An Experiment on Cash and In-Kind Transfers with Application to Food Assistance Programs

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Abstract: The impact of providing food assistance in kind (via food, stamps, or restricted debit cards) vs. cash has long been a subject of debate. Prior efforts to causally identify the effects of the two types of transfers have been hindered by concerns over non-random selection into assistance programs, misreporting of program benefits, and identification of inframarginal households who, theoretically, should treat cash and in-kind transfers identically. This paper reports the results of an economic experiment designed to cleanly test some conceptual issues associated with in-kind vs. cash giving in a lunchroom meal setting. Given current debates about the healthiness of food assistance recipients' diets, we also consider the impacts of placing restrictions on in-kind transfers that either prohibit soda purchases with the transfer or require the transfer be spent on fruits and vegetables. Overall, we find that, as theory predicts, in-kind transfers have the same effect on food expenditures as an unrestricted cash transfer for inframarginal consumers, and for extramarginal consumers, food expenditures are higher for in-kind than cash transfers. Participants also respond to the fruit and vegetable restriction as theory would predict. However, in contrast to the theoretical prediction, the soda restriction reduces soda expenditures for more than half the inframarginal consumers.

Keywords: experiment, food assistance, food stamps, SNAP, Southworth Hypothesis, sugar sweetened beverages

JEL Codes: C91, Q18

Introduction

Despite the rise in popularity of gift cards, recipients tend to value them less than an equivalent amount of cash, as evidenced by the secondary discount market for gifted cards (Offenberg, 2007). More generally, Waldfogel (1993) provocatively argued almost all gifts are likely to generate a deadweight loss relative to an equivalent gift of cash because of a mismatch between what recipients want and givers give. Despite the drawbacks of in-kind transfers relative to cash, they are a primary vehicle for domestic government transfers and international aid (though see Haushofer and Shapiro (2014) for discussion of renewed interest in cash giving in an international development context). A prominent example of domestic in-kind transfers in the United States is the food stamp program, today known as the Supplemental Nutritional Assistance Program (SNAP).

The earliest incarnations of the food stamp program in the United States began in the 1930s. Because a primary purpose of the early program was to reduce government food surpluses accrued as a result of farm policies, the transfers to consumers were in kind, either in food directly or stamps which could be exchanged for food. As World War II was ending, concerns about declining food demand and agricultural prices emerged. Against that backdrop, Southworth (1945) considered several food policies to promote food consumption. He was perhaps the first to formally note that in-kind transfers may have the same effect as giving cash, providing the following example related to a government transfer of beans (1945, p. 47), "If a family would buy two pounds of beans anyway, giving it up to two pounds of beans as a consumption subsidy merely relieves it of the necessity of that much expenditure on its own behalf. In effect, its income is increased by the value of two pounds of beans, and it may spend some or none of this increased income on additional beans." In short, if a household already

plans to buy beans, it doesn't matter whether the household is given beans or an equivalent amount of cash – the final outcome is the same.

The modern day food assistance programs in the U.S. focus more on food security than farm support and they began in the 1960s. Since that time, there have been repeated debates about the merits of in-kind vs. unrestricted cash transfers to lower income households. Southworth's (1945) theoretical results suggest that for inframarginal consumers, those who spend more on food than they receive in benefits, there will be no difference between giving in kind or cash because the recipient can achieve the same consumption bundle either way. As Barrett (2002, p. 2156) put it, "Because the vast majority of participants in any [food assistance program (FAP)] are inframarginal (i.e., purchase or produce food in excess of their transfer receipts), theory suggests income elasticity should be the chief determinant of FAP additionality and that the form of the transfer (cash or kind) should be immaterial." By contrast, extramarginal consumers, who receive more in benefits than they spend on food, will theoretically choose more food than they would otherwise prefer and thus achieve lower utility than had the transfer been in cash. As a result, some economists have made the case for cash transfers. For example, Thurow (1974, p. 195) concluded, "While it is not axiomatically true that cash transfers always dominate restricted transfers, the general economic case for cash transfers is strong enough that the burden of proof should always lie on those who advocate restricted transfers." Nonetheless, in-kind transfers have persisted, perhaps because providing transfers in kind rather than cash is more politically palatable for politicians or for taxpayers who may have paternalistic preferences about how transfers are spent (Currie and Gahvari, 2008).

