The challenge of program evaluation: When increasing program participation decreases the relative well-being of participants

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A B S T R A C T

Two goals of food assistance programs are to improve well-being and to increase participation among those in need. Progress in meeting the first goal can be measured by the difference in well-being between participants and eligible non-participants. This gap in well-being though can be affected by progress made toward the second goal of increasing participation rates. In particular, if those with the lowest levels of well-being disproportionately enter the program, the gap can increase. To examine whether this tension between goals exists empirically, we consider the case of the Food Stamp Program and its effect on food insecurity in the United States, using data from the Survey of Income and Program Participation (SIPP). In particular, we use variation in State policies (the change in administrative error rates and the combined value of Temporary Assistance for Needy Families (TANF) and food stamp benefits) to analyze whether increasing participation rates leads to increases in the difference in food insecurity rates. Controlling for other factors, we find evidence of the tension between these two program goals insofar as States with policies which encourage participation have higher differences in the food insecurity rates of participants and non-participants.

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Introduction

Food assistance programs in countries across the world are designed to help address poverty-related nutrition challenges facing those most in need. These programs and their potential benefits will lead policymakers and program administrators to encourage participation. As an example, consider the case of the largest food assistance program in the United States, the Food Stamp Program. This program is “…the most critical component of the safety net against hunger because it provides basic protection for citizens of all ages and household status (US Department of Agriculture, Food and Nutrition Service, 1999, p. 7).” To be this critical component, the Food Stamp Program must reach households in need of assistance and, at the same time, provide these households with an effective means to reduce the probability of hunger. For the former goal, researchers have examined how successful the program is at reaching the intended recipients, especially the most needy of potential recipients (see, e.g., Cunyngham, 2004). For the latter goal, researchers have examined the effect of food stamps on food insecurity (i.e., the restricted access to enough food for active, healthy lives because of financial constraints) and hunger in the US (Gundersen and Oliveira, 2001; Borjas, 2004; Wilde and Nord, 2005; Gundersen and Kreider, 2008).

The existence of the dual goals of improving well-being and encouraging participation can create a challenge for those examining the success of a food assistance program. Consider again the case of food stamps and food insecurity in the United States. To gauge the effectiveness of food stamps in reducing food insecurity, one can compare the food insecurity status of recipients with eligible non-recipients. In almost all comparisons of eligible households, food stamp recipients have higher rates of food insecurity than eligible non-recipients. In 2006, for example, 52% of food stamp recipients were food insecure at some point in the previous year, while 25% of eligible non-recipients were food insecure (Nord et al., 2007, Table 11). This is not surprising insofar as the households most at risk of being food insecure are also most likely to enter the Food Stamp Program. Given the goals of the Food Stamp Program, program administrators and policymakers are motivated to take actions to reduce this gap in food insecurity rates between participants and eligible non-participants. This motivation is further encouraged by the closely followed reports of State-level food insecurity rates (e.g., Cook, 2007). At the same time, program administrators and policymakers are motivated to increase participation rates among eligible households. The success of States in achieving high participation rates is monitored by the annual compilation of participation rates by State (e.g., Castner...
From a resource allocation standpoint, both of these goals may be recommended – improving programs such that the well-being of participants increases relative to eligible non-participants is consistent with the goals of any program and, given that the program is seen as a positive contribution to well-being, society would like more eligible people to participate in this program. However, a counterintuitive result may arise – increasing participation could lead to a decrease in the well-being of participants relative to eligible non-participants. In the case of food insecurity and food stamps, for example, if participation rises among those who are most at-risk of being food insecure, this would lead to an increase in the food insecurity rates of participants relative to non-participants (the food insecurity gap). If this gap in well-being (e.g., with respect to food insecurity) were used as a guide to resource allocation for a food assistance program, allocation decisions may choose to decrease participation (especially among those most in need) to narrow the gap in well-being between participants and non-participants. Similarly, from a program design standpoint, concentrating on the gap in well-being between participants and non-participants may lead administrators to direct targeting efforts towards those in least need of assistance insofar as, with or without the program, these persons may have higher levels of well-being.

In this paper, we examine whether the goals of increasing participation and reducing the gap in well-being between participants and non-participants within a food assistance program can be in tension. To do so, we consider the case of the Food Stamp Program in the US. In particular, we exploit State-level variation in food stamp policies to see, empirically, whether States which take actions to increase participation rates do have larger food insecurity gaps. We use State-level variation because, while benefit levels and most eligibility criteria are set at the national level, States have discretion over other policy tools that can influence program participation. The two policy tools we use portray (1) the benefit levels of gateway programs and (2) the cumbornesseness of the food stamp application process. States with higher benefit levels and/or less cumbersome application processes are said to encourage participation. With these State-level measures of policy tools, we use household-level data taken from a 1998 cross-section from the Survey of Income and Program Participation (SIPP) to test whether the gap between the food insecurity status of recipients and non-recipients is higher in States with policies that reduce participation in food stamps. In other words, do some States have a higher food insecurity gap between participants and eligible non-participants because of a policy environment which encourages participation?

