3 present the estimated participation rates in each pilot and comparison district separately, which represent the data used to calculate the numbers shown in Table A.1. Table A.2 presents participation rates estimates for each district based on administrative data for 2002 and also for the baseline year of 1999.

TABLE A.1

ESTIMATED PARTICIPATION RATES IN 2002 BASED ON SURVEY AND ADMINISTRATIVE DATA IN UP-FRONT DOCUMENTATION AND GRADUATED VERIFICATION SITES, BY PILOT STATUS

Measure of Participation	Mean Participation Rate		Difference
	Pilot	Comparison	
Up-Front Documentation Sites			
Total Participation Rate			
Survey data	66.1	72.6	-6.5
Administrative data	42.0	48.1	-6.0
(Survey-based rate) – (Admin-based rate)	24.1	24.5	
Free/Reduced-Price Participation Rate			
Survey data	15.4	18.5	-3.1
Administrative data	13.4	16.6	-3.3
(Survey-based rate) – (Admin-based rate)	2.0	1.9	
Paid Participation Rate			
Survey data	50.5	54.0	-3.5
Administrative data	28.7	31.4	-2.7
(Survey-based rate) – (Admin-based rate)	21.8	22.6	
Graduated Verification Sites			
Total Participation Rate			
Survey data	77.9	81.5	-3.6
Administrative data	65.8	62.3	3.5
(Survey-based rate) – (Admin-based rate)	12.1	19.2	
Free/Reduced-Price Participation Rate			
Survey data	28.1	33.6	-5.5
Administrative data	28.2	30.7	-2.5
(Survey-based rate) – (Admin-based rate)	-0.1	2.9	
Paid Participation Rate			
Survey data	49.4	47.9	1.5
Administrative data	37.6	31.6	6.0
(Survey-based rate) – (Admin-based rate)	11.8	16.3	

percentage was 48.1 percent.⁴ We calculated a rate of over-reporting participation by calculating the percentage of students who were not participants (according to administrative data) who were reported to be participants (according to parent-reported survey data). In Up-Front Documentation comparison districts, this over-reporting rate was 47 percent.⁵ Over-reporting of NSLP participation occurred primarily among students not certified for free or reduced-price meals. The paid meal participation rate—the percentage of all students who got a school lunch at the full price—was 54.0 percent in Up-Front Documentation comparison districts according to parents and 31.4 percent according to administrative data (Table A.1). By contrast, the free/reduced-price participation rate according to the two data sources was much more similar—18.5 percent according to parents and 16.6 percent according to administrative data.

Parents over-reported their children’s participation at similar rates in Up-Front Documentation pilot districts as in comparison districts. As a result, the estimated pilot-comparison difference in participation was similar whether based on survey or administrative data. In particular, the estimated participation rate was 6.5 percentage points lower in pilot districts than in comparison districts according to parents and 6.0 percentage points lower in pilot districts according to administrative data. This is a preliminary indication that estimated impacts

⁴ A careful examination of the data on Tables A.2 and A.3 identifies one site in which parents’ over-reporting of their children’s NSLP participation was particularly severe. In UFD District Pair 7, the overall participation rate was 68 to 81 percent according to parents and 12 to 18 percent according to administrative data. Due to the severe over-reporting in this district, we conducted a sensitivity analysis to determine whether the estimates from the basic models presented in this report would have changed if this district were excluded. The results of the model in which estimated impacts on participation rates were not substantially affected by the exclusion of this site. The magnitude of the estimated impacts on participation accuracy did change when this site was excluded, though these estimated impacts were not statistically significant regardless of whether the site was included or excluded.

⁵ In particular, we divided the difference between the parent-reported participation rate and administrative data-based participation rate (72.6 – 48.1) by the estimated percentage of all students who did not get a school lunch (100 – 48.1).