Partially as a result of these debates, a large empirical literature has arisen that has sought to determine whether, in fact, in-kind transfers are treated the same as cash. Empirical research

on the Southworth hypothesis is mixed, with some evidence in support (Hoynes and Schanzenbach, 2009; Moffitt 1989, Whitmore 2002) and some against (Beatty and Tuttle, 2015; Levedahl, 1995; Senauer and Young 1986; Wilde and Ranney, 1996), with the latter studies suggesting that participants in food assistance programs spend more of the benefit on food than would be predicted by an equivalent cash transfer (see Hoynes and Schanzenbach, 2015, for a recent review).

Despite this sizable body of literature, debate about in-kind vs. cash giving remains, in part because of data limitations and inferential problems. For example, participation in government assistance programs is often under- or mis-reported on surveys, resulting in biased estimates of the effect of SNAP participation on outcome variables of interest (Kreider et al., 2012; Meyer, Mok, and Sullivan, 2015). Determining which households, and individuals within a household, are inframarginal is also a challenge (Breunig and Dasgupta, 2005; Wilde et al., 2009). Additionally, SNAP participation is often endogenously determined with outcomes of interest (Gundersen, Kreider, and Petter, 2011). Even recent studies that have relied on administrative data and quasi-experimental designs utilizing abrupt changes in assistance as an identification strategy don't actually compare cash to in-kind transfers, but rather must infer the counterfactual marginal propensity to spend out of hypothetical cash transfers. There are also attendant concerns about choice of functional form and other specification choices on resulting tests (e.g., Breunig and Dasgupta, 2002; Levedahl, 1995).

This paper seeks to compare the effects of cash vs. in-kind giving in a controlled laboratory (lunchroom) environment where we are able to side-step the problems associated with mis-reporting, endogeneity, and econometric specification, and where there is clear identification

of infra- and extra-marginal consumers.[1] A within-subject experimental design was used where subjects made meal choices in different treatments that varied the presence and type (e.g., cash vs. in-kind) of transfers. Our experimental results support the original Southworth hypothesis. In-kind transfers increase food purchases by an amount statistically indistinguishable from cash transfers for inframarginal consumers (representing 82% of the sample), but for extramarginal consumers (representing the other 18% of the sample), in-kind transfers increase food expenditures eight times more than an equivalent sized transfer of cash.

In addition to the inquiry into in-kind vs. cash transfers, we were motivated by current proposals that seek to make in-kind transfers even more restrictive. Public health concerns have led researchers to study the healthfulness of SNAP participants' diets and various authors have suggested restrictions on SNAP funds for such purchases of unhealthy items such as sugar sweetened beverages (Andreyeva et al. 2012; Barnhill, 2011; Leung et al., 2012; Shenkin and Jacobson, 2010). In fact, the state governments of Maine and New York have sought permission from the U.S. Department of Agriculture to prevent some SNAP participants from purchasing soda with benefits. These policies seek to prohibit transfers from being spent on unhealthy items, but other proposals have sought larger transfers when benefits are spent on healthy items. For example, the Healthy Incentives Pilot (HIP) program, carried out in Hampden County, Massachusetts, explored whether a 30% incentive (i.e., an additional 30 cents is added to total benefits when $1 is spent on fruit and vegetables) would increase purchases of fruit and

[1] Ours is not the first study to utilize mealtime choices as the basis of a laboratory or field experiment. Strelestkaya et al. (2014) utilized mealtime choices to study effects of taxes, subsidies, and advertising. Ellison et al. (2014) studied the effect of different menu labels on diner's choices (see Sinclair et al., 2014 for a review of such studies). Muller et al. (2017) utilized an experiment to study the distributional impacts of unhealthy food taxes and healthy food subsidies, where participants made an entire day's worth of meal choices. Wansink (2006) reviewed a number of studies on effects of various cues and frames on meal choices.

vegetables among SNAP participants. Results suggest the incentive increased consumption of these products by about 20% (Klerman, Bartlett, and Wilde 2014).