We begin with a review of the Food Stamp Program and food insecurity. We follow this with a discussion of the ways that institutions can, in theory, influence the relationship between food assistance participation and well-being. In this discussion, we describe how efforts to increase participation can, depending on the composition of recipients and non-recipients, lead to an increase or a decrease in the food insecurity gap. In the discussion of our empirical model, we also comment on why we consider the estimation issues faced in this analysis to differ from the standard case of sample selection bias associated with participation in the Food Stamp Program. We then describe our data sources and the two measures of State generosity used to test our theoretical conjectures – administrative error rates and the maximum combined Temporary Assistance for Needy Families (TANF) and food stamp benefit level. In discussing these measures, we describe why a State’s choice for each of these measures will have an influence on the composition of potentially food insecure households. We show that States with policies that encourage participation in the Food Stamp Program have higher gaps between the food insecurity rates of Food Stamp Program participants and non-participants.

This relationship between State policies and the food insecurity gap is maintained, even after controlling for other factors, especially for our most direct measure of a State’s action to encourage participation, the maximum combined TANF plus food stamp benefit levels. These findings highlight the importance of distinguishing whether decreasing the food insecurity gap between participants and non-participants is due to real improvements in well-being or simply due to shifts in the composition of participants.

Background

The Food Stamp Program

The Food Stamp Program is by far the largest US food assistance program, serving approximately 26.7 million individuals in 2006 with an annual benefit distribution of $32.9 billion (Wolkwitz, 2007). Participants receive benefits for the purchase of food in authorized, privately run retail food outlets selling food to participants and non-participants. Benefits are distributed via an Electronic Benefit Transfer (EBT) card which is operationally similar to an ATM card.

To receive food stamps, households must meet three financial criteria: the gross income test, the net income test, and the asset test. A household’s gross income before taxes in the previous month must be at or below 130% of the poverty line. Households headed by someone over the age of 60 are exempt from this test (although they must still pass the net income test). After passing the gross income test, a household must have a net monthly income at or below the poverty line. Finally, households must also have assets less than $2000 to qualify for the program ($3000 for households headed by someone over age 60). The value of a home is not considered an asset. Until 2001, federal rules required that the value of a vehicle above $4650 be counted as an asset, unless the vehicle is used for work or for the transportation of disabled persons. In 2001, States were given some increased flexibility to set their vehicle asset policy. Households receiving TANF or households where all members receive Supplemental Security Income (SSI) are categorically eligible for food stamps and do not have to meet these three tests.

To receive food stamps, eligible households must make a decision to apply for benefits. We assume a household will choose to participate if the benefits exceed the pecuniary and non-pecuniary costs associated with food stamps and will choose not to participate if the opposite holds. There are two main costs associated with the receipt of food stamps – stigma and transactions costs. Stigma encompasses a wide variety of sources, from a person’s own distaste for receiving food stamps to his or her desire to avoid disapproval from others when redeeming food stamps to the possible negative reaction of caregivers (Rainwater, 1982; Moffitt, 1983; Stuber and Kronebusch, 2004). The transactions costs associated with food stamp receipt include the amount of time to get to the food stamp office and the time spent in those offices; the burden of taking children to the office or paying for child care services; and the availability and costs of transportation (Ponza et al., 1999).

To remain a participant, a household faces these costs on a repeated basis when it must recertify its eligibility. Other costs that a household faces when applying for the program include the time and effort needed to acquire the necessary paperwork and to fill out the application forms.

Deductions are also taken for child care and/or care for disabled dependents, medical expenses, and excessive shelter expenses.
Policymakers have a direct influence on the benefits and transactions costs associated with the food stamp participation decision. As an example, a more streamlined application process would reduce the transactions costs associated with applying, making a household more likely to perceive that the benefits of food stamps exceed the costs. Conversely, requiring more frequent recertification of benefits may lead some households to believe the costs exceed the benefits. Policymakers have a more indirect influence on stigma. For example, higher TANF benefits may be a signal that a State’s residents are supportive of those who are in need of assistance.

Food insecurity

The main goal of the Food Stamp Program is to increase the nutritional levels of low-income households in the United States. To measure the effectiveness of reaching this goal the USDA has placed questions regarding food insecurity on surveys for almost thirty years. In this project, we use data from three of these questions. The first question is the food insufficiency question that has been included in numerous surveys since 1977. This question asks respondents to describe their food intake in terms of the following: Which of these statements best describe the food eaten in your household in the last month? Respondents have four choices: enough of the kinds of food we want to eat; enough but not always the kinds of food we want to eat; sometimes not enough to eat; or never enough to eat. Those households reporting that they or others sometimes or often do not get enough to eat are defined as “food insufficient”. The other two questions are from the Core Food Security Module (CFSM) of the Current Population Survey (CPS). These questions are the second and third questions asked in the CFSM (Nord et al., 2007; Appendix Table A1). Since the questions in the CPS are ordered from least to most severe, these two questions provide relatively less severe measures of food insecurity within the CFSM. The questions ask about whether a household’s food just did last and there wasn’t any money to get more and whether a household couldn’t afford to eat balanced meals. The possible responses are never true; sometimes true; or often true. Households responding sometimes or often true are defined as, respectively, “food bought did not last” and “could not afford to eat balanced meals”. As the wording and subsequent responses indicates, these two measures are less severe than the food insufficiency measure. These measures have all been widely used, e.g., Alaimo et al., 2001; Bitler et al., 2005; Casey et al., 2001; Gundersen and Oliveira, 2001; Gundersen et al., 2003; Nelson et al., 1998; Ribar and Hamrick, 2003.