TABLE A.2

ESTIMATED PARTICIPATION RATES BASED ON ADMINISTRATIVE DATA IN
UP-FRONT DOCUMENTATION AND GRADUATED VERIFICATION SITES,
BY DISTRICT AND PILOT STATUS

Measure of Participation	Mean Participation Rate ^a				Difference	
	2002		1999		2002	1999
	Pilot	Comparison	Pilot	Comparison		
Up-Front Documentation Sites						
Total Participation Rate						
District pair 1	36.2	51.7	37.0	48.6	-15.2	-11.6
District pair 2	61.8	63.8	61.8	68.8	-2.0	-7.0
District pair 3	45.5	32.2	50.2	23.2	12.9	27.0
District pair 4	38.4	50.1	40.2	52.8	-11.8	-12.7
District pair 5	44.0	47.0	32.7	43.9	-3.0	-11.2
District pair 6	66.3	71.8	72.4	69.2	-5.5	3.2
District pair 7	12.4	17.7	15.5	17.7	-5.3	-2.2
District pair 8	36.1	42.7	42.9	47.8	-6.6	-4.8
District pair 9	38.0	55.1	38.3	47.4	-17.1	-9.1
Free/Reduced-Price Participation Rate						
District pair 1	9.7	21.1	10.4	19.9	-11.3	-9.5
District pair 2	24.3	19.7	20.4	23.0	4.7	-2.6
District pair 3	10.9	12.4	12.1	10.6	-1.5	1.5
District pair 4	7.5	12.3	8.4	12.3	-4.8	-3.9
District pair 5	12.9	14.5	10.3	14.8	-1.6	-4.5
District pair 6	30.1	23.6	33.0	24.8	6.5	8.2
District pair 7	5.1	10.1	8.7	6.8	-5.0	2.0
District pair 8	4.2	9.2	5.8	7.2	-5.0	-1.4
District pair 9	15.7	27.1	14.4	25.6	-11.3	-11.2
Paid Participation Rate						
District pair 1	26.5	30.6	26.6	28.7	-4.1	-2.1
District pair 2	37.4	44.1	41.4	45.8	-6.7	-4.4
District pair 3	36.3	19.9	38.1	12.6	14.5	25.5
District pair 4	30.9	37.9	31.8	40.5	-7.0	-8.8
District pair 5	31.1	32.5	22.4	29.1	-1.4	-6.7
District pair 6	36.2	48.2	39.4	44.4	-12.1	-5.0
District pair 7	7.3	7.6	6.8	10.9	-0.3	-4.1
District pair 8	31.9	33.5	37.2	40.6	-1.6	-3.5
District pair 9	22.3	28.1	23.9	21.8	-5.8	2.1
Graduated Verification Sites						
Total Participation Rate						
District pair 1	54.1	62.5	54.6	62.5	-8.4	-7.9
District pair 2	76.9	55.6	73.7	51.9	21.4	21.8
District pair 3	66.3	68.8	65.6	63.9	-2.5	1.7

TABLE A.2 (continued)

Measure of Participation	Mean Participation Rate ^a				Difference	
	2002		1999		2002	1999
	Pilot	Comparison	Pilot	Comparison		
Free/Reduced-Price Participation Rate						
District pair 1	24.6	37.9	22.0	30.4	-13.3	-8.4
District pair 2	42.7	33.7	44.9	31.3	9.0	13.7
District pair 3	17.3	20.6	18.0	19.2	-3.3	-1.2
Paid Participation Rate						
District pair 1	29.5	24.6	32.6	32.1	4.8	0.5
District pair 2	34.3	21.9	28.7	20.6	12.4	8.1
District pair 3	49.0	48.2	47.6	44.7	0.8	2.9

Source: Internal memorandum from Paul Strasberg to John Burghardt and Phil Gleason, "NSLP Application/ Verification Pilot Projects: Analysis of the Effect on Participation," September 23, 2003.

^a Mean participation rate among all students attending district except those directly certified.