In public health discussions, however, the conceptual arguments related to the Southworth hypothesis have received scant attention (see Alston et al., 2009, for an exception). A soda consuming SNAP recipient who spends more money on food and drink than they receive in SNAP benefits can achieve the same consumption bundle regardless of whether SNAP dollars are prohibited from being used on soda by rearranging which items are bought with SNAP dollars and which are bought with other income. Thus, an extension of the Southworth hypothesis to this case would predict little or no effect of a soda restriction as long as the difference in total food spending and SNAP benefits does not exceed spending on sugar-sweetened beverages. To test this hypothesis, our experiment includes a treatment where in-kind transfers are prohibited from being spent on soda; another treatment also requires the in-kind transfer be spent on fruits and vegetables.

The primary objectives of this research are to construct a relatively simple economic environment to test the original Southworth hypothesis and versions of that hypothesis applied to restrictions on purchases of soda and fruits and vegetables. We do not claim that our experimental environment is perfectly analogous to the environment surrounding SNAP. SNAP participants differ from our college student participants in many ways, and various details of SNAP differ from the in-kind transfers in our laboratory environment. Nonetheless, our experiment creates a "clean" environment free of many confounds in observational data that typically makes such inquiries a challenge. Moreover, the Southworth hypothesis is a general hypothesis that should apply not just for SNAP participants but for our laboratory environment as well. As Noussair, Plott, and Riezman (1995) put it when justifying their laboratory

experiment on international trade, "The laboratory economies are very simple and are special cases of the broad class of (often complex) economies to which the general theories are supposed to be of relevance. If a general theory does not work successfully to explain behavior in the simple and special cases of the laboratory, then it is not general."

The next section describes the experiment created to test the effects of soft drink and fruit/vegetable restrictions. Following sections then discuss the data and results. The last section concludes.

Methods and Procedures

A within-subject framed field experiment was conducted in which individuals' choices were observed in five treatments, one of which was randomly selected as binding. Respondents made non-hypothetical (real food, real-money) choices from a lunch menu for items to be consumed on site. Menu items were displayed in the front of the room; across all five treatments, the prices and menu offerings were held constant. Figure 1 shows an example of one of the menus, which includes sections for choosing an entrée, side, and beverage.

The minimum requisite sample size was determined by power calculation. Given an expected standard deviation of the difference in expenditures between two treatments of 0.5, 88 subjects would be required to identify a critical effect size of 0.15 (i.e., that the difference in expenditure between two treatments is at least $0.15) given an alpha level of 0.05 and power of 80%. Participants were recruited from the student population of Oklahoma State University by sending an email solicitation to a random selection of 5,000 undergraduate and graduate students via the University's mass email service for human subjects' research. Students were recruited by offering a $10 show-up fee and by indicating that lunch options would be available (one hour

sessions started at 11 a.m., 12 p.m. and 1 p.m.). We ultimately recruited 120 individuals who participated in 12 different sessions.

In our experiments, subjects could use their participation fee (or more of their own money if they so desired) to purchase menu items, but we did *not* require that the entire compensation be spent for the reasons discussed in Fischer (2014). In addition to the $10 cash endowment given to respondents, various coupons or certificates were given that varied across treatments so as to accomplish the key objectives of the study.

Table 1 lists the five different treatments used in the experiment. Because of the need to identify inframarginal consumers, we utilized a within-subject design where each person participated in each treatment. The order in which people made menu choices associated with each treatment was randomized across experiment sessions to prevent an order effect from driving the findings. At the onset, participants were told that they would make choices from five different menus and they were free to make the same or different choices on each menu, and that one and only one of the menus (or treatments) would be randomly selected as binding. For the randomly selected treatment, subjects were given the participation fee and certificate associated with the respective treatment. Then subjects paid the experimenters for their purchases and were given the items they bought. Within a given session, instructions were read for each treatment/menu and subjects made their choices for that menu. Participants were not allowed to move to the next treatment/menu until the instructions were read for the next menu. Although all participants within a session followed the same order, each participant had a unique draw to determine which menu was binding so as to emphasize that all menus/treatments should be completed carefully as they all had an equally likely chance of being binding.