Increasing participation and the gap in well-being between participants and non-participants in food assistance programs

We now demonstrate how, theoretically, efforts to increase participation in food assistance programs (e.g., food stamps) can lead to increases in the gap in well-being (as measured by, e.g., food insecurity) between participants and non-participants. We assume a household chooses whether to participate (P) in a food assistance program based on utility maximization:

\[ U^*(F, OG, S, T) = \max \{ U(P^P, OGP^P, S, T), U(P^NP, OGNP^P) \} \]  

where the first element of the max function is the utility obtained when participating in the program, the second element is utility when not participating, and the max function returns whichever is greater. \( F \) represents food consumption, \( OG \) is consumption of other goods, \( P \) reflects participation in a food assistance program, \( NP \) is non-participation, \( S \) is the stigma and \( T \) the transaction costs associated with program participation. The relative importance of \( S \) and \( T \) will depend on the household.

One implication of Eq. (1) is that the higher the food assistance benefit level a household stands to receive, the higher must be the level of stigma or transactions costs to deter it from participating. This participation decision, and simultaneous decisions regarding the budget constrained consumption of food and other goods, leads to the standard following reduced-form demand equations for food

\[ F^* = f(p_F, p_OG, EINC, TINC, OINC, FAB) \]  
\[ F^* = f(p_F, p_OG, EINC, TINC, OINC, FAB) \]

where \( p_F \) is the price of food; \( p_OG \) is the price of other goods; \( EINC \) is current earned income; \( TINC \) is transfer income; \( OINC \) is other income; and \( FAB \) is the benefit level from the food assistance program. Let \( F_{min} \) be the minimum amount of food needed for food security.2 This minimum will vary by household size. If \( F > F_{min} \) a household is food insecure (FI = 1); if \( F \leq F_{min} \) a household is food secure (FI = 0). Note that some households will be food insecure whether they participate in a food assistance program or not while other households will be food secure whether they participate or not.

We now turn to a discussion of how program design can have an influence on the above model. Consider two eligible but non-participating households, A and B. Assume A is food insecure whether or not food assistance is received while B is food secure irrespective of participation.3 Suppose further that the reasons for non-participation differ for the two households. For A, the gains from participating are large but the disutility to participation is also large. For B, the gains from participating are small but the disutility to participation is also small.

In the United States, the food insecurity and food stamp participation literatures provide evidence of both households of type A (i.e., households with high probabilities of food insecurity which do not participate in the Food Stamp Program due to transactions costs) and households of type B (i.e., households with low probabilities of food insecurity which do not participate due to small gains from participation). For type A households, there is evidence that households with poor management skills are more likely to be food insecure (see, e.g., Ahluwalia et al., 1998; Campbell and Desjardins, 1989; Olson et al., 2004) and that households with poor management skills are also less likely to be able to navigate the application process (Hays, 2003). Households of type B are more likely to have higher incomes which leads to lower benefit levels and hence, lower probabilities of participation (Cunnyngham, 2005). These households are also less likely to be food insecure due to the inverse relation between food insecurity and income (e.g., Nord et al., 2007).

One way that institutions can affect the food assistance participation decision is reflected primarily in the disutility associated with participation. Whether these policies lead to more increases in participation among households of type A or type B is an open question. If type A households are more likely to be positively affected by, say, a State’s policy changes and choose to participate, there would be an increase in the food insecurity gap between participants and non-participants in those States. This would hold because there would then be more food assistance recipients that are food insecure. Conversely, if type B households are more likely to be affected, there would be a decrease in the food insecurity gap.
This would hold because there would then be more food assistance recipients that are food secure.\(^4\) In this paper we investigate which effect dominates empirically in the case of the Food Stamp Program in the US.

**Empirical approach**

**Econometric approach**

We begin our analysis by describing whether States which encourage food stamp participation through various actions have higher food insecurity gaps between participants and non-participants. An outcome like this would be consistent if these policies primarily affected households of type A (as described above). We then consider whether the gap in food insecurity rates between participants and non-participants is still present after controlling for other factors. To analyze this, we specify the following model of food insecurity (FI):

\[
F_{i1} = 1 \text{ if } F_{i1} > 0; \quad F_{i0} = 0 \text{ otherwise}
\]

\[
F_{i1}^* = \alpha X_i + \delta SP_s + \eta P_i + \delta SP_s P_i + u
\]