TABLE A.3

ESTIMATED PARTICIPATION RATES BASED ON SURVEY DATA IN UP-FRONT DOCUMENTATION AND GRADUATED VERIFICATION SITES, BY DISTRICT AND PILOT STATUS

Measure of Participation	Mean Participation Rate ^a		Difference
	Pilot	Comparison	
Up-Front Documentation Sites			
Total Participation Rate			
District pair 1	66.4	75.2	-8.8
District pair 2	70.4	73.7	-3.3
District pair 3	75.7	47.0	28.7
District pair 4	44.3	79.3	-35.0
District pair 5	75.0	65.1	9.9
District pair 6	82.6	78.5	4.1
District pair 7	67.5	81.3	-13.8
District pair 8	57.2	69.9	-12.7
District pair 9	59.7	89.4	-29.7
Free/Reduced-Price Participation Rate			
District pair 1	10.5	28.3	-17.8
District pair 2	31.5	23.8	7.7
District pair 3	18.3	14.6	3.7
District pair 4	10.2	14.2	-4.0
District pair 5	16.6	10.4	6.2
District pair 6	31.5	22.0	9.5
District pair 7	2.6	18.5	-15.9
District pair 8	4.8	9.7	-4.9
District pair 9	17.9	28.7	-10.8
Paid Participation Rate			
District pair 1	55.9	47.0	8.9
District pair 2	39.0	49.7	-10.7
District pair 3	57.1	32.0	25.1
District pair 4	33.9	64.8	-30.9
District pair 5	57.9	54.7	3.2
District pair 6	50.3	56.5	-6.2
District pair 7	64.9	62.8	2.1
District pair 8	52.3	60.2	-7.9
District pair 9	41.6	60.8	-19.2
Graduated Verification Sites			
Total Participation Rate			
District pair 1	74.8	91.2	-16.4
District pair 2	86.8	72.6	14.2
District pair 3	75.2	86.3	-11.1
Free/Reduced-Price Participation Rate			
District pair 1	25.3	45.5	-20.2
District pair 2	473.5	36.2	7.3
District pair 3	17.4	20.4	-3.0

TABLE A.3 (continued)

Measure of Participation	Mean Participation Rate ^a		Difference
	Pilot	Comparison	
Paid Participation Rate			
District pair 1	49.0	45.7	3.3
District pair 2	43.0	36.3	6.7
District pair 3	57.8	65.9	-8.1

^a Mean participation rate among all students attending district except those directly certified.

of the pilot on participation were not strongly influenced by the data source, although we address this question more carefully below.

In Graduated Verification districts, parents also over-reported their children's NSLP participation. At first glance, the over-reporting in Graduated Verification districts appears less prevalent than in Up-Front Documentation districts, since the difference between the participation rate based on survey data and that based on administrative data was smaller in absolute terms. In particular, the participation rate was 81.5 percent in Graduated Verification comparison districts according to parents, and 62.3 percent according to administrative data (Table A.1). This difference of about 19 percentage points was smaller than the absolute difference in Up-Front Documentation comparison districts of nearly 25 percentage points. However, this was primarily due to the fact that a larger proportion of students in Graduated Verification comparison districts got a school lunch on any given day (according to the administrative data), implying that there was less opportunity for over-reporting among parents in those districts. In fact, the rate of over-reporting in Graduated Verification comparison districts was 51 percent, compared with 47 percent in Up-Front Documentation comparison districts.

Over-reporting of participation occurred less frequently in Graduated Verification pilot districts than in comparison districts. In particular, the absolute difference between the survey-based participation rate and administrative data-based participation rate was 19.2 percentage points in comparison districts compared with only 12.1 percentage points in pilot districts (Table A.1). Thus, while the survey data indicated a higher participation rate in comparison districts, the administrative data indicated a higher participation rate in pilot districts. This is a preliminary indication of a potential bias in the estimated impact of Graduated Verification on NSLP participation, but since this difference may have been driven by some district characteristic other

than the implementation of the pilot intervention, we need to look at the comparison of estimated impacts (after controlling for student/household characteristics) based on survey versus administrative data to get a better indication of potential bias.

2. Estimated Impacts on NSLP Participation

Table A.4 shows the estimated impacts of Up-Front Documentation and Graduated Verification on NSLP participation rates. In particular, for both survey and administrative data, the table shows the mean participation rate in comparison districts, the estimated impact in this rate in percentage points, and this impact measured as a percentage of the comparison district participation rate.