Treatment 1 (T1) serves as the control, and participants made menu choices given that they only had the $10 participation fee. In treatment 2 (T2) participants were given $12 cash instead of just $10 as in treatment 1. The change in choices from T1 to T2 is used to indicate the income effect that arises from a pure $2 cash transfer. Assuming food in our experiment is a normal good, we hypothesize that there will be an increase in food expenditure with $12 versus $10 of "income", but that expenditures will increase less than $2 as suggested by Engel's Law (i.e., we hypothesize the income elasticity of demand for food in our experiment is between 0 and 1). That is, we expect that participants will save a portion of the additional $2 or spend it on other goods outside the experiment.

In treatment 3 (T3), instead of cash, subjects were given a $2 coupon that could be used on any menu item. This is an in-kind transfer because it is specified for a certain use analogous to a SNAP transfer. If participants purchased a lunch item, the coupon reduced the total meal cost and increased the change due back in the end. However, if participants chose not to use the coupon, they had less money at the end as compared to T2 (or they had the same $10 participation fee as in T1 if not purchasing items in either treatment).

The original Southworth hypothesis can be tested by comparing how food expenditures change as a subject moves from T1 to T2 (a cash transfer of $2) to how expenditures change as the subject moves from T1 to T3 (an in-kind coupon of $2). When comparing the change in expenditures from a cash transfer, $E_2 - E_1$, to that from an in-kind transfer, $E_3 - E_1$, the level of spending in the control treatment, E_1, nets out and we are left with the comparison of E_3 to E_2.

Whether E_3 is expected to exceed E_2 depends on whether a respondent is defined as inframarginal or extramarginal. As show in table 3, we hypothesize (H1) E_3 will equal E_2 for inframarginal consumers, and we hypothesize (H2) E_3 will exceed E_2 for extramarginal

consumers. We define an inframarginal consumer as one who, when given a constrained in-kind transfer, can achieve the same consumption bundle as they did in a baseline scenario without the constraint at no additional cost. In the case of H1 and H2, an inframarginal consumer is one who has expenditures of at least $2 in T2.

Treatment 4 (T4) considers the effect of restricting the in-kind transfer in a way that prohibits the use of the coupon for soda purchases. In particular, T4 offers a $2 coupon that can be used on any item on the menu except soft drinks. Comparing expenditures on soft drinks in T3 to T4 provides insight into whether the Southworth-like effects limit the effectiveness of a soda restriction. As posited in H3 (see table 3), spending on soda is expected to be identical in T3 and T4 for non-soda consumers (i.e., those who had $0 expenditures on sodas in T3). These are inframarginal consumers because they can achieve the same consumption bundle in T3 and T4 at the same cost because their T3 decisions were already in compliance with the coupon's restriction. There is an additional type of inframarginal consumers for whom we hypothesize (H4) soda expenditures will be equal in T3 and T4 – those who have expenditures of more than $2, including a soda purchase, in T3. Despite the soda restriction, consumers who meet these criteria can re-allocate which items are bought with the coupon and which are bough with cash to achieve the same consumption bundle in T4 as in T3 with no extra cost.

To illustrate, imagine a hypothetical subject who bought a sandwich for $3, a bag of chips for $1, and a soda for $1 in T3 for a total of $5 ($3 of which is paid by cash and $2 out of the coupon). In T4, this same subject is not allowed to use the coupon on soda. However, they can use the $2 coupon to pay for a portion of the sandwich and pay for the remaining sandwich, chips, and soda out of cash for a total cost, again, of $5 ($3 of which is paid by cash and $2 out of coupon). Despite the restriction on the in-kind transfer, the cost is the same as are the items

purchased. By contrast, extramarginal consumers, who in this context have expenditures of $2 or less but have positive soda expenditures, are hypothesized (H5) to have lower soda expenditures in T4 than T3. These consumers cannot achieve the same consumption bundle in T4 as in T3 without utilizing more cash.