where \(F^*\) represents a continuous, underlying latent variable; \(i\) denotes a household; \(s\) denotes a State; \(SP\) is a vector of State policies with respect to the Food Stamp Program; \(P = 1\) if a household receives food stamps, \(0\) otherwise; \(X\) is a vector of covariates; and \(u\) is an error term. We estimate three specifications of Eq. (3), using each of the food insecurity measures noted above, where \(F_i = 1\) if a household is defined as either: (1) being food insufficient, (2) having bought food that did not last, or (3) not being able to afford to eat balanced meals. If State policies affect the composition of food stamp recipients which results in a wider gap between the rates of food insecurity of participants and non-participants, we hypothesize that the estimate of \(\alpha\) will be positive. (Our State policy variables are defined so that higher values represent actions that encourage participation.) We restrict the sample to households eligible for the Food Stamp Program and estimate the model using probit maximum likelihood estimation methods. We use two State policies in our analyses: (a) the maximum combined TANF plus food stamp benefit level and (b) administrative error rates. These measures portray, respectively, the benefit levels of gateway programs and the cumbersome nature of the food stamp application process.

Before turning to further description of the State policy measures, we comment on the issue of selection into the Food Stamp Program. On average, even after controlling for relevant covariates, food stamp participants are more likely to be food insufficient than eligible non-recipients. This has been ascribed to selection insofar as those most likely to be food insufficient are also most likely to enter the Food Stamp Program. Previous work has controlled for this selection and found that the negative link between food stamps and food insufficiency disappears once selection is addressed (Gundersen and Oliveira, 2001). In this paper, we are not interested in obtaining an unbiased measure of the extent to which the Food Stamp Program alleviates food insecurity. Rather, we focus on how State policies can affect the food insecurity gap simply by altering the composition of Food Stamp Program participants and non-participants. This focus provides a different portrayal of selection and allows us to examine the potential pitfalls of comparing the food insecurity status of program participants and non-participants in the absence of information about how State policies affect the composition of the participants and non-participants.

**Maximum TANF plus food stamp benefit levels**

The maximum TANF plus food stamp benefit level has been widely used as a measure of State policy in both household and State-level models\(^5\) (See, e.g., Hoynes, 1996; Moffitt et al., 1998; Blank, 2001; Paxson and Walford, 2003). Indirectly, States with higher than average combined benefit levels may foster more participation insofar as recipients may feel less stigmatized by program receipt if higher benefit levels are perceived to be a reflection of a State’s greater commitment to helping poor persons. These perceptions of diminished stigma will hold for all households, not just those who would receive both TANF and food stamp benefits. This reduced stigma means it is more likely that a household will perceive that the benefits to participating exceed the non-pecuniary costs associated with stigma. For households eligible for both TANF and food stamps, the combined benefit level will have a direct effect on participation decisions since, with higher benefits, the benefits to participating are more likely to exceed the costs to participation (e.g., transactions costs, stigma costs). For these direct and indirect reasons, we expect States with higher combined benefit levels to have higher levels of participation.

In Fig. 1 we display the maximum combined TANF plus food stamp benefit level by State for 1998. In 1998, in the continental US, Connecticut had the highest maximum combined benefit of 881 dollars and Mississippi had the lowest of 441 dollars.\(^6\)

**Error rates**

In determining eligibility for program benefits, administrative errors frequently arise. As a consequence, to monitor the delivery of benefits the USDA annually constructs an error rate for each State. The error rate is calculated as the percentage of total dollars incorrectly given to or taken from food stamp recipients. That is, it is the value of benefits given to ineligible households plus the under-issuance of benefits to eligible households as a percent of total value of food stamps distributed. States are subject to a financial penalty if their error rates exceed the national average. In response, some States have taken actions to reduce these error rates. For example, States have increased the amount of paperwork needed to verify eligibility and the consequent benefit level and States have increased the frequency with which a household has to recertify its eligibility status (US GAO, 1999). These and other actions can lead to a more cumbersome application process and this has been associated with a fall in the number of people receiving food stamps because of the higher transactions costs associated with navigating the application process (See Kabbani and Wilde (2003) for more on the relation between changes in administrative practices, error rates, and changes in participation rates. Also see Rosenbaum, 2000 and Ziliak et al., 2003).

For our analyses, we use the administrative error rates in 1998. In Fig. 2 we display these error rates by State. As seen, there is a great deal of variation across States. The lowest error rate is 5.5% in Minnesota and the highest is in Michigan (18.0%).

\(^4\) Formally, prior to any change in the food insecurity gap (FIG), the difference can be described as FIG = (FIFAP/FAP) - (FINFAP/NFAP) where FIFAP is the number of food insecure food assistance participants, FAP is the number of food assistance participants, FINFAP is the number of food insecure food assistance non-participants, and NFAP is the number of food assistance non-participants. If more households of type A entered the food assistance program, the value of FIFAP/FAP will rise and the value of FINFAP/NFAP will fall leading to an increase in the gap. The opposite would hold if more households of type B entered the food assistance program.

\(^5\) Prior to the introduction of TANF, previous authors used the maximum Aid to Families with Dependent Children (AFDC) plus food stamp benefit level as a measure.