Overall, estimated impacts based on survey data are similar to those obtained from the administrative data difference-in-differences model. In Up-Front Documentation districts, the estimated impact on the total participation rate was -8.0 percent according to survey data compared with -6.0 percent according to administrative data.⁶ The estimated impact of Up-Front Documentation on the free/reduced-price participation rate was negative in both cases, but the impact estimate was a bit different when based on survey data (-15.1 percent) compared with when based on administrative data (-5.6 percent). For both survey data and administrative data, however, Up-Front Documentation was estimated to lead to a 6.1 percent decrease in the paid participation rate.

Despite the fact that the previous section described differential rates of over-reporting of participation in Graduated Verification pilot versus comparison districts, the estimated impact of

⁶ In absolute terms, the estimated percentage point impact based on survey data is twice as large as the percentage point impact based on administrative data (-5.8 versus -2.9 percentage points). However, this difference is somewhat misleading because the comparison district participation rate is much lower according to administrative data than according to survey data.

TABLE A.4

ESTIMATED IMPACTS ON PARTICIPATION RATES BASED ON SURVEY AND ADMINISTRATIVE DATA IN UP-FRONT DOCUMENTATION AND GRADUATED VERIFICATION SITES, BY PILOT STATUS^a

Measure of Participation	Estimates Based on Survey Data			Estimates Based on Administrative Data		
	Participation Rate in Comparison Districts	Estimated Impact of Pilot (Percentage Points)	Impact as Percentage of Participation Rate in Comparison Districts	Participation Rate in Comparison Districts	Estimated Impact of Pilot (Percentage Points)	Impact as Percentage of Participation Rate in Comparison Districts
Up-Front Documentation Sites						
Total Participation Rate	72.6	-5.8	-8.0%	48.1	-2.9	-6.0%
Free/Reduced-Price Participation Rate	18.5	-2.8	-15.1%	16.0	-0.9	-5.6%
Paid Participation Rate	54.0	-3.3	-6.1%	31.4	-1.9	-6.1%
Graduated Verification Sites						
Total Participation Rate	81.5	-3.4	-4.2%	62.3	-1.7	-2.7%
Free/Reduced-Price Participation Rate	33.6	-4.7	-14.0%	30.7	-3.8	-12.4%
Paid Participation Rate	47.9	1.2	2.5%	31.6	2.2	7.0%

Note: Estimates based on survey data are based on a regression model and are drawn from Chapter III, Tables III.2 and III.7. Estimates based on administrative data are calculated based on a difference-in-differences model described in this appendix and using data from Tables A.2 and A.3.

^aParticipation rate estimates and impact estimates are based on samples of students attending district except those directly certified.

Graduated Verification on the total participation rate was similar across the two data sources. Graduated Verification was estimated to lead to a 4.2 percent decline in the NSLP participation rate according to survey data and to a 2.7 percent decline according to administrative data.

Unlike Up-Front Documentation, the estimated impact of Graduated Verification on the free/reduced-price participation rate was also very similar across the two data sources: -14.0 percent for survey data and -12.4 percent for administrative data. However, Graduated Verification was estimated to lead to a small (2.5 percent) increase in paid participation according to survey data, compared with an somewhat larger increase of 7.0 percent according to administrative data.

C. IMPLICATIONS OF THE ANALYSIS OF ADMINISTRATIVE DATA

Based on data received from and preliminary analysis conducted by FNS, we used administrative data to address two questions: (1) How accurate were parents' reports of their children's levels of NSLP participation on the survey conducted for the Evaluation of NSLP Application/Verification Pilot Projects? (2) Can the data on NSLP participation reported by parents be used to estimate the impacts of Up-Front Documentation and Graduated Verification on NSLP participation without fear of substantial bias?

We determined that parent reports of NSLP participation by their children lead to higher estimates of the level of NSLP participation among students in the pilot and comparison districts than are revealed in the program administrative data. Parents are especially likely to over-report school meal participation by students who are not certified for free or reduced-price meals.

Despite these differences in the levels of NSLP participation in the two data sources, the two sources provide similar estimates of pilot impacts. After important student/household characteristics were controlled for, either through a regression model or through a difference-in-differences model, the resulting estimates of the impacts of the pilots on participation based on

parent-reported survey data or on administrative data were similar. This finding increases our confidence that the estimated impacts on participation based on the survey data reported in Chapter III are accurate and reliable.