Finally, T5 restricts the use of the $2 coupon to fruits or vegetables. Respondents with $0 expenditures on fruit and vegetables in T3 are extramarginal in this context; they are expected (H6) to increase expenditures on fruit and vegetables in T5 than in T3. By contrast, inframarginal consumers, who in this context spent at least $2 on fruits and vegetables in T3, are expected (H7) to have the same fruit and vegetable expenditures in T5 as in T4 because they can achieve the same consumption bundle for the same cost in both treatments. Hypothesis 8 (H8) posits that expenditures on fruit and vegetables will increase for those consumers in T5 who had less than $2 in spending on fruit and vegetables in T3.

Results

Table 2 reports summary statistics for each treatment. While we did not necessarily have specific hypotheses about the effects of different treatments on total expenditures for the entire sample (as opposed to our specific hypotheses regarding infra- and extra-marginal participants), the bottom of the table reports p-values associated with tests for the equivalence of means across treatments. The overall test for equality of means across all five treatments is firmly rejected for total, soft drink, and fruit and vegetable expenditures according to a within-subject F-test. Given this rejection, we then test for equality of means for each two-way comparison using a within-subject t-test, where p-values are corrected for multiple comparisons using the Tukey-Kramer adjustment.

Total expenditures increased in all treatments relative to the control, T1. Moving from T1 to T2, expenditures increased by $0.333 (from $4.017 to $4.350). This implies the food in our experiment was a normal good, and that the marginal propensity to buy experimental food out of extra cash was $0.166 ($0.333/$2). Likewise, comparing total expenditure in T3 relative to T1 provides an estimate of the marginal propensity to buy experimental food out of the in-kind (coupon) transfer for the entire sample, which amounts to $0.375 ((4.767-4.017)/2). Despite the many differences between our experimental set up and the "real world," these estimated marginal propensities to consume are quite similar to that obtained in previous studies. For example, in their review of prior literature, Beatty and Tuttle (2015) indicate most previous estimates of the marginal propensity of food spending with respect to SNAP are between 0.20 and 0.40. Similar logic suggests that the marginal propensity to spend on soda is $0.067 out of cash and $0.075 out of the in-kind transfer (a difference that is not statistically different as indicated by the test for equivalence of soda spending in T2 and T3). The marginal propensity to spend on fruit and vegetables is $0.142 out of cash and $0.216 out of the in-kind transfer (a difference that is not statistically different as indicated by the test for equivalence of fruit and vegetable spending in T2 and T3).

T4 with the soft drink restriction invoked significantly less soda expenditure than in T2 or T3. T5 with the fruit and vegetable restriction increased spending on fruit and vegetables compared to T2 or T3. Interestingly, soft drink expenditure were also reduced by the fruit and vegetable coupon; moving from T3 to T5 reduced average soda expenditures from $0.383 to $0.282 (p-value = 0.051) for the entire sample.

Many of the tests reported in table 2 simply reflect income effects because they do not separate inframarginal and extramarginal consumers. The key hypothesis tests of this paper are

reported in table 3. H1 and H2 test the original Southworth hypothesis related to cash vs. in-kind transfers. As posited by Southworth (1945), total expenditures are statistically indistinguishable for cash vs. in-kind giving for the 81.7% (98/120) of respondents defined as inframarginal for this hypothesis. By contrast, for the remaining 18.3% (22/120) who are extramarginal respondents, total spending increased from an average of $0.227 to $1.955, as hypothesized.

H3, H4, and H5 deal with the application of the Southworth hypothesis to the soda restriction. As conjectured by H3, for the 65% of participants (78/120) who did not consume soda in T3, soda expenditures were unaffected soda restriction. H4 posited that consumers who had expenditures of more than $2 (including a soda purchase) in T3 would likewise be unaffected by the soda restriction as they moved to T4. However, this hypothesis was rejected ($p<0.001$). Soda expenditures fell from an average of $1.000 to $0.588, contrary to the theoretical prediction. We find that 58.8% (20/34) of the respondents to which the hypothesis applied behaved as the theory predicted (they did not change soda expenditures); however, the remaining 41.1% (14/34) reduced soda expenditures when moving from T3 to T4.