\(^6\) Because the structure of benefits are different in Hawaii and Alaska, residents in these States are dropped from our analyses.
Data

We use the SIPP, a multipanel longitudinal survey of the non-institutional population of the US for our analyses. The SIPP is divided into two major sections, a set of core questions used in every wave (a four-month time period) collecting information on household characteristics such as monthly earnings and participation in government programs (including food stamps), and a set of topical modules containing questions asked periodically of each panel. The food security questions described above were asked in a Topical Module in wave eight (in 1998). There are approximately 40,000 households in the SIPP, but we restrict our analysis to the 3574 households estimated to be eligible for the Food Stamp Program in the final month of wave 8.

By using the SIPP, we are incorporating the advantages of SIPP versus more limited data sets. We concentrate on the advantages of SIPP in comparison to the Current Population Survey (CPS). This comparison is relevant because the food security questions are also asked in the CPS on the Core Food Security Module (CFSM), which is the source for the official rates of food insecurity in the United States. The primary advantage of the SIPP is that it contains more information to better estimate eligibility for the Food Stamp Program. A first advantage is that SIPP has income information at the monthly level, consistent with actual program requirements, as well as information on assets to estimate eligibility. Without monthly income, a misclassification of eligible households results (McConnell, 1997). In addition, a continuous income measure is used on the SIPP. On the CPS the information is at an annual level and is given in intervals (for the months in which the CFSM is placed on the CPS) rather than as a continuous measure. A further advantage of the SIPP is that information on food stamp receipt and our measures of food insecurity are for the same month. In the set of questions taken from the CPS to establish the official food insecurity statistics, this simultaneity is absent. Finally, unlike the CPS, the SIPP has information on household assets which allows us to more precisely estimate FSP eligibility. Approximately one in four income eligible households are asset ineligible for the Food Stamp Program so including asset information is necessary to avoid misclassifying households as eligible.

Results

Descriptive statistics

In Table 1 we present descriptive statistics for the food stamp eligible population in 1998, further broken down by food stamp participation status. As is often the case with assistance programs, food stamp recipients are worse-off than non-recipients. This can be seen in columns (2) and (3) where, for example, in comparison to food stamp recipients, non-recipients have higher incomes, are more likely to own their homes, and are more likely to be employed. Consistent with previous work, food stamp participants have higher rates of food insecurity than non-participants. This holds for each of the three measures – 9.6% of food stamp participants are food insufficient versus 5.4% of non-participants; 44.1% of food stamp participants bought food that did not last versus 25.7% of non-participants; and 38.5% of food stamp participants could not afford to eat balanced meals versus 23.2% of non-participants. Consistent with the less severe nature of the latter two measures, the percentage of households experiencing these outcomes is much higher than for food insufficiency.

Above we demonstrated how State actions to increase participation rates could lead to increases or decreases in the food insecurity gap with the direction depending on the composition of those shifting from non-participating to participating. This theoretical conjecture is examined empirically in Table 2 where we display results for each of the three measures of food insecurity. For

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7 We have used data from 1998 for our analyses for two central reasons. First, there has been little change in the maximum TANF + food stamp benefit levels since 1998 and state-level food insecurity rates have been largely stable between 1996–1998 and 2004–2006 (Nord et al., 2007). Second, although there have been decreases in state error rates since 1998, these are largely due to changes in the method of accounting for errors rather than a fundamental change in patterns of errors.
each measure, we compare rates of participants and non-partici-
pants broken down by (a) whether the State has a higher or lower
than average maximum TANF plus food stamp benefit levels and
(b) whether the State has a higher or lower than average error
rates. The average maximum TANF plus food stamp benefit level
was $694 in 1998 and the average error rate was 10.80.

States with policies which might lead to increases in participa-
tion have higher differences between participants and non-partic-
ipants for our measures of food insecurity. This difference holds for
each of the measures with respect to maximum benefit levels and
for two of the three measures with respect to error rates (and in
the third case, the difference is very small). The differences are
especially large for food insufficiency with respect to maximum
benefit levels where there is a 40.8% difference; food bought not
lasting with respect to error rates (31.1%); and food bought not
lasting with respect to maximum benefit levels (28.2%). Using
the language from the theoretical section above, these results indi-
cate that, in comparison to less generous States, more generous
States induce increases in participation rates among households
at higher risk of food insecurity, i.e., type A households.

Models

We now consider whether the differences by State-level poli-
cies in food insecurity rates between non-participants and partici-
pants in Table 2 is also observed after controlling for other factors.
To do so, we use the model described in Eq. (3). The results for each
of the food insecurity measures are in, respectively, Tables 3–5.
As seen in column (1) of Table 3, food stamp participants, all else equal, have a higher probability of food insufficiency than non-participants.8 (We consider this by setting all of the elements of the vector SP equal to zero.) All else equal, food stamp participants have a 25.9% higher probability of food insufficiency.

In column (2) we display the coefficients of the food stamp participation variable, the administrative error rate, and the interaction between food stamp participation and the error rate. We also display the p-values for the F-test of joint significance of all three variables. The effect of error rates on food insufficiency is insignificant at usual confidence levels. In column (3) we display the coefficients of the food stamp participation variable, the maximum TANF plus food stamp benefit level, and the interaction between food stamp participation and the maximum benefit level. The p-values of the F-test are in the same pattern as above. As seen in the p-value for rows (1), (4), and (5), the combined effect of these three variables implies that the gap in food insufficiency rates between participants and non-participants does hold after controlling for other factors. For households in States with average maximum benefit levels, all else equal, there is a 25.1% difference in the probability of food insufficiency between participants and non-participants. For households in States with benefits $126 higher (one standard deviation), all else equal, there is a 42.7% difference.9

In column (4), error rates and maximum benefit levels are both entered into the model. As seen in the p-values for the F-tests, the combined effect of maximum benefit levels remains statistically significant. Now, for households in States with the average maximum benefit levels, all else equal, there is a 25.1% difference in the probability of food insufficiency between participants and non-participants while in States with benefits $126 higher, the figure is 53.4%.

In Table 4, the effects of State policies on our second food insecurity measure – whether food bought did or did not last – are displayed. The structure of Table 4 is the same as Table 3. As seen in column (1), as with the food insufficiency measure, food stamp participants are more likely to have reported that the food they bought did not last; 30.2% more likely. We now concentrate on the results in column (4). In contrast to the results for the food insufficiency measure where it was insignificant, increases in error rates lead to lower probabilities of having bought food that did not

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8 Along with the food stamp participation variable, the other covariates in this and the subsequent models are total household income; number of children; whether the household head is a high school graduate; homeownership status; whether the household head is a senior citizen; family structure; race/ethnicity of the household head, and the employment and disability status of the household head. The coefficients for these covariates can be found in Appendix Table A1.

9 The percent differences for this and subsequent discussions are defined as $ D = \Phi(a_0 + a_1X + \gamma_{SP} + \eta_{FSP} + \delta_{SP} + \delta_{FSP}) - \Phi(a_0 + a_1X + \gamma_{SP}) / \Phi(a_0 + a_1X + \gamma_{SP})$ where $\Phi$ is the cumulative standard normal distribution. The variables are as defined in Eq. (3) and the coefficients are the relevant ones from Tables 3-5.


Table 4  
The effect of state specific food stamp policies on food insecurity, food not lasting measure.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Food stamp recipient</td>
<td>0.237 (0.069)</td>
<td>0.242 (0.066)</td>
<td>0.256 (0.065)</td>
</tr>
<tr>
<td>(2)</td>
<td>Administrative error rate</td>
<td>-0.008 (0.007)</td>
<td>-0.090 (0.007)</td>
<td>-0.002 (0.012)</td>
</tr>
<tr>
<td>(3)</td>
<td>Administrative error rate + food stamp receipt</td>
<td>0.015 (0.016)</td>
<td>0.015 (0.016)</td>
<td>0.015 (0.016)</td>
</tr>
<tr>
<td>(4)</td>
<td>Maximum TANF + food stamp benefit</td>
<td>0.258 (0.200)</td>
<td>0.258 (0.200)</td>
<td>0.258 (0.200)</td>
</tr>
<tr>
<td>(5)</td>
<td>p-value of F-test for joint significance of variables in rows (1), (2), and (3)</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>p-value of F-test for joint significance of variables in rows (1), (4), and (5)</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>p-value of F-test for joint significance of variables in rows (1) through (5)</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses. The data are from the final month of the eighth wave of the 1996 panel of the Survey of Income and Program Participation (SIPP). The other covariates in the model are total household income, number of children, whether the household head is a high school graduate, homeownership status, whether the household head is a senior citizen, family structure, race-ethnicity of the household head, and the employment and disability status of the household head. The coefficients for these covariates can be found in Appendix Table A1.

Table 5  
The effect of state specific food stamp policies on food insecurity, could not afford to eat balanced meals measure.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Food stamp recipient</td>
<td>0.265 (0.049)</td>
<td>0.266 (0.049)</td>
<td>0.272 (0.052)</td>
</tr>
<tr>
<td>(2)</td>
<td>Administrative error rate</td>
<td>0.002 (0.009)</td>
<td>0.002 (0.009)</td>
<td>0.002 (0.009)</td>
</tr>
<tr>
<td>(3)</td>
<td>Administrative error rate + food stamp receipt</td>
<td>0.003 (0.011)</td>
<td>0.003 (0.011)</td>
<td>0.003 (0.011)</td>
</tr>
<tr>
<td>(4)</td>
<td>Maximum TANF + food stamp benefit</td>
<td>0.390 (0.310)</td>
<td>0.390 (0.310)</td>
<td>0.390 (0.310)</td>
</tr>
<tr>
<td>(5)</td>
<td>p-value of F-test for joint significance of variables in rows (1), (2), and (3)</td>
<td>-0.377 (0.244)</td>
<td>-0.377 (0.244)</td>
<td>-0.377 (0.244)</td>
</tr>
<tr>
<td></td>
<td>p-value of F-test for joint significance of variables in rows (1), (4), and (5)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>p-value of F-test for joint significance of variables in rows (1) through (5)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses. The data are from the final month of the eighth wave of the 1996 panel of the Survey of Income and Program Participation (SIPP). The other covariates in the model are total household income, number of children, whether the household head is a high school graduate, homeownership status, whether the household head is a senior citizen, family structure, race-ethnicity of the household head, and the employment and disability status of the household head. The coefficients for these covariates can be found in Appendix Table A1.