There were 8 respondents identified as extramarginal in regards to the impact of the soda restriction. As H5 posited, these consumers significantly reduced soda consumption from an average of $1.000 in T3 to only $0.125 in T4.

The final three hypotheses shown in table 3 relate to the effect of restricting the in-kind transfer to only fruit and vegetable expenditures. As indicated in the row related to H6, 60 respondents had $0 expenditures on fruit and vegetables in T3. Because these individuals spent less on fruit and vegetables than the amount of the constrained fruit and vegetable coupon transfer, they are extramarginal in this context. As hypothesized (H6), these consumers significantly increased fruit and vegetable consumption, by over a dollar. The other class of

extramarginal consumers represents those who bought some fruit and vegetables in T3, but spent less than the $2 fruit and vegetable transfer. As hypothesized (H8), they too significantly increased their fruit and vegetable expenditures from $1.000 to $1.657. The 25 respondents who were inframarginal in this context already consumed more than $2 in fruit and vegetables, and their expenditures were hypothesized (H7) to remain unchanged when moving from T3 to T5, and that is what we found (p-values of 0.057 and 0.125 from the parametric and non-parametric tests, respectively).

Conclusions

This experiment reported in this article was intended test versions of the Southworth hypothesis in a controlled experimental setting. While all in-kind transfers increased spending on the food in our experiment more than an equivalent amount of cash, the result significantly differed across respondents according to whether they were classified as infra- or extra-marginal in specific instances.

The original Southworth hypothesis emerged unscathed. Giving extra cash increased spending in our experiment by an amount stastistically indistingusihable from an in-kind transfer of an equivalent monetary amount for consumers who were defined as inframarginal (who spent more on experiment food than they received in the in-kind transfer). By contrast, extramarginal consumers increased food expenditures by a larger amount when given an in-kind transfer as compared to cash, as theory predicted.

Likewise, restricting the in-kind transfer to only purchases of fruits and vegetables had effects in accordance with that predicted by theory. Individuals already spending more on fruits and vegetables than the amount of the restricted transfer spent the same amount on fruits and

vegetables as they did with the less restrictive in-kind transfer that was not tied to a specific type of food. The fruit and vegetable restriction had no significant effect on the spending of these inframarginal consumers. Extramarginal consumers, however, increased their spending on fruits and vegetables when the fruit and vegetable restriction was added, as theory predicted.

Motivated by various public policy proposals to restrict SNAP spending to only "healthy" goods, we tested the effect of disallowing soda purchases with the in-kind transfer. The majority of our respondents (78 our of 120) did not purchase soda before the soda restriction and, as expected, the restriction did not alter their soda expenditures. The next biggest class of respondent (34 out of 120) purchased soda and spend more than $2 on food items; these individuals can re-arrange which items are purchased with the in-kind transfer and which are bought with cash and attain the same consumption bundle with no additional cost irrespective of the soda restriction. Advocates of such "health restrictions" often fail to ackonwledge this possibility for extramarginal consumers. Despite this theoretical prediction, however, we found that average soda spending fell from $1.000 to $0.588 for this group of respondents (an effect driven by the decision of 14 out of 34 people to reduce soda purchases).

At this point, it is a bit unclear why some participants did not respond in accordance with theory for this particular hypothesis (especially in light of the fact that all the other main study hypotheses were supported). Previous research has identified heterogeneity in cognitive abilities and in consistency with economic theories (Choi et al., 2014; Frederick, 2005), and future research might seek to explore the extent to which cogntive ability plays a role in the ability of extramarginal consumers to recognze that they can achieve the same consumption bundle despite the soda restriction. In addition, our experiment was a one-shot game. In a field environment, respondents can talk to friends, gain experience, and alter behavior over time as they learn that

the same consumption bundle can be achieved despite the restriction. This learing conjecture could be tested in an experimental setting by conducting repeated trials with feedback. It could also be tested using field data (after a policy was passed) by investigating the change in soda purchases for inframarginal buyers over time. Another hypothesis that could explain the anomolous result is that the soda restriction could have non- pecuinary effects, providing information about realtive healthfulness of items or signaling what people "should" be doing. For example, Kaplan, Taylor, and Villas-Boas (2016) found that, following a widely publisized vote to tax sodas, Berkeley California residents reduced soda consumption *before* the tax was even put into place, illustrating significant information effects surrounding soda consumption policies. Future research could further explore this signaling effect by including a treatment that restricts purchases of food items not generally percieved as unhealthy or by including survey questions about percieved healhfulnes of an item before and after a restriction.