last. For households in States with average error rates, all else equal, there is a 30.6% difference in the probability of having food that did not last between participants and non-participants while in States with 3.3% point higher (one standard deviation) error rates, the figure is 26.7%. This is a reversal from the bivariate case in Table 2, demonstrating the need to control for other factors in reaching conclusions about the influence of State actions to increase the participation rate. So, at least with respect to State actions to increase participation rates via less concern with error rates and under this measure, increased participation rates lead to lower gaps in reports of food being bought that did not last between participants and non-participants although the size of the difference is small. The effect of higher maximum benefit levels is similar under this measure as it is under the food insufficiency measure. For households in States with benefits $126 higher, all else equal, there is a 47.9% difference in the probability of food being bought that did not last between participants and non-participants.

The results for our final measure of food insecurity – not being able to afford balanced meals – are found in Table 5. As seen in column (1), food stamp participants are more likely to not be able to afford to eat balanced meals; 36.6% more likely. Turning to column (4), we find that, as in Table 4, the combined effects of our measures of State generosity are statistically significant. For households in States with average error rates, all else equal, there is a 36.5% difference in the probability of not being able to afford balanced meals between participants and non-participants in States with benefits $126 higher. This difference in the probability is somewhat less than under the other two measures.

### Conclusion

Actions taken by policymakers to increase food assistance participation rates among eligible households can, in theory, lead to a widening of the gap in well-being between participants and non-participants. Thus, the goal of increasing participation can be in tension with some measures of improved wellbeing resulting from the program. In this paper we find some evidence in the United States that measuring the well-being of participants viz. non-participants is a poor measure of program effectiveness when participation rates are changing. In particular, we find that States which attempt to directly and indirectly increase participation in the Food Stamp Program through higher combined TANF plus food stamp benefit levels have higher food insecurity gaps between food stamp participants and eligible non-participants. This holds in both bivariate and multivariate comparisons across all of our measures of food insecurity. The evidence with respect to State participation rates is more muted.

A primary finding of this paper is to illustrate the importance of understanding how changing the composition of program participants affects the selected measure of program effectiveness. In the context of poverty alleviation programs, this is similar to the problem associated with measuring improvements in social well-being by changes in the "income-gap ratio" (the average distance between the income of the poor and the poverty line). A declining income-gap ratio can be readily misportrayed as evidence of improved wellbeing because the poor are on average better off. The well known problem with this is that the measure fails to account for the composition of the poor. For example, if a nonpoor family falls just slightly below the poverty line, there will be an increase in the number of poor people, but a decline in the income-gap ratio.

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10 See Ravallion (2007) for discussion of this measure, as well as other poverty measures.
Conversely, if a poor family with income greater than the income-gap ratio becomes nonpoor (an improvement in social wellbeing), the income-gap ratio increases.

As one specific example of this measurement issue, the US Census Bureau annual report on poverty in 2002 (Proctor and Dalaker, 2003) reports that the average income shortfall for poor, single women is $4593 while the average shortfall for poor, single men is higher at $5082 (Table 6, p. 13). This measure though does not account for the fact that the poverty rate for single women (23%) in 2002 was greater than that for single men (18%).

We conclude with four policy implications emerging from this paper. First, policymakers and program administrators in the US and elsewhere may need to adjust their expectations regarding the outcome of increased participation rates. As seen in this paper, increasing participation rates may cause the well-being of participants, as measured against non-participants, to decline. Policymakers may choose not to pursue increased participation rates for a number of reasons—to contain program costs; to avoid possible negative labor supply consequences; or if they believe that those most in need are already receiving benefits. However, policymakers should not necessarily reject efforts to increase participation because they do not lead to improvements in the well-being of participants versus non-participants.

Our second suggestion is a corollary to our first suggestion. Policymakers and program administrators are interested in the well-being of participants versus non-participants. In these considerations they must be aware that these comparisons of participants and non-participants are not independent of the policies used to encourage or discourage participation. The results of this paper indicate that, in the US, States which pursue policies to discourage participation in the Food Stamp Program may actually have a smaller food insecurity gap between participants and non-participants. While justifications for policies which discourage participation can be made, improvements in the gap in well-being between participants and non-participants should not be one of those arguments.

Our third suggestion is to encourage a slightly different perspective on the part of policymakers and program administrators on the success of a program. Instead of making aggregate comparisons in well-being between participants and non-participants, a more accurate procedure would be to consider well-being with respect to the full population of potential recipients in, say, a State. These considerations could be done with respect to comparisons across States or within States over time. In this way, increases in participation which may widen the gap in well-being between participants would not be analyzed but, rather, increases in participation that would lead to improvements in well-being would be analyzed. As an example, consider a State which increased participation in food stamps by encouraging those most at-risk of food insecurity to enter the program. Some of these new recipients may become food secure due to food stamps while others will continue to be food insecure. An analysis over time would find a drop in aggregate food insecurity (all else equal), which would be a central goal of policymakers and program administrators, despite the potential corresponding increase in the gap in food insecurity between participants and non-participants.

The previous suggestion deals with the case of when institutions are examining aggregate levels of well-being. Our fourth suggestion is when institutions are able to look at individuals rather than aggregate measures to examine the success of their food assistance programs. If access to panel data is available, comparisons of individuals over time can be made. Alternatively, if cross-sectional data is available, appropriate econometric techniques can be applied to ascertain whether a program is meeting its goal of improving the well-being of participants. One limitation to these individual-level analyses is that the data may not be available in sufficiently large sample sizes (especially for smaller geographic locations), the cost to collecting panel (or even cross-sectional) data can be high, and the costs to analyzing these data with appropriate techniques are non-trivial. Thus, States may have to rely on aggregate comparisons of well-being in many instances.

We have considered the ramifications for the food insecurity gap of State actions to influence food stamp participation rates. In particular, we considered the influence of two sets of policies. Future research may wish to pursue how other policies may influence participation rates in the Food Stamp Program and, subsequently, the food insecurity gap. In addition, research on the effects of other programs on the food insecurity gap in the United States may be of interest. Finally, future research may wish to pursue similar questions for other programs in other countries.

Acknowledgement

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Appendix A

See Table A1.

Table A1

<table>
<thead>
<tr>
<th></th>
<th>Food insufficiency</th>
<th>Food not lasting</th>
<th>Not afford to eat balanced meals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total household income</td>
<td>−0.187 (0.095)</td>
<td>0.023 (0.056)</td>
<td>0.034 (0.044)</td>
</tr>
<tr>
<td>Number of children under age 18</td>
<td>0.005 (0.042)</td>
<td>0.054 (0.029)</td>
<td>0.024 (0.023)</td>
</tr>
<tr>
<td>High school graduate</td>
<td>−0.151 (0.052)</td>
<td>−0.178 (0.049)</td>
<td>−0.159 (0.045)</td>
</tr>
<tr>
<td>Homeowner</td>
<td>−0.126 (0.072)</td>
<td>−0.087 (0.063)</td>
<td>−0.064 (0.060)</td>
</tr>
<tr>
<td>Senior citizen</td>
<td>−0.214 (0.114)</td>
<td>−0.315 (0.077)</td>
<td>−0.339 (0.062)</td>
</tr>
<tr>
<td>Married couple without children</td>
<td>−0.173 (0.170)</td>
<td>0.116 (0.154)</td>
<td>0.160 (0.114)</td>
</tr>
<tr>
<td>Single person with children</td>
<td>0.092 (0.102)</td>
<td>0.314 (0.067)</td>
<td>0.141 (0.072)</td>
</tr>
<tr>
<td>Single person without children</td>
<td>−0.068 (0.129)</td>
<td>0.102 (0.113)</td>
<td>0.195 (0.089)</td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>−0.134 (0.178)</td>
<td>−0.146 (0.158)</td>
<td>−0.323 (0.155)</td>
</tr>
<tr>
<td>Non-Hispanic black</td>
<td>−0.025 (0.182)</td>
<td>0.127 (0.152)</td>
<td>−0.071 (0.156)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>−0.085 (0.183)</td>
<td>0.039 (0.144)</td>
<td>0.032 (0.139)</td>
</tr>
<tr>
<td>Employed person in household</td>
<td>0.060 (0.110)</td>
<td>−0.017 (0.070)</td>
<td>−0.046 (0.084)</td>
</tr>
<tr>
<td>Disabled person in household</td>
<td>0.361 (0.071)</td>
<td>0.441 (0.077)</td>
<td>0.416 (0.059)</td>
</tr>
<tr>
<td>Food stamp recipient</td>
<td>0.125 (0.062)</td>
<td>0.257 (0.065)</td>
<td>0.272 (0.052)</td>
</tr>
<tr>
<td>Administrative error rate</td>
<td>0.005 (0.016)</td>
<td>−0.002 (0.012)</td>
<td>0.017 (0.009)</td>
</tr>
<tr>
<td>Administrative error rate + food stamp receipt</td>
<td>−0.019 (0.024)</td>
<td>−0.006 (0.020)</td>
<td>−0.009 (0.016)</td>
</tr>
<tr>
<td>Maximum TANF + food stamp benefit</td>
<td>0.100 (0.373)</td>
<td>−0.214 (0.313)</td>
<td>−0.653 (0.213)</td>
</tr>
<tr>
<td>Maximum TANF + food stamp benefit + food stamp receipt</td>
<td>0.871 (0.666)</td>
<td>0.948 (0.546)</td>
<td>0.525 (0.460)</td>
</tr>
</tbody>
</table>

These results correspond to the models estimated in column (4) of Tables 3–5. The data are from the final month of the eighth wave of the 1996 panel of the Survey of Income and Program Participation (SIPP). The sample is restricted to households eligible for the Food Stamp Program. Standard errors are in parentheses.