One of the concerns about further restricting how SNAP participations can spend their transfer is that it could hinder participation rates. Our experiment allows us to measure something like participation rates by looking at how many people use their coupon and by investigating the portion of the coupon used in different treatments. Recall in treatments T3-T5 each person was given a $2 in-kind transfer. In T3, T4, and T5 (which use coupons), 91.7%, 91.3%, and 73.4% of the $2 coupons were used on average. We reject the null that the mean expenditures out of the coupon are identical across the three treatments at the $p<0.001$ level. In particular, in T5 with the fruit and vegetable restriction, coupon expenditures are significantly less than in T3 and T4. Moreover the percentage of respondents who used their $2 at all (in any amount) was 92.5%, 91.7%, and 80.0% in T3, T4, and T5. By this metric, participation rates drop off significantly from T3 to T5 ($p<0.001$ from McNemar's Test). Thus, even in our

experimental context, we find that further restrictions on in-kind transfers can affect "participation."

Our experiment differs in many ways from the SNAP program, and caution should be taken in generalizing to the effects of policies on retail behavior. However, our results show that even in our simiple lunchroom laboratory environment without learning or repeated sessions, extramarginal consumers typically get around the contraints imposed by giving in kind rather than in cash.

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Table 1. Treatments Utilized in Experiment

Treatment	Participation fee	Description/Manipulation
T1	$10	None (control)
T2	$10	$2 added to show-up fee (unrestricted transfer)
T3	$10	$2 certificate only good for menu items (in-kind transfer)
T4	$10	$2 certificate only good for menu items; certificate cannot be used to pay for soda (restricted in-kind transfer)
T5	$10	$2 certificate only good for fruits/vegetables on menu (restricted in-kind transfer)

Table 2. Summary Statistics By Treatment

Treatment	Mean Total Expenditure ($/person)	Mean Soft Drink Expenditures ($/person)	Mean Fruit/Veg Expenditures ($/person)
T1 ($10 cash)	4.017	0.308	0.525
	(2.563)[a]	(0.464)	(0.721)
T2 ($12 cash)	4.350	0.375	0.667
	(2.737)	(0.520)	(0.853)
T3 ($10 cash+ $2 food coupon)	4.767	0.383	0.741
	(2.589)	(0.553)	(0.884)
T4 ($10 cash+ $2 food coupon w/ soda restriction)	4.725	0.192	0.683
	(2.446)	(0.395)	(0.799)
T5 ($10 cash+ $2 fruit/veg coupon)	4.692	0.283	1.441
	(2.536)	(0.471)	(0.828)
Tests for Equivalent Means (p-values)[b]			
T1=T2=T3=T4=T5	<0.001	<0.001	<0.001
T1=T2	0.045	0.363	0.211
T1=T3	<0.001	0.245	0.011
T1=T4	<0.001	0.013	0.124
T1=T5	<0.001	0.960	<0.001
T2=T3	0.005	0.999	0.794
T2=T4	0.016	<0.001	0.999
T2=T5	0.037	0.092	<0.001
T3=T4	0.997	<0.001	0.906
T3=T5	0.971	0.051	<0.001
T4=T5	0.999	0.092	<0.001

Note: N=120 in each treatment

[a]Numbers in parentheses are standard deviations

[b]p-values from within-subject F-test (for multiple comparisons) and t-tests (for two-way comparisons); the reported p-values from the two-way comparisons are corrected for multiple comparisons using the Tukey-Kramer adjustment.

Table 3. Tests of Eight Conjectures Related to Versions of the Southworth Hypothesis

Hypotheses	Definitions of infra- and extra-marginal consumers	# of Respondents for which Hypothesis Applies	Mean Expenditure ($/person)	P-values from test of equivalent means	Outcome
Do in-kind transfers have the same effect on food purchases as cash transfers?					
H1: Expenditures are equal in T2 and T3 for inframarginal consumers	Inframarginal consumers have expenditures of at least $2 in T2	98	T2: 5.286 T3: 5.388	0.320[a] {0.483}[b]	H1 supported
H2: Expenditures are higher in T3 than T2 for extramarginal consumers	Extramarginal consumers have expenditures less than $2 in T2	22	T2: 0.227 T3: 1.955	<0.001 {<0.001}	H2 supported
Do soda restrictions on in-kind transfers reduce soda expenditures?					
H3: Expenditures on soda are equal in T3 and T4 for non-soda consumers	Non-soda consumers have expenditures of $0 on soda in T3	78	T3: 0.000 T4: 0.026	0.189 {0.500}	H3 supported
H4: Expenditures on soda are equal in T3 and T4 for inframarginal consumers	Inframarginal consumers have expenditures of more than $2, including a soda purchase, in T3	34	T3: 1.000 T4: 0.580	<0.001 {<0.001}	H4 rejected
H5: Expenditures on soda are lower in T4 than T3 for extramarginal consumers	Extramarginal consumers have expenditures $2 or less but positive soda expenditures in T3	8	T3: 1.000 T4: 0.125	<0.001 {<0.016}	H5 supported
Does restricting in-kind transfers to only fruit/veg purchases increase fruit/veg purchases?					
H6: Expenditures on fruit/veg are greater in T5 than T3 for non-fruit/veg consumers	Non-fruit/veg consumers have expenditures of $0 on fruit/veg in T3	60	T3: 0.000 T5: 1.100	<0.001 {<0.001}	H6 supported
H7: Expenditures on fruit/veg are equal in T5 and T3 for inframarginal consumers	Inframarginal consumers have expenditures of at least $2 on fruit/veg in T3	25	T3: 2.200 T5: 2.000	0.057 {0.125}	H7 supported
H8: Expenditures on fruit/veg are greater in T5 than T3 for extramarginal consumers	Extramarginal consumers have expenditures less than $2 on fruit/veg in T3	35	T3: 1.000 T5: 1.657	<0.001 {<0.001}	H8 supported

[a]p-value from paired t-test
[b]p-value from signed rank test

Instructions

In this choice, you have:

$10 + $2 coupon that can purchase anything on menu except diet or regular soda (items have a star by the number)

Menu 4

	Qty	Entrée	Price
*1	_____	***Sandwich*** *Ham and Cheese on a French loaf*	$3.00
*2	_____	***Chef Salad*** *Lettuce, carrots, cheese, tomatoes, chicken and turkey*	$3.00
*3	_____	***Pizza*** *Two slices of one-topping pizza - pepperoni_____ or cheese _____*	$3.00
*4	_____	***Peanut Butter and Jelly Sandwich*** *Standard PB&J*	$2.00
		Sides	
*5	_____	***Bag of Chips***	$1.00
*6	_____	***Fruit Cup***	$1.00
*7	_____	***Carrots and Ranch Dressing***	$1.00
*8	_____	***Whole Fruit (Banana, Apple or Orange)***	$1.00
*9	_____	***Cookie***	$1.00
		Beverages	
10	_____	***Regular Soda*** *Coke, Dr. Pepper, Pepsi, Sprite*	$1.00
11	_____	***Diet Soda*** *Diet Coke, Diet Dr. Pepper, Diet Pepsi, Diet Sprite*	$1.00
*12	_____	***Bottled Water***	$1.00
*13	_____	***Fruit Juice***	$1.00

Number of Items Chosen _____

Total Participation Fee $10

Coupon Applied ☐ Yes ---To which item(s) #? _____

☐ No

Cost of Food Items $_____

Total Cost (Cost - Coupon Value Used) $_____

Change Due ($10 - Total Cost) $_____

Figure 1. Example of Menu Choices with Treatment 4 Instructions